

EVERGREEN WIND POWER III, LLC
(Rollins Wind Project L-24402-24-A-N, L-24402-TH-B-N, L-24402-IW-C-N)

Excerpts from the Department's File

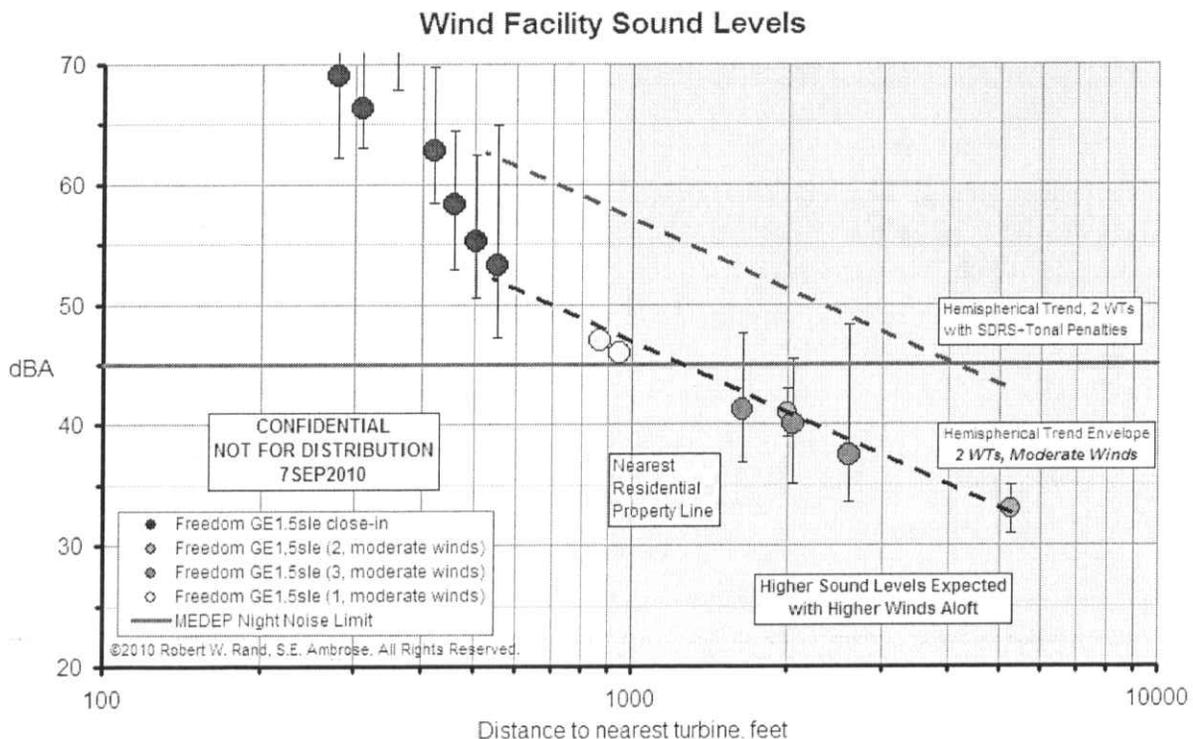
MEMO

Date: September 7, 2010
 To: Jim Cassida, Maine DEP
 From: Rob Rand and Steve Ambrose
 Reference: Independent Investigations- GE Model 1.5sle Wind Turbines
 Subject: Freedom Wind Facility

Our wind turbine noise assessments stem from reading community complaints about wind turbine noise being louder than expected or predicted. Why is this? Using our 30 years of experience working together in acoustics, we determined that the most appropriate approach to measure wind turbine sound was the way people hear. This means evaluating noise levels based on the speed of the human ear to process variations in sound levels, i.e., 1/8 second, same as the fast meter response. When we applied this methodology we had eye-opening results that correlate very well with the community response we read about.

This memo presents data from independent investigations at the Freedom Wind Turbine Facility in 2010. These wind turbines are the same as at Vinalhaven and can used to show the sound level changes versus increase in distance. Measured noise levels were also assessed for the presence of short-duration repetitive sound (SDRS) and tonal sound.

One to three turbines were operating during the Freedom measurements. Type 1 precision instrumentation was used and is listed in Table 1. During the measurements, the wind turbines were the dominant noise source with no other natural or man-made noise sources observed. All measurements were acquired with direct, attended acoustic observations and the data acquired had no wind noise, leaf rustle or wind in tree limbs.

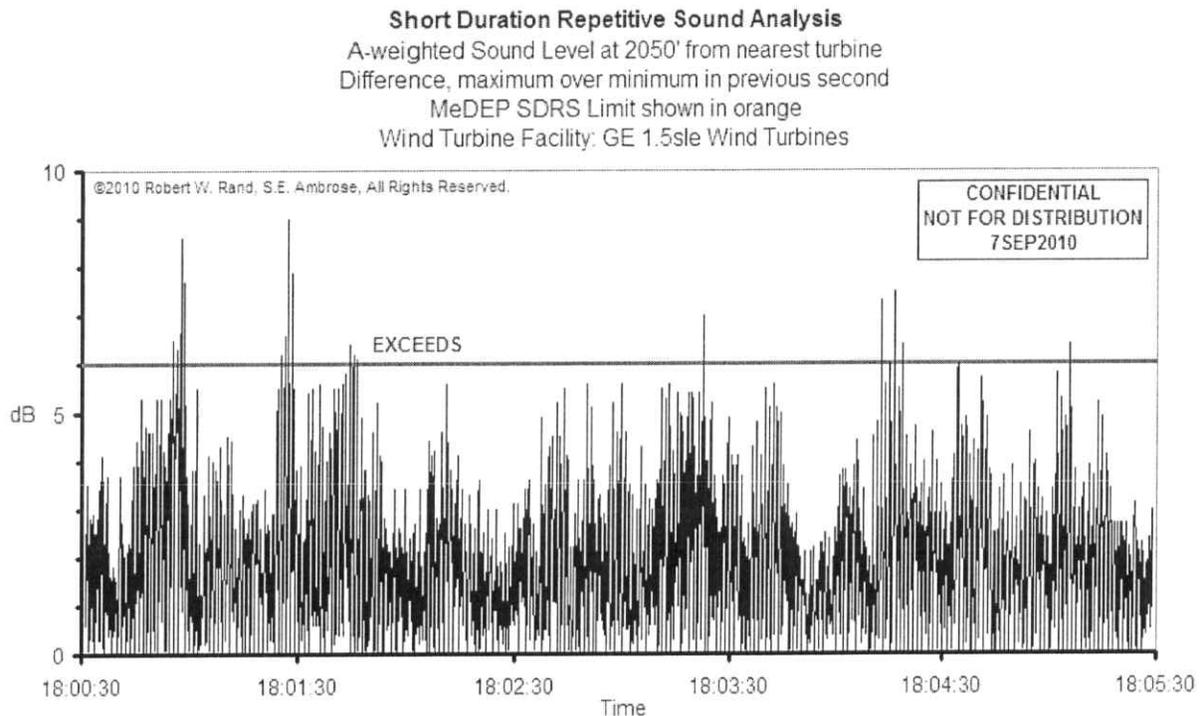


Sound level versus distance was based on distance from the nearest turbine and is shown above. The measurements ranged from positions close-in to far away. The sound level decrease is consistent with hemispherical divergence (6 dB per doubling of distance) beyond about 300 to 400 feet away (about one dimension length for blade sweep diameter).

We expect the far-field emissions and sound character would be similar or about the same at both Freedom and Vinalhaven. The chart above shows the Freedom wind turbine sound levels measured during *moderate* wind speeds aloft with a trend line for the two-turbine operating condition. For reference, the approximate distance to the nearest property line for Vinalhaven is superimposed with the data, along with the MEDEP night noise limit, and a second trend line depicts the level for combined penalties for SDRS (+5 dB) and Tonal Sound (+5).

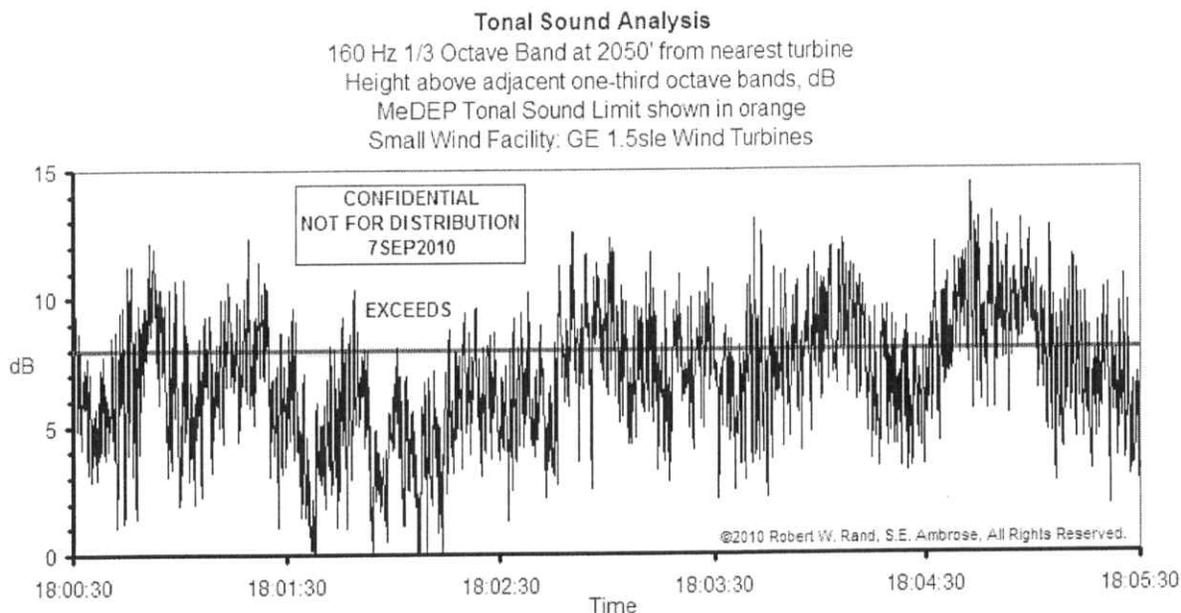
Short Duration Repetitive Sound (SDRS)

SDRS was evaluated using 0.1 second sampling (10x the typical blade pass amplitude modulation) as a time history with the DEP's SDRS limit as shown below. SDRS is clearly evident with multiple exceedances of the DEP limit in this 5-minute analysis.



Tonal Sound

Tonal Sound was determined to be clearly present in the 160 Hertz 1/3 octave band at 2050 feet. Analysis of the Fast response noise measurements in the 160 Hz band are shown below. The MEDEP defines tonal sound limits through an algorithm detailed in Chapter 375.10. MEDEP allows a maximum of 8 dB rise in the 160 Hertz octave band compared to the average of its neighbor bands (125 and 200 Hertz). Tonal Sound is clearly evident with numerous exceedances of the DEP threshold in this 5-minute analysis.



Even GE's published sound power level data show about a 4 dB rise in the 160 Hz band over adjacent bands. If the GE measurements were averaged during testing, the variation would be reduced, therefore hiding the true extent of variations. The actual Fast-response measurement data shows response variations up to 14 dB over adjacent bands. The more turbulent wind conditions in the tree-covered topography of Maine may increase aerodynamic modulations during blade sweeps compared with GE's test conditions.

Discussion

We expect the sound emissions and sound character from the GE wind turbines to be similar at Vinalhaven and Freedom. The Freedom surveys show that noise levels from the wind turbines can exceed the MEDEP protected location nighttime noise limits with only one turbine operating during moderate wind speeds. SDRS and Tonal Sound is also present and would warrant the addition of a 10 dB penalty to the predicted or measured Leq noise level to determine compliance.

Using the approximate distance of 900 feet to the nearest residential property line at Vinalhaven, the data indicate the Vinalhaven site would exceed the DEP regulations by a significant margin. *With winds aloft stronger than moderate wind speeds and with three operating wind turbines the sound levels are expected to be higher than those measured, with larger exceedances of the MeDEP regulations.*


Robert W. Rand, INCE

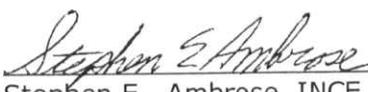

Stephen E. Ambrose, INCE (Brd. Cert.)

Figure 1. Freedom Measurement Locations.



Table 1. Instrumentation.

<u>Instrument</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial#</u>
Type 1 Sound Level Meter	Larson Davis	824	0914
Preamplifier	Larson Davis	902	0235
Microphone	GRAS	40AN	27538
Acoustic Calibrator	Bruel & Kjaer	4230	1103065
Digital Audio Recorder	M-Audio	Microtrack II	138AOC8107245
Analysis	PHS	SpectraPlus Pro v.5	5879

Instruments were calibrated end-to-end at the beginning of the surveys, and checked within calibration tolerance after the survey periods. Calibration is traceable to NIST.

Blais Becky

From: Warren Brown [Warren_Brown@umit.maine.edu]
Sent: Wednesday, September 08, 2010 11:04 AM
To: Blais Becky
Subject: July 17-18, 2010 Complaint Review

Attachments: EnRad Estimated Sound Levels for July 17-18, 2010 at ML-A.pdf; REVIEW data submission July 17-18, 2010 for FIW.pdf



EnRad Estimated
Sound Levels f...



REVIEW data
submission July 17..

Becky,

I have reviewed the July 17 & 18 FIWN noise complaint measured in Arthur Farnham's dooryard as submitted by Rick James in "2010-7-17 2233 MLC-RJ". I have reviewed FIW data (meteorological, sound, wav. files and turbine output) for compliance proxy point ML-C on the Webster property and predictions for compliance point ML-A on the Farnham property.

10 m average wind speeds ranged from 3.5 to 5.6 mph with maximums 5.9 to 10.2 mph, which are within the compliance measurement criteria. The Farnham property ML-A location was crosswind from the turbine array center during the entire complaint period. The Webster property ML-C location was downwind for the first 30 minutes and then crosswind for the remainder of the complaint period.

Wind turbines were operating in NRO mode which limits sound power output, as follows T1 - 102 dBA; T2 - 100 dBA; T3 - 102 dBA.

I do not find significant wind interference with sound data during the complaint period based on the L10 - L90 values or time stamped audio files. L10 - L90 values were predominantly 3 dBA (5-10 minute intervals) and 4 dBA (3-10 minute intervals). The wind sound correlation employed by Accentech to estimate wind sound was based on measurements recorded at the Farnham property during ambient measurements (fall 2008) where the anemometer was at 14ft 2in elevation above the ground and partially obstructed by the residence and a nearby tree. The ML-C anemometer is 10 m above grade in an unobstructed location (Webster property). There is insufficient information to calculate a useful wind speed/noise level correlation at ML-C based on results derived in the fall of 2008.

SDRS and tonal penalty calculations were not included in the FIW data analysis. SDRS during the complaint period occurred infrequently and applied penalties did not result in a significant change in findings. WTG 6.3kHz tonal sounds occurred during 2300-2350hrs. (5-10 minute intervals), but applied penalties did not result in a significant change in findings.

Conclusions/Recommendations.

I find no 10 m meteorological, audible or L10-L90 basis for applying a wind speed/noise level adjustment to ML-C measurements or ML-A calculated sound levels.

I have attached measured sound levels at the Webster property (ML-C) and EnRad estimated sound levels at the property line of the Farnham property ML-A, which indicates that FIW exceeded the nighttime noise limit of 45 dBA for 7-10 minute intervals during the complaint period.

The July 17 & 18 complaint conditions were very similar with regards to surface wind speeds and WTG output or 80m wind speeds (May data) as FIWN complaints previously submitted for May 1, 4, 5, & 6 all of which reported sound levels between 46-48 dBA. Although these complaints were prior to the "FIW compliance protocol" in timing, nonetheless there exists a significant body of consistent meteorological and

sound data indicating sound levels greater than applicable limits.

Substantial changes are recommended for FIW nighttime operations, limiting WTG sound levels at ML-A to 45 dBA.

A review of the Compliance-Complaint data submission requirements for Fox Islands Wind, LLC is attached. Consultants for FIW and FIWN please note items requiring your attention and submission.

Warren

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