


Do Wind Farms Produce Noise
 Chuck Ebbing

Town Board
 Allegany, NY
 2-2-2009

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Chuck Ebbing

- Retired (1999) from Carrier
- 47 years Experience in Acoustical Engineering
- BSEE Purdue MSEE SUNY
- Taught Acoustics and Noise Control at RPI, SU, Carrier
- Camp on Grindstone (1960)
- House in LaFargeville (2005)
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Background

- I'd like to **share with you my experiences** on wind farm noise and vibration issues.
- I have interacted with other **Acoustical Engineers**, the **Community**, and **Local Governments** and the **Wind Industry**.
- I'm old enough to have experienced that **Our Citizens**, when in **groups**, can operate over a very, very wide range extending from **Collective Wisdom** to **Collective Stupidity**.
- I think all of us have experienced our share of the **Thrill of Victory** and the **Agony of Defeat**.
- So with all our **current national and global problems** I ask you to:
 - **Be Happy**
 - **Not Worry**
 - **Be Informed**
 - **Ask Questions**

Background

- I am giving you a talk explaining what I would want to know if I were one of you listening today.
- I am trying to make this subject more understandable to the board in order to make better sense as to the information you should be looking for in the DEIS.

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Background

- I live in Northern New York near the Thousand Islands on the St. Lawrence River. I am a Facilitator for the **Wind Committee in Orleans, NY** and as a **retired Acoustical Engineer** I serve as an Acoustical Resource for the Committee.
- The Orleans Terrain is a little flatter and is a little less populated than the Allegheny Residential areas but otherwise it faces the same questions of **how to best protect the Health, Safety and Welfare of its Citizens from the potential risks and problems of a Wind Farm** located in Orleans County.

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Background

- Because of the **sparse population, very low traffic density**, distance from industry, the **ambient noise levels** in the rural areas of the North Country **typically are in the range of 20 to 30dBA**, closer to 20 dBA at night and closer to 30 during the day.
- The **residual ambient background** results from **both near and far noise sources** and is the base noise level that remains after the noise from manmade sources such as traffic, aircraft noise barn, farm machinery noise, and local domesticated animal noise is removed.
- The 90-percentile-exceeded sound level **L90** often is taken as a measure of the **residual noise level, little influenced by nearby discreet events**.

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Rural Areas are Very Quiet

- A good practical indicator that can be used to judge your Acoustic Ambient was given to me by Rick James, E-Cooustic Solutions, Okemos, MI 48805, Email: rickjames@e-cooustic.com
- *"If, on a clear windless morning or evening, you can hear distinct traffic or other sounds from distances of a mile or more from your location the long-term background sound level is most likely 25 dBA, or lower."*

I don't know the answers to all your questions

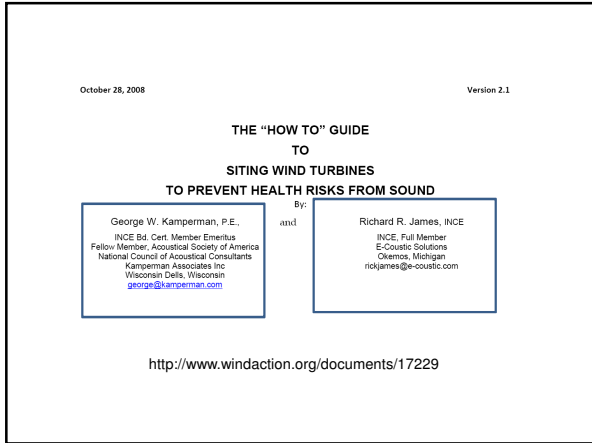
- But I do know a lot of the questions, and I can share what I learned in dealing with a **Proposed Wind Farm** in areas adjacent to our winter shelter in Lafargeville, NY and at our camp on Grindstone Island Clayton, NY.
- These are some of the questions I have had in reading many draft environmental impact Statement concerning noise and vibration.

**Key Questions
Key Issues**

- What are the **dBA ranges of ambient noise levels** in the **affected areas** of your community now and what will they be after wind turbines?
- What are the **dB(C) ranges of ambient noise levels** in the **affected areas** of your community now and what will they be after wind turbines?
- What are the **dB(C) - dBA ranges of ambient noise levels** in the **affected areas** of your community now and what will they be after wind turbines?
 - Daytime
 - Nighttime
 - In worst case **Stable Environmental Conditions**
 - **Minimum or no wind** at ground level
 - **Sufficient wind** at Turbine Level to Operate
 - In Rural Areas
 - In Suburban Areas

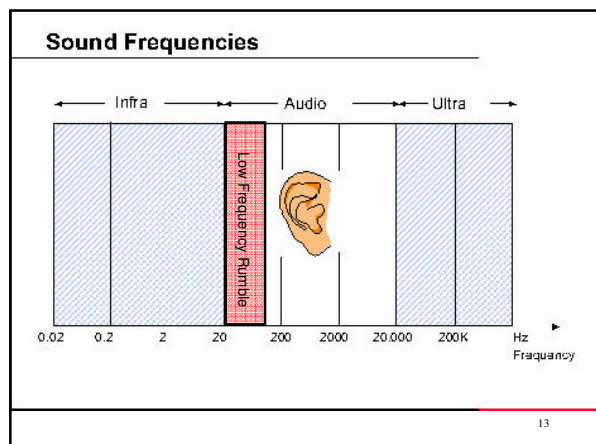
Suggestion

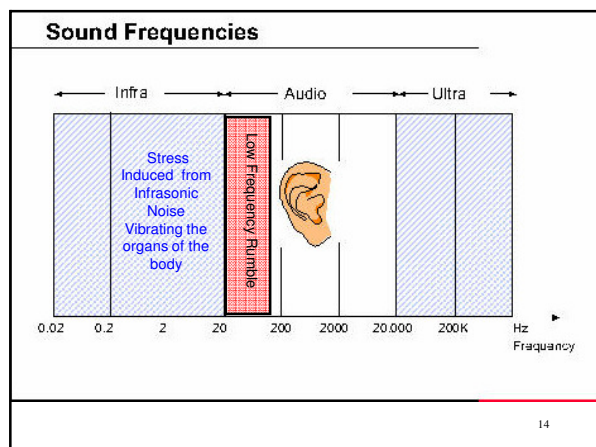
- Take a hard look at work of two very capable and experienced Acoustical Engineers.
- [George Kamperman](#)
- [Rick James](#)
- INCE **Guidelines The "how to" guide to siting wind turbines To prevent health risks from sound.**
- This document was produced Pro-Bono
- It was written to help communities understand and to cope with the high and low frequency noise and vibration.
- [08-11-02 Kamperman-James Ver 2.1 \(WindAction\) Noise Criteria for Siting Wind Turbines .pdf](#) (951.41 kB)

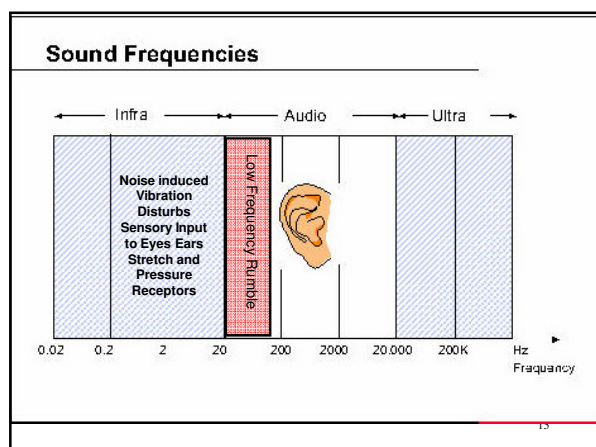


The purpose of their paper was to outline a rational evidence based set of criteria for industrial wind turbine siting in rural communities

- A review of the European and other wind turbine siting criteria and existing studies of the [prevalence of noise problems after construction](#).
- Primary review of sound studies done in a variety of locations in response to [wind turbine noise complaints](#).
- Review of publications on [health issues](#) for those living in close proximity to wind turbines
- Review of critiques of [pre-construction developer noise impact statements](#)
- Review of technical papers on [noise propagation and qualities from wind turbines](#)





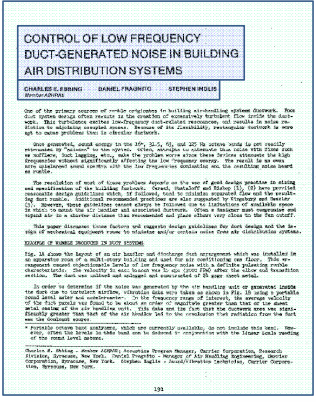


1978 ASHRAE PAPER

Showed under what acoustical conditions air conditioning systems in buildings produced low frequency rumble in buildings.

Paper showed from actual jobs, that if you keep the loudness of the low frequency noises less than the higher frequency sounds people are not bothered by Rumble.

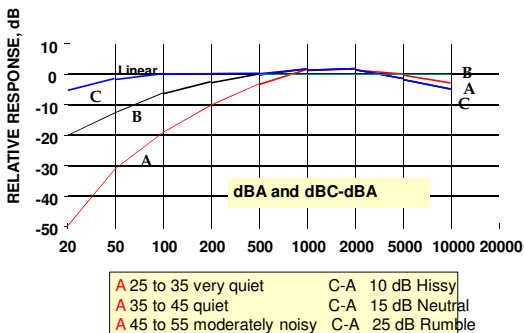
It has been established that excess low frequency noise can cause stress.



Low Frequency Health Effects

- **Audible Rumble Stress** 16Hz to 125 Hz.
- **Infrasound** below 20 Hz can **Vibrate the Body** and can cause **Stress**.
- **Excess Infrasound** can also cause **changes in body cells**.
- **ASHRAE** has defined where **Rumble** sets in
- If **dBC - dBA < 20 dB Rumble and Excess Infrasound is also minimized**.
- See Kamperman and James INCE **Guidelines for siting wind turbines**.

A, B & C-Weighted Networks



So How Much Low Frequency Noise is too Much?

- If the wind farm produces excess low frequency noise in the range of 16 Hz to 125 Hz either **indoors or out of doors** then rumble noise will be present....**how bad**...it depends on how loud the low frequencies are in relation to the higher frequencies.
- This can be determined by measuring both the low-mid-high frequency noise **dBc, along with the dBA.**
- If **dBc - dBA < 20 dB Rumble and Excess Infrasound are minimized.**
- Apparently the organs in our body respond differently to the low frequency sound. This vibration can cause medical problems

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I suggest that

- Town Councils should insist that:
 - Wind Farm Applicants Document in the DEIS the analysis of the projected sound levels to be expected in the Frequency Range of from 1Hz to 200 Hz both inside and outside affected homes.
 - Document the **error bounds +/- of their sound level estimates**
 - Establish if **Low Frequency Rumble** and/or **Significant House Vibration** is expected either outside, or inside of the affected residences.
 - Establish the **expected dBc - dBA levels** effecting the residents.

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I suggest that

- Town Councils should insist that:
 - They meet the requirements set by the American National Standards Institute (ANSI) and the Acoustical Society of America's procedures for outdoor noise measurement and determining the background sound level of a community.
 - That ASA S12.18 Procedures for Outdoor Measurement of Sound Levels are followed.
 - It is clear that the Standard views wind as a major negative element in accurate testing and it goes so far as to require that all effects of wind be eliminated from precision grade measurements by disregarding all data collected when the wind speed at the measurement microphone exceeds (between 6 and 7 miles per hour)

I suggest that

- Town Councils should be aware that:
- ANSI S12.18 points to the effects of wind and weather which can affect sound levels by up to 20 dB.
- Sound Ambient Noise tests be limited to times when the winds are calm enough at the ground to not cause flow induced signals to be read by the microphone.
- Wind speed can have pronounced effects on the ambient noise measurements because it's effects are generally accepted to be an artifact of measurement and are thus excluded as errors

I suggest that

- In order to determine, **after the fact that the noise samples used to establish the residual noise ambient are not contaminated with artifacts that significantly compromised the data**, it is necessary to be able to monitor the recordings by listening to them. It will be necessary to record these sounds in parallel with the measured data. This can be used to establish if contamination was present. Below is a partial list of these problems that can occur in DEIS.
- Swarm of **Cicadas** raising the local ambient.
- Microphone **too close to local brook**
- **Flooded brook noise not representative** of year around noise from the brook.
- Data that was **valid but lower than 5 other samples**, so it was classed as an outlier and eliminated.
- Presence of **wind noise due to inadequate diameter of wind screen** over the microphone where ambient noises in the order of 25 dBA were being measured.
- Presence of **unrepresentative traffic noise or machinery noise** in noise sample
- Noise monitor too houses and barns
- Detect , **snow, rain , sleet** and dogs playing nerf ball with the wind screen

Can anything be done after the wind turbines are installed?

- In my opinion, based on my experience, they **won't be able to do significant noise reduction on these wind turbines after they are installed.**
- In theory they could be replaced with quieter turbines but is this is highly improbable.
- The only option afforded local communities to minimize the impact of Wind Turbine Noise on non-participating residents, is to require Wind Farms **to limit the intruding noise to near that of the existing ambient.** This can only be done by placing them further away from non-participating residents.

Questions
