Pierpont rebuttal to McCunney affidavit

The comments in the green bubble to the right side of each page thoughout the following affidavit were made by

Nina Pierpont, MD, PhD, on 12/6/10

STATE OF VERMONT
PUBLIC SERVICE BOARD

Petition of Green Mountain Power Corporation, Vermont Electric Cooperative, Inc., and Vermont Electric Power Company, Inc., for a certificate of public good, pursuant to 30 V.S.A. Section 248, to construct up to a 63 MW wind electric generation facility and associated facilities on Lowell Mountain in Lowell, Vermont, and the installation or upgrade of Approximately 16.9 miles of transmission line and Associated substations in Lowell, Westfield and Jay, Vermont

} Docket No. 7628

REBUTTAL TESTIMONY OF

ROBERT McCUNNEY

ON BEHALF OF GREEN MOUNTAIN POWER CORPORATION

November 22, 2010

Summary of Testimony

Dr. Nina Pierpont:

Just as in a scientific article, Dr. McCunney needs to reveal and review the full extent of his financial ties to wind power and other industries, with regard to both consultant positions and support of his research or dept. at MIT.

Dr. McCunney responds to claims by Department of Public Service witness Mr. Kane, Albany witness Mr. James, Lowell Mountains Group witness Mr. Blomberg and others concerning the health and related impacts of sound. He also supports the Board's approved sound standard for wind projects.

REBUTTAL TESTIMONY OF
ROBERT McCUNNEY
ON BEHALF OF GREEN MOUNTAIN POWER CORPORATION

1. Q. What is your name, occupation, 1 and business address?

A. My name is Robert McCunney. I am a medical doctor practicing in the field of occupational and environmental medicine, a research scientist at the Massachusetts Institute of Technology Department of Biological Engineering, and a co-author of a recent comprehensive review of the peer-reviewed scientific literature respecting wind turbines and human health. My business address is 245 First Avenue, 18th Floor, Cambridge, MA 02142.

Dr. Nina Pierpont:
Who does he work for and who has he worked for?

Dr. Nina Pierpont:
Rank, position, duration, source of support for his salary and research? Area of research? Publications regarding this research?

2. Q. Please describe your educational background and pertinent professional experience.

A. A copy of my CV is attached as **Exh. Pet.-RJM-1**. For the past 30 years, I have practiced Occupational and Environmental Medicine from a variety of perspectives, including research, clinical and educational dimensions. I have been board certified since 1982 by the American Board of Preventive Medicine in Occupational and Environmental Medicine. I have an active clinical practice in Cambridge, Massachusetts where I evaluate and treat people exposed to potential occupational and environmental hazards. At the Massachusetts Institute of Technology ("MIT"), where I am a research scientist, I conduct environmental and occupational medical research and also co-teach a course in epidemiology. I also regularly lecture at the Harvard School of Public Health on the subject of noise and hearing.

Dr. Nina Pierpont:
I did not get the CV. Degrees are MS, MD, MPH. Publications are summarized in comment on p. 16, Note 1, from my Medline search.

Dr. Nina Pierpont:
Who has he worked for? What has he researched? Who has supported it?

Dr. Nina Pierpont:
Private or institutional or industry practice?

Dr. Nina Pierpont:
On what? Supported by whom?

Dr. Nina Pierpont:
What is extent of involvement in this course?

Dr. Nina Pierpont:
Sounds in the next paragraph like he does one lecture a year here. It might be interesting to see the lecture syllabus.

Dr. Nina Pierpont:
My summary of his publications from a Medline search:
48 articles indexed in MEDLINE, dated 1984 to 2010.
(read my full note on Page 16, Note 1)

My professional interest in the health implications of noise exposure arose as a result of my responsibilities as an occupational physician in overseeing hearing conservation programs of workers in occupational settings. Occupational exposure to noise can adversely affect hearing, a finding noted and confirmed in the medical literature for many years (Meyer and McCunney, 2007). My involvement with potential noise implications on hearing has focused on (1) publishing: I have written three book chapters for two different textbooks; (2) clinical issues: in serving as Director of Environmental Medicine at MIT from 1994 to 2001, I was responsible for reviewing, interpreting and following up the results of audiometric tests conducted on MIT employees; and (3) lecturing: for the past 10 years, I have regularly lectured at the Harvard School of Public Health to graduate students on noise and hearing, the most recent lecture was on March 12, 2010.

Dr. Nina Pierpont:
This is a book chapter in Rom WN *Environmental and Occupational Medicine*.
(read my full note on Page 16, Note 2)

Dr. Nina Pierpont:
Our concern is not effects on hearing, but the other health effects of which Dr. McCunney displays his ignorance even in a published book chapter (see previous note).

Dr. Nina Pierpont:
Signing off as the physician of record on the reports from audiologists? Kind of trivial.

Dr. Nina Pierpont:
Ditto comment line 5.

My involvement with wind turbines and potential human health implications dates to 2009 when I was invited to be a member of an expert panel by the American Wind Energy Association ("AWEA") and CanWEA. The purpose of the panel was to address the peer-reviewed scientific literature regarding potential health implications of wind turbines. I was a co-author of the comprehensive review "Wind Turbines and Health" (the "White Paper"), which was authored by the panel. The White Paper was released in December 2009.

Dr. Nina Pierpont:
The critique of this report by Carl V. Phillips, PhD, presented to the Wisconsin Public Service Commission, would be helpful here.
(read my full note on Page 16, Note 3)

3. Q. Have you previously testified before the Vermont Public Service Board ("Board")?

A. No.

4. Q. What 1 is the purpose of your testimony?

A. I respond to claims by Department of Public Service ("DPS") witness Mr. Kane, Albany witness Mr. James, Lowell Mountains Group ("LMG") witness Blomberg and others concerning the health and related impacts of sound. I provide information from scientific studies related to the evaluation of potential sound-related health implications of living in the vicinity of wind turbines. I also support the Board's approved sound standard for wind projects.

5. Q. Please summarize your conclusions.

A. The risk of any direct adverse health effect at levels below 45 dB (A) is virtually non-existent.

Infra sound from wind turbines is not a risk to health, and low frequency sound does not usually reach levels where the sound would be detectable. There is no evidence that the audible or sub audible sounds emitted by wind turbines have any direct adverse physiological effects. Noise levels associated with sleep disturbances tend to be higher than 45 dB (A). The ground borne vibrations from wind turbines are too weak to be detected by, or to affect, humans. Some people may be annoyed at the presence of sound from wind turbines, or its fluctuating nature, depending primarily on personal characteristics as opposed to the intensity of the sound level. Annoyance, however, is not a pathological condition, *per se*; so-called "Wind Turbine Syndrome" is not a recognized medical disorder, and the array of symptoms identified by one author (Pierpont, 2009) is most likely a reflection of annoyance to noise.

Dr. Nina Pierpont:
This is contradicted by the World Health Organization guidelines for community noise and night noise. What sources is he using? Perhaps he is oriented just towards noise levels that damage hearing.

Dr. Nina Pierpont:
Physiologic effects do not depend on detectability; see Salt and Hullar 2010.

Dr. Nina Pierpont:
On the contrary, there is evidence from case reports, self-reports *(read my full note on Page 16, Note 4)*

Dr. Nina Pierpont:
This is contradicted by the WHO guidelines for community noise and night noise. Perhaps he does not know this literature, given his specifically industrial, rather than community, orientation.

Dr. Nina Pierpont:
It should be asked on what basis he makes this assertion. *(read my full note on Page 17, Note 5)*

Dr. Nina Pierpont:
There is indeed individual variability in who is most susceptible to WT noise-related health effects. *(read my full note on Page 17, Note 6)*

Dr. Nina Pierpont:
Pedersen's data directly contradict this. *(read my full note on Page 17, Note 7)*

Dr. Nina Pierpont:
I would ask him: Did he read "Wind Turbine Syndrome"? *(read my full note on Page 17, Note 8)*

The World Health Organization ("WHO") guidelines 1 on noise represent a consensus view of international expert opinion on the lowest noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached. The Board's approved sound standard of 45 dBA (exterior) (Leq) (1hr) is sufficient to protect human health and avoid sleep disturbance.

Dr. Nina Pierpont:
I don't think so. I think they are recommending levels to protect the public health based on research. Just because these levels are unattainable given traffic, aircraft, and industry does not mean existing higher noise levels are safe.

Dr. Nina Pierpont:
Very vague; I would ask him to clarify and defend this statement and provide references.

Dr. Nina Pierpont:
On what basis does he say this? People actually studying wind turbine noise all say there needs to be a measure of low frequency noise as well as dBA measurements.

6. Q. Please describe briefly the testimony to which you are responding.

A. DPS witness Mr. Kane states that the lack of any comprehensive analysis of infrasound and low-frequency noise is a "glaring omission." Kane Prefiled Direct Testimony ("Pf.") at 14. He also cites a study by Salt and Hullar stating that infrasound may have an impact on inner ear physiology. Exh. DPS-MK-2 at 20. Mr. James cites a study finding that long-term exposure to sound levels of 90 dBA increased hearing loss, and a so-called Wind Turbine Syndrome report relating to the health effects of sound. James Pf. at 12, 14. Mr. Blomberg cites a WHO report that referred to sleep disturbance at sound levels between 30 dBA and 40 dBA. Blomberg Pf. at 4. Other witnesses, such as Mr. Brooks, express concern about noise impacts.

Dr. Nina Pierpont:
It does, in a variety of ways Salt has been studying for years including inducing endolymphatic hydrops, which could produce all the symptoms of Wind Turbine Syndrome.

Dr. Nina Pierpont:
If this is indeed what Mr. James said, it would not be relevant to WT's.

7. Q. Please discuss the minimum level of sound 1 that has been associated with adverse health effects on humans.

A. The risk of any direct adverse health effect at levels below 45dB (A) is virtually non-existent (Miedema, Passchier-Vermeer and Vos 2003, Elements for a position paper on night time transportation noise and sleep disturbance TNO Inro, Delft, 2002-59).

Dr. Nina Pierpont:
Probably superceded by the WHO night noise guidelines published in 2009.

8. Q. Please address the effects on humans of infra sound or low frequency sound.

A. Infrasound occurs at frequencies less than 20 Hz. Table 1 shows the sound pressure level of the corresponding frequency of infrasound and low frequency sound necessary for the sound to be heard by the average person (Leventhall *et al*., 2003). In essence, the lower the frequency of a sound, the higher the sound pressure needed for the sound to be heard by the average person. There are, however, different levels of hearing sensitivity that may allow some people to hear infrasound

Dr. Nina Pierpont:
See Salt and Hullar 2010; "if you can't hear it, it can't hurt you" assumption has been disproven.

TABLE 1

Hearing Thresholds in the Infrasonic and Low Frequency Range

Hz	4	8	10	16	20	25	50	100	200
SPL	107	100	97	88	79	69	44	27	14

At low frequencies, a much higher level of sound is necessary for it to be heard in comparison to higher frequencies. For example, at 10 Hz, the sound must be at 97 dB to be audible. (See Table 1 above). If this level occurred at the mid to high frequencies, which the ear detects effectively,

it would be roughly equivalent to standing without hearing protection 1 directly next to a power saw.

It has been claimed that sounds that contain low frequency noise, most notably within the infrasonic level, can adversely affect health even when the levels are below the average person's ability to detect them (Alves-Pereira and Branco, 2007; Salt *et al*. 2010). Low frequency sounds may be irritating to some people and, in fact, some low frequency sound complaints prove impossible to resolve (Leventhall *et al.*, 2003).

Comprehensive reviews of low frequency sound, its sources and measurement have been published (Berglund and Lindvall, 1996), including infrasound from wind turbines (Leventhall 2006). Studies conducted to assess wind turbine low frequency noise have shown that wind turbine sound near residences is not audible below about 50 Hz (Hayes 2006). Recent work on evaluating a large number of noise sources between 10 Hz and 160 Hz suggests that wind turbine noise heard indoors at typical separation distances is modest (Pedersen 2008). The low levels of infrasound and low frequency sound from wind turbine operations have been confirmed by others (Jakobsen 2004; van den Berg 2004). Low frequency noise at 26 Hz was inaudible. In general terms, acousticians have reached consensus that infrasound from wind turbines is not a health problem (Leventhall 2006).

A few recent field studies exemplify these conclusions. Low frequency sound was assessed in the vicinity of Danish wind turbines (Low frequency noise from large wind turbines; DELTA,

Dr. Nina Pierpont:
...and keeps them awake and makes them feel off balance and nauseated and otherwise ill.

Dr. Nina Pierpont:
The accounts of symptoms from known low frequency noise exposures are essentially the same as Wind Turbine Syndrome.

Dr. Nina Pierpont:
Audibility is not the issue; I also doubt this number, 50 dBA is above audibility threshold no matter what the source.

Dr. Nina Pierpont:
Outdoors and indoors are both issues. Audibility is not a necessary condition for effects.

Dr. Nina Pierpont:
Depends on whether you consider 70-100 dB lin at low frequencies to be "low." See Alec Salt's Powerpoint from his presentation in Picton, ONT, 10/30/10, on his website. The LFN levels are not "low" relative to the ear's true ability to have a physiologic reponse.

Dr. Nina Pierpont:
Audibility is not a criteria any more.

Dr. Nina Pierpont:
Not a justifiable statement. See Audiology Today article from 2010.

April 30, 2008). This study, conducted at the request 1 of the Danish Energy Authority, concluded:

a. Wind turbines do not emit audible infra sound.

b. Other noise sources, such as road traffic, emit low frequency sounds at higher levels.

c. There is an approximate 5-15 dB attenuation in individual 1/3 octave bands of low frequency noise from outdoors to indoors.

d. The percentage of people annoyed by wind turbine noise at < 40dB (A) is about 5%.

A study by the British Wind Energy Association concluded: "low frequency noise has been below accepted thresholds and is therefore not considered a problem" (Hayes McKenzie partnership; The measurement of low frequency noise at three UK wind farms; Dept of Trade and Industry, URN number 06/1412, 2006). The authors of this report describe the results of noise assessments conducted in 2004 at three wind farms in the UK. They concluded:

a. "Low frequency noise associated with road traffic was greater than sound from neighbouring wind farms.

b. Infrasound associated with modern wind turbines will not be injurious to the health of a wind farm neighbour.

c. Measurements of infrasound of modern wind farms at distances of 200 meters were between 25 and 40 dB below perception thresholds. The authors also referred to a World Health Organization report that stated:

Dr. Nina Pierpont:
May be true for most people, but irrelevant.

Dr. Nina Pierpont:
Ask him to site sources. Pedersen shows that road traffic noise is less disturbing and objectionable than WT noise at the same dBA levels.

Dr. Nina Pierpont:
The lower the frequency, the less the attenuation. Low frequency noise may be louder and more objectionable indoors than outdoors because it comes inside without attenuation and can reverberate in rooms, amplifying at certain locations in the room.

Dr. Nina Pierpont:
Check Pedersen papers for accuracy of this.
Note that "annoyance" in these studies includes sleeplessness, headache, tinnitus, poor concentration, etc., which are not asked about in noise annoyance studies.
The relevant noise level for the hearing is 45 dBA, not 40.

Dr. Nina Pierpont:
What about the cases in which it has been, and people have abandoned their homes and lost substantial resources to get away and regain their health?

Dr. Nina Pierpont:
Hearing thresholds are not relevant to the WT effects.

'There is no reliable evidence 1 that infra sounds below the hearing threshold produce physiological or psychological effects.' (Community Noise: Berglund *et al*, Archives of the Centre for Sensory Research Vol 2 (1) 1995: Section 7.1.4: page 41).

d. The common cause of complaint was not associated with low frequency noise but with occasional audible modulation of aerodynamic noise, mostly at night.

e. Of the 126 wind farms operating in the UK, 5 reported low frequency noise problems. Therefore such complaints are the exception rather than a general problem for wind farms (Hayes McKenzie, 2006)."

A study in Texas earlier this year (2010) addressed noise levels and frequency of sound distribution in the vicinity of wind turbines (O'Neal RD *et al*., Low frequency sound and infrasound from wind turbines, Noise-Con, April 19-21, 2010, Baltimore, MD). The results indicated that infrasound is inaudible to even the most sensitive people 305 meters (1,000 feet) from the wind turbines with the windows open or closed: low frequency sound above 40 Hz may be audible depending on background sound levels.

In experiments related to the Apollo space program, subjects were exposed to between 120 and 140 dB without known harmful effects. Early attention to low frequency sound in the U.S. space program led to studies which suggested that 24-hour exposures to 120 to 130 dB are tolerable below 20 Hz, the upper limit of infrasound. Modern wind turbines produce sound that is

Dr. Nina Pierpont:
1995. Berglund's journal articles (e.g., 1999) say otherwise.

Dr. Nina Pierpont:
Rick James's data from WT installations, using sophisticated LFN recording devices, shows amplitude modulation of both the audible and lower frequency sound.

Dr. Nina Pierpont:
Not everyone is affected. Some WTs are noisier and some people are more susceptible. The unlucky ones are still the responsibility of the public health system to protect.

Dr. Nina Pierpont:
Audibility is not the issue.

Dr. Nina Pierpont:
We don't know exactly which frequencies affect people *(read my full note on Page 17, Note 9)*

Dr. Nina Pierpont:
Healthy, young subjects, who would have self-selected against the types of motion sensitivity that makes people susceptible to Wind Turbine Syndrome.

Dr. Nina Pierpont:
Tolerable to young space program recruits, perhaps--not to middle-aged women with migraine disorders. No source cited.

Dr. Nina Pierpont:
At what frequencies and for how long *(read my full note on Page 17, Note 10)*

Dr. Nina Pierpont:
van den Berg and others routinely obtain higher decibel levels than this; see Salt Powerpoint 10/30/10 on his website.

assessed as infrasound at typical levels of 50 to 70 dB, below the hearing threshold at those frequencies (Jakobsen 2004). In fact, Jakobsen concluded that infrasound from wind turbines does not present a health concern.

Dr. Nina Pierpont:
Audibility is not the issue.

Dr. Nina Pierpont:
He would not be able to conclude this if he did not subscribe to the "if you can't hear it, it can't hurt you" outdated assumption.

The sound levels associated with infra or low frequency sound are also addressed in criteria of the American National Standards Institute /Acoustical Society of America. For instance, the threshold for moderate acoustically induced vibration and rattles for the 31.5 and 63 Hz octave bands is 65 dB, and for the 63 Hz octave band, it is 70 dB inside the room. ANSI/ASA S12.2-2008.

Dr. Nina Pierpont:
The early researchers are right--the ear is the most sensitive receptor. This does not mean, however, that you have to hear it for it to have an effect on the ear, as shown by Salt and Hullar.

There have also been studies assessing the physiological impact of low level sounds on the human body. Low-level sounds from outside the body do not cause a high enough excitation within the body, however, to exceed the internal body sounds. When measuring chest resonant vibration caused by external sounds, the internal vibration masks resonance for external sounds below 80 dB excitation level (Leventhall, 2006). Investigations at very low frequencies show a reduction of about 30 dB from external to internal sound in the body of a sheep (Peters *et al*. 1993). Similar findings have been noted in the protective effect of the uterus in attenuating noise exposure to the fetus at about 30 dB(A).

Dr. Nina Pierpont:
I've seen Leventhall's mechanical models for this. They present the body as a closed box, and the potentially vibrating organs as suspended inside the closed box. He does not use a model of the chest as elastic and open to the air. Leventhall's model is physiologically absurd.

A recent review article addressed potential health implications of infrasound (Salt *et al.* 2010). The authors stated: "In most cases, the inner ear's responses (that is, of the outer hair cells of guinea pigs) to infrasound can be considered normal, but they **could be** associated with

Dr. Nina Pierpont:
The National Institute on Deafness and Other Communication Disorders does not agree.
http://www.nidcd.nih.gov/news/releases/10/07_28_10.htm

unfamiliar sensations or subtle changes in physiology. This raises 1 the **possibility** that exposure to the infrasound component of wind turbine noise **could** influence the physiology of the ear." As noted by the bold emphases added by this author, Salt *et al*. are appropriately tentative about their hypotheses. Their review article does not make any firm conclusions about health implications of exposure to infrasound and low frequency sound. In fact, the authors make clear that they have simply introduced concepts about responses of the outer hair cells of the inner ear (which do not send signals to the brain) to exposure to infrasound. A response, however, of outer hair cells does not necessarily mean that the response is harmful. The results, cited by Salt *et al*. and upon which they base their hypotheses, are from investigations involving guinea pigs. These laboratory animals, however, have a strikingly different anatomy of the inner ear in comparison to humans, and, as a result, the corresponding implications of these animal studies to humans are dubious. Moreover, the outer hair cells are not connected to the brain. Salt *et al*. make no mention of background infrasound in their review article. Moreover, in all mammals, one of the limits of low-frequency hearing is the helicotrema (the gap in the basilar membrane that connects the scala tympani and scala vestibuli). The helicotrema acts as a high-pass filter; the larger the helicotrema, the greater low-frequency sound is shunted away from hair cells. The guinea pig has a very small helicotrema (only 7% of the area of the human helicotrema) and therefore unusually good low-frequency hearing. This review article is not persuasive of a risk of adverse health effects from infrasound. Scientific data are not available to confirm their hypotheses and the concepts proposed remain speculative.

Dr. Nina Pierpont:
This is wrong. McCunney read poorly or is deceptive.

Dr. Nina Pierpont:
Not necessarily, but possibly.
(read my full note on Page 17, Note 11)

Dr. Nina Pierpont:
It is not strikingly different, it is slightly different.

Dr. Nina Pierpont:
WRONG!

Dr. Nina Pierpont:
On the contrary, Salt thinks this mechanism of the inner ear may be to suppress our hearing of our own heartbeat and other low frequency noise.

Dr. Nina Pierpont:
This is incomprehensible. I've asked Alec Salt to comment.

Dr. Nina Pierpont:
Yes, it is.

Dr. Nina Pierpont:
No, they are presented with data from Salt and other researchers.

Dr. Nina Pierpont:
Not true. *(read my full note on Page 17, Note 12)*

Dr. Nina Pierpont:
This is wrong. The guinea pig's low frequency threshold is at a higher frequency than the human's.

9. Q. Please discuss the relationship between sound 1 and sleep disturbance.

A. Environmental noise levels associated with sleep disturbances tend to be higher than 45 dB (A). (Miedema*et al*. 2003) The prevalence of chronic insomnia in the U.S. has been estimated to be about 10%; in fact, about 50-70 million Americans suffer from chronic sleep problems. (Institute of Medicine, Committee on Sleep Medicine and Research; "Sleep disorders and sleep deprivation: an unmet public health problem," National Academies Press, 2006). Sound can adversely affect sleep, but such effects are highly individualized. Research has also shown that people can become habituated to sounds so that they no longer are affected by the sounds.

Dr. Nina Pierpont:
So let's go ahead and make things even worse for these people, and add others to their ranks.

Dr. Nina Pierpont:
"Since people vary, we don't have to be responsible for affecting them." Poor logic for public health, good logic for industry bottom-liners.

Dr. Nina Pierpont:
People exposed to wind turbine noise actually become sensitized over time. The same phenomemon is true of other LFN sources.

10. Q. Please discuss the issue of annoyance and claimed symptoms relating to annoyance?

A. Annoyance is not a recognized clinical diagnosis and its manifestations and definition vary considerably. Some people may be annoyed at the presence of sound from wind turbines, or its fluctuating nature, depending primarily on personal characteristics. The annoyance of a sound also tends to increase as loudness increases and there is also a more rapid growth of annoyance at low frequencies. Studies have shown that as environmental noise levels increase, especially beyond 45 dB(A), regardless of the source (transpiration, industrial or wind turbines), more people report being annoyed.

Dr. Nina Pierpont:
Ditto comment p. 5 line 17.

Dr. Nina Pierpont:
Contradicts what he said on p. 5, line 17-18,

Dr. Nina Pierpont:
True, and has direct bearing on the issue at hand. See next comment.

Dr. Nina Pierpont:
Pedersen shows that people are more annoyed at low dBA for WT than for other noise sources. dBA measurements filter out the LF noise and infrasound.

11. Q. Is the Board's currently approved noise level standard 2 sufficient to protect human health?

A. Yes. The standard set in the Board's recent wind decisions is 45 dBA (exterior) (Leq) (1hr) and 30 dBA (interior) (Leq) (1hr). As Kenneth Kaliski indicates, the 45 dBA standard is equivalent to, if not more stringent than, the 2009 WHO guideline for nighttime noise in Europe, which is 40 dB (Leq) (night) averaged on an annual basis. The WHO guidelines on noise represent a consensus view of international expert opinion on the lowest noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached. See Miedema, Passchier-Vermeer and Vos 2003, Elements for a position paper on nighttime transportation noise and sleep disturbance TNO Inro, Delft, 2002-59. This report reviews eight environmental noise studies and concludes that exposures to noise < 45 dB (A) do not adversely affect sleep. This paper was also cited in the 2009 WHO report on night time noise.

The Board's standard is also support by studies undertaken in the states of Wisconsin and Maine, and the province of Ontario. See Exhs. Pet.-RJM-2, 3, 4. The Wisconsin and Maine studies support a standard of 45 dBA (night), and the Ontario study refers approvingly to the WHO standard which, as noted above, is more lenient than the Board's standard.

Dr. Nina Pierpont:
But if the WHO published it, there is a good chance it does represent a significant noise impact.

Dr. Nina Pierpont:
This older source is superceded, even if he's quoting it accurately.

Dr. Nina Pierpont:
Cited but perhaps not agreed with? This should be checked. He may well not be using these sources correctly, since there are bald inaccuracies in his interpretation of other studies, such as Salt and Hullar.

Dr. Nina Pierpont:
What studies might he be referring to? They don't exist. No agency is doing primary research. Hearings are not studies. Statements by experts are not studies.

Dr. Nina Pierpont:
But does not incorporate that standard into the law? This should be checked. What document is he referring to? There are no studies of the problem by governments.

Dr. Nina Pierpont:
There are significant wind turbine noise problems in all three areas *(read my full note on Page 17, Note 13)*

12. Q. Does 1 this conclude your testimony?

A. Yes.

Dr. Nina Pierpont:
He should provide copies of all references, not just the citations, since many are not standard published works, but rather private or agency reports. He uses information other than articles published in peer-reviewed journals, which effectively scuttles the assumption on which the AWEA-CanWEA report is based--that information must come from a peer-reviewed journal to be valid.

Dr. Nina Pierpont:
Use papers from the Picton, ONT conference as evidence of health effects, or enough valid concern for health effects to warrant moratoria and further research.

Notes

1. My summary of his publications from a Medline search:

48 articles indexed in MEDLINE, dated 1984 to 2010.

A) 21 of these concern the practice of occupational medicine, e.g., opportunities for occupational medicine doctors given this or that social or governmental trend, his experience working with industry, his experience as head of a professional organization, the role of an academic program in occupational medicine, and similarly lightweight commentary.

B) 16 are short commentaries, letters, or editorials without abstracts (lots of overlap with group A).

C) 15 concern particulate exposures and lung disease. This appears to be his primary area of interest and research. Six of the most recent articles are co-authored with a German occupational medicine researcher and involve a variety of types of statistical analysis of lung cancer risk in a cohort of "carbon black" workers in Germany.

D) 7 are based on Medline review of a topic only without original data.

E) 1 is a critique of the analysis of an experimental paper, without original data.

F) 5 are case reports on particulate or chemical exposures. Since he publishes case reports, he does not need to disdain the research protocol of Wind Turbine Syndrome, a case series with systematized development of a cluster of less affected people around each severely affected case, focused on elucidation of individual risk factors for being affected by WT noise. However, McCunney has confessed to dismissing my research without reading it, I have been told by people in Mass. who questioned him at one of his performances on Wind Turbine Syndrome. Indeed, the AWEA-CanWEA report was published within days of my book to rebut and discredit the book, based only on excerpts posted on the web; none of the authors had read my book.

G) None concern noise or vibration.

2. This is a book chapter in Rom WN *Environmental and Occupational Medicine*. Chapter 85, "Occupational Exposure to Noise." From this chapter, p. 1296:

"The non-auditory effects of environmental noise on human health, most notably hypertension, have also aroused concern. Health effects arising from ambient noise present substantial scientific challenges in study design, implementation, and analysis, particularly with respect to confounding factors, and **as such have not yet attracted well-controlled epidemiologic studies**. A theoretical basis exists for a proposed relationship between noise and hypertension, grounded in the stress response; as a result of noise exposure, positive release of adrenocortical hormones and sympathomimetic mediators these to increased heart rate and eventually higher blood pressure." (p. 1296, emphasis added) Bolded sentence is patently false. There is a large published epidemiologic literature on the interactions between community noise, stress, stress hormones, cardiovascular risk, and children's learning.

3. The critique of this report by Carl V. Phillips, PhD, presented to the Wisconsin Public Service Commission, would be helpful here.

It might be good to explore in questioning how the AWEA-CanWEA report was done, especially with regard to there having been no attempt to conduct primary research, the self-serving nature of the definitions for acceptable and unacceptable kinds of information, and the unjustified conclusion that no further research needs to be done. McCunney's specific role and how he carried out this role might be explored.

4. On the contrary, there is evidence from case reports, self-reports, and surveys that WT noise causes sleep disturbance, headache, tinnitus, nausea, dizziness, poor concentration, and panic symptoms. Dr. Sarah Laurie in Australia is in addition studying hypertension and hypertensive crises with regard to WT noise exposure. Dr. Michael Nissenbaum has documented an exposure gradient with

regard to sleep disturbance out to 5 km (3 miles) from turbines.

5. It should be asked on what basis he makes this assertion. Ground-borne vibrations are enough to limit how close turbines can be placed to seismic monitoring stations. I have spoken to subjects who could feel vibrations in their legs on certain parts of their property, and to an audiologist who became nauseated from vibrations when he put his forehead against the floor in an affected house.

6. There is indeed individual variability in who is most susceptible to WT noise-related health effects. The most susceptible people include those who are older and those with migraine disorder, preexisting motion sensitivity, or preexisting damage to inner ear structures from industrial noise, blast exposure (e.g. veterans), or chemotherapy. To call these "personal characteristics" rather than "individual differences" has a quality of telling the susceptible people to "buck up" or "get a grip," implying they can be disregarded. In public health we need to be attentive to the needs of the most vulnerable in the population. As opposed to industrial health, we can't just send them to a quiet part of the plant when people are exposed to noise disturbance in their homes.

7. Pedersen's data directly contradict this, as do all the data on other community noise sources. He's just blathering here, saying what is expedient with no reference to (or knowledge of?) the relevant literature. He also contradicts himself later in the testimony (p. 13 line 16)

8. I would ask him: Did he read "Wind Turbine Syndrome"? Is he able to summarize its major points? Does he know how the research was structured? Did he read the peer reviews and peer commentary included in the book? Does he know anything about the symptoms of balance or vestibular disorders, beyond unsteadiness or dizziness? Is he aware of the similarity of the symptom cluster of Wind Turbine Syndrome to the symptom clusters of other vestibular disorders, such as perilymphatic leak conditions or blast injury conditions?

9. We don't know exactly which frequencies affect people; it may be a variety of frequencies; it may be the pulsating qualities at low or higher frequencies. It is driving people from their homes and causing them not to sleep, whatever the exact qualities of the noise.

10. At what frequencies and for how long, and cite reference. I cite a Navy paper from the 1960s showing symptoms during an exposure of several minutes to high-intensity infrasound.

11. Not necessarily, but possibly. Since the outer hair cells respond, and by responding prevent the response of inner hair cells, the ear is actively suppressing hearing of infrasound, but there is a physiologic response--and signals are sent to the brain on Type II afferent fibers to the cochlear nucleus.

12. Not true. The paper is based on Salt's own research on the cochlea. He has worked with guinea pig ears using low frequency noise as an experimental modifier of physiologic function for years.

13. There are significant wind turbine noise problems in all three areas, as I know from speaking with victims in all three locations, from the Ontario survey of wind turbine effects, and from victims publicizing their plight. Clearly, these are not effective noise standards.