



From: **Steve Thurston** <thurston.steve@gmail.com>
Date: Mon, May 11, 2009 at 9:39 PM
Subject: Review of WTS literature Record Hill Wind LLC
To: "Beth.Callahan@maine.gov" <Beth.Callahan@maine.gov>

Dear Beth,

Following is a comprehensive review of the current literature about wind turbine noise induced human health problems. I'm not sure you have this information and I'm sure Dr. Dora Mills must not, judging by her public comments and testimony in the Rollins decision. Please include it as part of my testimony for Record Hill Wind LLC and in your findings of fact.

Thanks,

Steve

Wind Turbine Syndrome

Wind turbine syndrome (WTS) is a cluster of clinical symptoms first formally identified by British physician Amanda Harry, MD, and subsequently given the name Wind Turbine Syndrome and a pathophysiological explanation by New York State behavioral pediatrician Nina Pierpont, MD, PhD.

WTS refers to the discrete constellation of symptoms that some -- not all -- people experience when living near wind turbines, symptoms which Pierpont and other clinicians maintain are caused chiefly by turbine low-frequency noise and vibration and shadow flicker affecting the body's various balance organs, including the utricle and saccule (vestibular organs) of the inner ear. According to Pierpont, people at notable risk for WTS are those with migraine disorder and a history of balance and motion sensitivity (such as car-sickness and sea-sickness).

Both Harry and Pierpont have based their research on clinical case series (defined, in medicine, as a descriptive account of a group of individuals with the same new medical conditions), and both have called for large-scale government-sponsored epidemiological studies to definitively establish WTS as a full-blown disease state. Until that happens, WTS remains, clinically, merely a syndrome.

Symptoms

Pierpont has identified the following cluster of symptoms among many people living near wind turbines. In *Wind Turbine Syndrome: A Report on a Natural Experiment* (Santa Fe, NM: K-Selected Books, in press) she explains how these seemingly disparate symptoms result from turbine low frequency noise scrambling the body's balance, motion, and position sensors.

1. sleep disturbance
2. headache
3. tinnitus (pronounced "tinn-uh-tus": ringing or buzzing in the ears)

4. ear pressure
5. dizziness (a general term that includes vertigo, lightheadedness, sensation of almost fainting, etc.)
6. vertigo (clinically, vertigo refers to the sensation of spinning, or the room moving)
7. nausea
8. visual blurring
9. tachycardia (rapid heart rate)
10. irritability
11. problems with concentration and memory
12. panic episodes associated with sensations of internal pulsation or quivering, which arise while awake or asleep

Case reports

British physician Dr. Amanda Harry, in a February 2007 article titled "Wind Turbines, Noise and Health" [1], wrote of 39 people, including residents of New Zealand and Australia, who suffered from the sounds emitted by wind turbines.

Pierpont interviewed 10 families living near large (1.5-3 MW) wind turbines, for a total of 38 people from infants to age 75. People in these families had noticed that they developed new symptoms after the turbines started turning near their homes. They noticed that when they went away, the symptoms went away, and when they came back the symptoms returned. Eight of the 10 families eventually moved away from their homes because they were so troubled by the symptoms.

Dr. Michael A. Nissenbaum, a radiologist at the Northern Maine Medical Center, conducted interviews with 15 people living near the industrial wind energy facility in Mars Hill, Maine. The purpose of the interviews was to investigate and record the health effects on those living within 3,500 feet of industrial-scale turbines.

On March 25, 2009, Dr. Nissenbaum presented his preliminary findings before the Maine Medical Association. The data, which he characterized as alarming, suggest the residents are experiencing serious health problems related to shadow flicker and noise emissions from the turbines near their homes. The onset of symptoms, including sleep disturbance, headaches, dizziness, weight changes, possible increases in blood pressure, as well as increased prescription medication use, all appeared to coincide with the time when the turbines were first turned on (December 2006).[2]

On April 22, 2009, Dr. Robert McMurtry, former Dean of Medicine of the University of Western Ontario, released a survey conducted on the various wind facilities in Ontario. Of the 76 respondents in the community-based self-survey, 53 people living near different wind power plants reported that industrial wind turbines were having a significant negative impact on their lives. The adverse effects ranged from headaches and sleep disturbance to tinnitus (ringing in the ear) and depression.[3]

In Japan, more than 70 people living near wind turbines have reported ill health. They include

residents in Ikata, Ehime Prefecture; Higashi-Izu, Shizuoka Prefecture; Toyohashi, Aichi Prefecture; and Minami-Awaji, Hyogo Prefecture. The Japanese Ministry of the Environment is now studying international data showing a potential link between wind turbines and health problems in surrounding areas to determine a plan of action for Japan. It has also started measuring low-frequency sounds around some wind farms.[4]

Scientific and clinical acceptance and explanation

Dr. Nina Pierpont's report has received peer reviews from the following:

- Professor Robert May, Baron May of Oxford OM AC Kt FRS. Professor May holds a professorship jointly at Oxford University and Imperial College, London, and is a Fellow of Merton College, Oxford. President of the Royal Society (2000-05), Chief Scientific Adviser to the UK Government and Head of the UK Office of Science and Technology (1995-2000), and member of the UK Government's Climate Change Committee (an independent body established by the Climate Change Bill, to advise on targets and means of achieving them).

- F. Owen Black, MD, Fellow of the American College of Surgeons, Senior Scientist and Director of Neuro-Otology Research, Legacy Health System, Portland, Oregon.

- Jerome Haller, MD, Professor of Neurology and Pediatrics (retired 2008), Albany Medical College, Albany, New York.

- Joel F. Lehrer, MD, Fellow of the American College of Surgeons. Former Professor of Otolaryngology, Mt. Sinai School of Medicine (NYC), currently Clinical Professor of Otolaryngology, University of Medicine & Dentistry of New Jersey.

- Ralph V. Katz, DMD, MPH, PhD, Fellow of the American College of Epidemiology, Professor and Chair, Department of Epidemiology & Health Promotion, New York University College of Dentistry.

- Henry S. Horn, PhD, Professor of Ecology and Evolutionary Biology, and Associate of the Princeton Environmental Institute, Princeton University.

- Robert Y. McMurtry, MD, Emeritus Professor and Dean of Medicine & Dentistry, University of Western Ontario Schulich School of Medicine. In 1999 McMurtry became the first Cameron Visiting Chair at Health Canada -- a post carrying the responsibility for providing policy advice to the Deputy Minister and Minister of Health for Canada. McMurtry is the founding Assistant Deputy Minister of the Population and Public Health Branch of Health Canada.

There are as yet no other reports in published clinical literature linking wind turbines to this set of symptoms. Residents of the U.K., however, presented their experience at the Second International Wind Turbine Noise Conference in Lyon, France, September 20-21, 2007.[5] And researchers in Portugal reported at the same conference that the conditions for Vibroacoustic Disease, in which low-frequency vibrations affect heart and lung tissues, were found in homes near wind energy facilities.[6]

Wind Turbine Syndrome, clarifies Pierpont, is not the same as Vibroacoustic Disease. The proposed mechanisms are different, and the noise amplitudes are probably different as well.

Wind Turbine Syndrome, according to Pierpont, is essentially low-frequency noise or vibration tricking the body's balance system into thinking it's moving. The process is mediated by the vestibular system -- in other words, by disturbed sensory input to eyes, inner ears, and stretch and pressure receptors in a variety of body locations. These feed back neurologically onto a person's sense of position and motion in space, which is in turn connected in multiple ways to brain functions as disparate as spatial memory and anxiety. New discoveries about the extreme noise/vibration sensitivity of the vestibular system of the human inner ear were published in *Neuroscience Letters* in 2008.[7]

Several lines of evidence suggest that the amplitude (power or intensity) of low-frequency noise and vibration needed to create these effects may be even lower than the auditory threshold at the same low frequencies. In other words, it appears that even low-frequency noise or vibration too weak to hear can still stimulate the human vestibular system, opening the door for the symptoms that Pierpont has called Wind Turbine Syndrome. There is now direct experimental evidence of such vestibular sensitivity in normal humans.

Vibroacoustic Disease, on the other hand, is hypothesized to be caused by direct tissue damage to a variety of organs, creating thickening of supporting structures and other pathological changes. The suspected agent is high-amplitude (high power or intensity) low-frequency noise. Given Pierpont's research protocol, her study is unable to demonstrate whether wind turbine exposure causes the types of pathologies found in Vibroacoustic Disease, although there are similarities that may be worthy of further clinical investigation, especially regarding asthma and lower respiratory infections.

Against this growing evidence, the wind industry insists that no problem exists or that it is so rare as to be of little consequence. The Canadian Wind Energy Association, for example, cites a set of articles in the June 2006 issue of *Canadian Acoustician* as refutation of serious health effects from wind turbine noise. Besides the fact that they are not medical articles, they do not conclude that there is no evidence of health problems.[8] Although the wind industry denies that

wind turbine noise is intrusive, let alone a health problem, it also fights against noise regulations that would ensure that to be the case.

In the United States, George Kamperman, INCE (Institute of Noise Control Engineering) Board Certified noise control engineer, and Rick James, INCE Full Member, have documented significantly increased levels and the unique character of noise from industrial-sized wind turbines. To ensure the World Health Organization recommendation of no more than 30 dB(A) inside a bedroom and that low-frequency noise be limited, they recommend that large wind turbines be sited at least 2 kilometers from homes.[9] Similarly, the Noise Association of the U.K. and the French Academy of Medicine recommend a distance of 1 mile or 1.5 kilometers, respectively.[10][11]

This is still an emerging phenomenon, but the evidence is clearly accumulating in support of Dr. Pierpont and others' observations of a clear clinical pattern of ill effects caused by large wind turbines.

References

1. Harry, Amanda (February 2007). "Wind Turbines, Noise and Health". http://www.wind-watch.org/documents/wp-content/uploads/wtnoise_health_2007_a_harry.pdf.
2. Nissenbaum, Michael (March 2009). "Mars Hill Wind Turbine Project Health Effects -- Preliminary Findings". <http://www.wind-watch.org/documents/wp-content/uploads/nissenbaum-mars-hill.pdf>.
3. "Ontario Health Survey Exposes the Wind Industry". <http://windconcernsontario.wordpress.com/2009/04/28/ontario-health-survey-exposes-the-wind-industry/>.
4. "Something in the Wind as Mystery Illnesses Rise". <http://www.asahi.com/english/Herald-asahi/TKY200902060054.html>.
5. Davis, Julian; and Davis, Jane (September 2007). "Noise Pollution from Wind Turbines". <http://www.wind-watch.org/documents/noise-pollution-from-wind-turbines/>.

6. Alves-Pereira, Mariana; and Castelo Branco, Nuno (September 2007). "In-Home Wind Turbine Noise is Conducive to Vibroacoustic Disease". <http://www.wind-watch.org/documents/in-home-wind-turbine-noise-is-conducive-to-vibroacoustic-disease/>.
7. Todd, Neil; et al. (October 17, 2008). "Vibration Sensitivity of the Vestibular System of the Human Inner Ear". <http://dx.doi.org/10.1016/j.neulet.2008.08.011>.
8. "Deconstructing CanWEA Health Claims". <http://windconcernsontario.wordpress.com/2009/04/24/deconstructing-canwea-health-claims/>.
9. Kamperman, George; and James, Rick (July 2008). "Simple Guidelines for Siting Wind Turbines to Prevent Health Risks". <http://www.wind-watch.org/documents/simple-guidelines-for-siting-wind-turbines-to-prevent-health-risks/>.
10. Noise Association, U.K. (July 2006). "Location, Location, Location: Investigation into wind farms and noise". <http://www.wind-watch.org/documents/wp-content/uploads/UKNA-WindFarmReport.pdf>.
11. Chouard, Claude-Henri; for the French Academy of Medicine (March 14, 2006). "Repercussions of wind turbine operations on human health" [in French]. <http://www.wind-watch.org/documents/wp-content/uploads/FrAcadMed-eoliennes.pdf>.

Testimony: diaries, letters, and interviews

- [Yvonne Sheehan's daily diary January 2008](#)
- [Yvonne Sheehan's daily diary 2008, Part 2](#)
- [Italian Windfarm Diary](#)

- Wind Towers in Telocaset, Oregon
- Life with Industrial Wind Turbines in Wisconsin: Part 5, Interview with Gerry Meyer, Byron, Fond du Lac County, Wisconsin
- Brownsville noise diary, March 3, 2008, to January 16, 2009
- Be Concerned About Health Effects from Wind Turbine Effects
- Daniel d'Entremont letter to Calumet County
- Rene Taylor testimony to Town of Union (Wisc.) Planning Commission
- Amaranth Wind Turbines, Noise and Health: Barbara Ashbee Interview
- Helen Fraser Interview — Melancthon I, Shelburne, Ontario

News reports

- Kriz, Kathy (October 12, 2006). "Could Wind Turbines Be A Health Hazard?". WHAM-TV. <http://www.13wham.com/news/local/story/Could-Wind-Turbines-Be-A-Health-Hazard/XvZanNzd1EG33Jknb0cNvA.csp>.
- St. James, Janet (July 29, 2008). "Neighbors claim wind turbine makes them ill". WFAA-TV. http://www.wfaa.com/sharedcontent/dws/wfaa/jstjames/stories/wfaa080728_lj_windturbines.fbc5e25.html. Retrieved on 2008-10-10.

- "Wind turbines cause health problems, residents say". CTV. September 28, 2008. http://www.ctv.ca/servlet/ArticleNews/story/CTVNews/20080928/windmill_safety_080928.
- Keen, Judy (November 3, 2008). "Neighbors at odds over noise from wind turbines". USA Today. http://www.usatoday.com/money/industries/energy/2008-11-03-windturbines_N.htm.
- Tilkin, Dan (November 14, 2008). "Wind farms: Is there a hidden health hazard?". KATU-TV. <http://www.katu.com/news/34469989.html>.
- Takeda, Tsuyoshi (February 6, 2009). "Something in the Wind as Mystery Illnesses Rise". Asahi Shimbun. <http://www.asahi.com/english/Herald-asahi/TKY200902060054.html>.
- Blaney Flietner, Maureen. "Green Backlash: The Wind Turbine Controversy". bobvila.com. http://www.bobvila.com/HowTo_Library/Green_Backlash_The_Wind_Turbine_Controversy-Green_Building-A3923.html.
- Nelson, Bob (March 2, 2009). "Wind farms: Interview of Malone and Johnsburg residents". Morning Show, KFIX. <http://www.wind-watch.org/news/2009/03/02/wind-farms-interview-of-malone-and-johnsburg-residents/>.
- Mills, Erin (March 8, 2009). "Loud as the wind: Wind tower neighbors complain of noise fallout". East Oregonian. <http://www.eastoregonian.com/main.asp?SectionID=13&SubSectionID=48&ArticleID=89854>.
- Miller, Scott. "Wind Turbines Driving People From Their Homes". A-News, CTV Globe Media. http://www.atv.ca/wingham/news_68031.aspx.

- Tremonti, Anna Maria (April 14, 2009). "Wind Turbines: Health". The Current, CBC Radio One. http://podcast.cbc.ca/mp3/currentdonotusetthis_20090414_14279.mp3.

- "Wind turbines causing health problems, some Ont. residents say". CBC News. April 14, 2009. <http://www.cbc.ca/canada/toronto/story/2009/04/14/tech-090414-wind-turbines.html>.

- Buurma, Christine (April 21, 2009). "Noise, Shadows Raise Hurdles For Wind Farms". Wall Street Journal. <http://online.wsj.com/article/BT-CO-20090421-714497.html>.

- "Reports of wind farm health problems growing". CTV Toronto. April 22, 2009. http://toronto.ctv.ca/servlet/an/local/CTVNews/20090422/wind_farms_090422/20090422/?hub=TorontoNewHome.

- Miller, Scott. "Daughter's Earaches Blamed On Wind Farm". A-News, CTV Globe Media. http://www.atv.ca/wingham/news_68176.aspx.

- Epp, Peter. "Survey points to health woes arising from wind turbines". Today's Farmer. May 5, 2009.