

**Literature Reviews on Wind Turbines and Health Effects
and the
Case for Audit**

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Notice to Reader

The contents of this paper should not be used to infer any bias for or against wind energy. This paper is not to be associated with and/or used to characterize any individual and/or organization.

Brett Horner has received no financial support for the research, authorship, and/or publication of this paper.

Reasonable precautions have been taken to verify the information contained in this paper.

Any errors and omissions are unintended.

References used

This paper provides references to support statements contained within.

References provided include:

- Peer reviewed references;
- Non peer reviewed references including grey literature;
- References prepared for the Canadian Wind Energy Association and/or the American Wind Energy Association;
- References authored by consultants for members of the wind energy industry;
- References authored by current members and/or previous members of the wind energy industry;
- References authored by Dr. Christopher Ollson and/or his Stantec study team and/or Dr. Loren Knopper and/or Stantec Consulting Ltd.;
- Other references

The majority of the references cited in this paper were available prior to the release of Knopper and Ollson (2011).

Literature Reviews on Wind Turbines and Health Effects and the Case for Audit

“Literature reviews can be useful tools for summarizing existing literature related to a particular topic. In order to be considered reliable a literature review must be complete, accurate, and objective.”¹

“Authors have an inherent responsibility to ensure that they accurately reflect the contents of references cited. Literature reviews which inappropriately cite or misquote references should be viewed with caution.”²

Some literature reviews provide a balanced assessment and attempt to draw reasonable scientific conclusions based on the totality of evidence. Other literature reviews lack completeness, accuracy, and objectivity and contribute little to inform the public about the potential health risks associated with living in the environs of wind turbines. Literature reviews which contain errors of omission and/or errors of commission cannot be relied on to make informed decisions and should be amended or regarded with caution.³

Readers may sometimes assume statements contained in literature reviews accurately reflect the content of the primary reference being cited. Objective examination of evidence (audit), is recommended to evaluate the appropriateness of a literature review’s citations.

Audit Illustration

The following example is provided to illustrate the importance of auditing literature reviews.

The peer reviewed literature review *Health Effects and Wind Turbines: A Review of the Literature*, (Knopper and Ollson, 2011), contains the following statement:

“A number of governmental health agencies agree that while noise from wind turbines is not loud enough to cause hearing impairment and are not causally related to adverse effects, wind turbines can be a source of annoyance for some people [1,30-34].”⁴

Knopper and Ollson (2011) cite six references to support this statement.

Readers might assume that the six references are appropriately cited.

Objective examination of evidence (audit) is recommended to evaluate if the references cited support the Knopper and Ollson (2011) statement.

The Audit Test

To verify if the cited references support the above Knopper and Ollson (2011) statement one needs to evaluate the individual references and assess if they meet the following four audit criteria:

1. Is the cited reference an official production of a governmental health agency?
2. Does the cited reference agree that noise from wind turbines is not loud enough to cause hearing impairment?
3. Does the cited reference agree noise from wind turbines is not causally related to adverse effects?
4. Does the cited reference agree wind turbines can be a source of annoyance?

Knopper and Ollson (2011) Reference 1

The first of the six references cited in Knopper and Ollson (2011) is *Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health*.

Knopper and Ollson (2011) attribute the authors of WHO (2004) to be the World Health Organization (WHO). This attribution suggests that WHO (2004) is an official production authored and/or endorsed by the WHO.

The WHO (2004) version cited ⁵ in Knopper and Ollson (2011) is an “UNEDITED DRAFT” ⁶ which states “The document still needs further in depth development and expert review.” ⁷ and describes a “... plan to hold a meeting to review this document and to develop further recommendations.” ⁸

WHO (2004) also contains a disclaimer “The views expressed in this document are the views of the authors”. ⁹ WHO (2004) lists numerous authors from different organizations.

The draft reference cited, WHO (2004), does not appear to be an official production of the WHO. ^{10 11}

Does WHO (2004) fulfill any of the next three criteria? The answer appears to be no.

WHO (2004) evaluates some health impacts of various sources of energy. WHO (2004) focuses on effects such as air pollution, bronchitis, and occupational accidents.

WHO (2004) does not provide conclusions regarding hearing impairment, causal relationship to reported adverse effects, or annoyance caused by wind turbine noise.

WHO (2004) acknowledges the methodology used in the report did not evaluate wind turbine noise effects stating: “Within the ExternE comparison, health effects from wind energy are negligible, however issues such as sleep disturbance, school absenteeism, eventually resulting from noise in vicinity, could not be evaluated.” ¹²

WHO (2004) comments on wind turbine noise stating:

“Wind energy can, however, have some potential burdens on amenity through visual intrusion or/and noise.”¹³

“Most wind farms are considered to have very low impacts, and these are caused mostly at the local scale – noise pollution may be a problem if turbines are situated close to centres of population.”¹⁴

Knopper and Ollson (2011) omit citing any of these WHO (2004) statements related to wind turbine noise.

To summarize WHO (2004) does not appear to be an official production of the WHO.

That being said the cited reference, WHO (2004), is a draft document¹⁵ which the authors note still needs further in depth development and expert review.

Furthermore, WHO (2004) does not appear to evaluate the health impacts of wind turbine noise.

WHO (2004) acknowledges noise pollution may be a problem if turbines are situated close to centres of population.

WHO (2004) does not state noise from wind turbines is not causally related to adverse effects.

Knopper and Ollson (2011) Reference 30

The second reference cited¹⁶ is *Coping strategies for low frequency noise. J Low Freq Noise V A 2008, 27:35-52.* (Leventhall et al., 2008)¹⁷. How many of the four audit criteria do Leventhall et al., (2008) meet? The short answer appears to be none.

Leventhall et al., (2008) does not appear to be an official production of a governmental health agency nor does it appear to consider wind turbines or the health impacts of wind turbines. Wind turbines do not appear to be mentioned in Leventhall et al., (2008).

Knopper and Ollson (2011) Reference 31

The next four references cited in Knopper and Ollson (2011) are literature reviews produced by various governmental health agencies. These literature reviews have varying degrees of completeness, accuracy, and objectivity (See discussion Horner et al., 2011¹⁸).

Knopper and Ollson (2011) cite *Chatham-Kent Public Health Unit: The Health Impact of Wind Turbines: A Review of the Current White, Grey and Published Literature 2008.*

Chatham-Kent Public Health Unit (2008) is a public health agency literature review that states the “... health impact of the noise created by wind turbines has been studied and debated for decades with no definitive evidence supporting harm to the human ear.”¹⁹ This appears to suggest noise from wind turbines is not loud enough to cause hearing impairment. Chatham-Kent Public Health Unit (2008) comments that noise and sound can be annoying but does not appear to specifically state that wind turbines can be a source of annoyance.

Chatham-Kent Public Health Unit (2008) states in the conclusion:

“This paper concludes and concurs with the original quote from Chatham-Kent’s Acting Medical Officer of Health, Dr. David Colby,

“In summary, as long as the Ministry of Environment Guidelines for location criteria of wind farms are followed, it is my opinion that there will be negligible adverse health impacts on Chatham-Kent citizens. Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence.”²⁰

Chatham-Kent Public Health Unit (2008) does not state noise from wind turbines is not causally related to adverse effects.

Although Chatham-Kent’s Acting Medical Officer is not the author of Chatham-Kent Public Health Unit (2008), he has stated that he endorsed it and takes full responsibility for the contents.²¹

Chatham-Kent’s Acting Medical Officer has authored^{22, 23} or participated in²⁴ references which identify noise induced annoyance and/or stress as the plausible cause of reported wind turbine adverse health effects. One such reference is The American Wind Energy Association and The Canadian Wind Energy Association convened literature review, Colby et al. (2009).²⁵

In 2009, The American Wind Energy Association and The Canadian Wind Energy Association “...established a scientific advisory panel ...”²⁶ and funded a literature review, Colby et al. (2009). Colby et al. (2009) discusses wind turbine symptoms documented by Dr. Nina Pierpont. These symptoms include sleep disturbance, headache, tinnitus, ear pressure, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, and panic episodes associated with sensations of internal pulsation or quivering when awake or asleep.²⁷ Colby et al. (2009) determined the symptoms documented by Dr. Nina Pierpont “...are not new and have been published previously in the context of “annoyance” to environmental sounds ...”²⁸ and are “... an example of the well-known stress effects of exposure to noise ...”²⁹ “... a subset of annoyance reactions ...”³⁰

In previous documents^{31, 32} Dr. Christopher Ollson and/or his Stantec study team cited and relied on Colby et al. (2009).

Knopper and Ollson (2011) omit any mention of The American Wind Energy Association and The Canadian Wind Energy Association convened literature review, Colby et al. (2009).

Knopper and Ollson (2011) Reference 32

The next reference cited is *Minnesota Department of Health Environmental Health Division: Public Health Impacts of Wind Turbines 2009*. Minnesota Department of Health (2009) does not appear to specifically comment on wind turbine noise and hearing impairment but does comment on wind turbine noise annoyance stating: “... lower noise levels (dB(A)) from wind turbines engenders annoyance similar to much higher levels of noise exposure from aircraft, road traffic and railroads.”³³

Minnesota Department of Health (2009) does not state noise from wind turbines is not causally related to adverse effects.

The conclusion of Minnesota Department of Health (2009) states:

“The most common complaint in various studies of wind turbine effects on people is annoyance or an impact on quality of life. Sleeplessness and headache are the most common health complaints and are highly correlated (but not perfectly correlated) with annoyance complaints. Complaints are more likely when turbines are visible or when shadow flicker occurs. Most available evidence suggests that reported health effects are related to audible low frequency noise. Complaints appear to rise with increasing outside noise levels above 35 dB(A). It has been hypothesized that direct activation of the vestibular and autonomic nervous system may be responsible for less common complaints, but evidence is scant.”³⁴

Knopper and Ollson (2011) omit disclosing these Minnesota Department of Health (2009) statements related to wind turbine noise.

Knopper and Ollson (2011) Reference 33

The fifth reference cited is *Chief Medical Officer of Health (CMOH) Ontario: The Potential Health Impact of Wind Turbines 2010*.

CMOH (2010) acknowledges wind turbine noise is not loud enough to cause hearing impairment and wind turbine noise may be annoying stating:

“The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct adverse health effects. However, some people might find it annoying. It has been suggested that annoyance may be a reaction to the characteristic “swishing” or fluctuating nature of wind turbine sound rather than to the intensity of sound.”³⁵

“Wind turbine noise was perceived as more annoying than transportation or industrial noise at comparable levels, possibly due to its swishing quality, changes throughout a 24 hour period, and lack of night-time abatement.”³⁶

CMOH (2010) focuses on direct causal links. In 2011 lead author of CMOH (2010) acknowledged under oath the literature review looked only at direct links to human health.³⁷

At a public information session on wind turbines Dr. Christopher Ollson acknowledged CMOH (2010) “... didn’t look at indirect effects ...”³⁸

CMOH (2010) states:

“While some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects.”³⁹

CMOH (2010) does not state noise from wind turbines is not causally related to adverse effects.

CMOH (2010) was released to the public on May 20, 2010. Another document was prepared by the office of the Chief Medical Officer of Health and transmitted to Ontario medical officers of health by the chair of the Council of Ontario Medical Officers of Health on May 19, 2010⁴⁰. This May 19, 2010 Chief Medical Officer of Health document states:

“Although some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, available scientific evidence does not demonstrate a direct causal link to wind turbine noise. It is possible that these symptoms are a result of annoyance with the noise.”⁴¹

CMOH (2010) acknowledges the Ontario “... Ministry of the Environment has recently hired independent consultants to ... review low frequency sound impacts from wind turbines, and to develop recommendations regarding low frequency sound.”⁴² Canadian Wind Energy Association member, Howe Gastmeier Chapnik Limited, was the consultant hired to prepare the report.

The Howe Gastmeier Chapnik Limited literature review is entitled *Low Frequency Noise and Infrasound Associated with Wind Turbine Generator Systems: A Literature Review*.

The drafts^{43, 44} and final⁴⁵ versions of *Low Frequency Noise and Infrasound Associated with Wind Turbine Generator Systems: A Literature Review* state:

“The audible sound from wind turbines, at the levels experienced at typical receptor distances in Ontario, is nonetheless expected to result in a non-trivial percentage of persons being highly annoyed. As with sounds from many sources, research has shown that annoyance associated with sound from wind turbines can be expected to contribute to stress related health impacts in some persons.”

...

“Stress symptoms associated with noise annoyance, and in particular low frequency annoyance include sleep interference, headaches, poor concentration, mood swings”

...

“Since it is evident that complaints related to low frequency noise from wind turbines often arise from the characteristics of the sound impact indoors, and since the indoor low frequency sound levels and frequency spectra can differ markedly from those outdoors, it is recommended that the MOE consider adopting or developing a protocol to provide guidance for addressing such complaints.”

In December 2010 the Ontario Ministry of Environment submitted *Low Frequency Noise and Infrasound Associated with Wind Turbine Generator Systems: A Literature Review – Final Draft, prepared for the Ministry of Environment, December 10, 2010*⁴⁶ as disclosure evidence at an Ontario Environmental Review Tribunal.

On January 17, 2011 Dr. Christopher Ollson stated he was provided a copy of *Low Frequency Noise and Infrasound Associated with Wind Turbine Generator Systems: A Literature Review – Final Draft, prepared for the Ministry of Environment, December 10, 2010*;⁴⁷ and that he reviewed it during the preparation of his witness statement for the Ontario Environmental Review Tribunal.⁴⁸

In December 2011 the Ontario Ministry of Environment released the final report by Howe Gastmeier Chapnik Limited stating "... three experts in the field of noise, vibration and acoustics reviewed and validated the report".⁴⁹ The report released in December 2011 appears to contain the same content as *Low Frequency Noise and Infrasound Associated with Wind Turbine Generator Systems: A Literature Review – Final Draft, prepared for the Ministry of Environment, December 10, 2010*;⁵⁰

Knopper and Ollson (2011) omit any mention of *Low Frequency Noise and Infrasound Associated with Wind Turbine Generator Systems: A Literature Review – Final Draft, prepared for the Ministry of Environment, December 10, 2010*.⁵¹

As noted above Knopper and Ollson (2011) cite and rely on *Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health*, (WHO, 2004) which is an "UNEDITED DRAFT"⁵²

Knopper and Ollson (2011) Reference 34

The sixth and final reference cited is "*Australian Government, National Health and Medical Research Council: Wind Turbines and Health: A Rapid Review of the Evidence 2010*." Rapid Review (2010) appears to acknowledge wind turbine noise is not loud enough to cause hearing impairment and wind turbine noise may be annoying. Rapid Review (2010) appears to focus on direct effects and states in the conclusion:

"There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines."⁵³

Rapid Review (2010) does not specify what the potential impacts on humans are nor does it provide specifics of the planning guidelines which will minimize the impacts.

Rapid Review (2010) does not conclude that noise from wind turbines is not causally related to adverse effects.

A 2011 Australian Senate committee inquiry refers to Rapid Review (2010) and reports:

"Many ... witnesses who asserted that there are not any adverse health effects from wind farms relied on a survey of the literature published by the National Health and Medical Research Council (NHMRC)"⁵⁴

The Australian Senate committee inquiry further reports:

"Professor Anderson, the Chief Executive Officer of NHMRC, informed the Committee that:

I do want to make a point to anybody who is relying on this.

We regard this as a work in progress. We certainly do not believe that this question has been settled. That is why we are keeping it under constant review.

That is why we said in our review that we believe authorities must take a precautionary approach to this. That is what we do say in medicine anyhow, but this is very important here because of the very early stage of the scientific literature. In any area we make statements on, we are robust, we are used to being criticised from all sorts of directions and we cannot be responsible for the use that others make of the literature ...”⁵⁵

In 2012 when asked if the NHMRC is prepared to say that there are no health problems from the wind turbines the Chief Executive Officer of NHMRC, Professor Anderson, stated “...we have never been prepared to say that because it is very hard to rule things out ...”.⁵⁶

The NHMRC is currently working on producing an updated literature review and public statement with an expected release date in 2013.⁵⁷

Audit Conclusion: Knopper and Ollson (2011) Statement

The above discussion suggests while some of the six references cited met some of the audit criteria, none met all four. (See **Appendix Table 1**).

One reference does not appear to meet any of the four audit criteria.

The audit comments presented suggest none of the six references cited support the complete Knopper and Ollson (2011) sentence:

“A number of governmental health agencies agree that while noise from wind turbines is not loud enough to cause hearing impairment and are not causally related to adverse effects, wind turbines can be a source of annoyance for some people [1,30-34].”

For example, none of the six references appear to have concluded that wind turbines “... are not causally related to adverse effects...”

The above discussion illustrates the importance of auditing the completeness, accuracy and objectivity of literature reviews.

Appendix Table 1: Summary of Knopper and Ollson (2011) Audit Result

Reference Cited in Knopper and Ollson (2011)	1. Is the cited reference an official production of a governmental health agency?	2. Does the cited reference agree that noise from wind turbines is not loud enough to cause hearing impairment?	3. Does the cited reference agree noise from wind turbines is not causally related to adverse effects?	4. Does the cited reference agree wind turbines can be a source of annoyance?
1. World Health Organization (WHO): Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health; 2004.	Uncertain Reference is an unedited draft. Reference does not appear to be an official WHO document. See discussion section Knopper and Ollson (2011) Reference 1	No Reference does not appear to comment on hearing impairment.	No Reference does not appear to evaluate noise health impacts.	No Reference does not appear to comment on wind turbine annoyance.
30. Leventhall G, Benton S, Robertson D: Coping strategies for low frequency noise. J Low Freq Noise V A 2008, 27:35-52.	No Reference does not appear to be an official production of a governmental health agency.	No Reference does not appear to mention wind turbines.	No Reference does not appear to mention wind turbines.	No Reference does not appear to mention wind turbines.
31. Chatham-Kent Public Health Unit: The Health Impact of Wind Turbines: A Review of the Current White, Grey and Published Literature 2008.	Yes	Yes - (Indirectly)	No “...as long as the Ministry of Environment Guidelines for location criteria of wind farms are followed, it is my opinion that there will be negligible adverse health impacts...” See discussion section Knopper and Ollson (2011) Reference 31	Yes - (Indirectly) Does not specifically state wind turbines can be a source of annoyance for some people

Reference Reference Cited in Knopper and Ollson (2011)	1. Is the cited reference an official production of a governmental health agency?	2. Does the cited reference agree that noise from wind turbines is not loud enough to cause hearing impairment?	3. Does the cited reference agree noise from wind turbines is not causally related to adverse effects?	4. Does the cited reference agree wind turbines can be a source of annoyance?
32. Minnesota Department of Health Environmental Health Division: Public Health Impacts of Wind Turbines 2009.	Yes	No Reference did not appear to specifically comment on hearing impairment.	No Reference states “Most available evidence suggests that reported health effects are related to audible low frequency noise.”	Yes “... lower noise levels (dB(A)) from wind turbines engenders annoyance similar to much higher levels of noise exposure from aircraft, road traffic and railroads.”
33. Chief Medical Officer of Health (CMOH) Ontario: The Potential Health Impact of Wind Turbines 2010.	Yes	Yes	No Focused on direct causal links. A separate CMOH Q&A document states: “It is possible that these symptoms are a result of annoyance with the noise.” See discussion section Knopper and Ollson (2011) Reference 33	Yes “Wind turbine noise was perceived as more annoying than transportation or industrial noise at comparable levels, possibly due to its swishing quality, changes throughout a 24 hour period, and lack of night-time abatement.”
34. Australian Government, National Health and Medical Research Council: Wind Turbines and Health: A Rapid Review of the Evidence 2010.	Yes	Yes	No Focused on direct pathological effects. See discussion section Knopper and Ollson (2011) Reference 34	Yes

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- ¹ Horner B, Jeffery R., Krogh C., “Literature Reviews On Wind Turbines And Health : Are They Enough?”, Bulletin of Science Technology & Society 31: 399, (2011)
- ² Horner B, Jeffery R., Krogh C., “Literature Reviews On Wind Turbines And Health : Are They Enough?”, Bulletin of Science Technology & Society 31: 399, (2011)
- ³ Horner B, Jeffery R., Krogh C., “Literature Reviews On Wind Turbines And Health : Are They Enough?”, Bulletin of Science Technology & Society 31: 399, (2011)
- ⁴ Knopper & Ollson, “Health Effects and Wind Turbines: A Review of the Literature” Environmental Health, 10:78, (2011)
- ⁵ Note: In an email dated July 17, 2012 Dr. Knopper confirmed the version of Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health cited in Knopper and Ollson (2011).
- ⁶ World Health Organization (WHO): Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health; 2004.
- ⁷ World Health Organization (WHO): Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health; 2004.
- ⁸ World Health Organization (WHO): Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health; 2004.
- ⁹ World Health Organization (WHO): Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health; 2004.
- ¹⁰ Note: a search of the WHO website “Library and Information Network” did not return a document EUR/04/5046267/BD/8, dated 3 June 2004, entitled: “Energy, sustainable development and health” [July 14, 2012] <http://dosei.who.int/uhtbin/cgiirsi/JI3dREVj55/72610010/5/0>
- ¹¹ Note: attempts to confirm if document number EUR/04/5046267/BD/8, dated 3 June 2004, entitled: “Energy, sustainable development and health” is an official WHO document have been made. As of the date of this paper the WHO have not confirmed that it is an official WHO document, Email from WHO July 23 2012.
- ¹² World Health Organization (WHO): Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health; 2004.
- ¹³ World Health Organization (WHO): Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health; 2004.
- ¹⁴ World Health Organization (WHO): Fourth Ministerial Conference on Environment and Health. Energy, Sustainable Development and Health; 2004.
- ¹⁵ Note: attempts to confirm if a final version has been published subsequent to June 3, 2004, regarding document number EUR/04/5046267/BD/8, dated 3 June 2004, and entitled: Energy, sustainable development and health, Background document. As of the date of this paper the WHO have not confirmed that a final version has been published, Email from WHO July 23 2012.
- ¹⁶ Note in an email dated July 17, 2012. Dr. Knopper confirmed this is the version of Leventhall et al. (2008) cited in Knopper and Ollson (2011) in an email dated July 17, 2012.
- ¹⁷ Leventhall G, Benton S, Robertson D: Coping strategies for low frequency noise. J Low Freq Noise V A 2008, 27:35-52.
- ¹⁸ Horner B, Jeffery R., Krogh C., “Literature Reviews On Wind Turbines And Health : Are They Enough?”, Bulletin of Science Technology & Society 31: 399, (2011)
- ¹⁹ Chatham-Kent Public Health Unit. (2008). The health impact of wind turbines: A review of the current white, grey, and published literature. Chatham, Ontario, Canada: Chatham-Kent Municipal Council. Retrieved from <http://www.wind-works.org/LargeTurbines/Health%20and%20Wind%20by%20C-K%20Health%20Unit.pdf>
- ²⁰ Chatham-Kent Public Health Unit. (2008). The health impact of wind turbines: A review of the current white, grey, and published literature. Chatham, Ontario, Canada: Chatham-Kent Municipal Council. Retrieved from <http://www.wind-works.org/LargeTurbines/Health%20and%20Wind%20by%20C-K%20Health%20Unit.pdf>
- ²¹ Personal communication, May 6, 2009
- ²² Acting Medical Officer of Health Chatham-Kent Health Unit. (2009, June 1). Request for further clarification on health effects of wind turbines. Retrieved from <http://www.canwea.ca/pdf/talkwind/Colby%20Letter%20June%202009.pdf>
- ²³ Dr. Colby’s presentation to Nova Scotia Department of Energy on March 4, 2010
- ²⁴ Chief Medical Officer of Health. (2010, May 19). Wind turbines Qs and As: Appendix b. Retrieved from http://www.oshawa.ca/agendas/City_Council/2010/2010_06_28/RF_14_RMD_Health_Wind_Turbines.pdf
- ²⁵ Colby, W. D., Dobie, R., Leventhall, G., Lipscomb, D. M., McCunney, R. J., Seilo, M. T., & Søndergaard, B., Wind Turbine Sound and Health Effects: An Expert Panel Review, Washington, DC: American Wind Energy Association and Canadian Wind Energy Association. (2009)
Retrieved from http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf

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- ²⁶ Colby, W. D., Dobie, R., Leventhall, G., Lipscomb, D. M., McCunney, R. J., Seilo, M. T., & Søndergaard, B., Wind Turbine Sound and Health Effects: An Expert Panel Review, Washington, DC: American Wind Energy Association and Canadian Wind Energy Association. (2009)
Retrieved from http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf
- ²⁷ Pierpont, N. (2009). Wind turbine syndrome: A report on a natural experiment. Santa Fe, NM: K-Selected Books.
- ²⁸ Colby, W. D., Dobie, R., Leventhall, G., Lipscomb, D. M., McCunney, R. J., Seilo, M. T., & Søndergaard, B. (2009, December). Wind turbine sound and health effects: An expert panel review. Washington, DC: American Wind Energy Association and Canadian Wind Energy Association. Retrieved from
http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf
- ²⁹ Colby, W. D., Dobie, R., Leventhall, G., Lipscomb, D. M., McCunney, R. J., Seilo, M. T., & Søndergaard, B. (2009, December). Wind turbine sound and health effects: An expert panel review. Washington, DC: American Wind Energy Association and Canadian Wind Energy Association. Retrieved from
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- ³⁰ Colby, W. D., Dobie, R., Leventhall, G., Lipscomb, D. M., McCunney, R. J., Seilo, M. T., & Søndergaard, B. (2009, December). Wind turbine sound and health effects: An expert panel review. Washington, DC: American Wind Energy Association and Canadian Wind Energy Association. Retrieved from
http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf
- ³¹ Dr. Ollson witness affidavit for the legal proceedings of David McKinnon v. Red Lily Wind Power Limited Partnership in September 2010., Dated September 15, 2010.
- ³² Stantec Consulting Ltd., Ostrander Point Wind Energy Design and Operations Report, Prepared for: Gilead Power Corporation, September 2010
- ³³ Minnesota Department of Health, Public Health Impacts Of Wind Turbines, (2009, May)
- ³⁴ Minnesota Department of Health, Public Health Impacts Of Wind Turbines, (2009, May)
- ³⁵ Chief Medical Officer of Health. (2010, May). Report: The potential health impact of wind turbines.
- ³⁶ Chief Medical Officer of Health. (2010, May). Report: The potential health impact of wind turbines.
- ³⁷ Erickson v. Director, Ministry of the Environment, Environmental Case Nos. 10-121 and 10-122. Transcript of Dr. G. Rachamin. 2011, March 4.
- ³⁸ Dr. Ollson recorded at an Ontario public information session 2011
- ³⁹ Chief Medical Officer of Health. (2010, May). Report: The potential health impact of wind turbines.
- ⁴⁰ Personal communication, January 27, 2011
- ⁴¹ Chief Medical Officer of Health. (2010, May 19). Wind turbines Qs and As: Appendix b. Retrieved from
http://www.oshawa.ca/agendas/City_Council/2010/2010_06_28/RF_14_RMD_Health_Wind_Turbines.pdf
- ⁴² Chief Medical Officer of Health. (2010, May). Report: The potential health impact of wind turbines.
- ⁴³ Howe Gastmeier Chapnik Limited. (August 3, 2010). Low frequency noise and infrasound associated with wind turbine generator systems: A literature review (Draft, Rfp No. Oss-078696). Mississauga, Ontario, Canada: Ministry of the Environment.
- ⁴⁴ Howe Gastmeier Chapnik Limited. (December 10, 2010). Low frequency noise and infrasound associated with wind turbine generator systems: A literature review (Final Draft, Rfp No. Oss-078696). Mississauga, Ontario, Canada: Ministry of the Environment.
- ⁴⁵ Howe Gastmeier Chapnik Limited. (2010, December 10). Low frequency noise and infrasound associated with wind turbine generator systems: A literature review (Rfp No. Oss-078696). Mississauga, Ontario, Canada: Ministry of the Environment.
- ⁴⁶ Howe Gastmeier Chapnik Limited. (December 10, 2010). Low frequency noise and infrasound associated with wind turbine generator systems: A literature review (Final Draft, Rfp No. Oss-078696). Mississauga, Ontario, Canada: Ministry of the Environment.
- ⁴⁷ Howe Gastmeier Chapnik Limited. (December 10, 2010). Low frequency noise and infrasound associated with wind turbine generator systems: A literature review (Final Draft, Rfp No. Oss-078696). Mississauga, Ontario, Canada: Ministry of the Environment.
- ⁴⁸ Erickson v. Director, Ministry of the Environment, Environmental Case Nos. 10-121 and 10-122, Witness Statement of Dr. Christopher Ollson, January 17, 2011
- ⁴⁹ Ontario Ministry of Environment, Expert Report Confirms No Direct Health Effects From Wind Turbines, [cited December 19, 2011] Retrieved from <http://news.ontario.ca/ene/en/2011/12/expert-report-confirms-no-direct-health-effects-from-wind-turbines.html>
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