

Hayes Exhibit #2

Reviews of Acoustic Testing Program at Cape Bridgewater Wind Farm

- Rand
- Ambrose
- Thorne
- Schomer/Hessler

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January 21, 2015

Mr. Steven Cooper
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Dear Steven,

Re: Cape Bridgewater Wind Farm Acoustic Study

Congratulations on this superlative work investigating the neighbor reports and correlating (unintended) adverse effects of the facility. The scope and detail of your report is sure to assist acoustic investigators, planners, utilities, and the public to understand without any further doubt or dismissal what wind turbine neighbors have been saying for years, as you so clearly sum up,

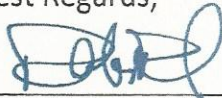
"What we found was that previously they were complaining about the noise, but it wasn't really the noise, it was sensations."

The report's establishing of tonal energy at the blade pass and harmonics along with higher frequencies with sidebands as the wind turbine signature, puts to rest any further tendency by acoustic professionals to rely on constant-percentage bands to attempt to assess neighbor impacts from wind turbine signals.

The correlation of sensation level to WTS tone level in the infrasonic and audible bands brings wind turbine acoustics right to the door of medical science. Medical tests in the homes, long overdue, can now be correlated directly to WTS. May the medical testing in homes begin without further delay.

I would like to express my deep appreciation to Pacific Hydro for sponsoring the study and providing turbine on/off conditions for evaluation.

Best Regards,



Robert W. Rand, ASA, INCE

January 22, 2015

Mr. Steven Cooper, INCE, AAS, ASA
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Ref: Cape Bridgewater Wind Farm Acoustic Study

Congratulations, I commend you for pursuing scientific truth by investigating the human response to large wind-turbines in the acoustic environment. Your correlation of human response journal entries with scientific waveform analysis clearly shows hearing is not limited to audible sounds. Research continues to reveal that the ear has multiple functions and capabilities. This study merits recognition by acoustic and public health professionals for more research.

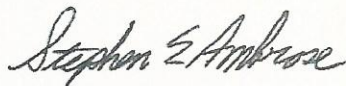
Your study goes far beyond the 1980s Neil Kelley et al. studies that identified operating wind-turbines can produce airborne transmissions that humans detect as "sensations". Bray/James research showed that one-third octave band filters could not measure the low-frequency peaks produced wind-turbines.

Neighbors' complaints were ignored by the majority. Acoustic experts failed to understand the limitations of their instruments and analysis methods. The Cape Bridgewater Wind Farm Analysis Study should end blaming the neighbor. Neighbors deserve respect. Experts earn respect.

Before wind turbines, the highest negative community reaction was "vigorous community action to stop the noise". Wind turbines have raised the bar to "home abandonment". This life-saving option is not affordable; most experience diminished quality of life, degradation of health, and loss of wellbeing. The population majority remains unknowing and unaffected by wind turbines because they live far away or genetically protected from "sensations". I was surprised to learn that I should not live near a wind turbine neighbor. I have no sympathy; I have real empathy.

Thank you and best wishes.

Respectfully,



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21 January 2015

Mr Steven Cooper
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Dear Steven

Cape Bridgewater Wind Farm Acoustic Study

Congratulations on the release of your benchmark research into the effects of wind farm activity and the measurable effects on persons living in the locale. At 235 pages for the report and 6 technical annexures (491 pages) the study cannot be matched by any previous wind farm study in Australia. The research is a unique contribution to science and is remarkable and ground-breaking:

1. The determination of the actual physical parameters involved in the measurement, interpretation and assessment of wind farm noise (audible and infrasound) on persons is formalised and supported by extensive documentation.
2. The development and determination of the concept of 'sensation' as distinct from 'noise' due to infrasound, low frequency sound, audible sound or vibration is ground-breaking and unique. The concept has an important place alongside standard measures such as 'quality of life' and psychoacoustical correlates.
3. The obvious support from both PacificHydro and the residents is the stand-out feature of the study and it is clear from the text that the outcomes were not envisaged by yourself or the study participants at the commencement of the study. The approach taken is highly professional and supportive to both your client (PacificHydro) and sympathetic to the residents who provided you with their assistance.

The study is extremely comprehensive. Outcomes immediately apparent from an overview of the study that should become a vital part of any present and future wind farm study are:

1. Measurement and analysis methodologies for instrumentation and uncertainty derived from the study are now the benchmark for all acoustic consultants, scientists and engineers involved in the field;
2. The determination of a wind turbine signature at two different frequency 'sets' related to sensation is unique. The sensation frequencies are grouped in the infrasound 1Hz to 5Hz and low frequency 30Hz to 35Hz bands for the REpower MM82 turbines. Different turbines will

have different centre frequencies and sidebands at the blade pass frequency. The methodologies for determining sensation are the link-points for many other studies that did not have the access to the acoustical data and human response questionnaires developed by you for this study.

3. Infrasound is firmly identified as a standard and normal part of the emissions of a wind farm. The character of the infrasonic emissions is identified as being measurably different from 'ordinary' wind; that is, infrasound generated by/from turbines consists of trains of pressure pulses and must be measured through narrow-band analysis and interpreted accordingly. Standard measures with third-octave bands and G-weighting are found to be not valid identifiers/measures of wind turbine affected wind noise;
4. The determination of a wind turbine signature consisting of the nominal blade pass frequency and first 5 or 6 harmonics is a significant outcome from the study as these frequencies are present and measurable even in high winds.
5. The study provides significant 'food for thought' for power station managers and regulators with respect to the anecdotal issues /questions / complaints of adverse health effects and sleep disturbance, annoyance and loss of amenity and wellbeing experienced by persons living near a wind farm.

The most intriguing part of your study is the set of conclusions dealing with the 'pattern of high severity of disturbance' experienced by the residents with the wind farm in operation. Therefore, the obvious question, based on the detail in your study, is:

Can the operation of the wind farm be modified to reduce or mitigate the disturbances experienced by the residents?

The present situation cannot continue without change. The report has raised hard questions for PacificHydro to discuss with the residents. It is to be hoped - and expected - that support is given for the next steps of resolving the issue of adverse effects and restoring individual amenity and wellbeing to its original status prior to the operation of the wind farm.

Best Regards



Dr Bob Thorne PhD, MAAS, MIOA, FRSPH
Principal

Reference source:

<http://www.pacifichydro.com.au/english/our-communities/communities/cape-bridgewater-acoustic-study-report/?language=en>

The Results of an Acoustic Testing Program, Cape Bridgewater Wind Farm

Prepared for Energy Pacific by Steve Cooper, The Acoustic Group

A Review of this Study and Where It Is Leading

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Schomer and Associates, Inc.; Standards Director, Acoustical Society of America

George Hessler, Hessler Associates, Inc.

10 February 2015

Recently Cooper has completed a first of its kind test regarding the acoustical emissions of wind turbines. This is the first study of effects on people that includes a cooperating windfarm operator in conjunction with a researcher that does not work exclusively for windfarms. This study makes three very simple points:

1. There is at least one non-visual, non-audible pathway for wind turbine emissions to reach, enter, and affect some people
2. This is a longitudinal study wherein the subjects record in a diary regularly as a function of time the level of the effects they are experiencing at that time
3. This periodic recording allows for responses as the wind-turbine power changes up and down, changes not known by the subject

The results are presented in a 218 page report augmented by 22 appendices spread over 6 volumes so that every single detail in the study has been documented for all to see and examine. The methods and results are totally transparent. The 22 appendices and the main text exhaustively document everything involved with this study.

Six subjects, 3 couples from different homes are the participants in this study. They do not represent the average resident in the vicinity of a wind farm. Rather, they are self-selected as being particularly sensitive and susceptible to wind farm acoustic emissions, so much so that one couple has abandoned their house. Cooper finds that these six subjects are able to sense attributes of the wind turbine emissions without there being an audible or visual stimulus present. More specifically, he finds that the subject responses correlate with the wind turbine power being generated but not with either the sound or vibration.

Although the very nature of a longitudinal study provides for a finding of cause and effect, some will undoubtedly argue that a correlation does not show cause and effect. In this case they must postulate some other thing like an unknown "force" that simultaneously causes the wind turbine power being generated and symptoms such as nausea, vertigo, and headaches to change up and down together. But that is the kind of "creative" logic it takes to say that this correlation does not represent cause-and-effect. So, rather than making such groundless arguments, perhaps something like an "expert statistical analysis" can be expected "proving" this is not a "valid sample" of the public at large, or proving the study does not do something else it was *never* intended to do.

So it is important to sort out what, by design, this study was intended to do and does do, and what, by design, it was not intended to do and does not do. This study is not in any way a sample of the general population nor is it in any way a sample of the general population in the vicinity of windfarms. According to Cooper's report, this study was intended to address the issue of complaints from residents in the vicinity of Pacific Hydro's Cape Bridgewater Wind Farm. Pacific Hydro requested the conduct of an acoustic study at 3 residential properties to ascertain any identifiable noise impacts of the wind farm operations or certain wind conditions that could relate

to the complaints that had been received. The study was to incorporate three houses that are located between 650 m and 1600 m from the nearest turbine. This research represents a case study at 3 houses, each with one couple, 6 people. This is one sample, and only one sample, of a small group of people who are all self-selected as being very or extremely sensitive to wind turbine acoustic emissions. A similar group could be assembled elsewhere such as in Shirley Wisconsin, USA or Ontario Canada.

This study finds that these 6 people sense the operation of the turbine(s) via other pathways than hearing or seeing, and that the adverse reactions to the operations of the wind turbine(s) correlates directly with the power output of the wind turbine{s} and fairly large changes in power output.

Attempts may be made to obviate these simple points with such arguments as it cannot be proved that infra-sound is the cause of the discomfort. But that again is a specious argument. The important point here is that something is coming from the wind turbines to affect these people and that something increases or decreases as the power output of the turbine increases or decreases. Denying infra-sound as the agent accomplishes nothing. It really does not matter what the pathway is, whether it is infra-sound or some new form of rays or electro-magnetic field coming off the turbine blades. If the turbines are the cause, then the windfarm is responsible and needs to fix it. Anyone who truly doubts the results should want to replicate this study using *independent*¹ acoustical consultants at some other wind farm, such as Shirley Wisconsin, USA, where there are residents who are self-selected as being very or extremely sensitive to wind turbine acoustic emissions.²

Some may ask, this is only 6 people, why is it so important? The answer is that up until now windfarm operators have said there are no known cause and effect relations between windfarm emissions and the response of people living in the vicinity of the windfarm other than those related to visual and/or audible stimuli, and these lead to some flicker which is treated, and "some annoyance with noise." This study proves that there are other pathways that affect some people, at least 6. The windfarm operator simply cannot say there are no known effects and no known people affected. One person affected is a lot more than none; the existence of just one cause-and-effect pathway is a lot more than none. It only takes one example to prove that a broad assertion is not true, and that is the case here. Windfarms will be in the position where they must say: "We may affect some people." And regulators charged with protecting the health and welfare of the citizenry will not be able to say they know of no adverse effects. Rather, if they choose to support the windfarm, they will do so knowing that they may not be protecting the health and welfare of all the citizenry.

<http://www.pacifichydro.com.au/pacific-hydro-releases-cape-bridgewater-wind-farm-acoustic-study/>

<http://www.pacifichydro.com.au/english/our-communities/communities/cape-bridgewater-acoustic-study-report/?language=en>

¹ Independent Consultants are those who have worked for both industry and communities, and or have espoused the need for research to sort out the issues of people reacting to non-audible non-visual stimuli.

² Cooper's test shows cause and effect for at least one non-visual, no-audible pathway to affect people. If one only wanted to test for the ability to sense the turning on of wind turbines, and not replicate the cause and effect portion of Cooper's study, this reduced test could be accomplished in one to two months with a cooperative windfarm where there are residents who are self-selected as being very or extremely sensitive to wind turbine acoustic emissions and who also assert that they have this sensing ability. This study, a subset of the full Cooper tests, would only prove, again, that non-visual, non-auditory pathways exist by which wind turbine emissions may affect the body and "signal" the brain.