

Low Frequency and Infrasound Noise Immission from Wind Farms and the potential for Vibro- Acoustic disease

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Wind Farm LFN and VAD

- Introduction
- The Issue
- VAD
- Measurements of infrasound and low frequency noise from wind farms
- Comparison of Levels between Wind Farm and VAD Levels
- Why might this link occur?
- Conclusions



The Issue

<http://kirbymtn.blogspot.com/2006/04/vibroacoustic-disease-and-wind.html>

Saturday, April 01, 2006

Vibroacoustic disease and wind turbines #_

From Calvin Luther Martin, Malone, N.Y.:

[Mariana Alves-Pereira](#), Dept. of Environmental Sciences & Engineering, New University of Lisbon, Caparica, Portugal, has for many years been part of a team of physicians and scientists studying the pathophysiology of low-frequency noise and infrasound on humans. She is Assistant Coordinator of the Vibroacoustic Disease Project.

Alves-Pereira and colleagues have been doing epidemiologic studies of airline pilots and technicians and other people who are chronically exposed to low-frequency noise and infrasound. The effects are grim: cardiovascular, respiratory, neurologic, and renal pathology and symptoms, which they call vibroacoustic disease.


Alves-Pereira, in discussion with physicians Amanda Harry in the U.K. and [Nina Pierpont](#) in the U.S., is now looking into the low-frequency noise and infrasound produced by industrial wind turbines, to determine whether they, too, can cause such vibroacoustic disease (VAD). Alves-Pereira's initial assessment, based on noise measurements taken inside and outside the homes of wind turbine neighbors, is that turbines are indeed a likely cause of VAD.



UK References

- UKNA Report: Location, Location, Location

Location, Location, Location
An investigation into wind farms and noise by The Noise Association



Noise - 'unwanted sound' -- can ruin people's well-being and environment

"Peace and quiet is the single most important factor people have in mind when buying a home - with one in five prospective homebuyers rating it as the most important consideration when choosing where they will buy." Alliance and Leicester Survey, 3/8/02

In Portugal, where low frequency noise has been researched extensively, a link has been found with a complex illness known as vibroacoustic disease. Although this research has been mainly concerned with high levels of low frequency noise, it is felt that prolonged exposure to lower levels of low frequency noise may cause similar problems. Certainly the symptoms which some people living around wind turbines complain of are very similar to those of vibroacoustic disease.



VAD Symptoms

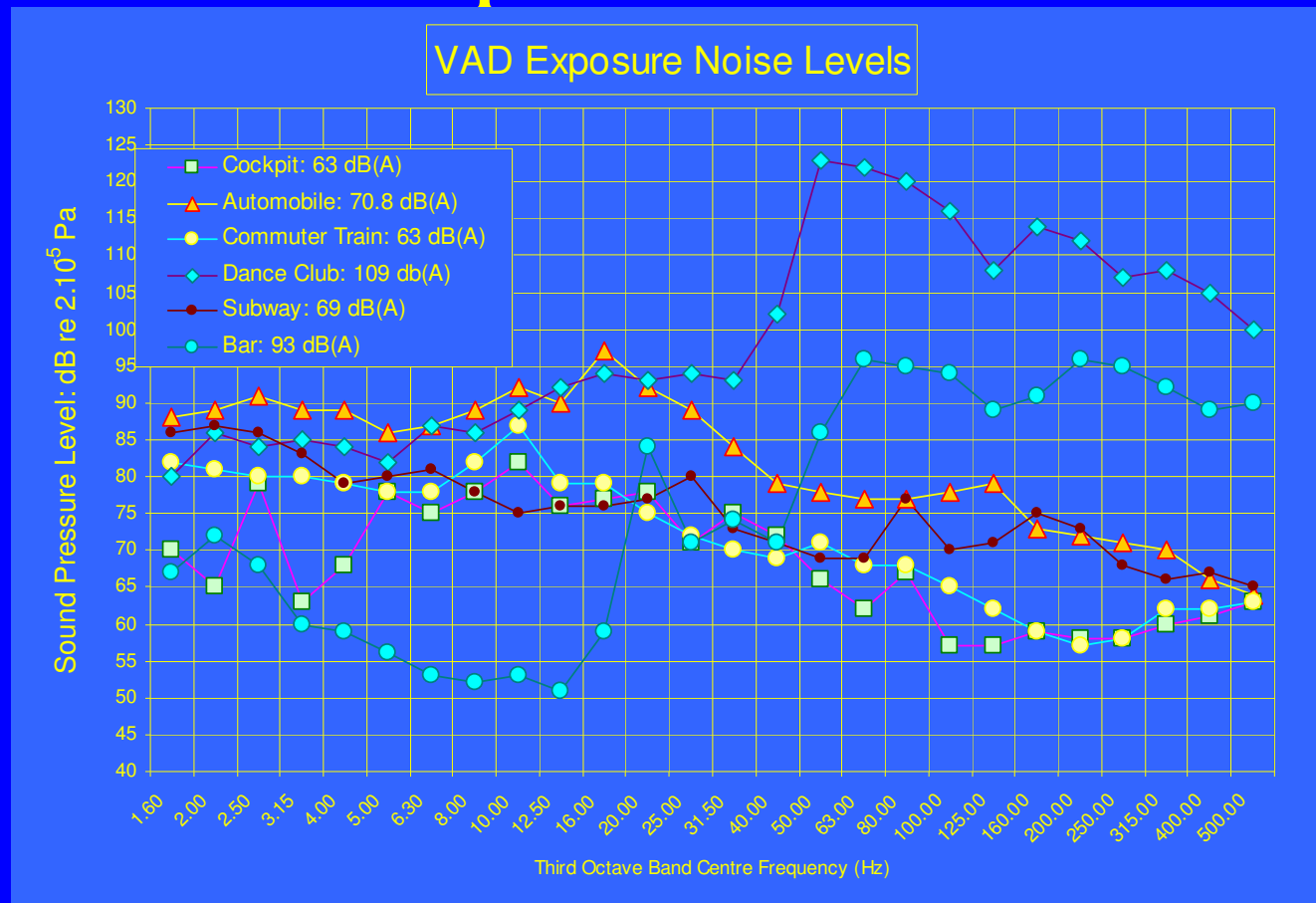
Table 1. Data from a group of 140 aircraft technicians (selected from an initial group of 306 workers), occupationally exposed to LFN (8 hrs/day, 5 days/week). Exposure time (in years) refers to the amount of time it took for 70 individuals (50%) to develop the corresponding sign or symptom (Castelo Branco, 1999b).

| Clinical Stage | Sign/Symptom |
|--|---|
| <i>Stage I-Mild</i> (1-4 years) | Slight mood swings, Indigestion and heart -burn, Mouth/throat infections, Bronchitis |
| <i>Stage II-Moderate</i> (4-10 years) | Chest pain, Definite mood swings, Back pain, Fatigue, Fungal, viral and parasitic skin infections, Inflammation of stomach lining, Pain and blood in urine, Conjunctivitis, Allergies |
| <i>Stage III-Severe</i> (> 10 years) | Psychiatric disturbances, Haemorrhages of nasal, digestive and conjunctive mucosa, Varicose veins and haemorrhoids, Duodenal ulcers, Spastic colitis, Decrease in visual acuity, Headaches, Severe joint pain, Intense muscular pain, Neurological disturbances |

Castelo Branco NAA, Rodriguez Lopez E, Alves-Pereira M, and Jones DR. (1999b) Vibroacoustic disease: some forensic aspects. *Aviation, Space and Environmental Medicine*, 70 (3, Suppl): A145-51.



VAD Exposure Noise Levels



Vibroacoustic disease: N.A.A. Castelo Branco and M. Alves-Pereira: : Noise & Health 2004, 6:23, 3-20

Low Frequency Noise: Bristol 2006



The measurement of low frequency noise at three UK wind farms

- Selection of measurement sites based upon reports in national press as giving rise to infrasound and low frequency noise
- Measurements performed at external and internal locations
- Measurements performed over extended periods: 2 – 4 weeks monitoring
- Analysis of periods when described by occupants as audible and “unacceptable”.



Infrasound Measurements

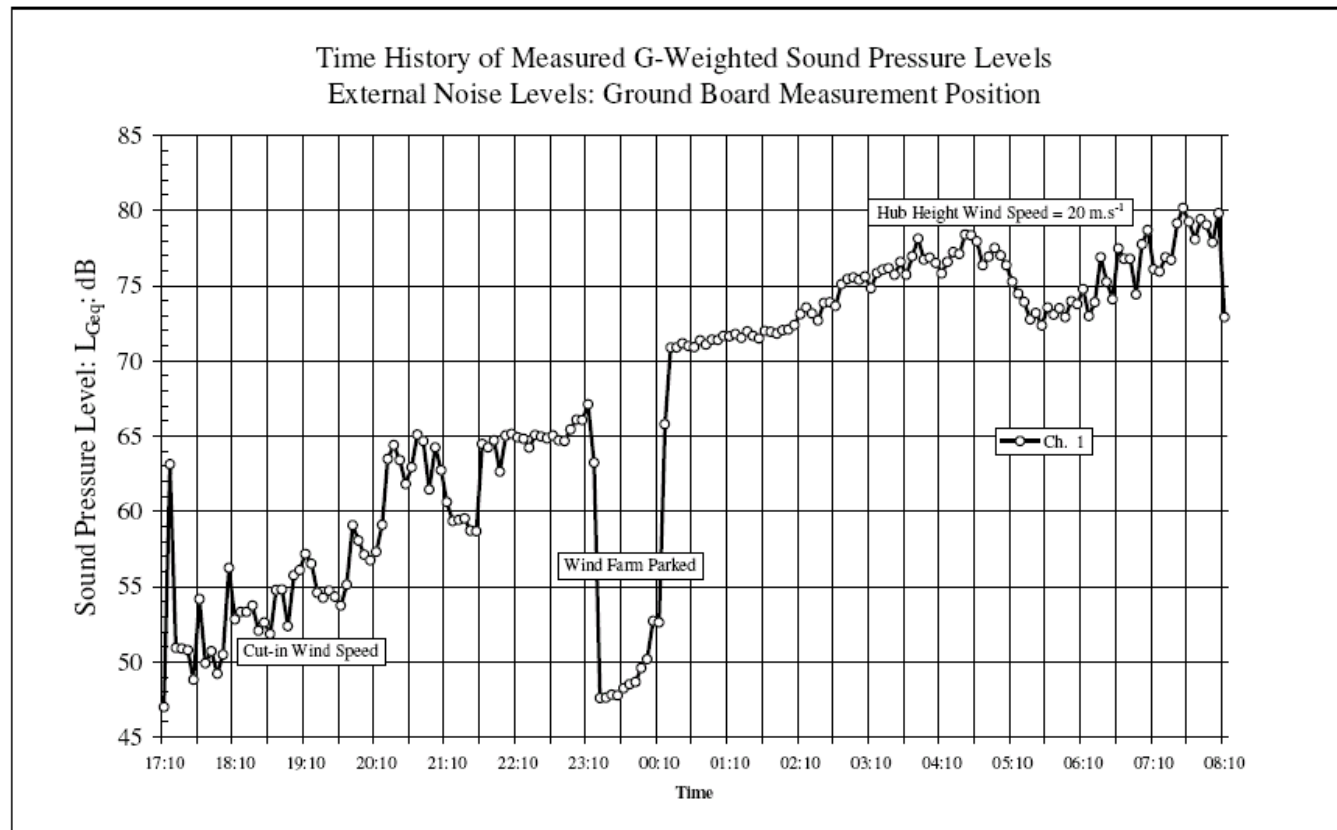


Figure 12: Time History Figure of G-Weighted Sound Pressure Levels for a Wind Farm

Infrasound Measurements

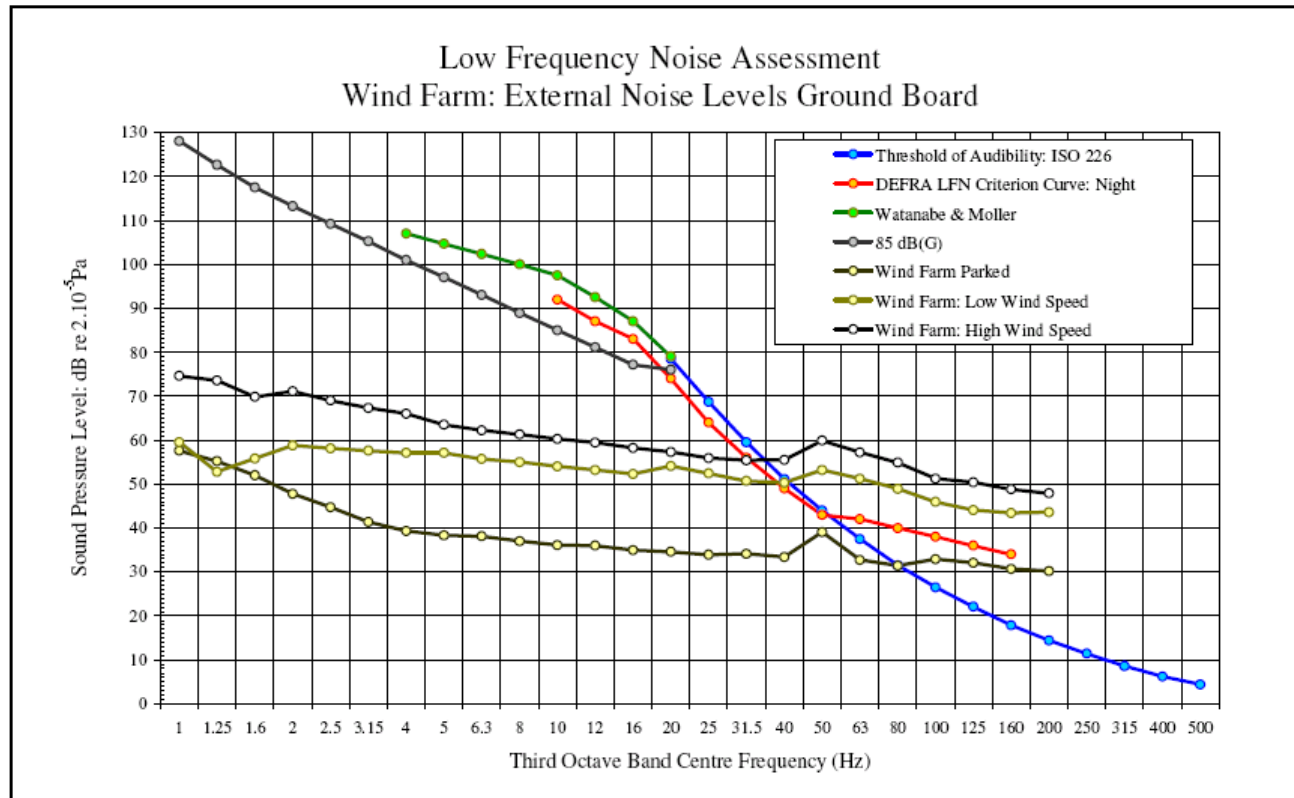


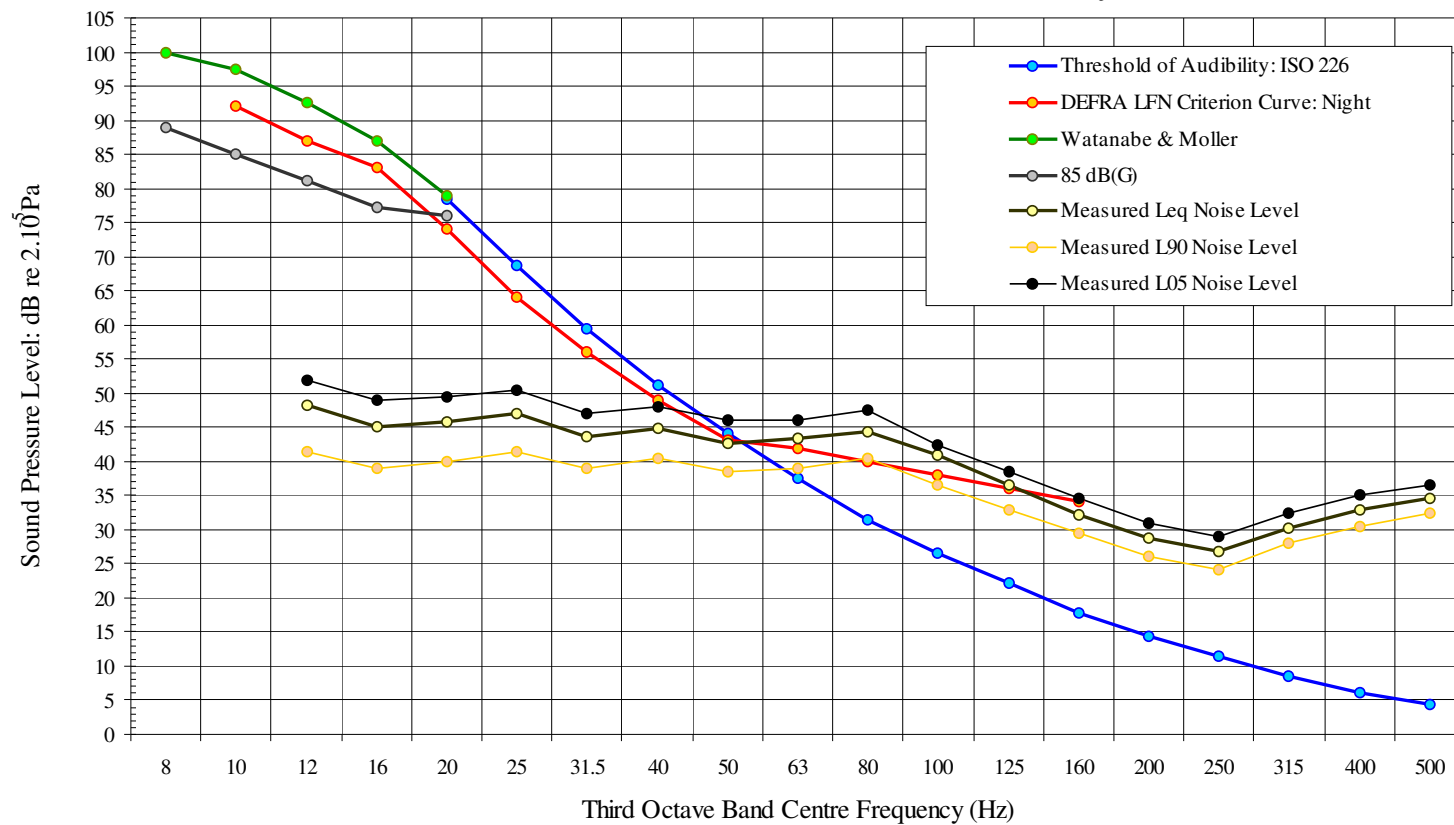
Figure 11: Measured Infrasound and Low Frequency Noise Levels: External Location on Ground Board



External Noise Levels

Low Frequency Noise Assessment

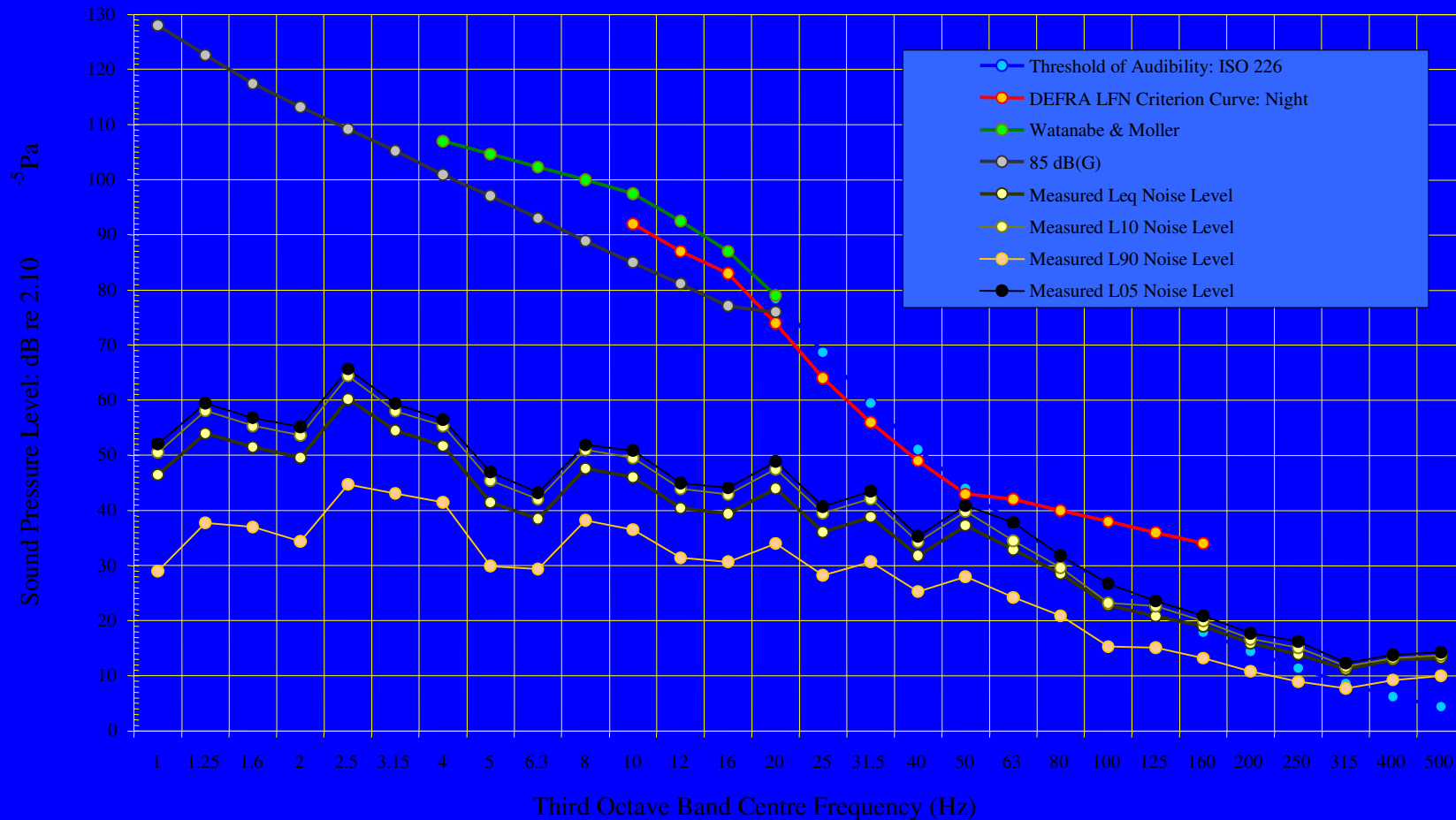
External ETSU-R-97: Location 1: 03:00 14th May 2005



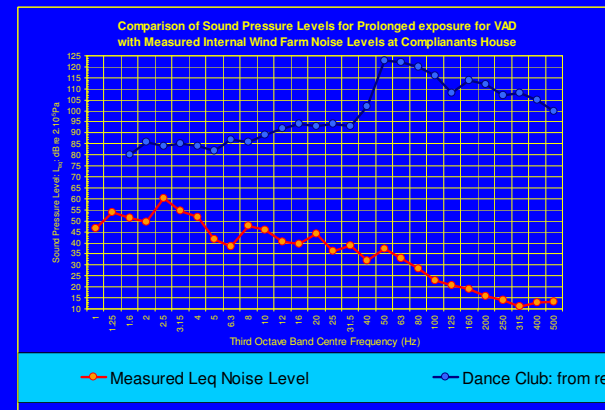
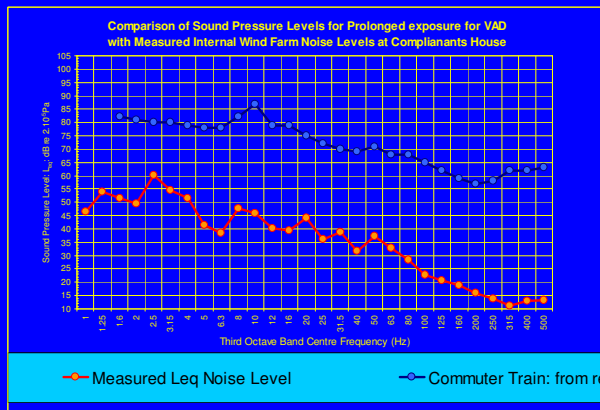
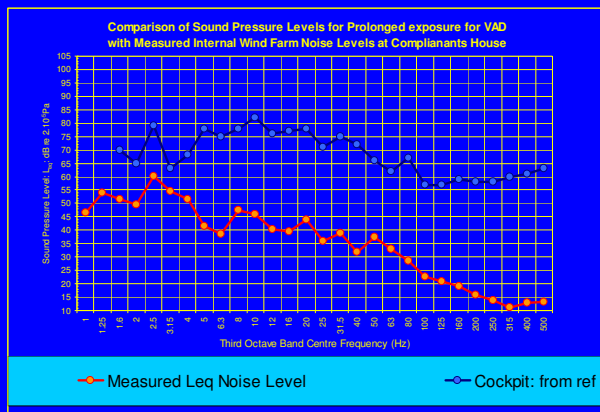
Internal Noise Level

Low Frequency Noise Assessment

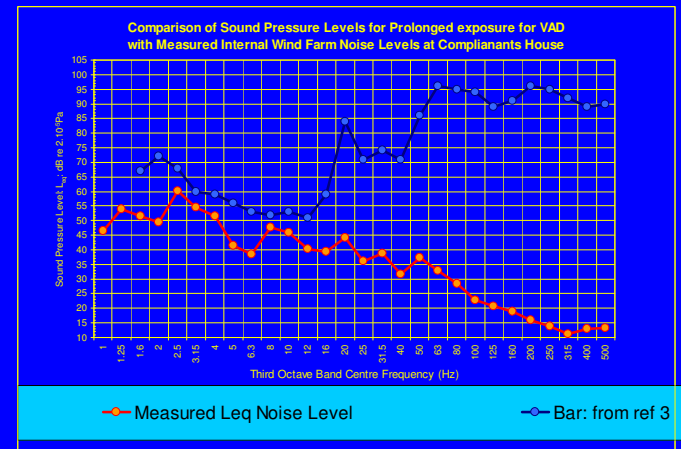
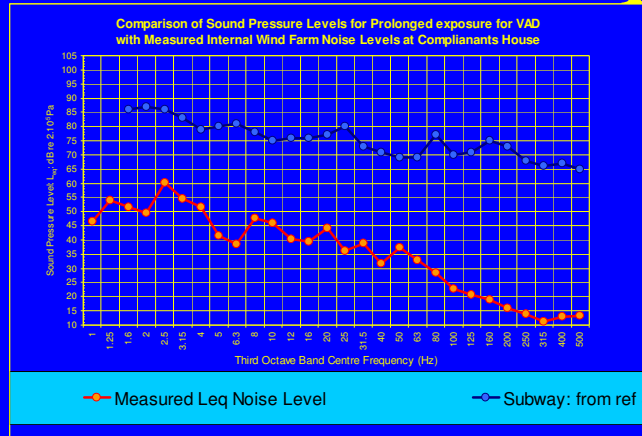
Location 1: 03:05 14th May 2005



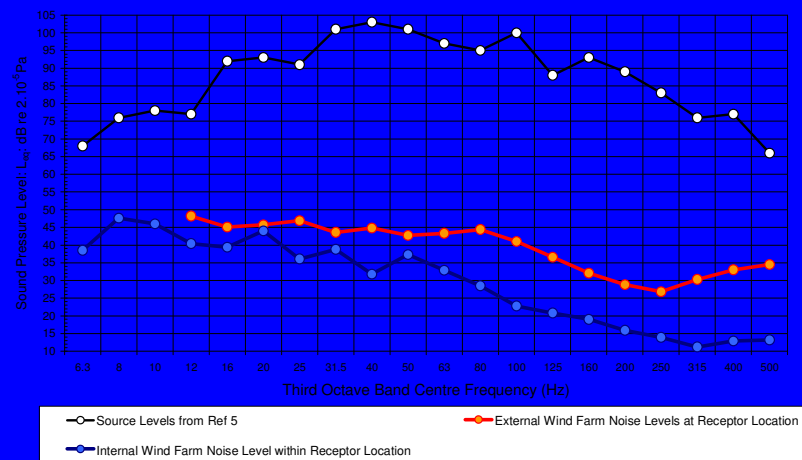
Comparison of Levels



Comparison of Levels



Comparison of Sound Pressure Levels for Prolonged exposure for VAD with Measured Wind Farm Noise Levels at Complainants House Internal and External

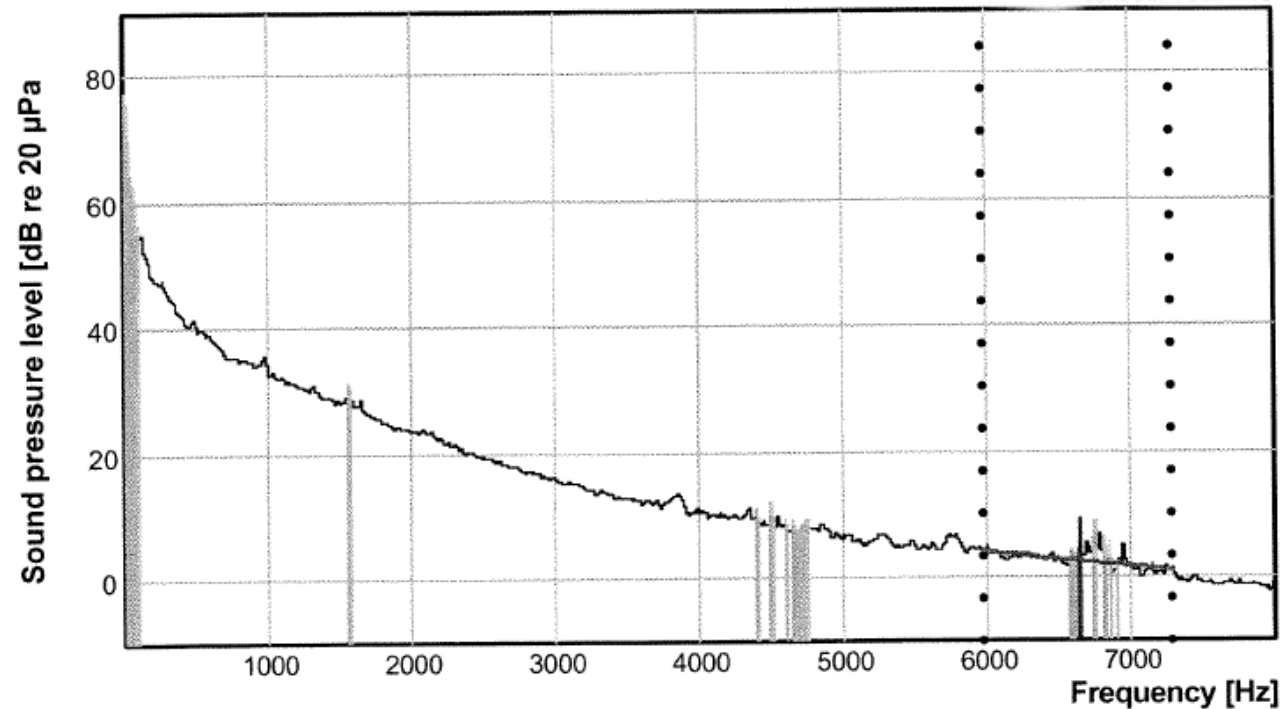


Why might this link occur?

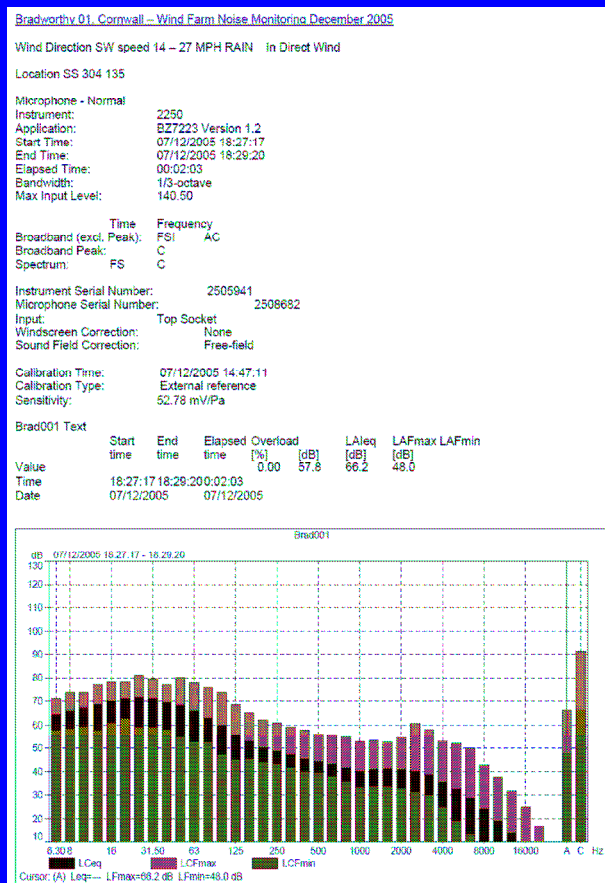
9.2 Narrow band analysis

An FFT analysis of noise on the metal sheet at approx 8 m/s has been performed in order to determine tonal audibility of turbine noise.

Spectrum: —
Tone(s): ■
Noise pauses: ▨



Why might this link occur?



Body Surface Induced Vibration from Low Frequency Noise

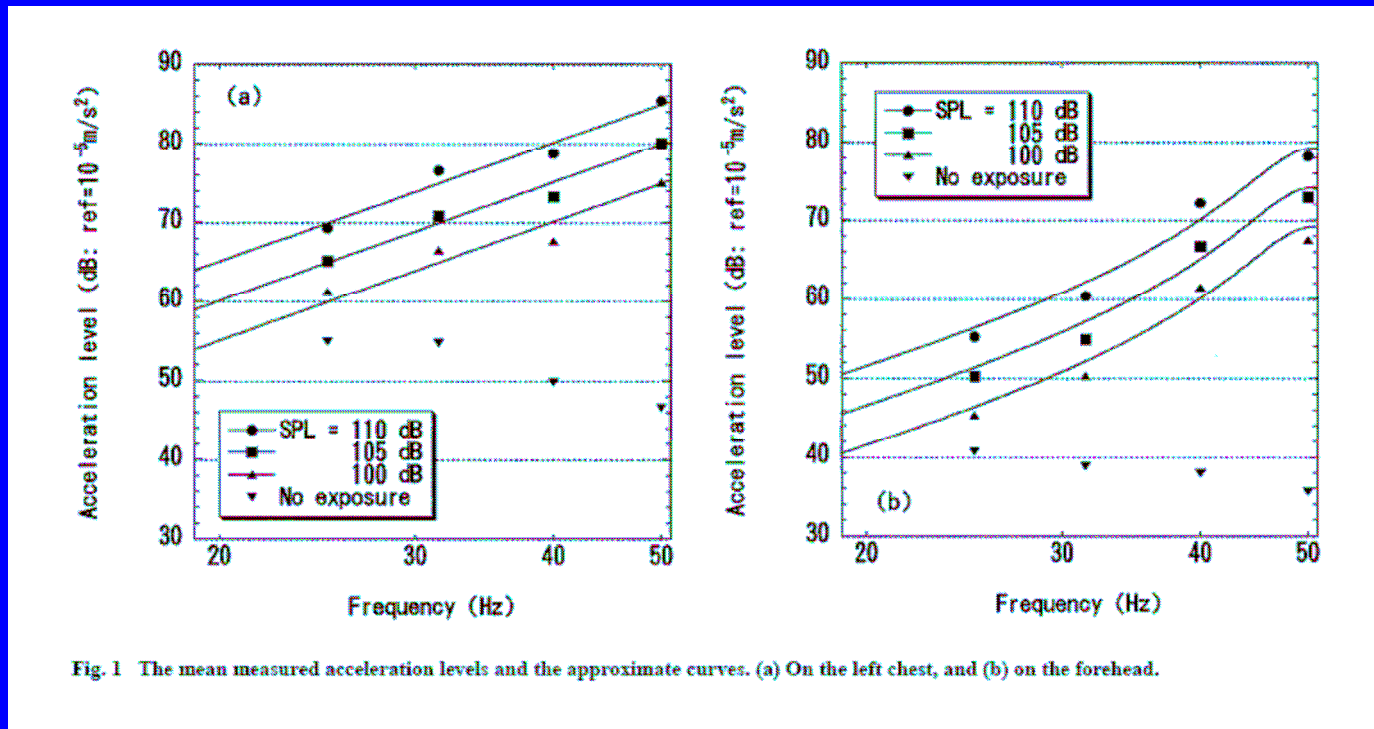


Fig. 1 The mean measured acceleration levels and the approximate curves. (a) On the left chest, and (b) on the forehead.

- Measurement of Human Body Surface Vibrations Induced by Complex Low-Frequency Noise Composed of Two Pure Tones: Y. Takahashi, S Maeda: Journal of Low Frequency Noise, Vibration and Active Control: Vol. 22 No. 4 2003
- A New Approach to Assess Low Frequency Noise in the Working Environment: Y. Takahashi, Y Yonekawa, K. Kanada: Industrial Health 2001, 39, 281 - 286



Conclusions

- Internal/External Infrasound and Low Frequency Data now available for operational wind farms in the UK
- Levels are significantly below those identified to give VAD
- Unlikely that symptoms will result through induced internal body vibration from incident wind farm noise

