Low Frequency Noise and Wind Turbines : Fact or Fiction

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All-Energy Opportunities2004

The Issues

- The potential effect of low frequency noise upon neighbours to wind farms.

- The potential effect of low frequency noise and vibration upon the Eskdalemuir Seismic Array.

Low Frequency Noise and Wind Farm Neighbours

- Complaints received from neighbours to three operational wind farms;
- Complainants claim that low frequency noise is leading to health effects;
- That the levels associated with the operation of the wind farms may lead to potential serious health effects.

DEFRA Report

A Review of Published Research on Low Frequency Noise and its Effects

A Report for DEFRA by Dr Geoff Leventhall

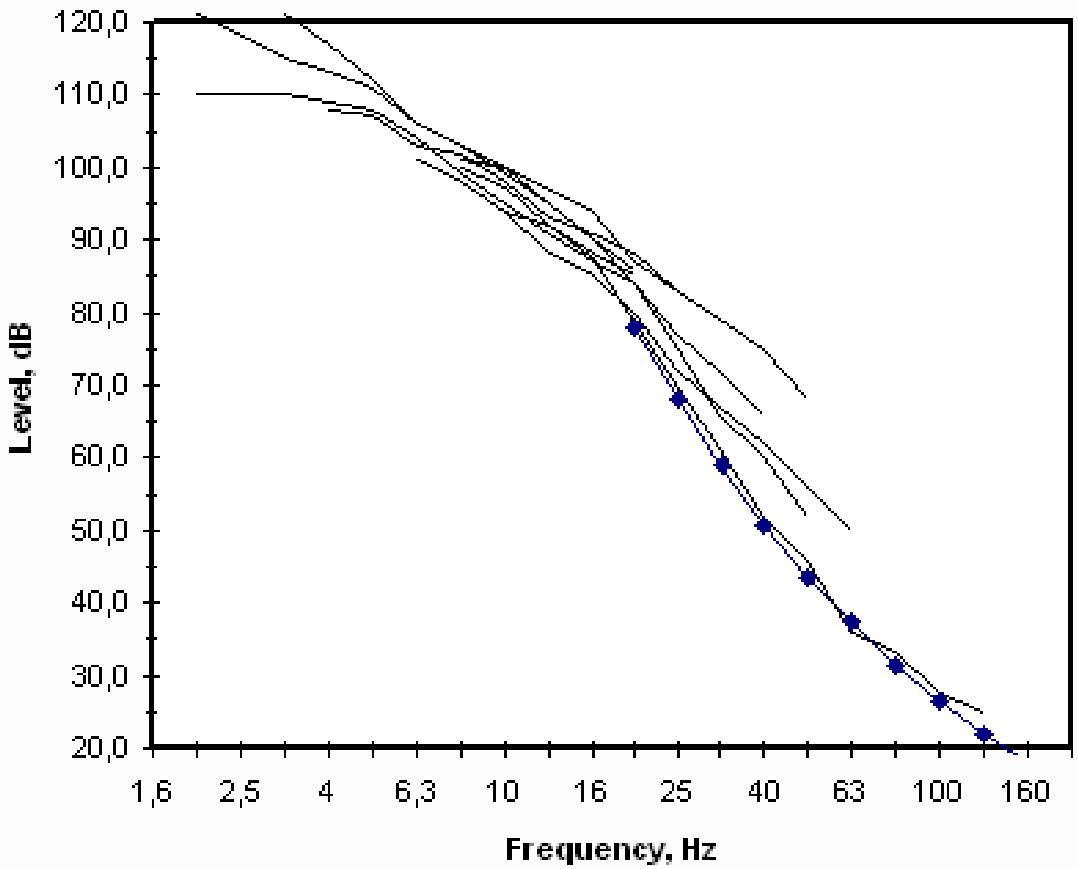
Dated May 2003

Low Frequency Noise

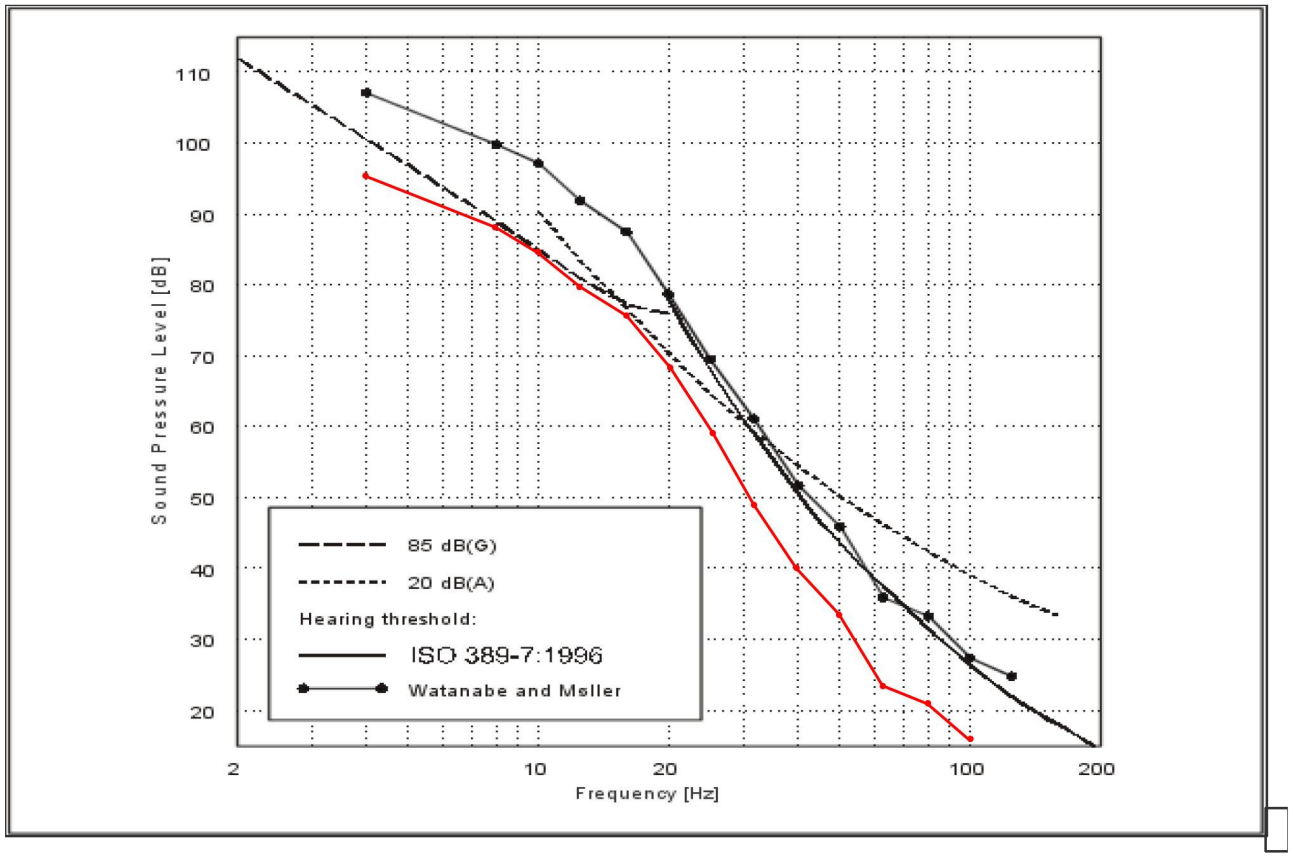
The range from about 10 Hz to
200 Hz covers low frequency noise.

All the low frequency noise range is audible, although high levels are required to exceed the hearing thresholds at he lower frequencies

Low Frequency Hearing Threshold

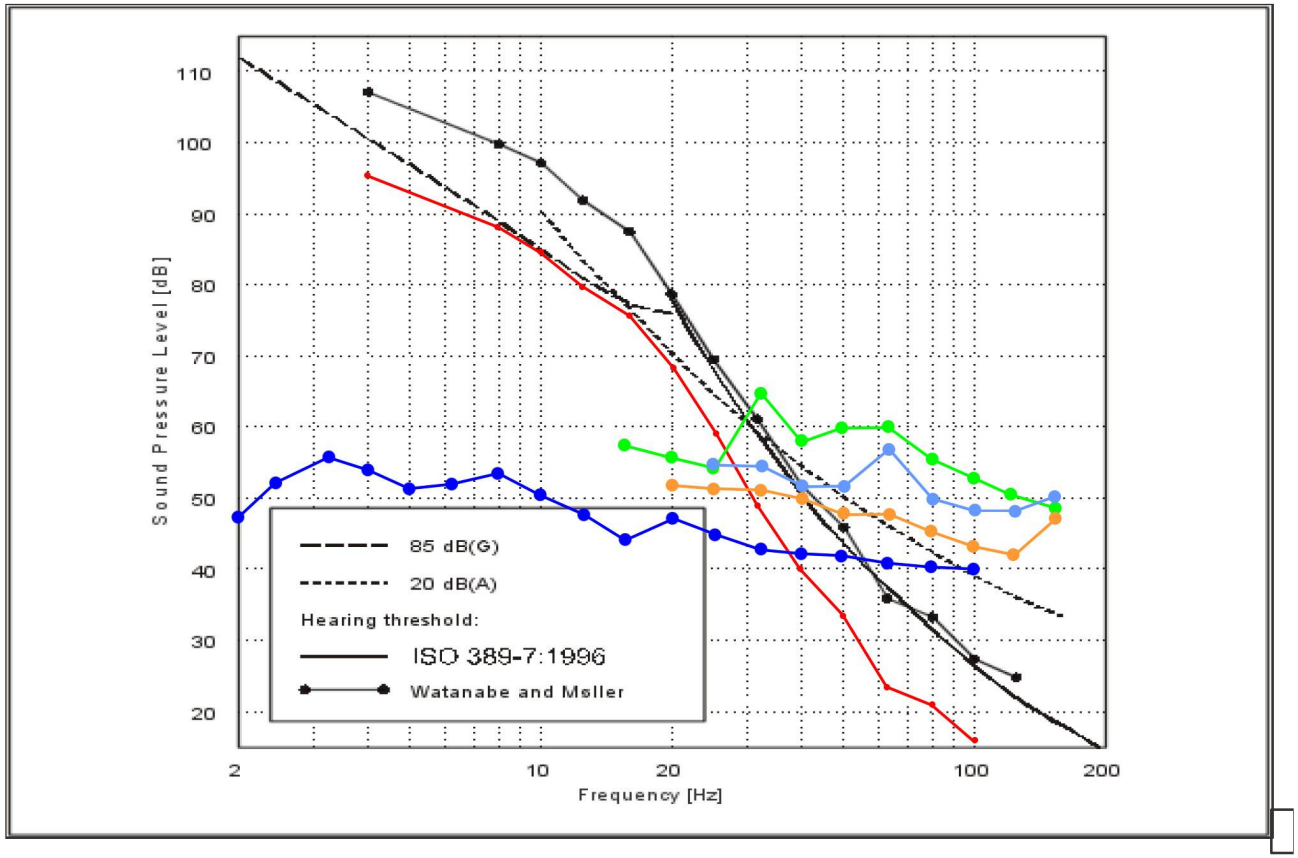


Low Frequency Hearing Threshold



Threshold levels after Watanabe and Møller (1990b).

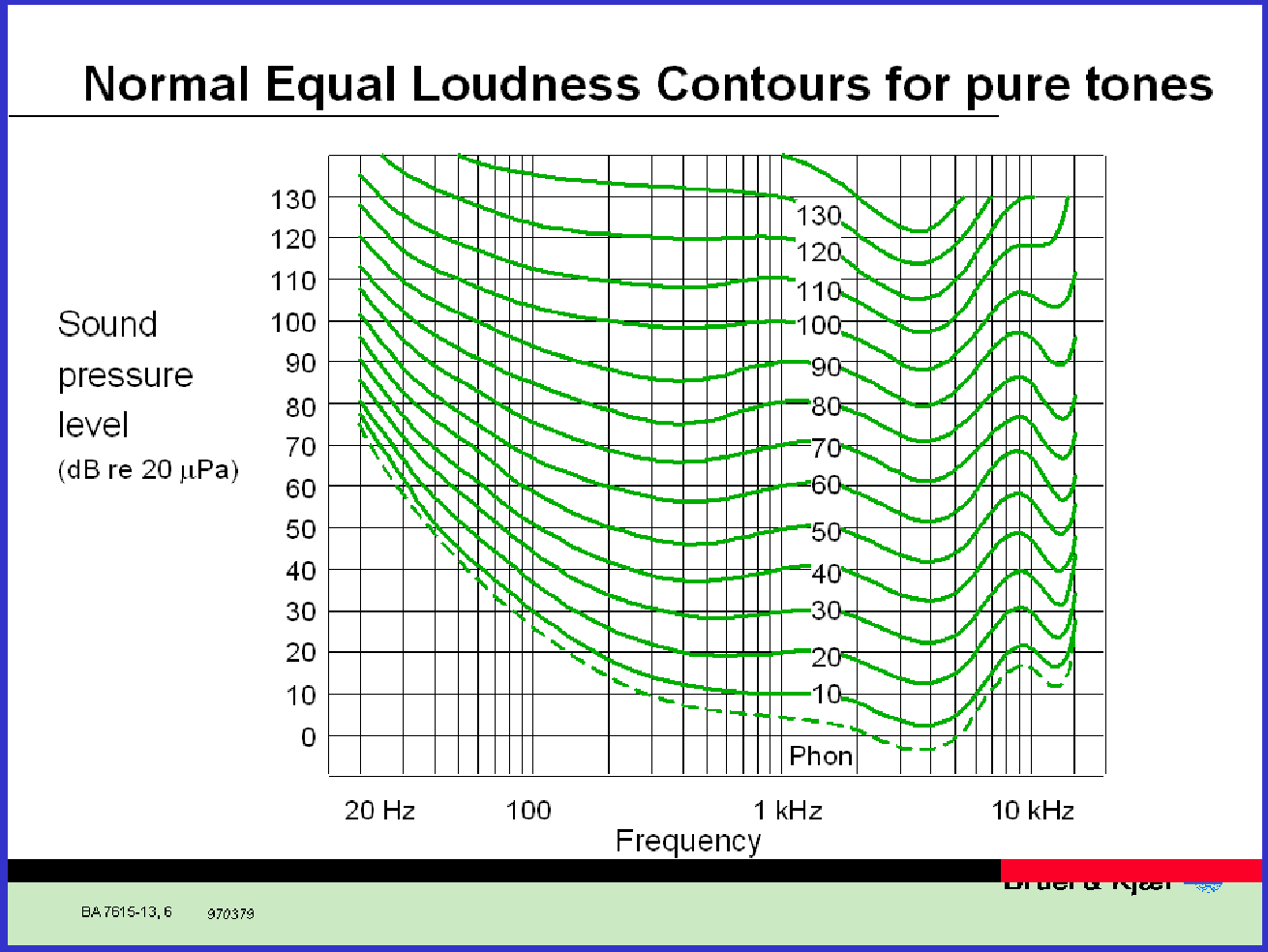
Low Frequency Hearing Threshold



Threshold levels after Watanabe and Møller (1990b).

Nordex N-80 : messung der Infraschall-Abstrahlung einer Windenergieanlage des Typs Nordex N-80 : 13th May 2003

Potential Change in Perceived Noise Level



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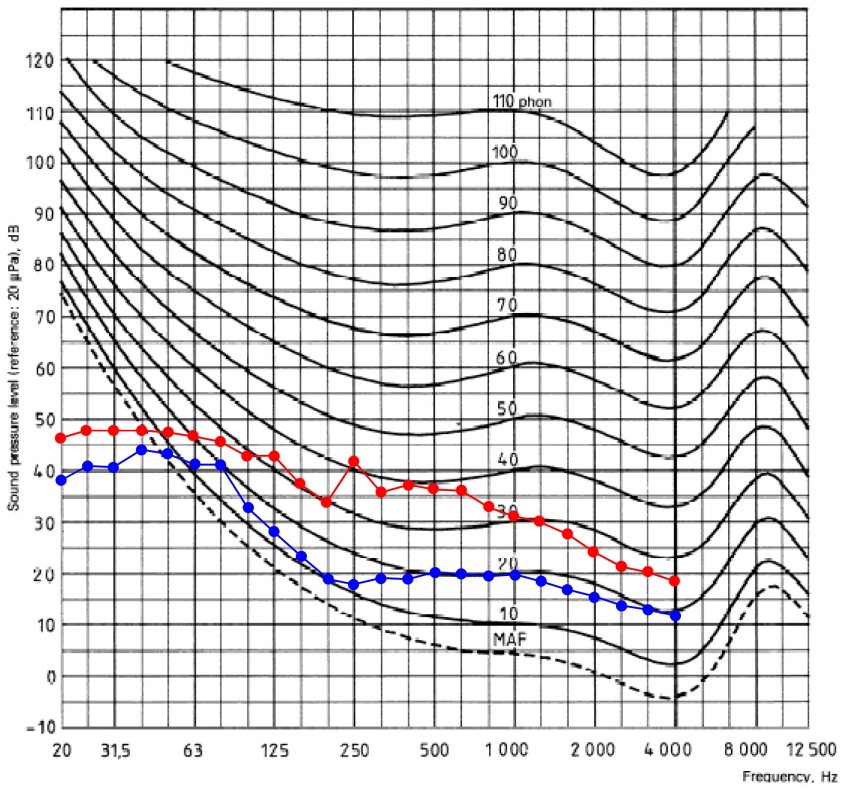


Figure 8. Equal loudness contours (ISO 226).

Potential Change in Perceived Noise Level

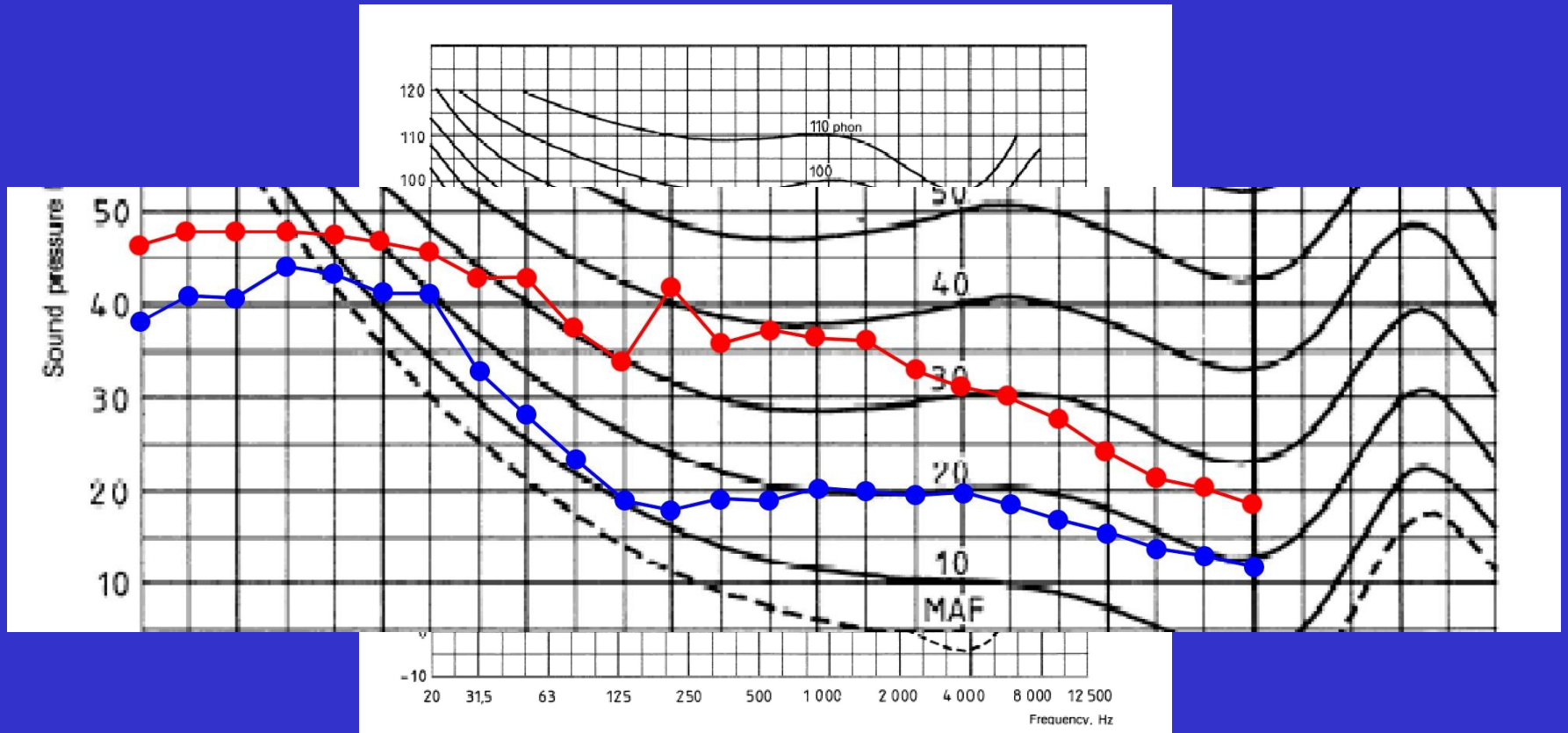


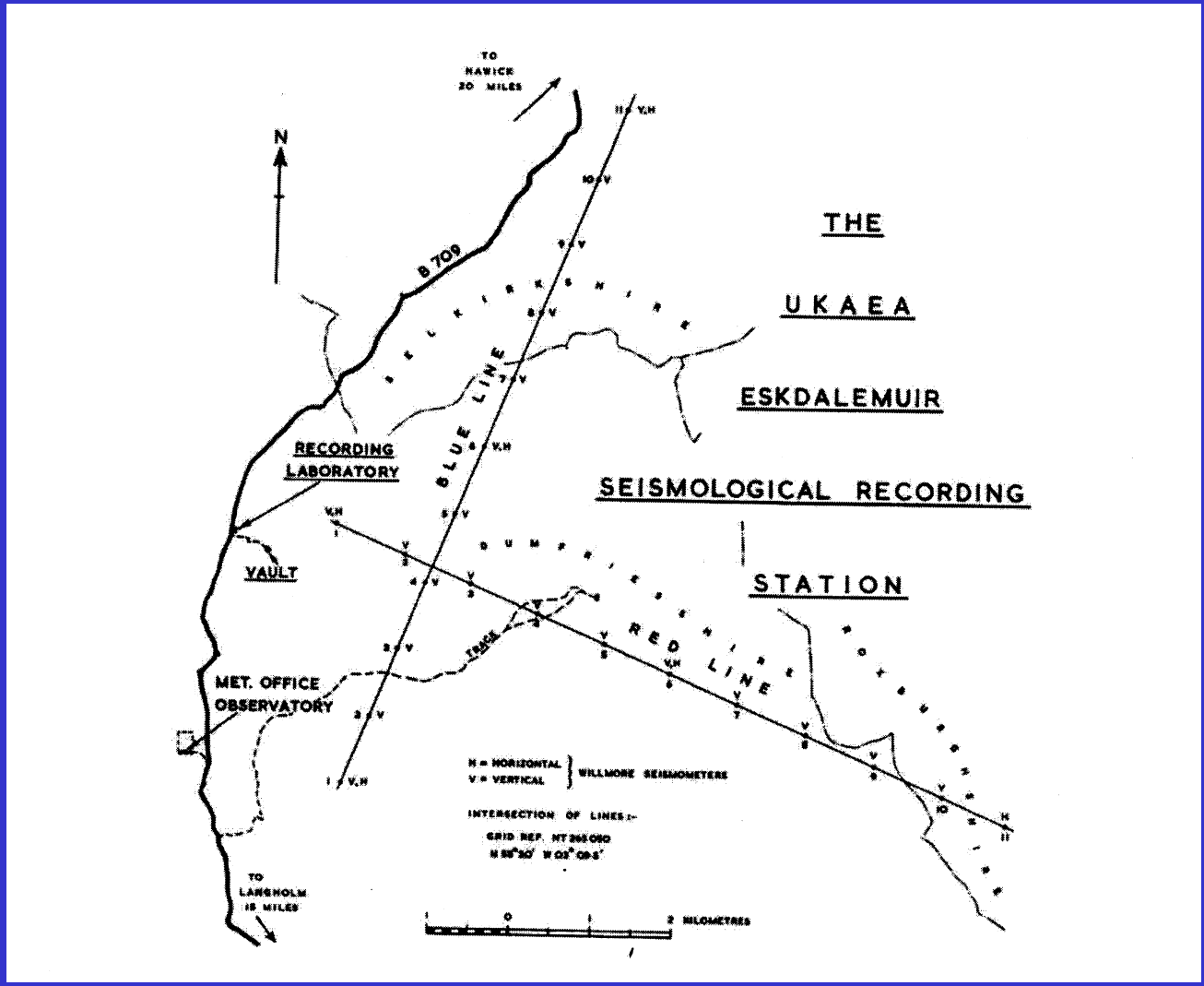
Figure 8. Equal loudness contours (ISO 226).

Eskdalemuir Low Frequency Noise Issues

- Eskadalemuir Seismic Array : Built 1960's
- Used to monitor foreign nuclear tests
- Identified by CTBTO as a potential Primary Station
- Currently undergoing upgrade to Alternate Primary Station

Eskadalemuir Array Location

Location of Eskdalemuir Array



Eskdalemuir Frequency Range

- Important to protect levels of existing vibration at array between 0.1 - 8 Hz
- Levels of vibration range between 0.05 - 0.2 nanometres
- Level of vibration significantly below human threshold of perception

Aims of Eskadalemuir Working Group Study

- To determine the potential transmission paths of seismic vibration;
- To determine the rate of attenuation of Infrasonic sound energy with distance;
- To determine the coupling effect of infrasonic sound energy to the ground;

Aims of Eskadalemuir Working Group Study

- To determine safe operational range for wind turbines;
- To provide mitigation advice with respect to wind turbine installation to minimise any potential effects upon array
- Issue a report on Oct. 2004 detailing findings

Eskadalemuir Working Group Study : Supplementary Work

- Supplementary measurements to be performed to look at low frequency noise emissions from wind turbines;
- Supplementary measurements to be made of low frequency noise immissions at neighbouring properties to existing wind farms, external and internal levels

Fact or Fiction?

- Wind turbines are sources of infrasonic and low frequency acoustic energy;
- Infrasonic emmissions are well below all recognised threshold of perception criteria even for sensitive receptors;

Fact or Fiction?

- Energy in the 30 - 200 Hz band may be audible;
- A small change of level in this frequency region may be perceived as an apparent larger increase of loudness;
- Measured levels below recognised onset levels for health effects;
- An issue of audibility and acceptability.