

Noise Measurements on Bergey Windpower Co. XL.1

In an effort to quantify the noise level from an XL.1 wind turbine, several measurements were made on June 11 and 12, 2001 at the Bergey Windpower factory. The wind turbine is located 80 feet from the factory, with no other buildings within ¼ mile. The turbine is mounted on a 42-foot tall tower.

The turbine is located near a small airport, and there are two heavily trafficked roads within ½ mile. The background noise levels ranged from 48 dBa to 57 dBa. During aircraft take-offs the background noise levels were higher than above, so noise measurements were not made until the aircraft were out of range. A windscreen was used on the sound level meter; however, at the highest wind speeds it was not very effective.

The wind turbine produces the most noise directly downwind, with the upwind direction being only slightly quieter. To the sides and directly underneath there is very little noise. All measurements were made 42 foot downwind of the tower. This location appeared to be the noisiest.

Two turbine conditions were tested, normal operation, and unloaded. In unloaded operation the wind turbine is allowed to spin freely. To conduct the tests, the turbine was run in the condition indicated, and then rapidly shut down to note the ambient noise level. Bringing the turbine to a complete stop takes about 2 seconds, so that the ambient noise levels can be checked accurately.

Data Taken			
Wind speed (MPH)	Background Noise Level (dBa)	Normal Operation Noise Level (dBa)	Unloaded Noise Level (dBa)
10	48		48
16	48	51 - 52	
17	48 - 49		54 - 56
18	47	50	
17 - 20	48	50	
20	50 - 53		56 - 59
18 - 24	50 - 53	50 - 57	
25 - 27	55 - 57	56 - 60	

Conclusions:

Under normal operation the XL.1 was found to be approximately 3 - 4 dBa above the ambient noise 42 feet from the base of the tower.

Unloaded operation was found to be 6 - 7 dBa above the ambient noise level, however the wind turbine is operated unloaded at wind speeds in excess of 28 mph (not tested) the noise levels rise and are estimated to be 15 dBa above ambient levels if tested as above.

The XL.1 should not be operated unloaded if noise is a concern. This requires the installation of an optional dump load circuit.

Test equipment:

XL.1 mounted on BWC 42 foot tower.

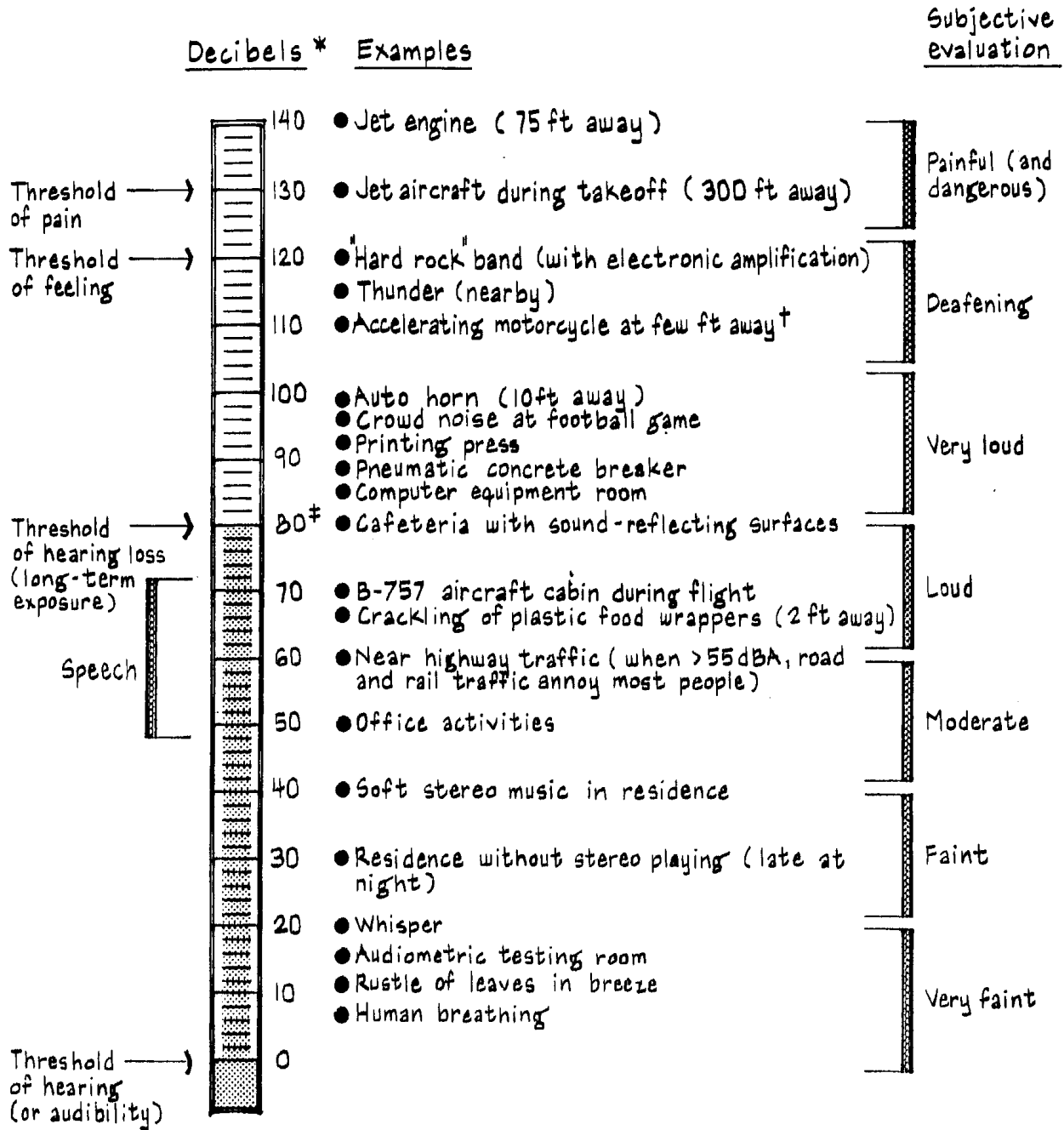
The sound level meter used was a B&K type 2203, last calibrated 6-94, calibration checked against Radio Shack #33-2050 and found to be within 1 dBa. A Radio Shack #33-378 Acoustic Foam Microphone Windscreen had to be used to keep the wind noises to a minimum. This windscreen was checked with a steady noise source and found to have no influence on the SLM reading. Wind speed measurement was from a Maxim 40 anemometer at a height of 60 foot.

Sincerely,

Tod Hanley
Engineer
Bergey Windpower Co.

COMMON SOUNDS IN DECIBELS

Some common, easily recognized sounds are listed below in order of increasing sound levels in decibels. The sound levels shown for occupied rooms are only example activity levels and do *not* represent criteria for design. Note also that thresholds vary among individuals.



*dBA are weighted values measured by a sound level meter. See page 31 for details of electronic weighting networks which modify the sensitivity of meters.

†50 ft from a motorcycle can equal the noise level at less than 2000 ft from a jet aircraft.

‡Continuous exposure to sound energy above 80 dBA can be hazardous to health and can cause hearing loss for some persons.