Comment Letter I32

From: Murphy Smith
To: Harris, Susan
Subject: Boulder Brush DEIR comments
Date: Monday, February 03, 2020 10:20:14 AM
Attachments: Murphy Smith WindTurbine Noise April 26 (1).pdf

Please include this in the formal Boulder Brush DEIR public record for its relevance. The proposed turbines are much larger than the ones I measured locally which means the proposed turbines impact would be even more significant than the ones in this report. I32-1

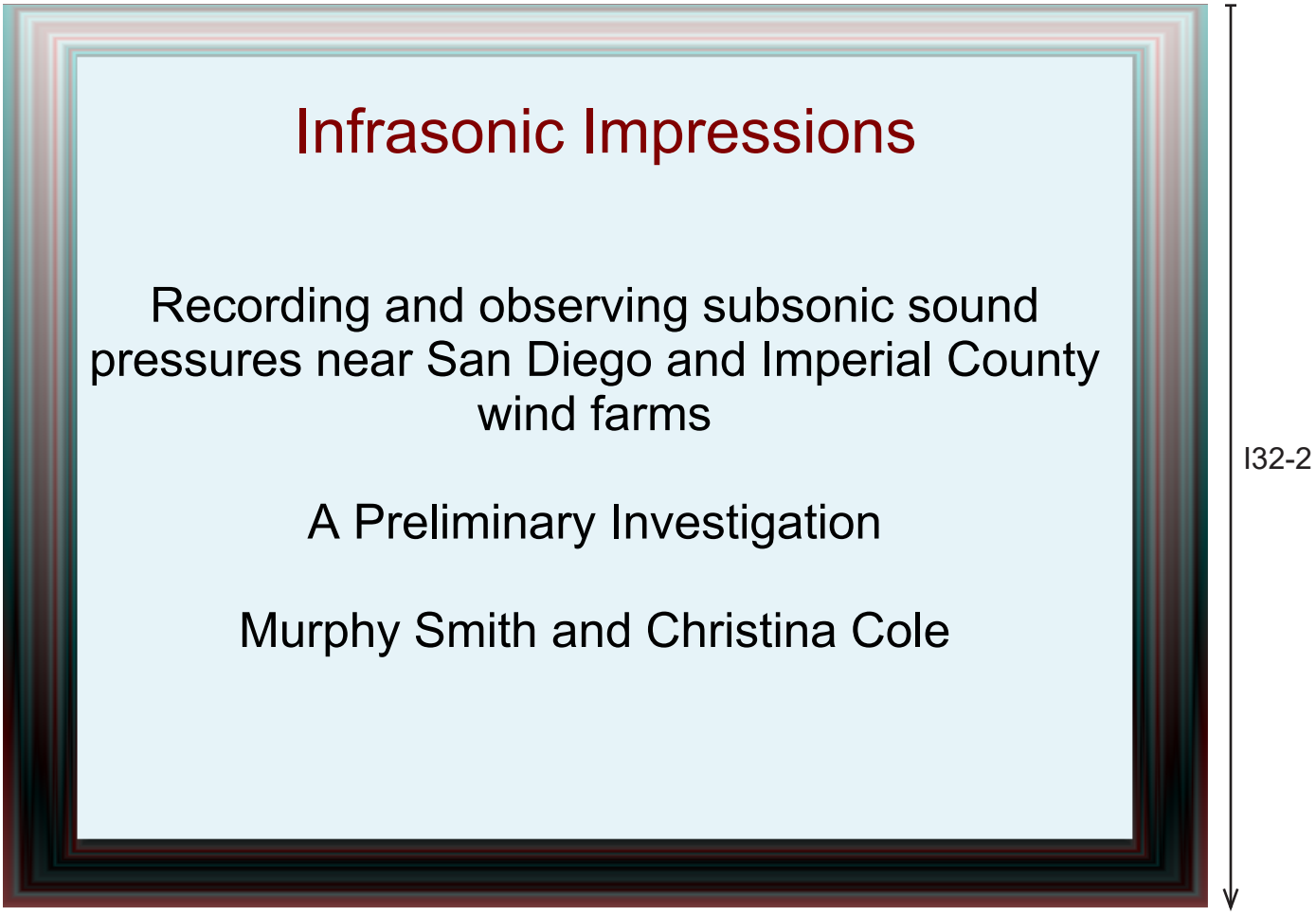
Thank You,
Murphy Smith

Infrasonic Impressions

Recording and observing subsonic sound pressures near San Diego and Imperial County wind farms

A Preliminary Investigation

Murphy Smith and Christina Cole



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Equipment

- Infiltec INFRA 20 LED microbarograph
- Spatial Wind Averaging Array (Filters and Tubing)

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Software

- AmaSeis – vibration logging software developed by Incorporated Research Institutions for Seismology (IRIS)
- SigView- Signal analysis
- Unit Conversion website https://www.translatorscafe.com/unit-converter/en/sound-pressure-level/3-9/millipascal-sound%20pressure%20level%20in%20decibels/

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Recording Locations

- Home – Paloma Way in Boulevard, CA
- Desert View Tower near In- Ko-Pah
- Ocotillo Public Park
- Road near Ocotillo Wind project

(String J, Turbine 99)

- Farmland in El Centro, CA
- Several more sites in Boulevard to be recorded soon...

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Sound and Numbers

- 1 Pascal = 93.98 dB SPL
- 1 milliPascal = 1/1000th of a Pascal
- INFRA20 measures in “counts” equal to 1 milliPascal +/- 0.2 milliPascal
- 30 milliPascals= 63.5 dB SPL

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Decibel SPL

- Sound pressure level reference tables and comparisons from
- https://www.chem.purdue.edu/chemsafety/Training/PPETrain/dblevels.htm
- http://www.sengpielaudio.com/TableOfSoundPressureLevels.htm

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Previous Related Research

- These papers provided a framework on which to build upon and focus our research
- Wilson Ihrig Acoustics 2014 and 2019 ILFN Reports

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Simple Turbine Rotation to Frequency Method

- Count how many times a blade rotates through the top of the turbine in one minute.
- Divide that number by 60

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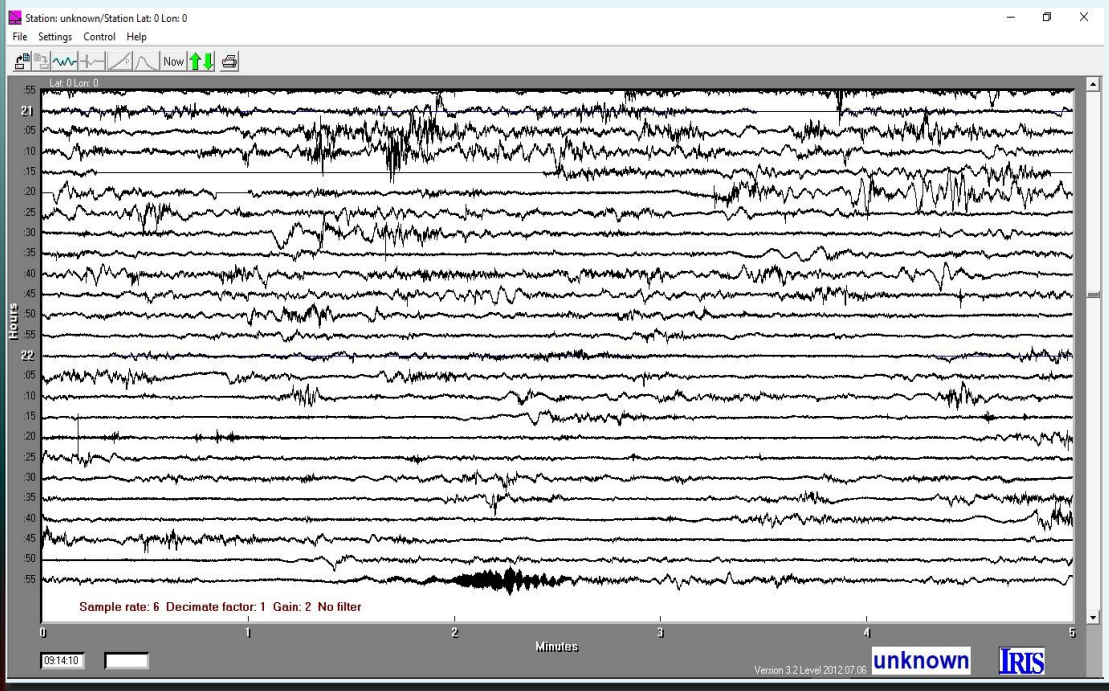
Paloma Way- April 17, 2019
Moderate Wind Gusts



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Reading Frequency Analyses

- Sound frequency on x axis
- Level on y axis
- Different colored arrows point to likely fundamental blade passing frequencies of turbines
- Matching colored diamonds above harmonics of same frequency
- Repetitive signals with corresponding harmonics imply cyclical sounds, therefore not other environmental noises.

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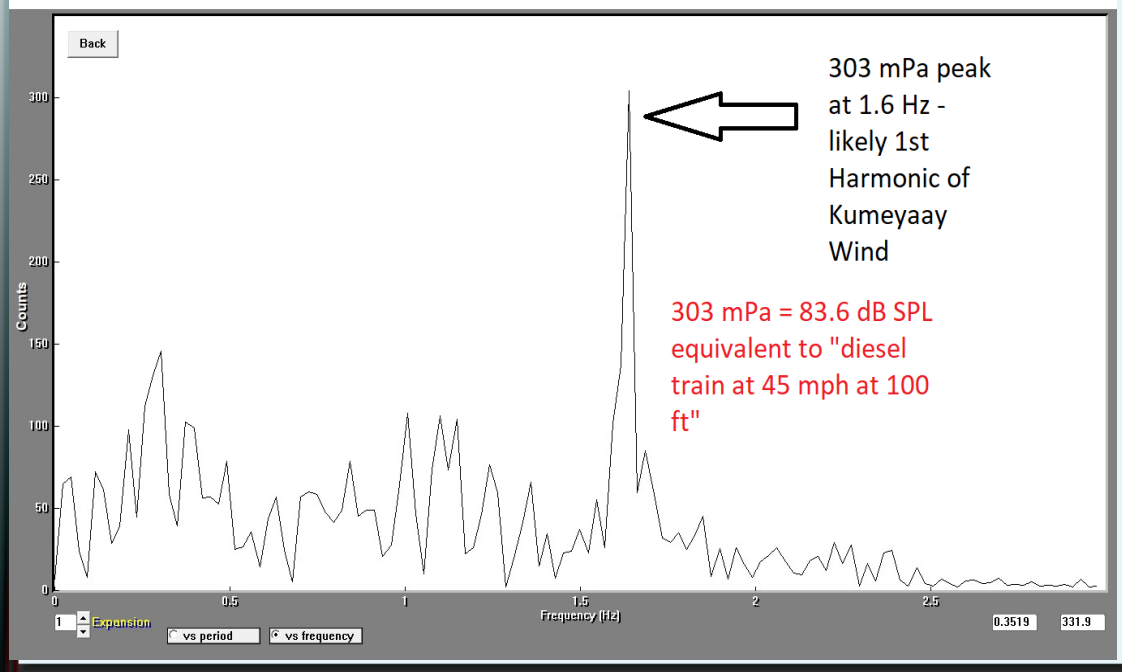
Paloma Way- April 17, 2019 2pm
Moderate Gusts of Wind



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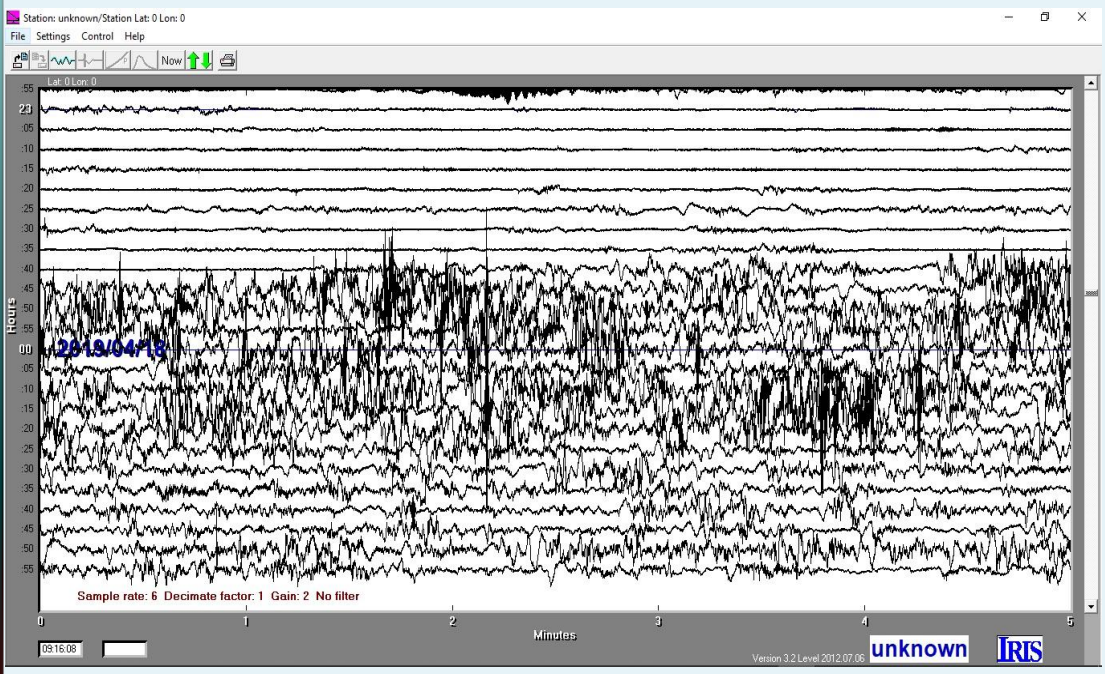
Paloma Way – April 17 4pm WindStorm



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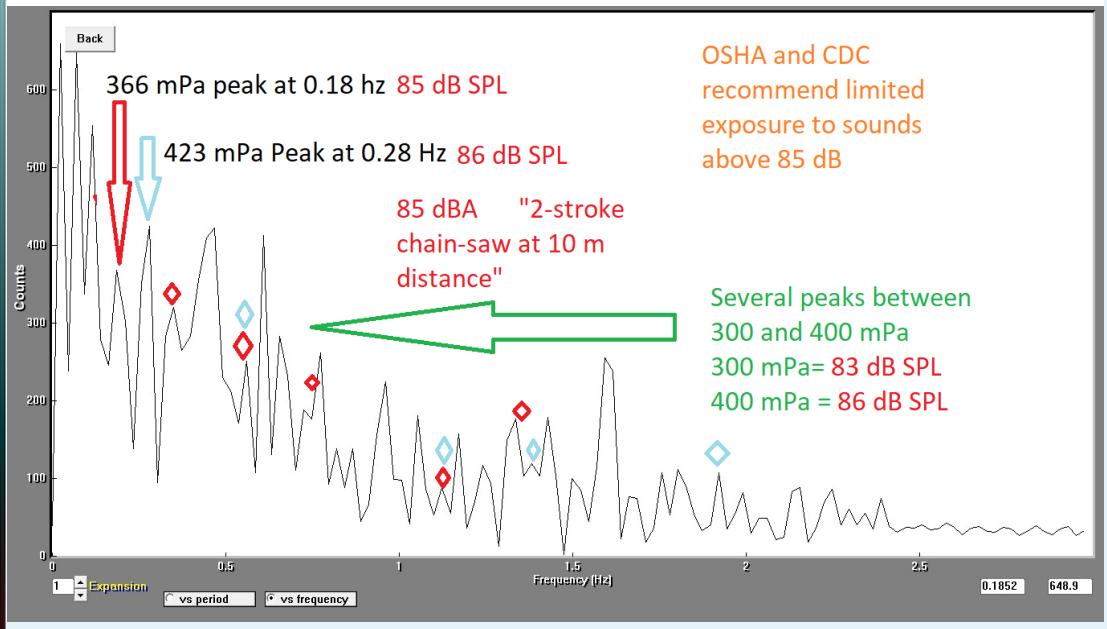
Paloma Way – April 17 4pm WindStorm Frequency Analysis



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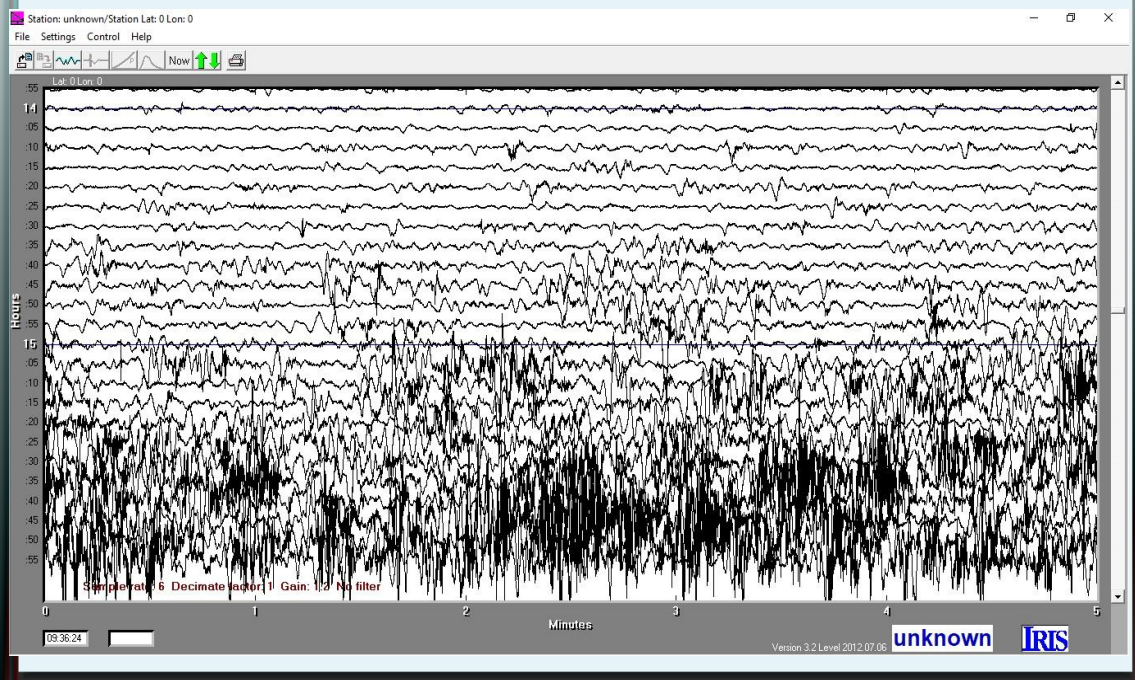
Paloma Way – April 18, 2019
A Windy Morning



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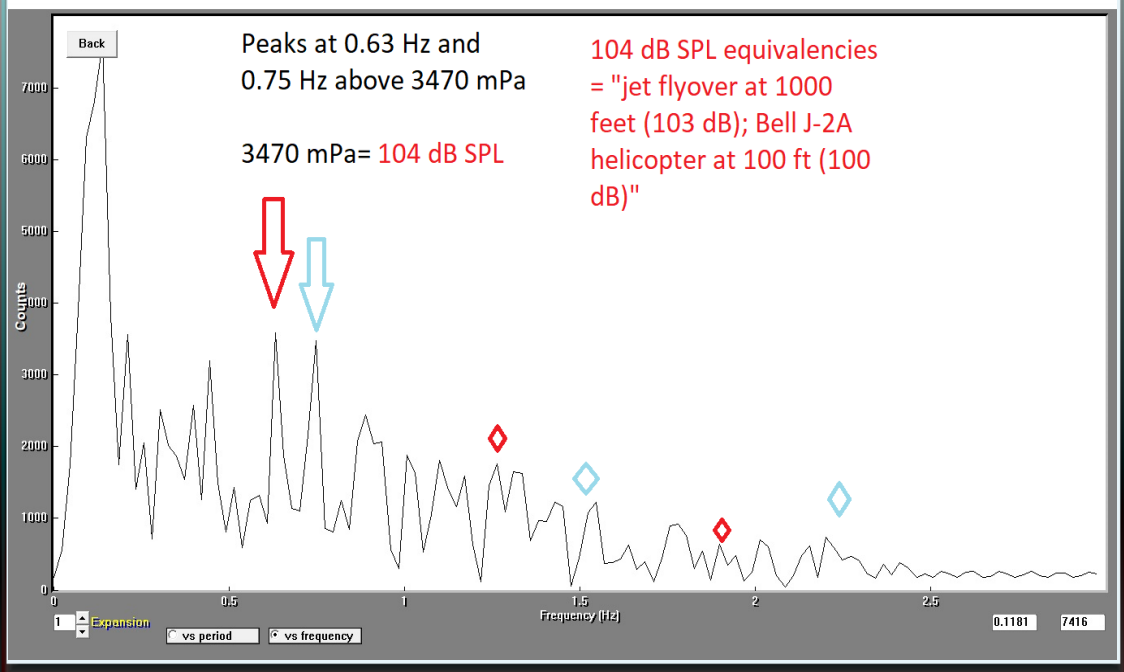
April 18, 2019 Morning Windstorm Frequency Analysis



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Ocotillo Wind Turbines measured up close

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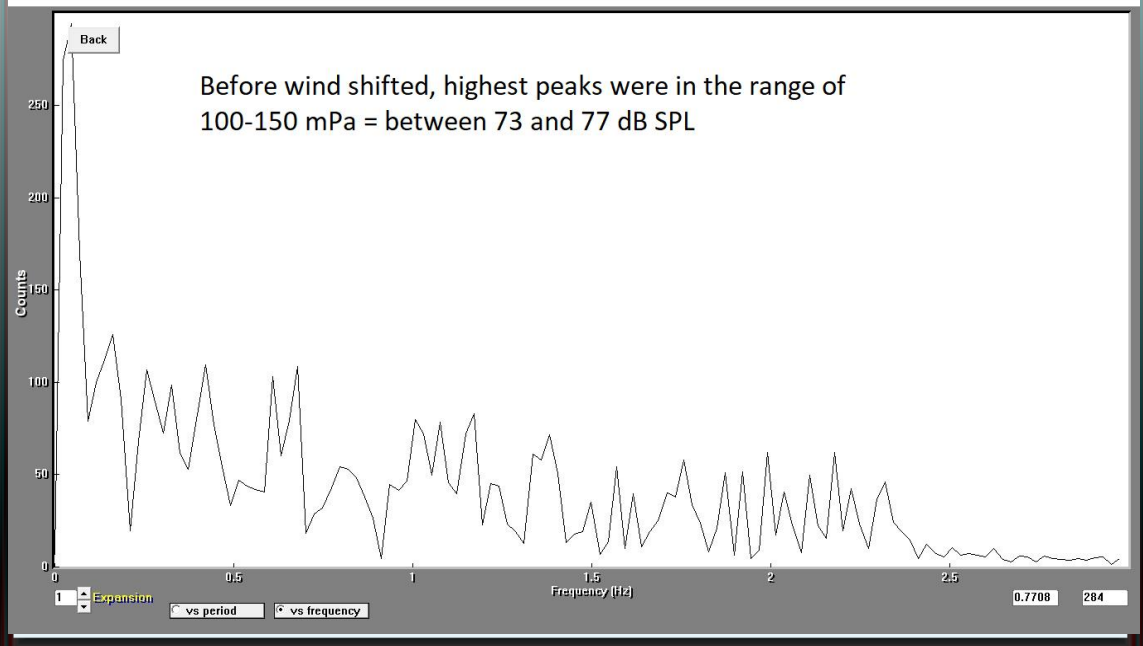
Ocotillo Wind Turbine 99
April 18, 2019 Before Wind Shift



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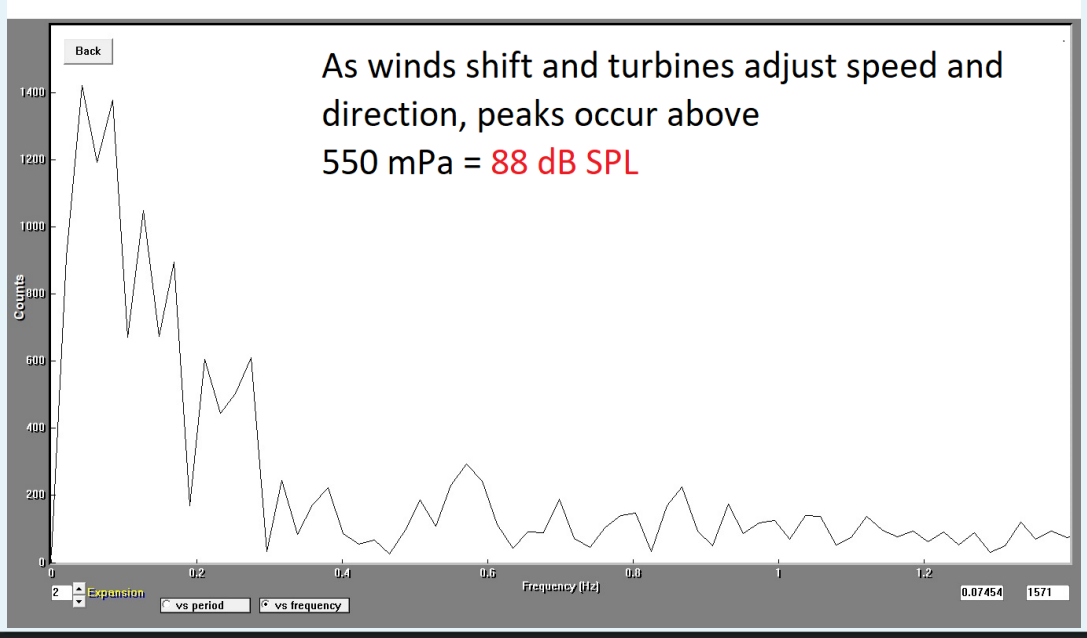
Ocotillo Wind Turbine 99
April 18, 2019 After Wind Shift



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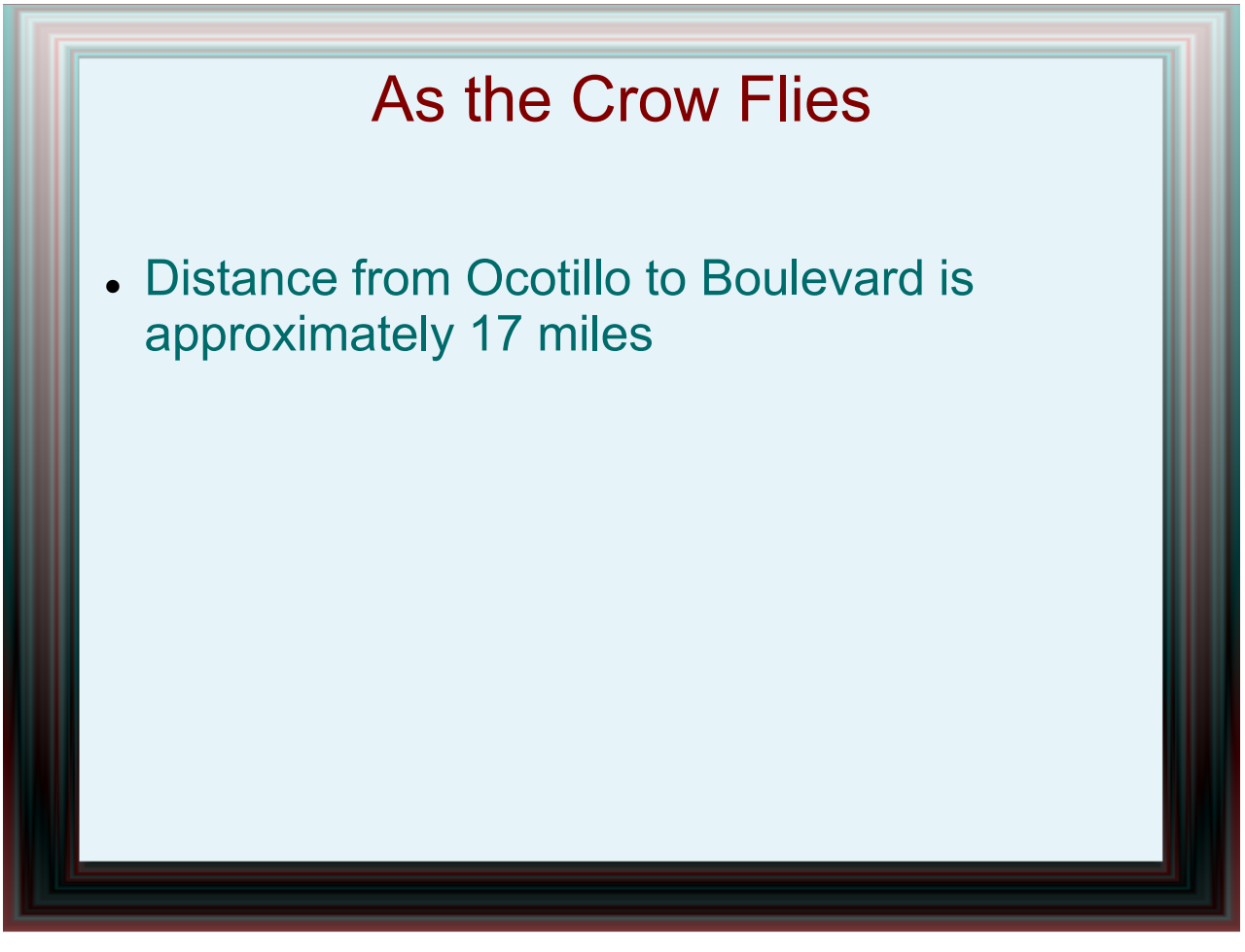
As the Crow Flies
Distance from Ocotillo to Boulevard is approximately 17 miles

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How does this ILFN travel so far?

- The wavelengths are much longer, so less energy is lost and there is negligible atmospheric absorbtion.
- Like the souped up car driving down the road from you, playing their music, but all you hear is the bass.
- Wind pushes sound even faster in currents.
- There are fewer structures to break up longer waves in rural areas, esp. deserts.

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Why is dBa weighting inaccurate for infrasonic sound?

- The dBa scale is based on human hearing and compensates for perceptive qualities of the ear.
- Infrasonic sound is felt more than heard, and sensed by the ear and vestibular system in ways that are not strictly hearing (via vibration, air pressure, conduction, and resonance)

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CDC and OSHA Noise Dosages

- “The noise dose is based on both the sound exposure level and how long it lasts (duration) so for each increase or 3-dB (NIOSH) or 5-dB (OSHA) in noise levels, the duration of the exposure should be cut in half”
- https://www.cdc.gov/niosh/topics/noise/reducenoiseexposure/regsguidance.html

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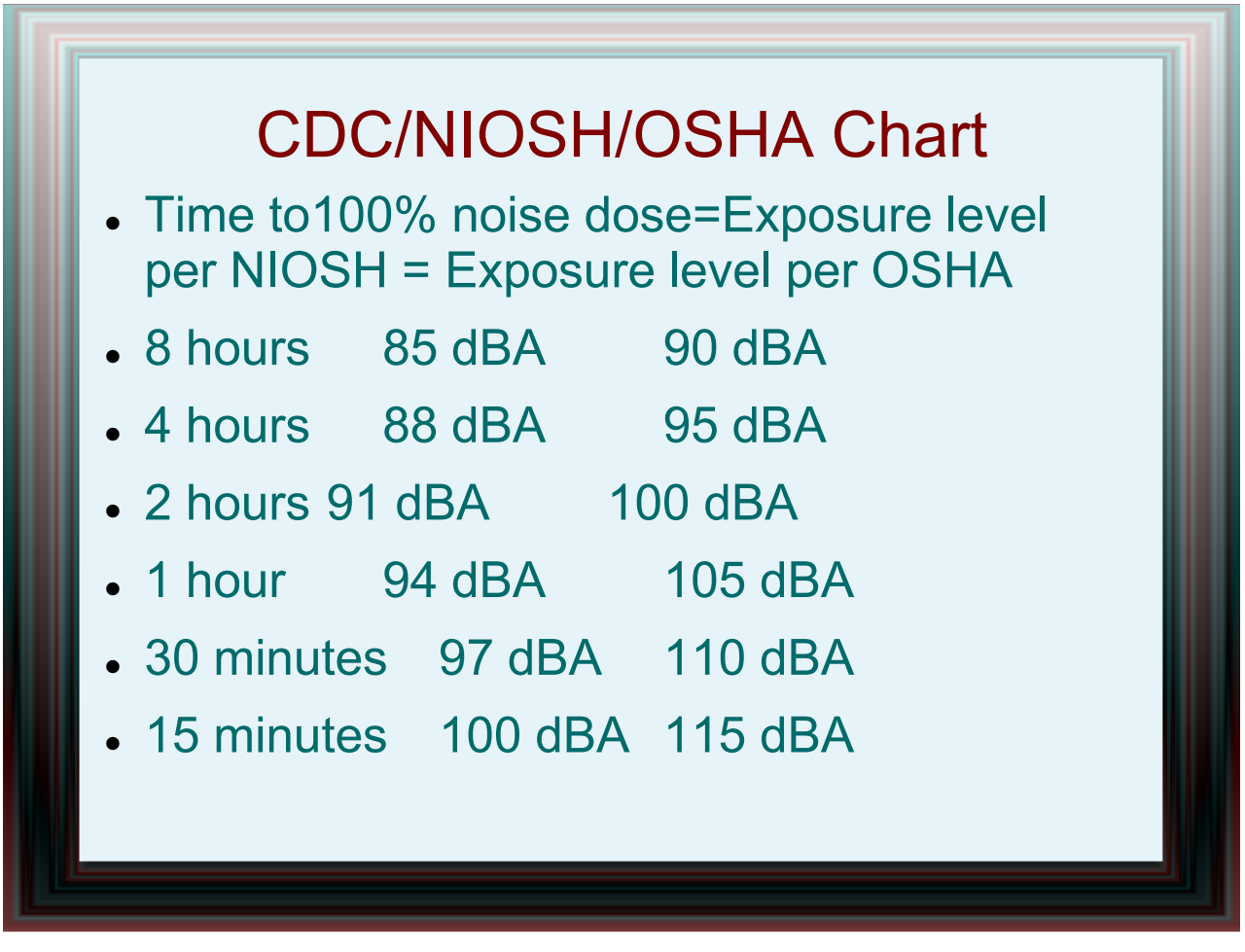
CDC/NIOSH/OSHA Chart
Time to100% noise dose=Exposure level per NIOSH = Exposure level per OSHA
8 hours 85 dBA 90 dBA
4 hours 88 dBA 95 dBA
2 hours 91 dBA 100 dBA
1 hour 94 dBA 105 dBA
30 minutes 97 dBA 110 dBA
15 minutes 100 dBA 115 dBA

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San Diego Noise Limits

- One hour average maximum of between 45-70 dBa based on zoning
- https://www.sandiegocounty.gov/content/dam/sdc/cob/ordinances/ord10364.pdf

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San Diego Noise Ordinance 9962

AN ORDINANCE AMENDING TITLE 3, DIVISION 6, CHAPTER 4

- Section 36.401
- “Disturbing, excessive or offensive noise interferes with a person's right to enjoy life and property and is detrimental to the public health and safety. Every person is entitled to an environment free of annoying and harmful noise.”

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