Train Noise in Rockport

Nov 1, 2025

Overview

Introduction

Police Study: Train idling

BU Study: Noise measurements

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Train Noise in Rockport: Problem Statement

In Rockport, the terminus of the **Newburyport/Rockport Line** operated by the MBTA/Keolis faces a persistent issue of diesel locomotives idling for extended periods and operating an alternative engine during periods when the trains should be off. This idling generates continuous engine **noise**, **diesel exhaust emissions**, and **vibration** which impact nearby residential and commercial properties.

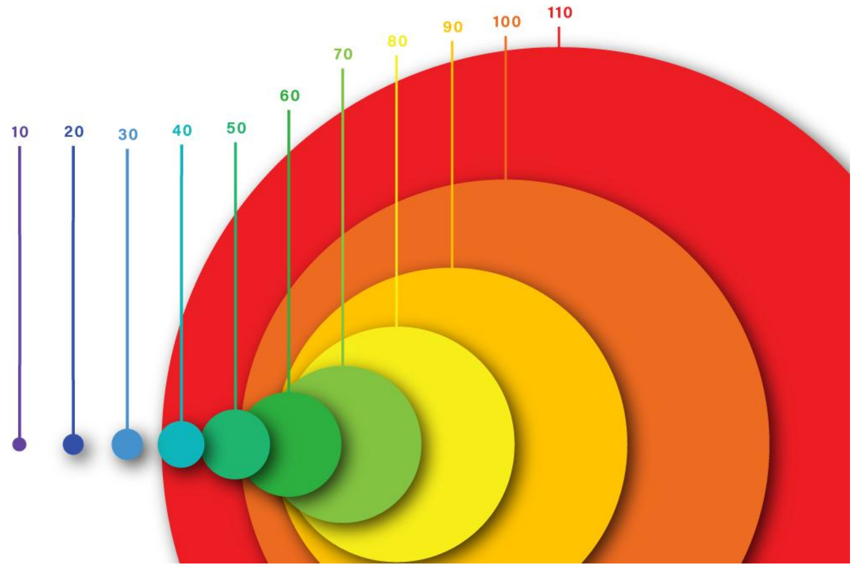
To learn more about the noise, BU School of Public Health came to Rockport to investigate.

What is noise? How is it measured?

Noise is an **unwanted** or **harmful** sound.

We measure noise in units called **decibels (dB).**

Decibels are ***logarithmic*** units, so a difference of 10 dB means that **sound is twice as loud.**



NIOSH, Noise and Hearing Loss

Noise in **decibels (dB)**

PAINFUL & DANGEROUS		
Dangerous; use hearing protection or avoid	140	· Fireworks · Gun shots · Custom car stereos (at full volume)
	130	· Jackhammers · Ambulances
UNCOMFORTABLE		
Dangerous; use hearing protection	120	· Jet planes (during take off)
VERY LOUD		
Dangerous; use hearing protection	110	· Concerts (any genre of music) · Car horns · Sporting events
	100	· Snowmobiles · Ear buds/mobile devices (at full volume)
	90	· Lawnmowers · Power tools
Over 85 dB for extended periods can cause permanent hearing loss. NIOSH* recommends wearing hearing protection whenever noise levels exceed 85 dB, regardless of how long the sound lasts.		
LOUD		
	80	· Alarm clocks
	70	· Traffic · Vacuums
MODERATE		
	60	· Normal conversation · Dishwashers
	50	· Moderate rainfall
SOFT		
	40	· Quiet library
	30	· Whisper
FAINT		
	20	· Leaves rustling

How can noise be harmful?

Short term impacts
- Disrupted sleep
- Stress

Long term impacts
- Hearing loss
- Higher blood pressure
- Cardiovascular disease

Noise → Stress/Activation → Health Consequences

Noise can disrupt your sleep even if you don’t wake up!

How much noise is too much noise?

Environmental Protection Agency (EPA): Ambient night-time noise should be <u>below **55dB**</u> to protect the public from harmful effects. (1974)

World Health Organization (WHO)

Railroad noise at night should not exceed **44dB**. (2018)

Railway noise

Recommendation	Strength
For average noise exposure, the GDG strongly recommends reducing noise levels produced by railway traffic below **54 dB** L_{den}, as railway noise above this level is associated with adverse health effects.	Strong
For night noise exposure, the GDG strongly recommends reducing noise levels produced by railway traffic during night time below **44 dB** L_{night}, as night-time railway noise above this level is associated with adverse effects on sleep.	Strong
To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from railways in the population exposed to levels above the guideline values for average and night noise exposure. There is, however, insufficient evidence to recommend one type of intervention over another.	Strong

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Train Idling: Rockport Police Study

In January 2024, the Rockport Police monitored train idling at the Rockport trainyard for one month, focusing on the evening hours.

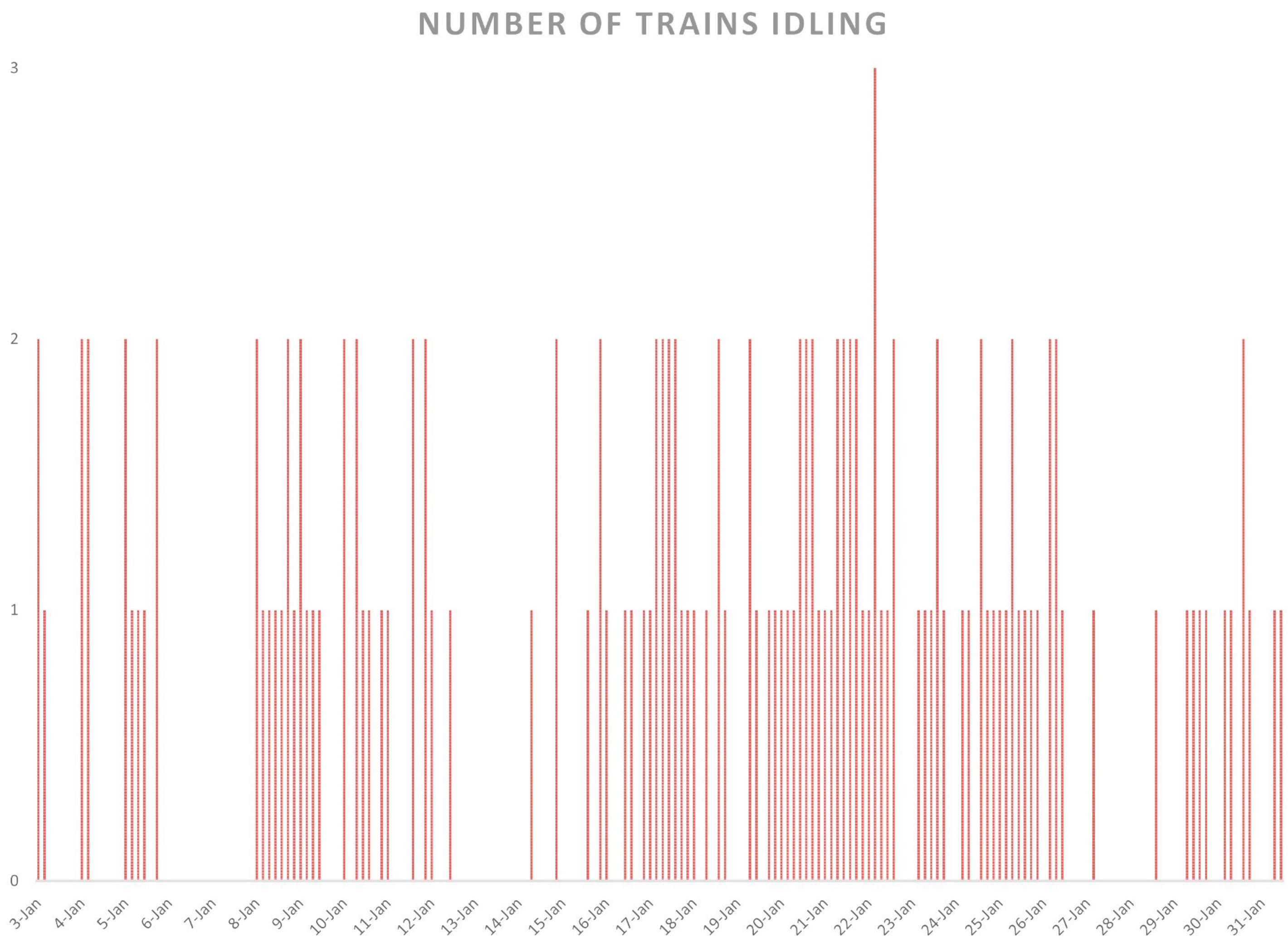
The data reveal that **trains were idling at 1:30 am, 2:30 am and even 3:30 am**, when they should be turned off. January 2024 was relatively warm.

Idling Occurrence -- Percentage of time Rockport police reported that **at least 1 train engine was idling** when they surveyed train yard every hour on the half hour.

12:30 am -- 72%
1:30 am -- 64%
2:30 am -- 38%
3:30 am -- 38%
4:30 am -- 46%
5:30 am -- 71%
6:30 am -- 41%

Rockport Police Train Idling Study

January 2024



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Train Noise: BUSPH Study

We placed noise volume monitors outside 5 volunteers' homes.

These monitors recorded noise levels for **6 days: June 25 - July 1**.

JUNE

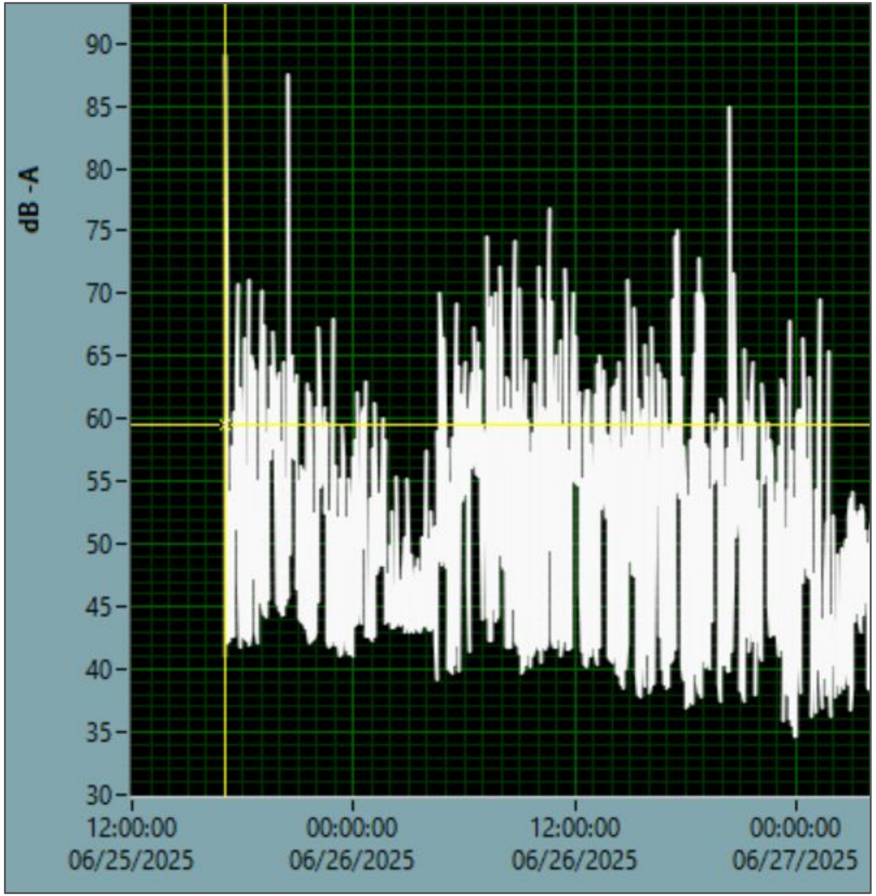
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
6	7	8	9	10	11	12

These sensors **only** measure volume. They don't record the noise.

https://convergenceinstruments.com/

Monitoring Locations

Noise Data



Processing:

- Restrict to night-time noise
- Exclude any times with weather noise (rain or wind)
- Compute average sound levels
  - Take into account that decibels are logarithmic

Note: we aren't capturing very low sound or vibration

Noise Data Processing: Why Night-Time?

We only have volume, so we can't identify the *source* of the noise.

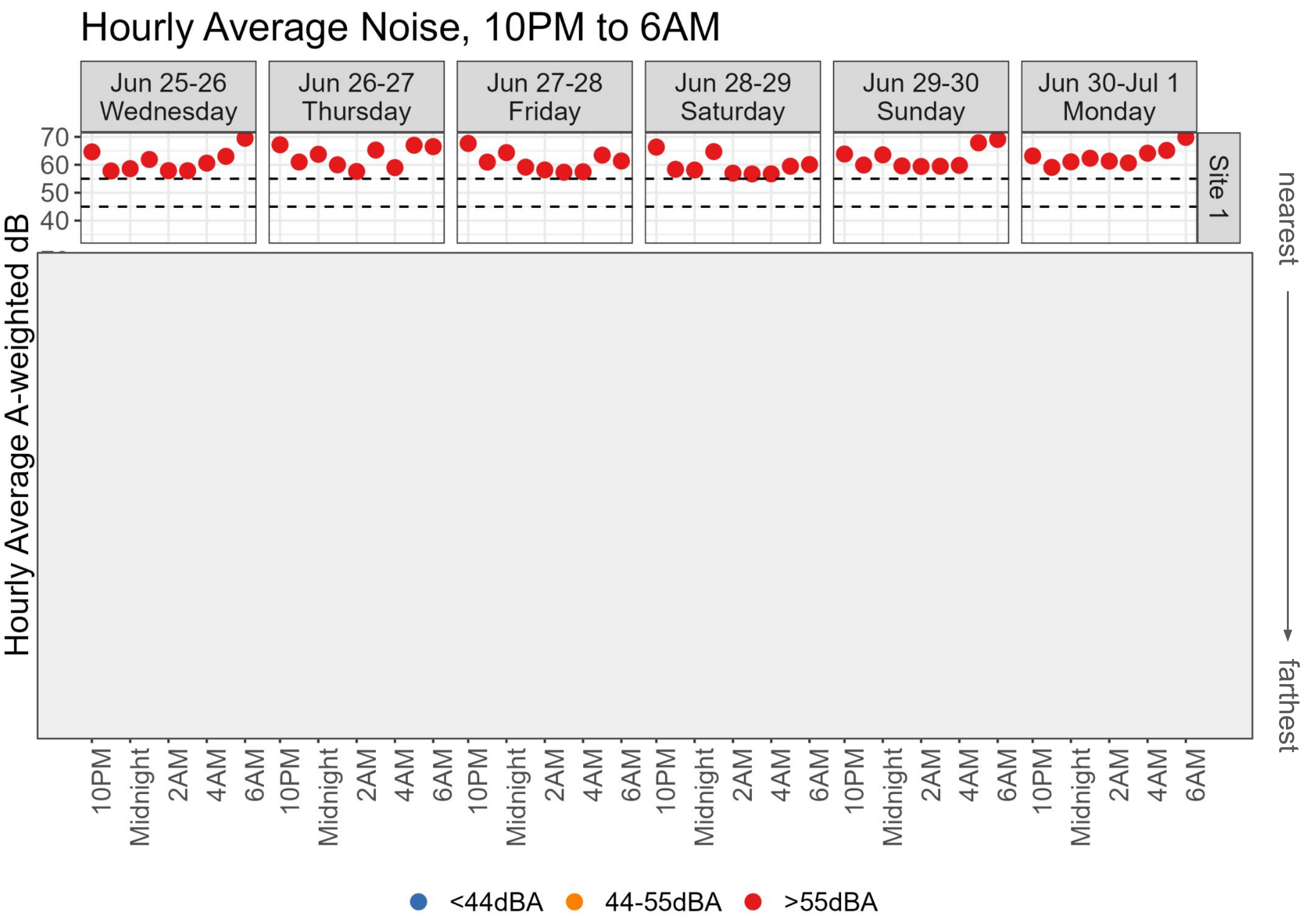
We defined "night" in two ways:

10:00 PM - 6:00 AM

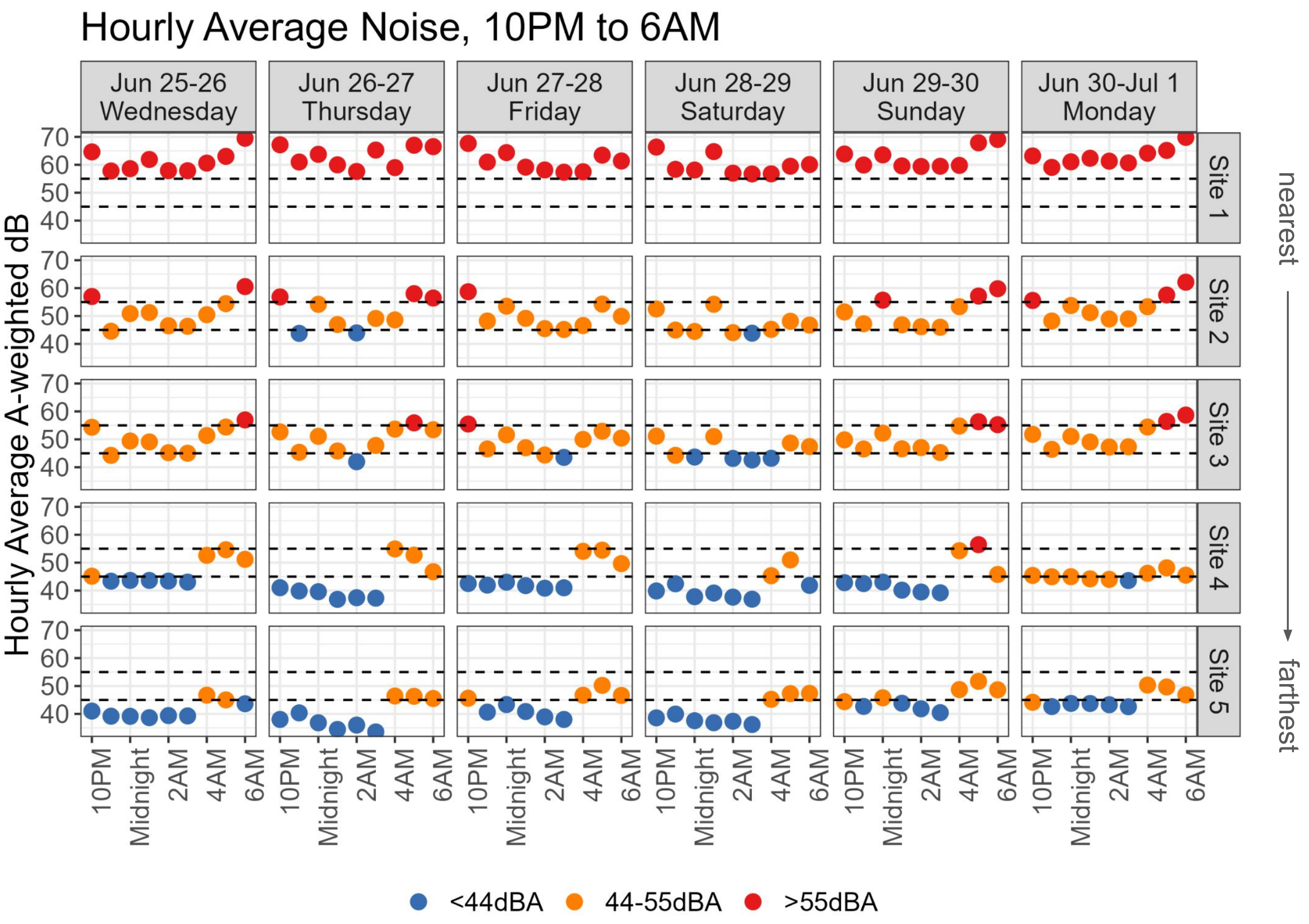
AND

The hours when trains are expected to be off:

30 minutes after the last arrival until 30 minutes before the first departure



- Nearer sites were generally **louder**
- Noise tends to increase between **4:00 AM and 5:00 AM**



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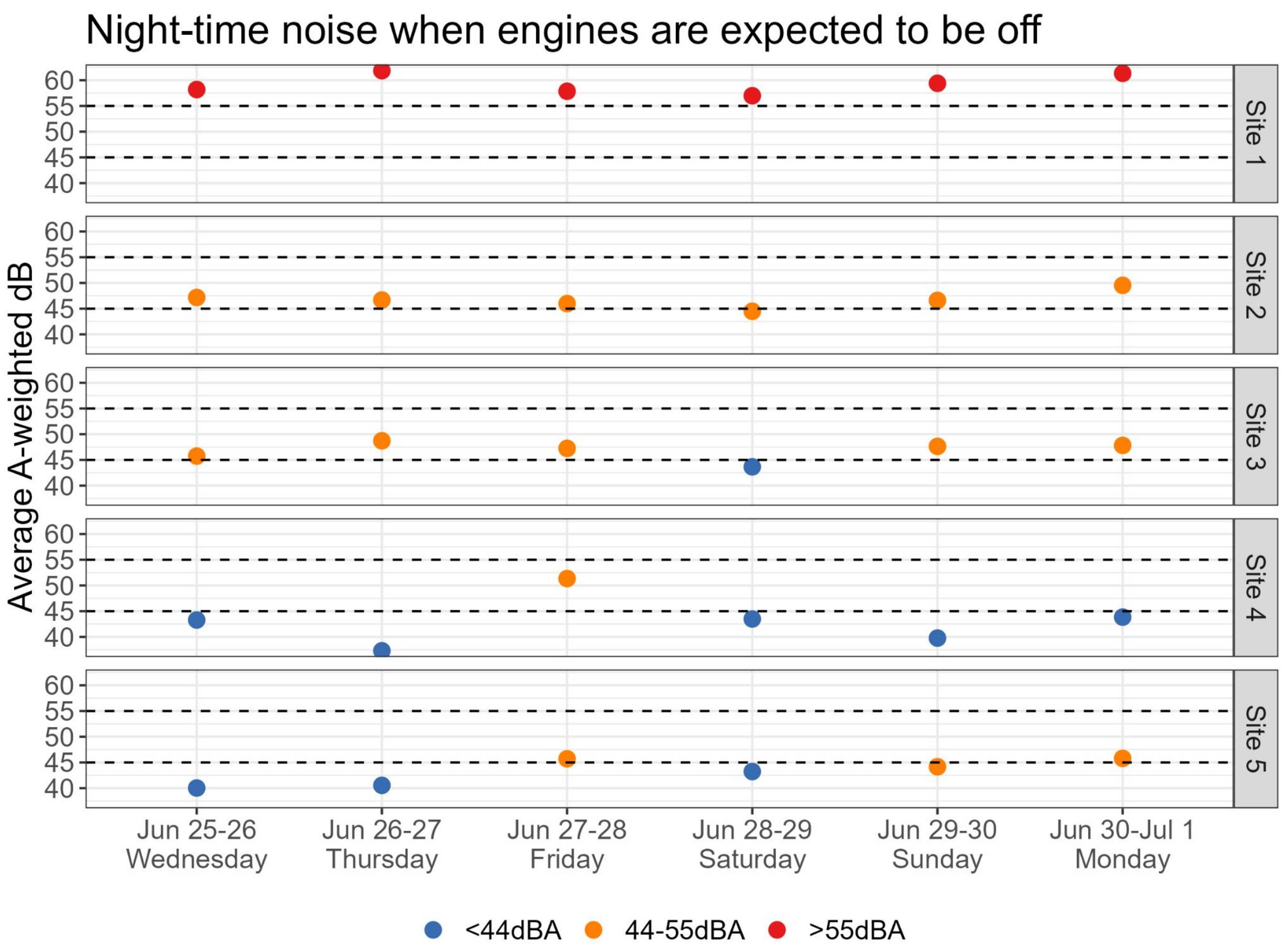
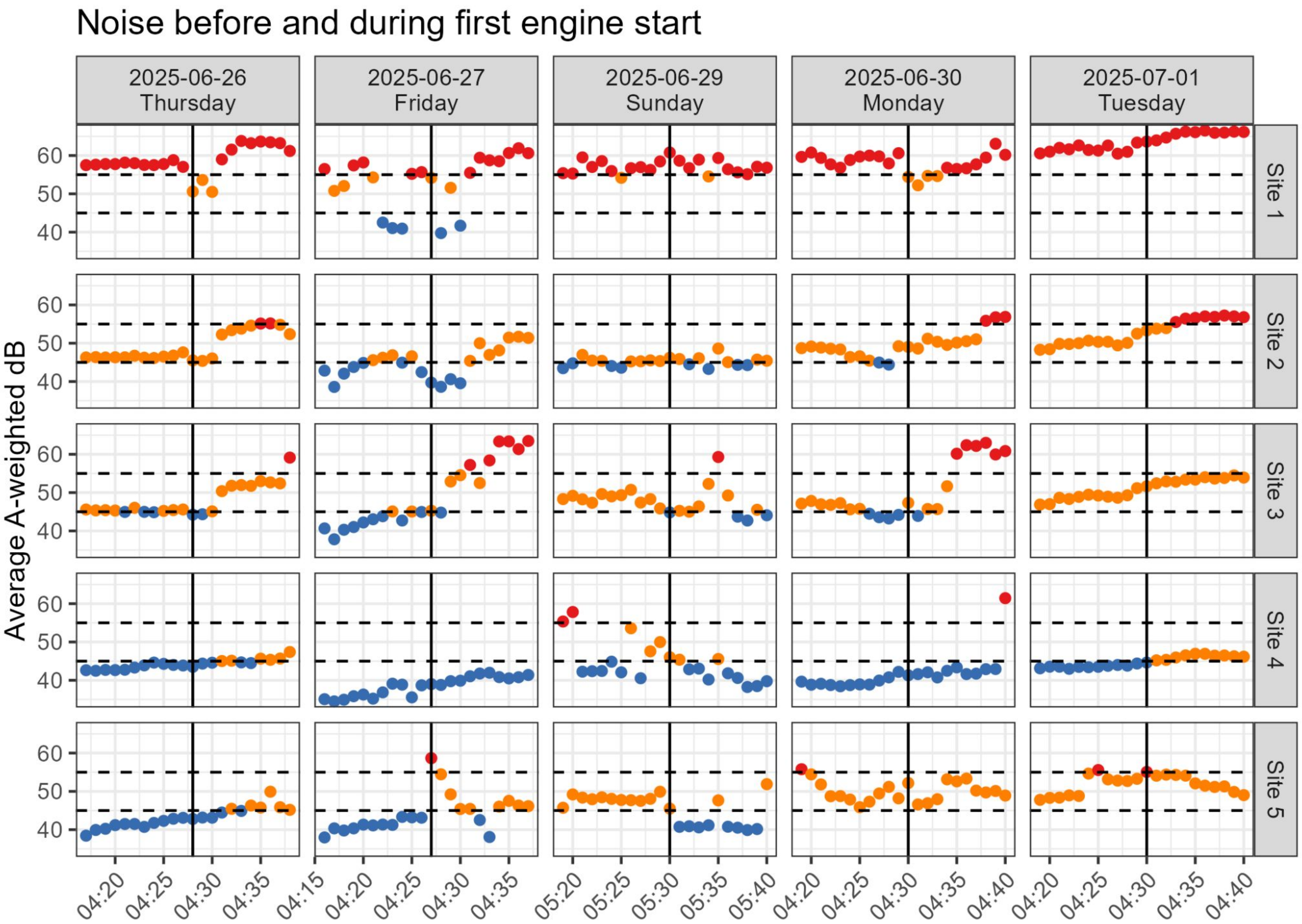


- Nearer sites were generally **louder**
- Noise is **above the 44dB threshold** even when engines should be off



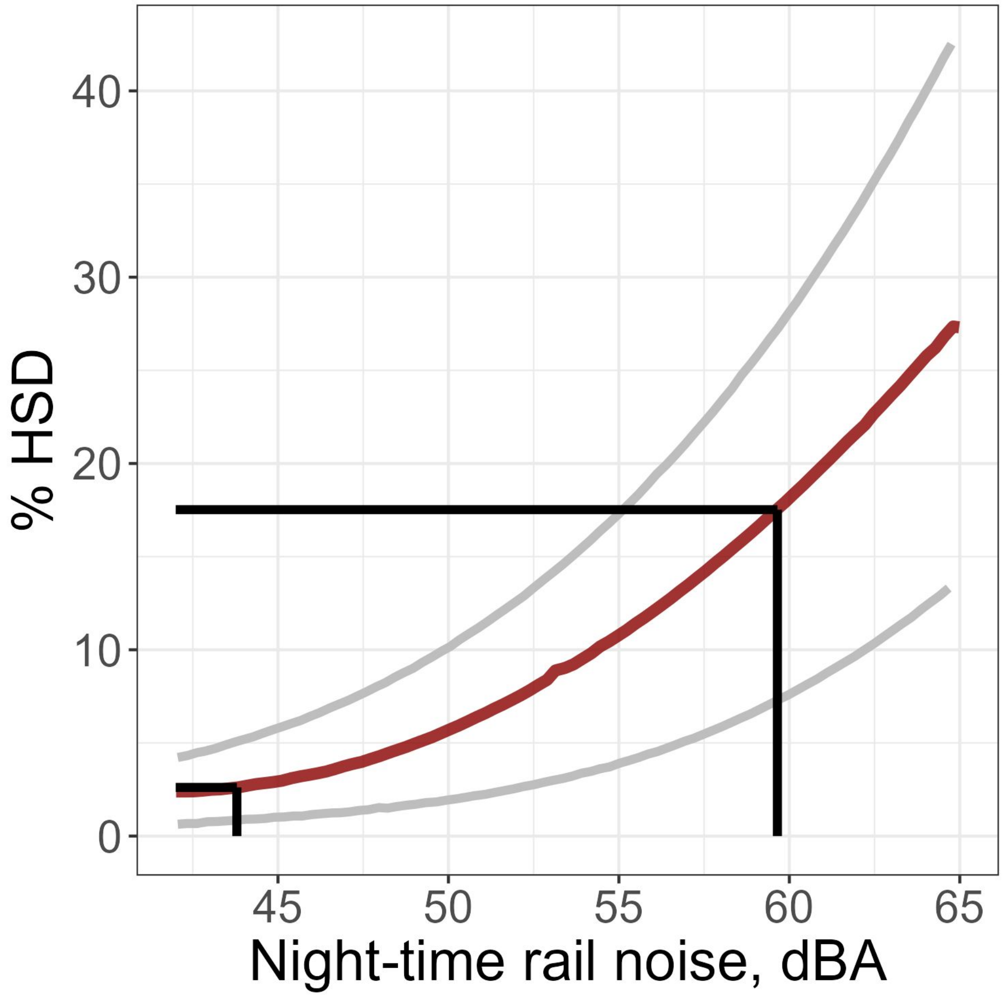
A Rockport resident recorded the time of the <u>morning's first engine start.</u>

We used these times to look at the **10 minutes before** and **10 minutes during** the <u>engine start event.</u>

Noise levels in context

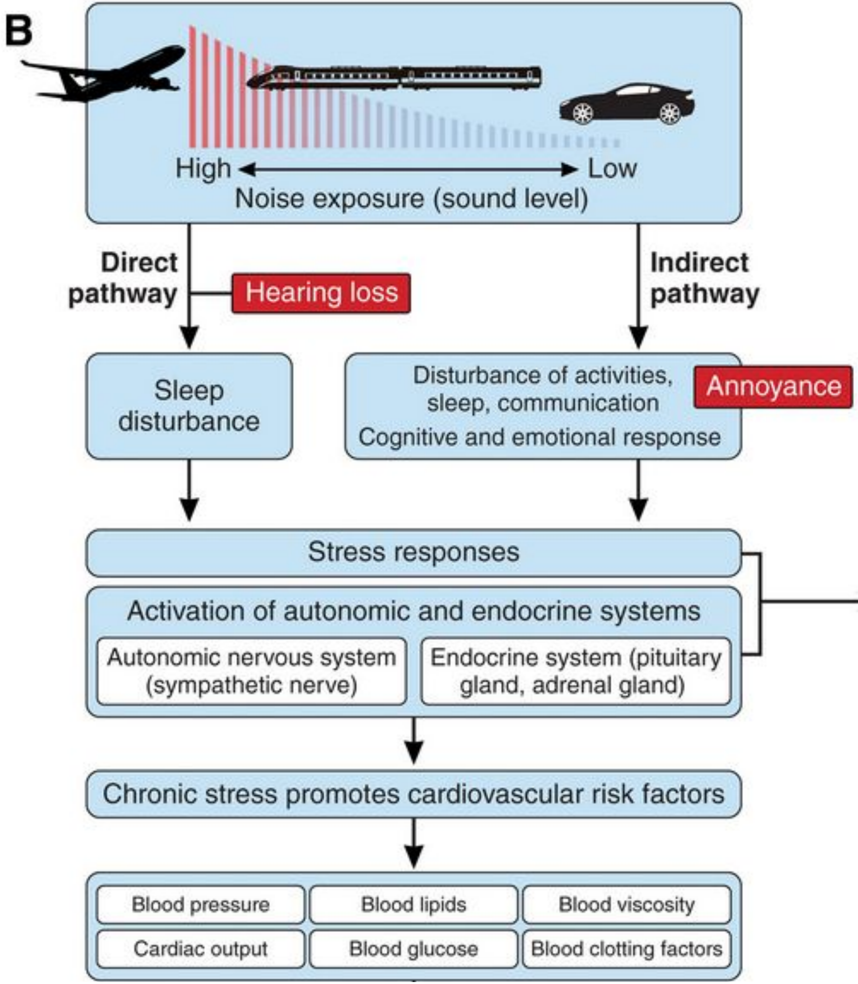
At **43.7dB** of night-time rail noise, approximately **3% of people are highly sleep disturbed (HSD).**

Some populations are especially susceptible to health impacts of noise disturbances: including children and the elderly.



Noise levels in context

According to the World Health Organization, a
least 1.6 million healthy life years are lost annually from traffic-related noise in Western Europe. **Traffic noise at night causes fragmentation and shortening of sleep, elevation of stress hormone levels, and increased oxidative stress in the vasculature and the brain.**



Summary

Police Study

At least one train was idling at least **38% of the time at night.**

BU Noise Study

Noise measurements near the station were **> 44dB** even when engines are expected to be off.

Measuring Noise Using Your Smartphone

NIOSH App (iPhone only)

Sound Meter and **Noise Detector** by Tools Dev (Android) (free version with ads)

Feedback and Questions

Links

1. EPA noise threshold:
2. WHO noise threshold: https://www.who.int/europe/publications/i/item/WHO-EURO-2018-3287-43046-60243
3. Logarithmic decibel graphic: https://www.cdc.gov/niosh/noise/about/index.html
4. Noise in decibels chart: https://www.audiology.org/advocacy/public-awareness/infographics_posters/
5. Sound level meters: https://convergenceinstruments.com/product/sound-level-meter-data-logger-with-type-1-microphone-nsrt_mk4/
6. Sleep disturbance figure source: https://ehp.niehs.nih.gov/doi/full/10.1289/EHP10197 (figure digitized by Jean)
7. Sensitive populations: https://www.mdpi.com/1660-4601/15/3/519
8. Transportation noise and healthy life year loss: https://www.ahajournals.org/doi/full/10.1161/CIRCRESAHA.123.323584
9. NIOSH iphone app: https://apps.apple.com/us/app/niosh-sound-level-meter/id1096545820
10. Android sound app: https://play.google.com/store/apps/details?id=coocent.app.tools.soundmeter.noisedetector&hl=en-US
    a. Article testing different sound apps for Android (2019): https://doi.org/10.1080/15459624.2019.1639718