air ALLIANCE HOUSTON

Air Monitoring Data

for **Kashmere Gardens**

2022

Air Pollutants

Nitrogen Oxides (NOx)	Volatile Organic Compounds (VOC)	Ozone (O_3)	Particulate Matter ($PM_{2.5}$)
Oxides of nitrogen - primarily emitted by vehicles and industrial facilities. Contributes to breathing problems, smog, acid rain, ozone	Highly reactive carbon compounds – emitted by vehicles, industries, gasoline equipment, paints, chemicals, solvents etc. Toxic at high concentrations, contributes to ozone	Ground level ozone – forms due to reactions between NOx and VOCs in sunlight and heat. Contributes to breathing difficulties, respiratory issues	Inhalable particles - dust, dirt, soot, etc – emitted by industries, vehicles, construction sites, fires, unpaved roads Contributes to heart & lung complications, asthma

Sources of Pollution

Toxic Release Inventory (TRI)

Industrial and federal facilities that report toxic chemical releases

Typically, larger facilities involved in manufacturing, metal mining/recycling, electric power generation, petrochemical, refining, and chemical manufacturing and hazardous waste treatment.

Concrete Batch Plants (CBP)

Facilities that combine sand, cement, and other aggregates to make concrete

Typically, neighborhood-level facilities, that are significant sources of particulate matter (dust), diesel truck smoke, noise and light pollution among other nuisances.

Roads / Freeways / Trains (yards)

Vehicular exhaust significantly emits a combination of multiple types of pollution:

NOx, VOCs, $PM_{2.5}$, GHGs and the precursors for ozone and smog

Superfund sites

Polluted waste locations contaminated with extremely hazardous substances. Usually abandoned.

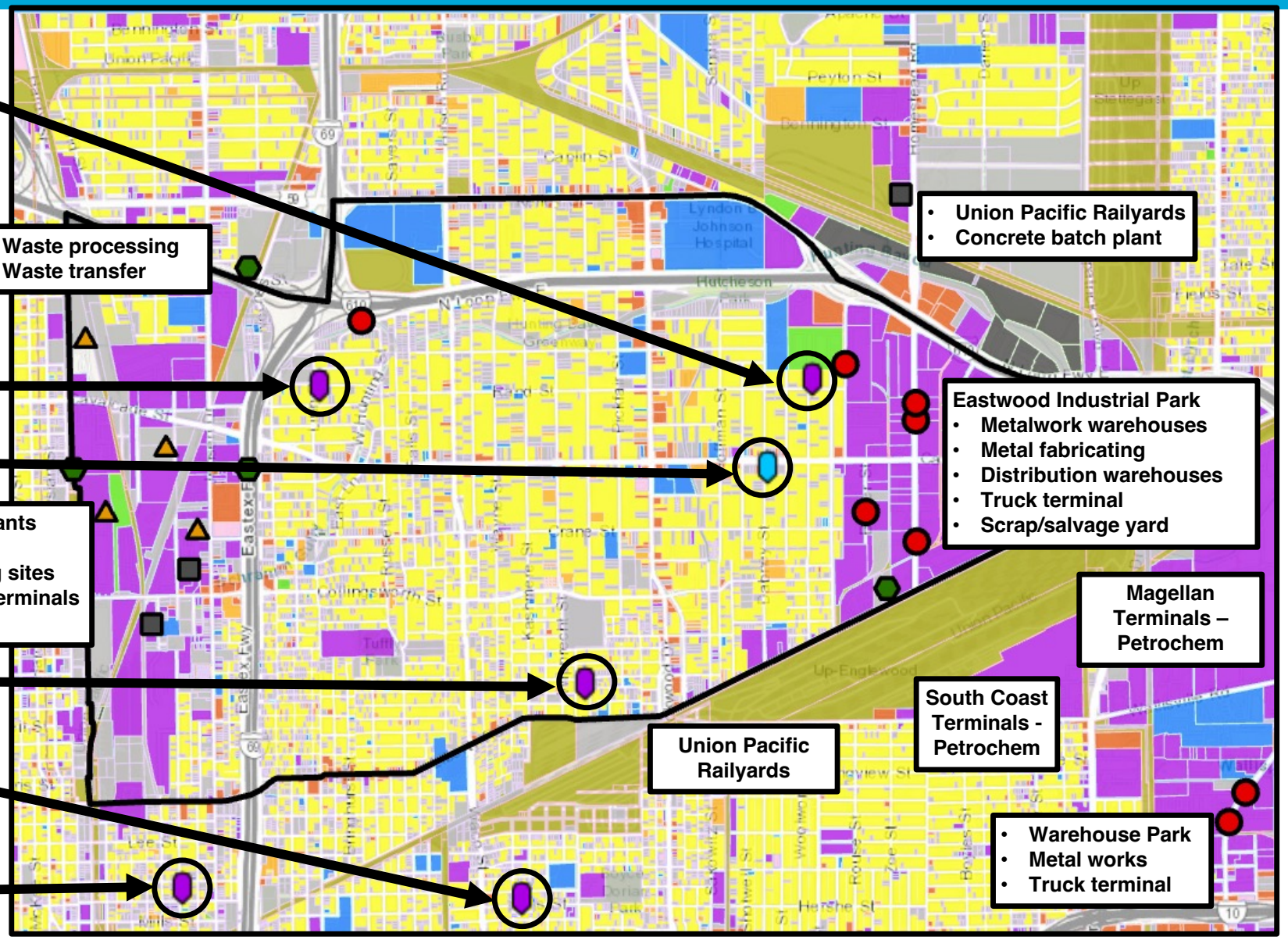
Uncleaned sites are continued sources of ground, air, and water pollution into the neighboring areas.

Surrounding Land Use: Kashmere Gardens

- Single-Family Residential
- Multi-Family Residential
- Commercial
- Office
- Public & Institutional
- Industrial
- Park & Open Spaces
- Transportation & Utility
- Undeveloped
- Agriculture Production
- Unknown

- Superfund Sites 2022
- Texas TRI Facilities, 2020
- Concrete Batch Plants 2021
- Active Municipal Solid Waste sites

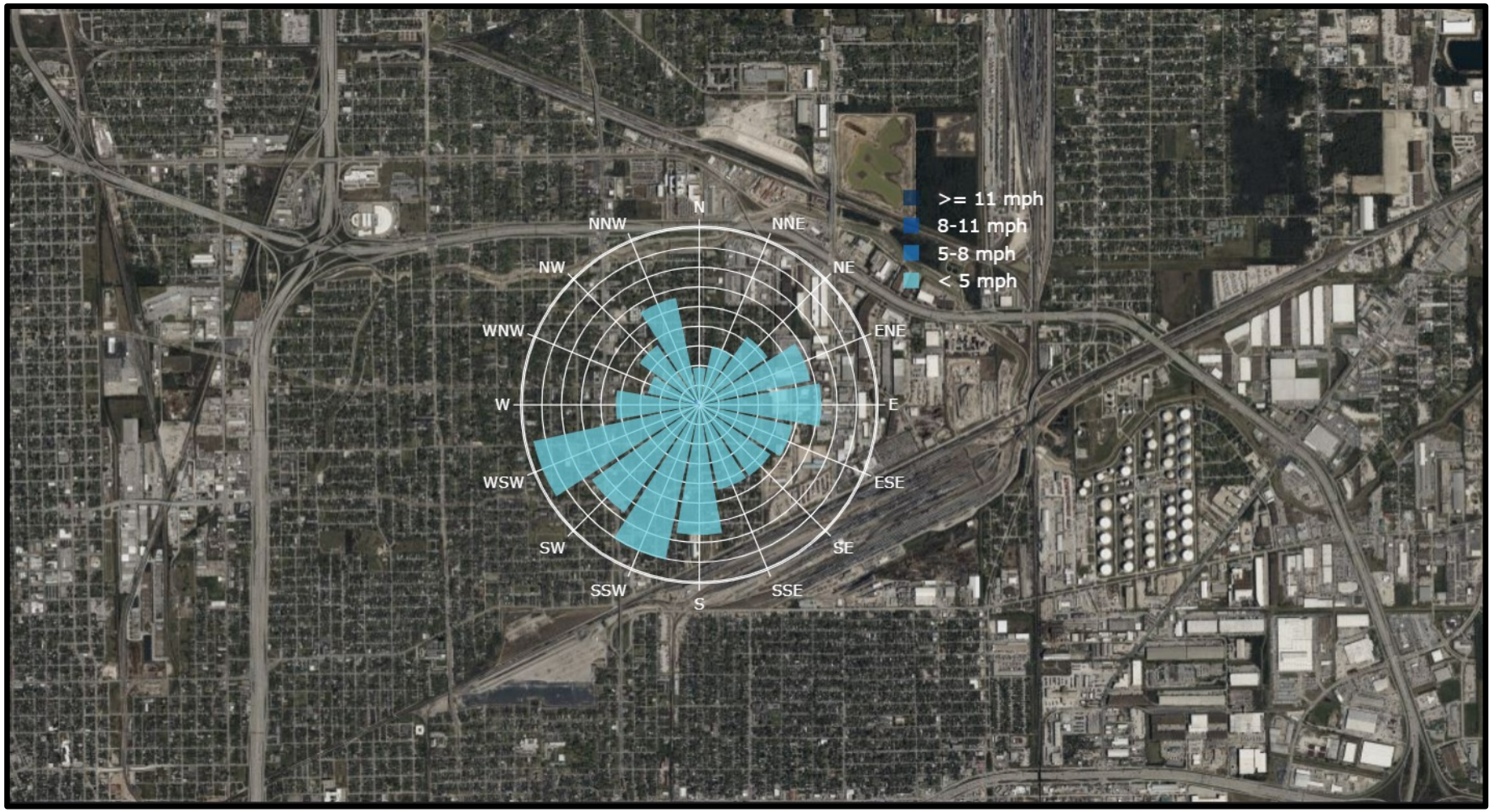
- APIS
- Purple Air



Wind Direction and Speed

Averaged over: 2022

Sources of pollution upwind of the monitors make significant contributions to readings and measurements

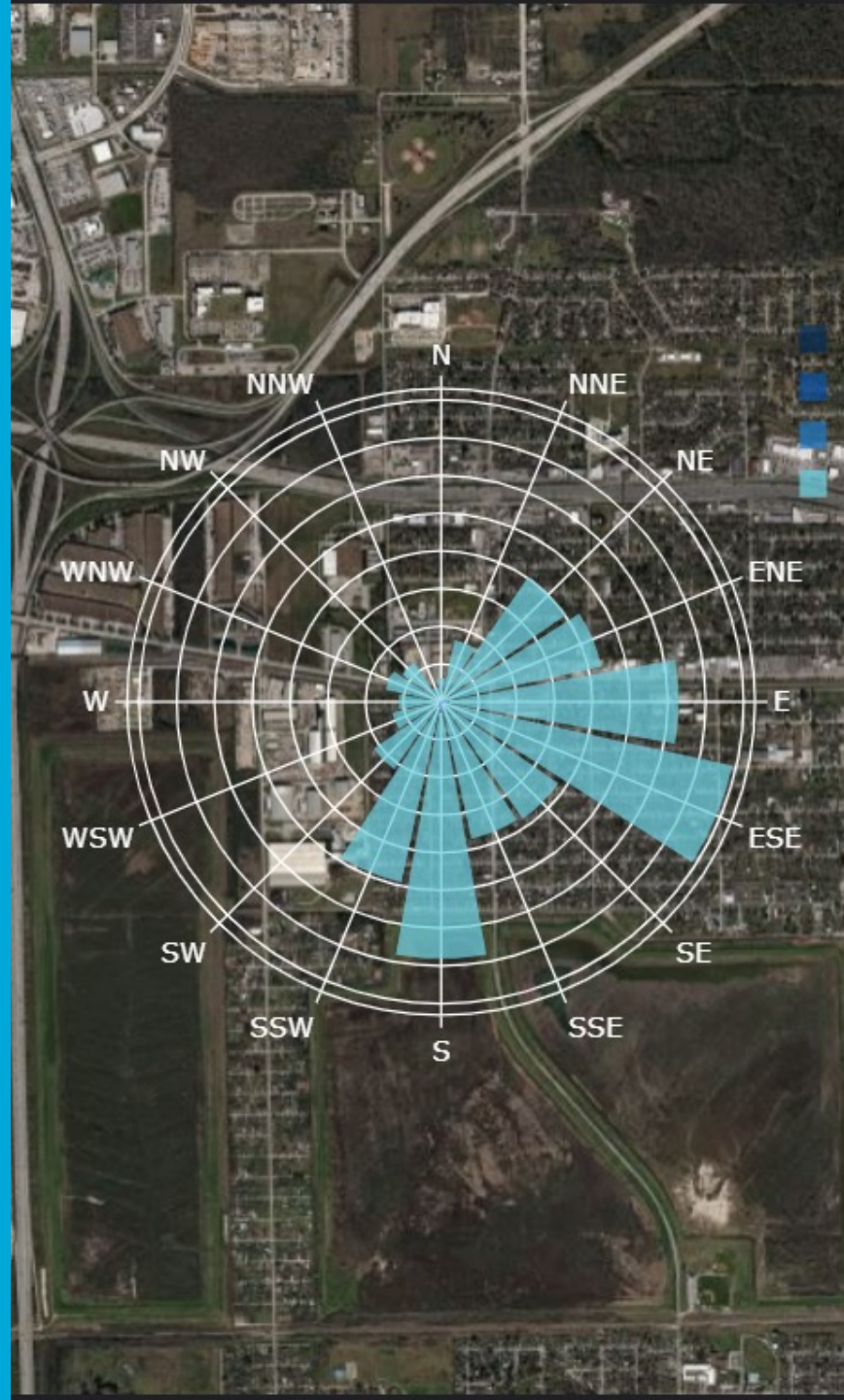


Predominant winds: SOUTH - SOUTHWEST

Air Monitor Measurements

2022

1. Nitrogen Oxides (NOx)
2. Ozone (O_3)
3. Volatile Organic Compounds (VOCs)
4. Particulate Matter 2.5 ($PM_{2.5}$)

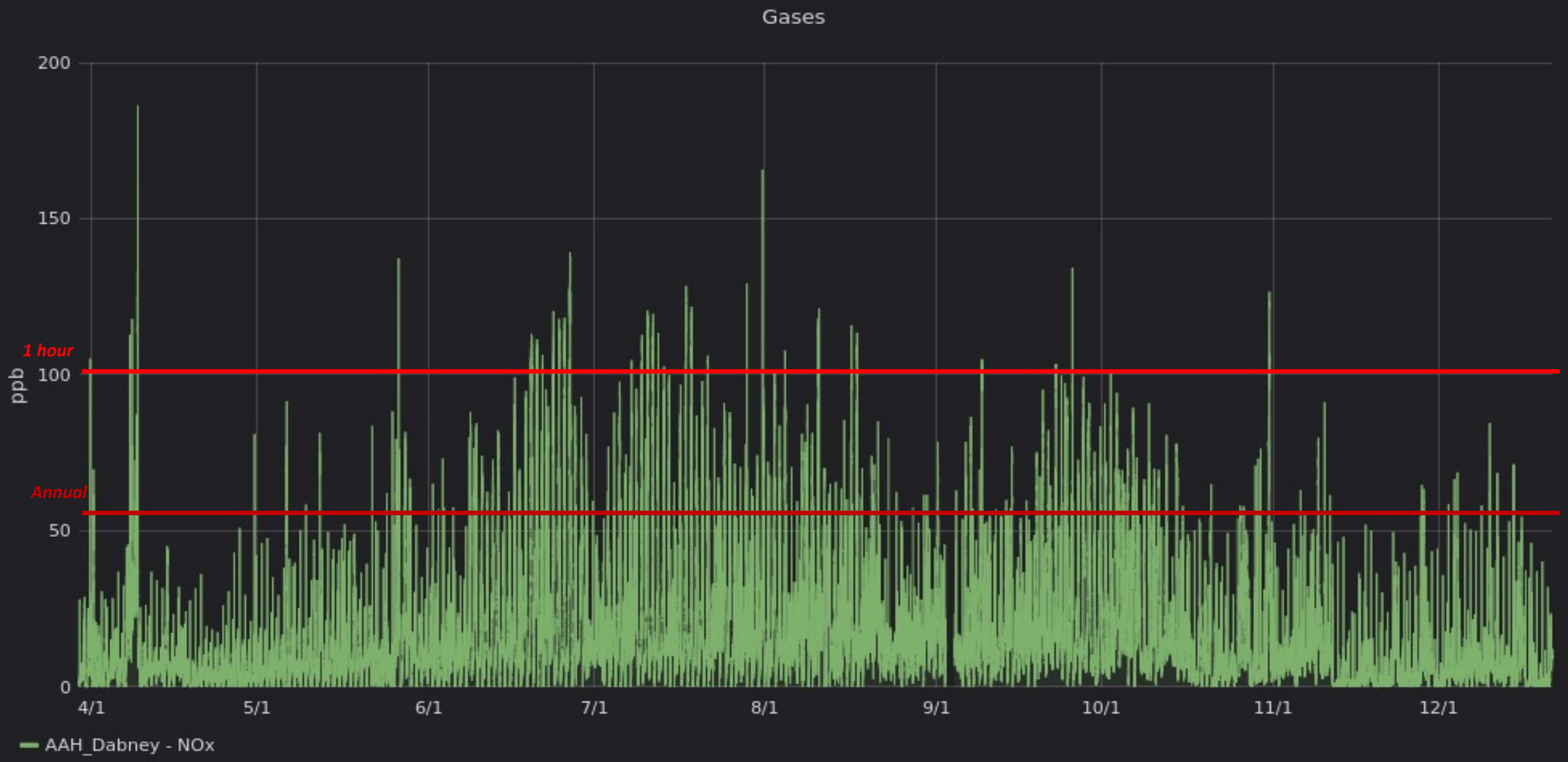


Nitrogen Oxides (NOx)

Includes Nitrogen Oxide (NO) and Nitrogen Dioxide (NO2)

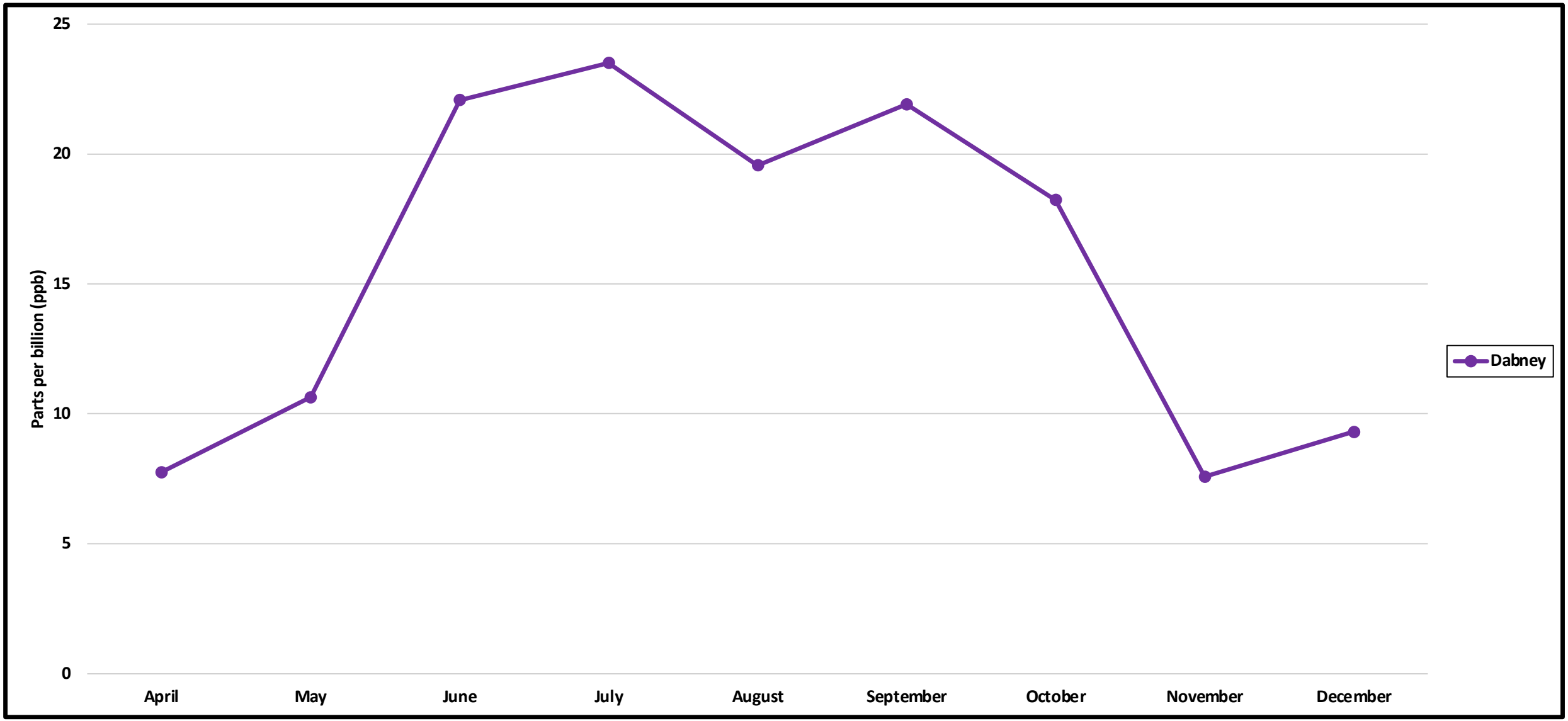
NOx: Day-to-Day

EPA NOx standard	1 hour	Annual
	100 ppb	53 ppb



NOx: Monthly Averages

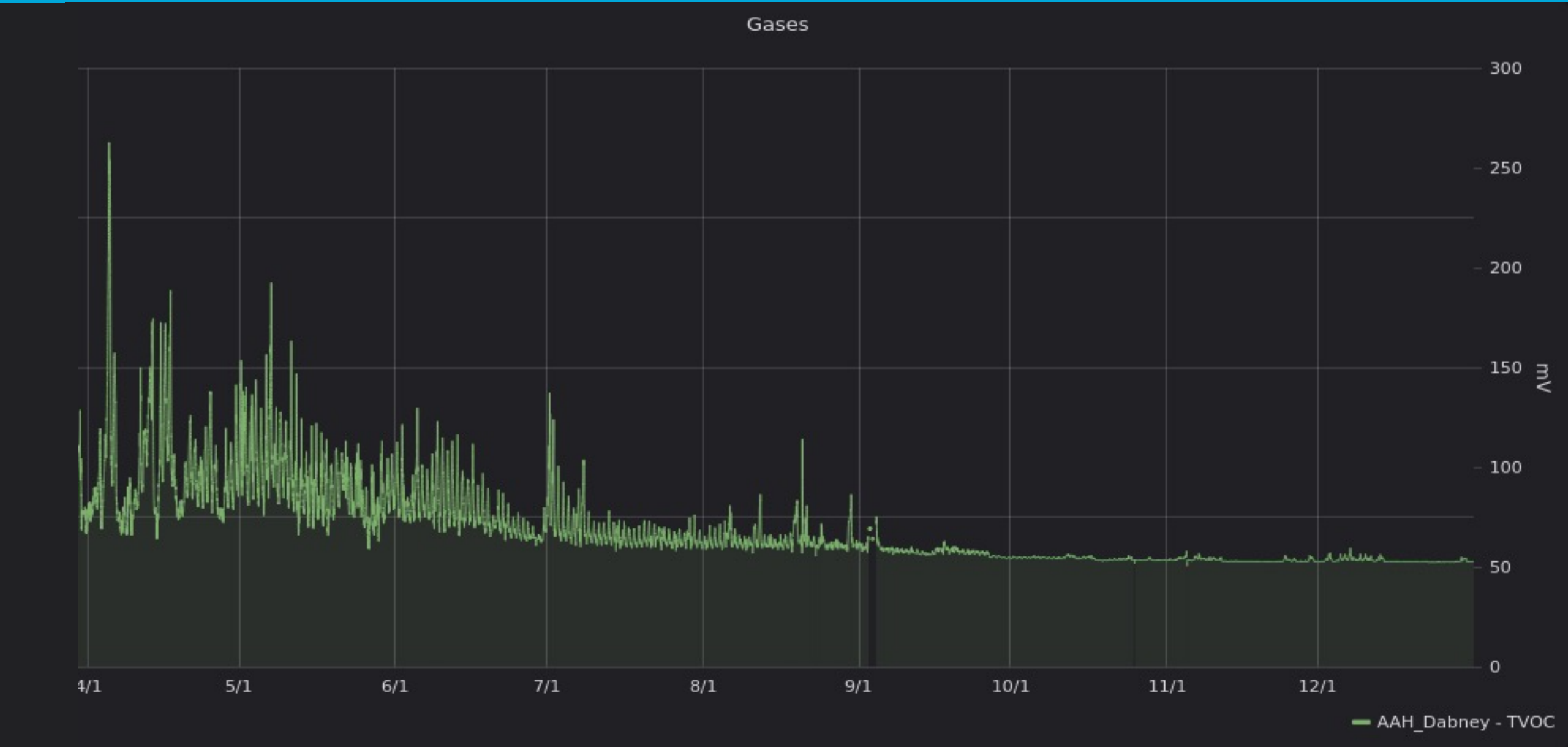
EPA NOx standard	Annual
	53 ppb



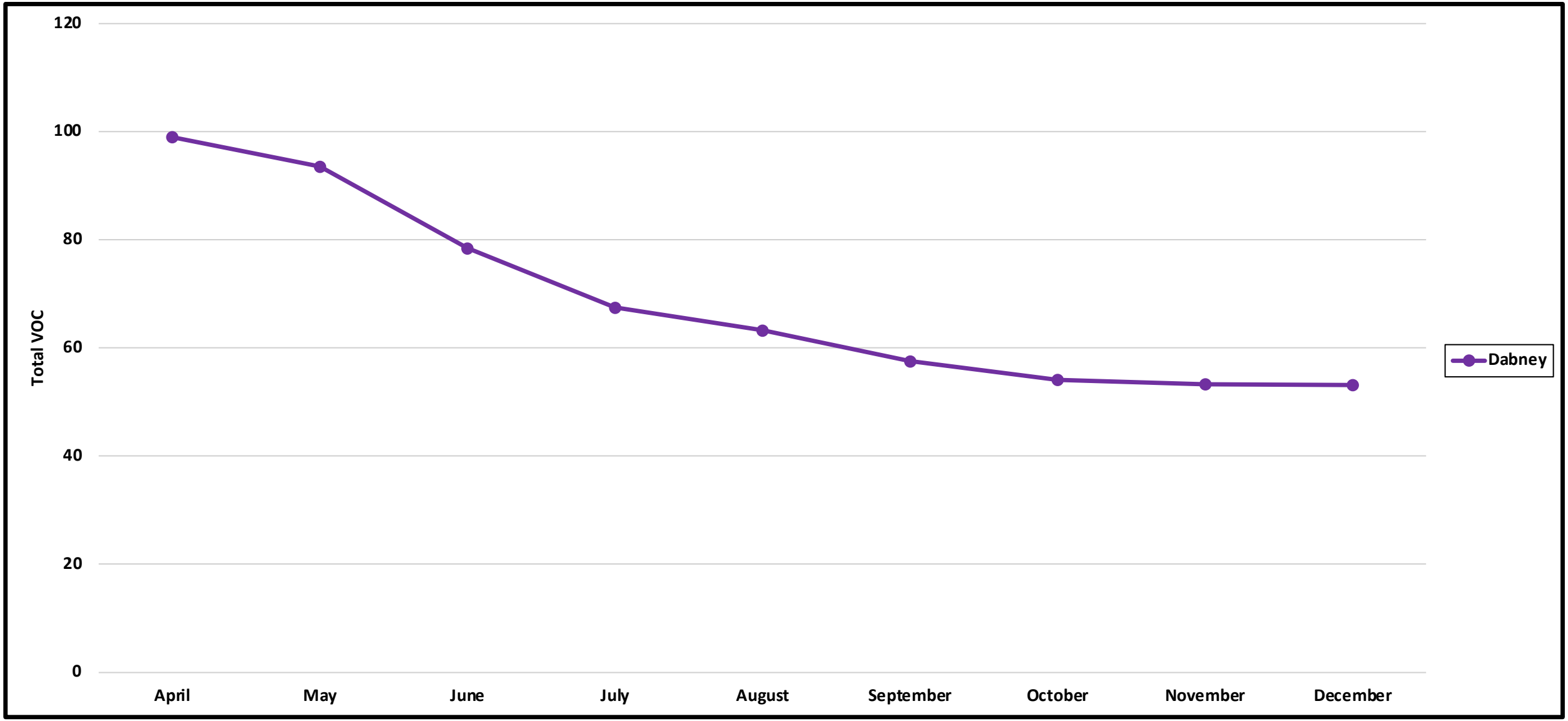
Volatile Organic Compounds (VOCs)

Includes benzene, ethylene, formaldehyde, butadiene, propane, and ethane among many others

Total VOC: Day-to-Day



Total VOC: Monthly Averages

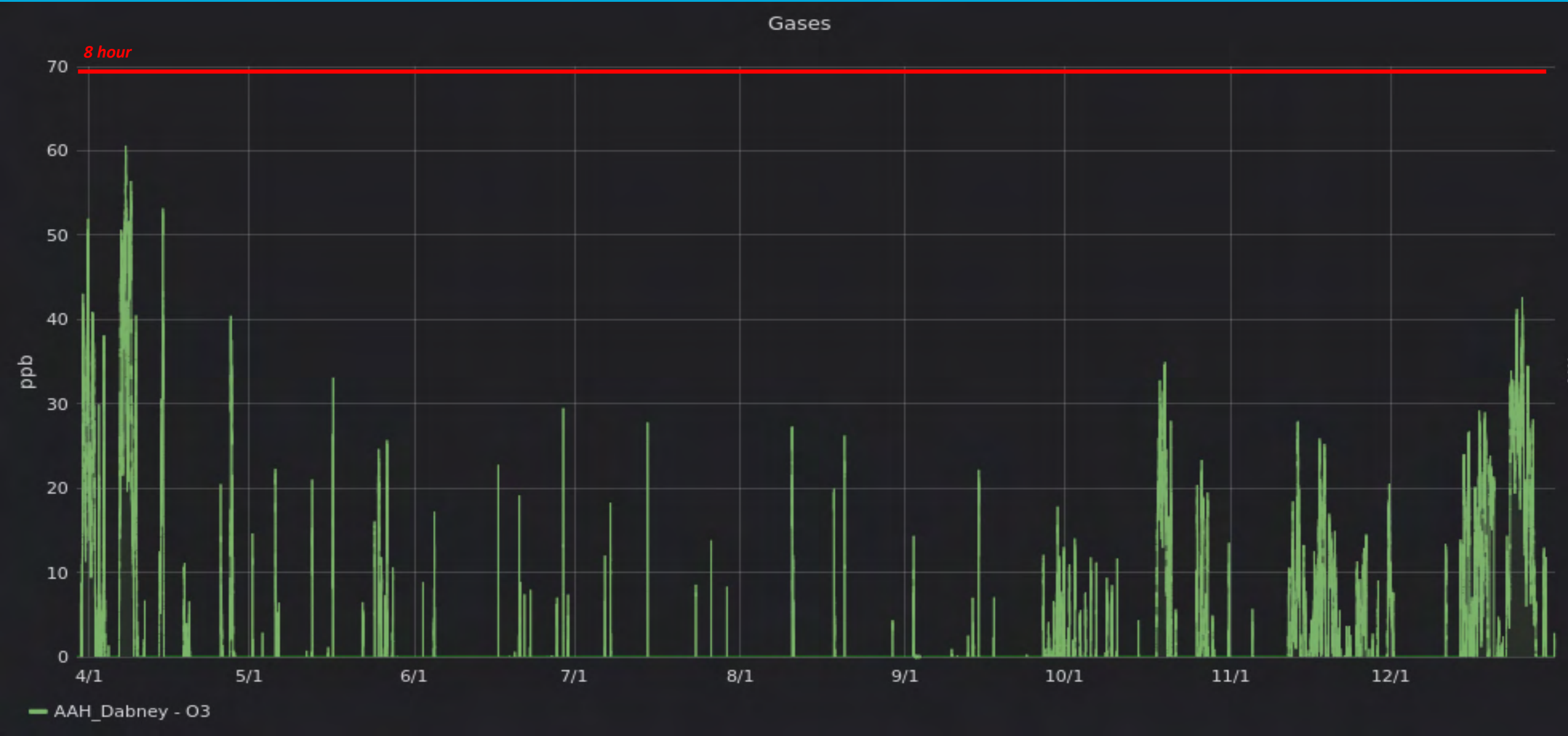


Ozone (O_3)

***<u>Ground level ozone</u>* (not stratospheric) that contributes to smog formation**

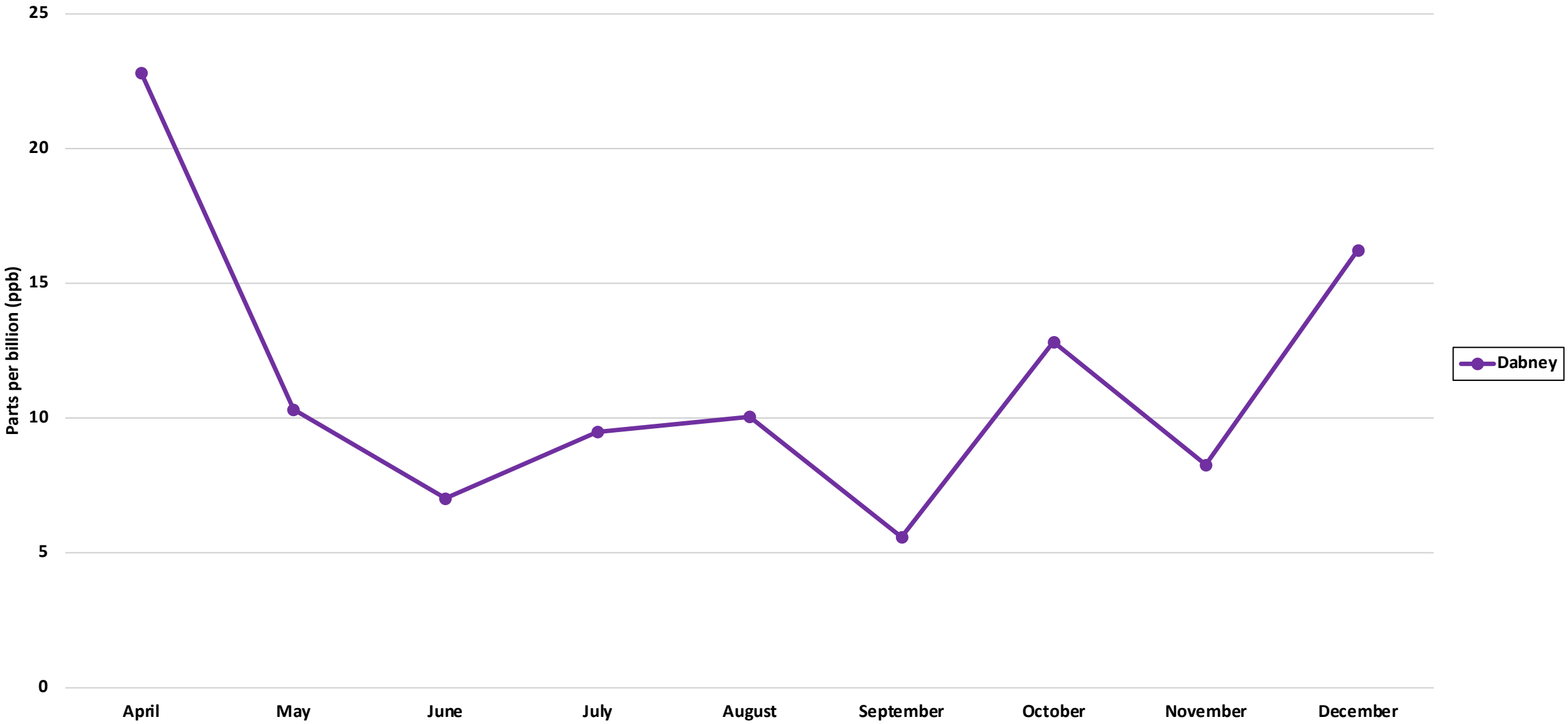
Ozone (O_3): Day-to-Day

EPA O_3 standard	8 hour
	70 ppb



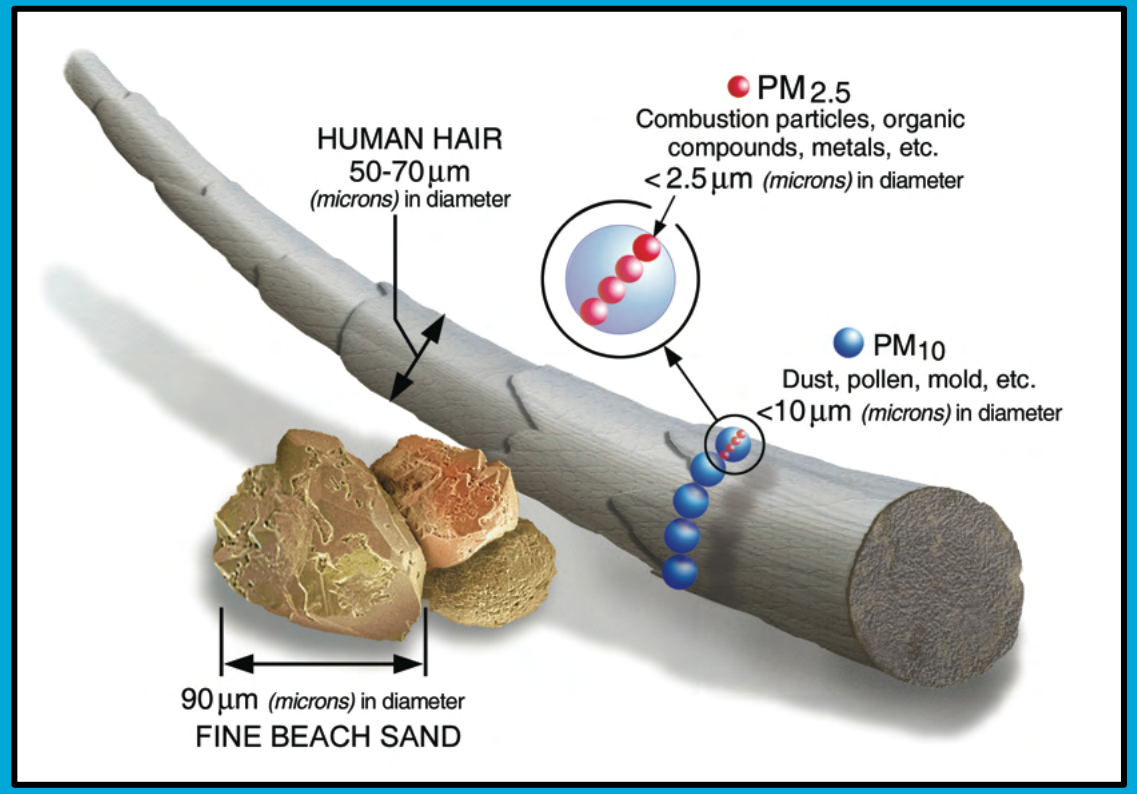
Ozone: Monthly Averages

EPA O_3 standard	8 hour
	70 ppb

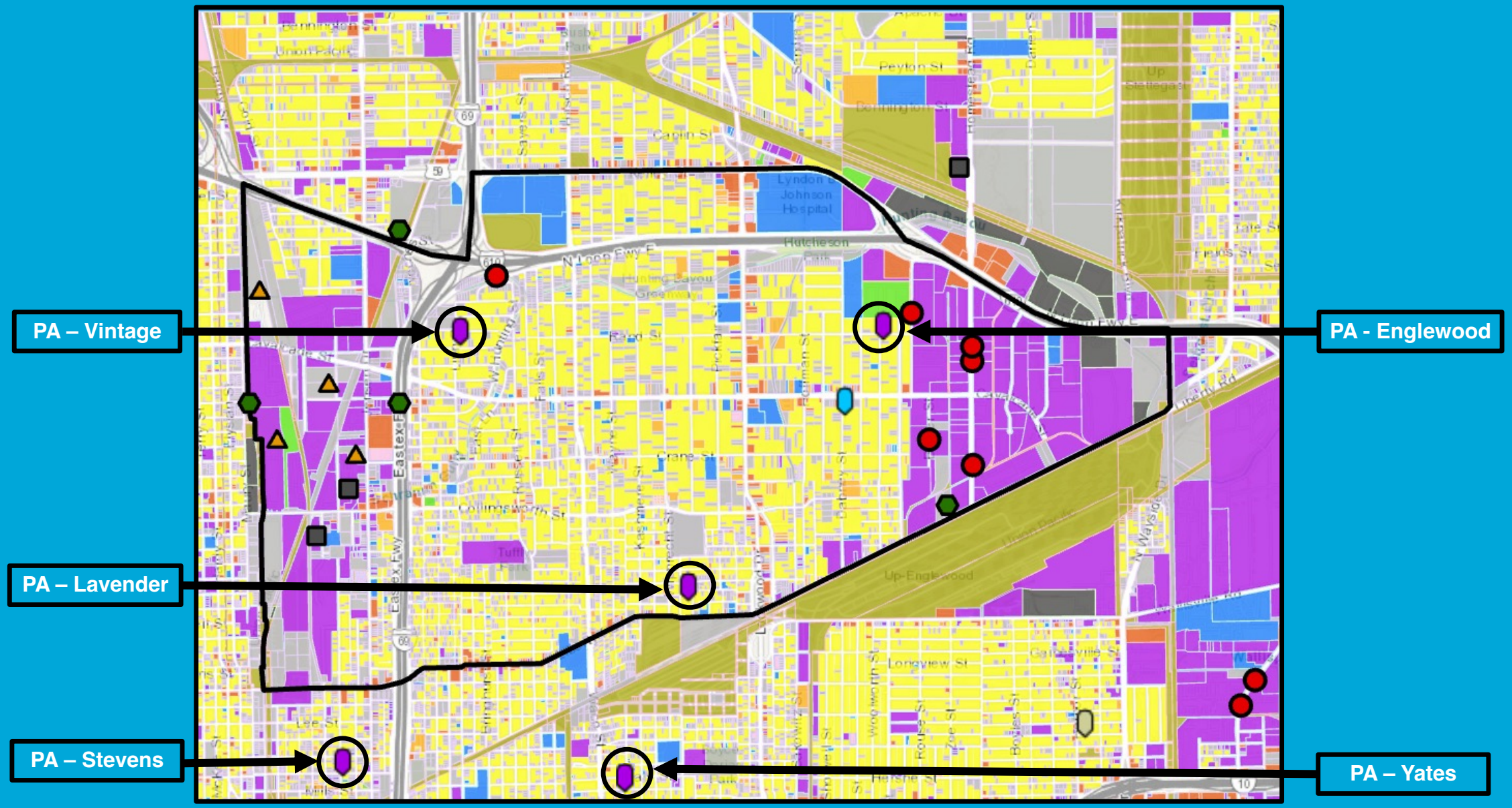


Particulate Matter 2.5 ($PM_{2.5}$)

Fine inhalable particles that can penetrate deep into the lungs

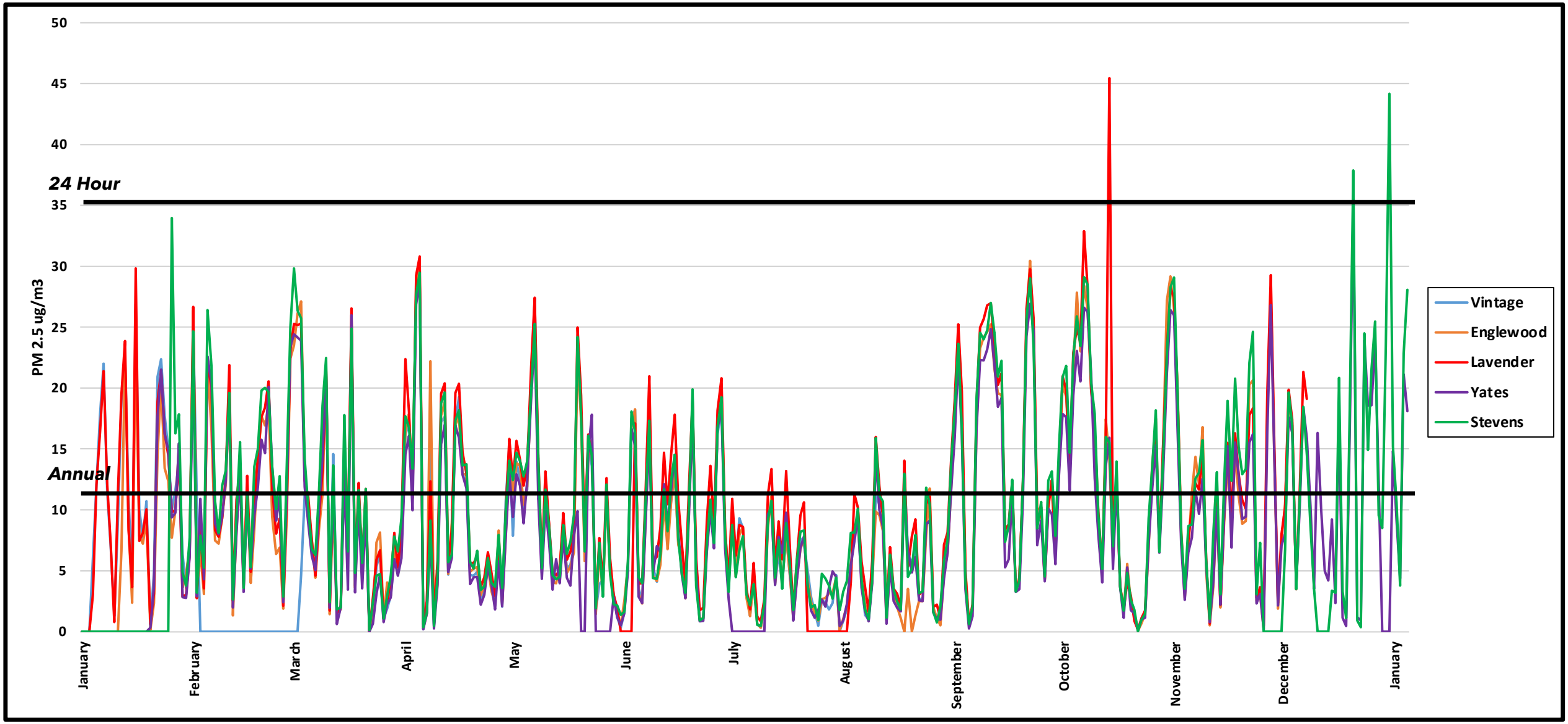


Particulate Matter Monitors:



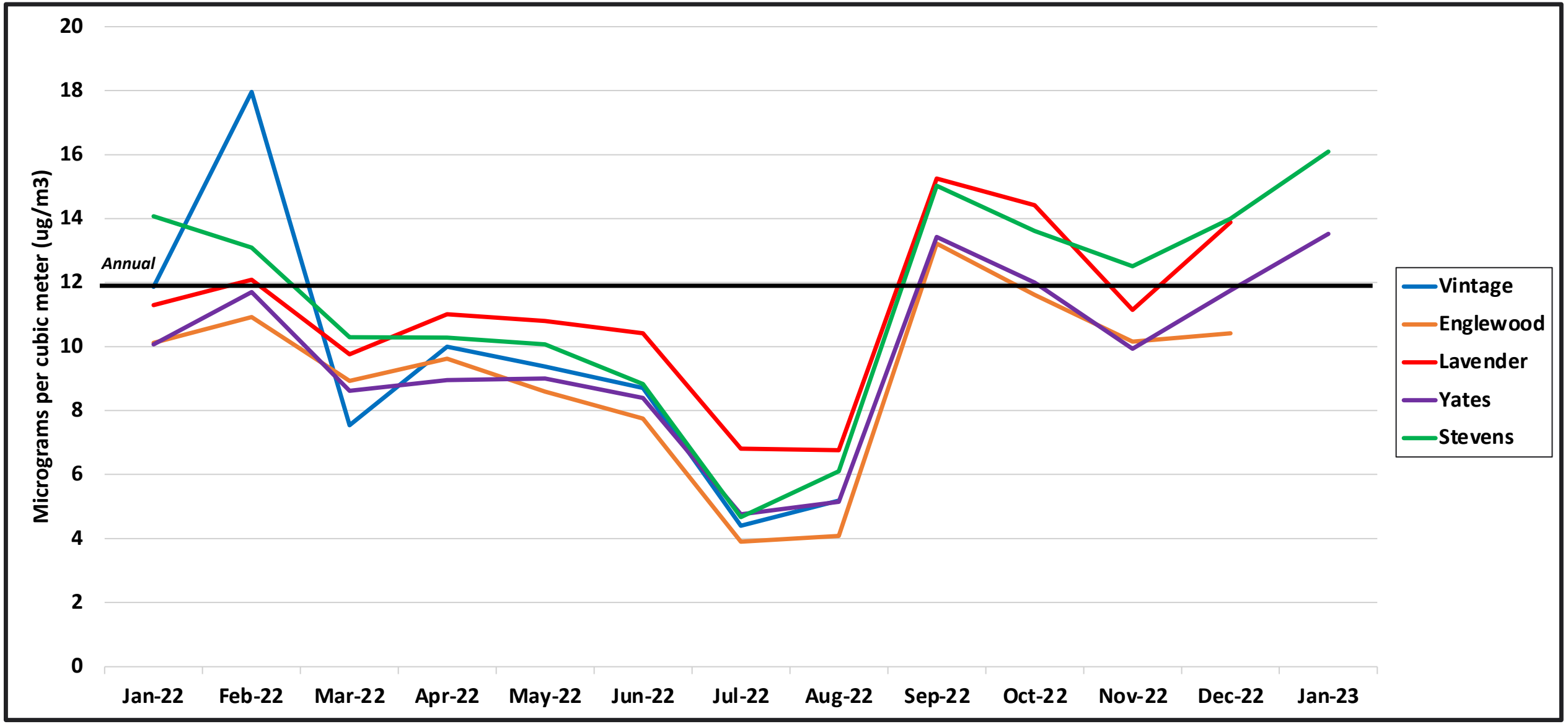
$PM_{2.5}$: Day-to-Day

EPA $PM_{2.5}$ standard	24 hour	Annual
	35 ug/m3	12 ug/m3

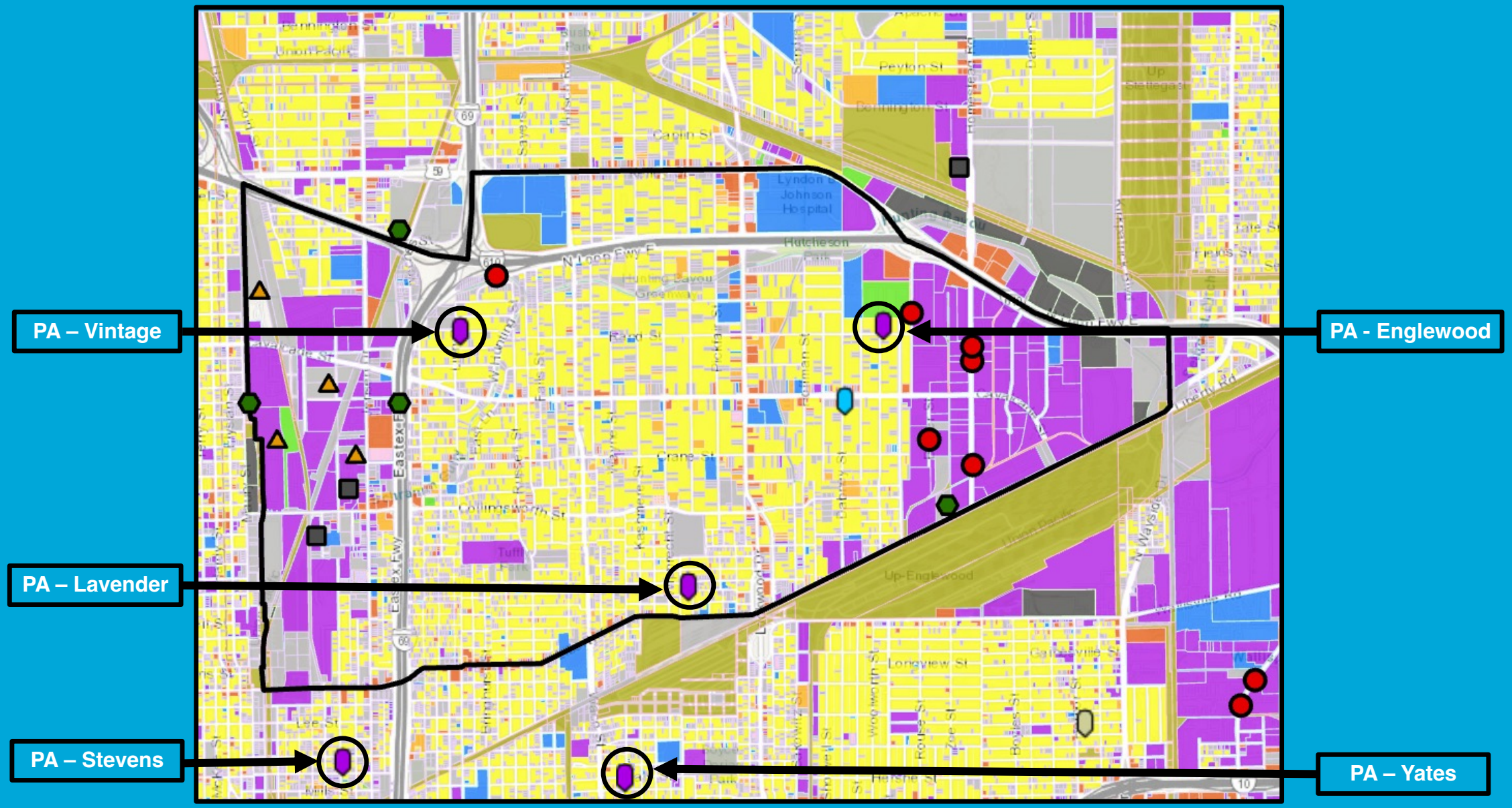


$PM_{2.5}$: Monthly Averages

EPA $PM_{2.5}$ standard	Annual
	12 ug/m3



Particulate Matter Monitors:



REVIEW

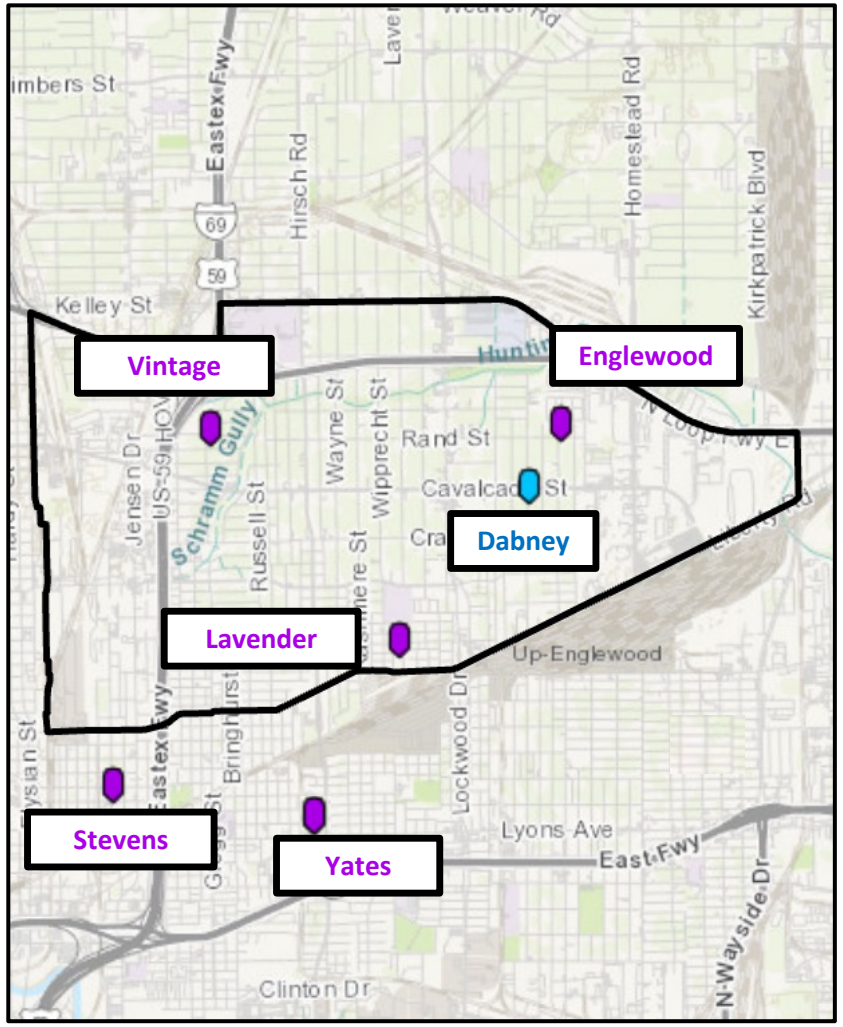
Caveats / Limitations

- **EPA Standards:**
  - Guidelines for public health protection. Regularly updated / revised
  - Averages / measurements below the limit do not imply a lack of effect
  - Short-term spikes can still have significant effects

- **Monitors:**
  - Limited by wind direction, technology (pollutants measured)
  - Area of location: Results may be affected by seemingly smaller events
    - E.g.: Idling cars, household events, fireworks, outages, etc.
  - Sensitivity: A high measurement can point to multiple possible sources
  - There may be pollution levels and types that are not being caught
  - Limited number of monitors across neighborhood

Conclusions: 2022

NOX	VOC	O_3	$PM_{2.5}$
Daily values peak very irregularly across months Regularly occurring spike at 7 pm daily	Daily values peak early mornings	No regular daily peak / cycle Irregular spikes	Daily values peak twice daily: Mornings and evenings
Trend upwards in summer and back down in winter	Trending downward with time	Trending downward until October	Trending downward until September Going upward again
Spikes during summertime exceed EPA standards	No unusual spikes as of late (Could be monitor malfunction)	Spikes below EPA standard	Daily peaks increasing in magnitude Highest at Stevens and Lavender



Next Steps

- Continue collecting and analyzing data
- Averages may change as monitors capture more emissions
  - More data improves accuracy
- Develop action plans
- Identify new locations for additional monitors:
  - To expand network and boost data accuracy