NYU School of Medicine
NYU LANGONE MEDICAL CENTER

NCA
NEWTOWN CREEK ALLIANCE

NCA Air Quality: Progress Report

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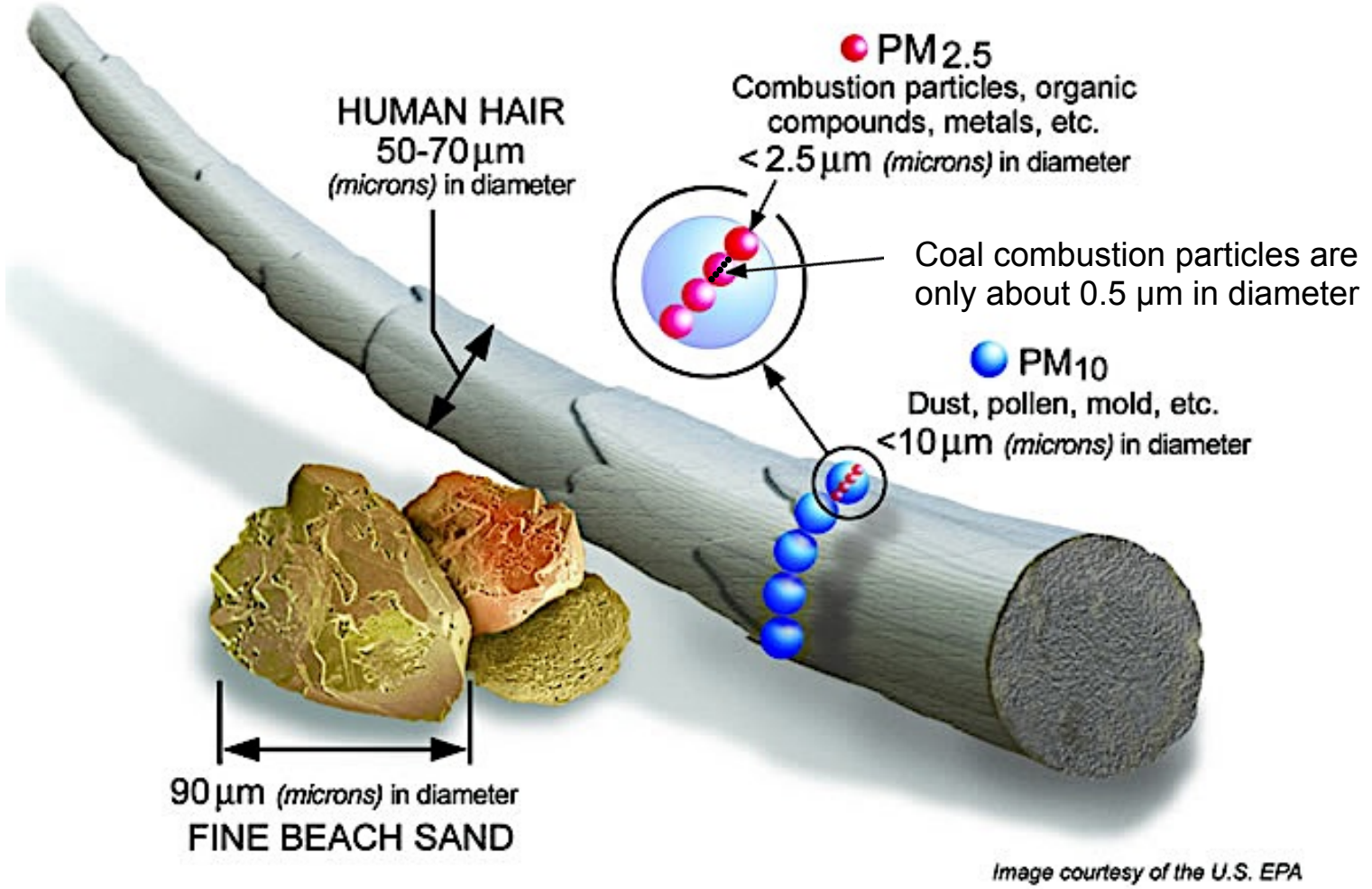
Why We're Here?

- Newtown Creek Alliance (NCA) partnered with NYU School of Medicine who received a Pilot grant to explore and identify local air pollution
  - NCA identified locations that had air quality concerns over time
- NYU Grossman School of Medicine Community Engagement Core partnership facilitated access to faculty experts & graduate student researchers:
  - Dr. Judith Zelikoff, Director of NYU Environmental Medicine Community Engagement Program and professor & expert in toxicology

What has been done so far?

- Industries and vehicular emissions contribute heavily to air pollution in industrial zones along Newtown Creek
- NCA and NYU partnered to identify air contaminants and better understand potential linkages between local air and health
- Over the course of a year and one-half, five different NCA-identified sites in Greenpoint and Williamsburg were monitored
- Air pollutants followed in this study included:
  - Volatile organic compounds (VOCs)
  - Particulate matter ($PM_{2.5}$)

Particulate Matter ($PM_{2.5}$)



The **diameter** of one strand of your hair is more than **100 times larger** than the diameter of a combustion particle

$PM_{2.5}$ analysis

- Integrated $PM_{2.5}$ samples were collected at 10 L/min for **6-hours**
- Collection done by two different filters i.e., Teflon and Quartz
- **Gravimetric analysis:** Pre-weight (before collection) and post-weight (after sample collection) of Teflon filters to determine total $PM_{2.5}$ concentration
- **Elemental analysis:** X-ray fluorescence spectroscopy (XRF) of Teflon filters to identify metals
- **Organic/Elemental Carbon (OC/EC)** analysis of quartz filter

PM monitors do not identify all pollutants in the air

PUF cartridge

VOC canister

To answer this question, we also deployed:

- Summa Air Canisters to identify Volatile Organic Compounds (VOCs).
- PUF Cartridges used to identify Polyaromatic Hydrocarbons.

What are VOCs?

Volatile Organic Compounds (VOCs)

New car smell, Charcoal grills, paint, cleaners, glue

Occur naturally when burning coal, crude, oil, gasoline, tobacco

Odorous (sometimes)

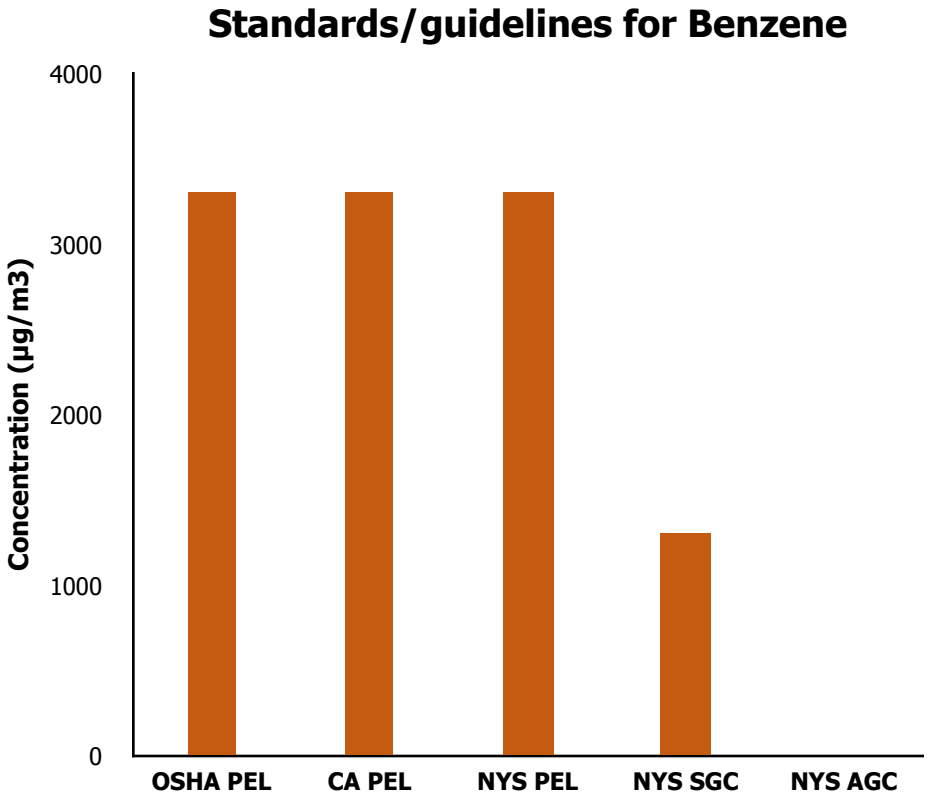
Gaseous

Volatile Organic Compounds (VOCs)

- VOCs are gases emitted into the air from chemical products or processes
- Some are hazardous for health and others are carcinogenic, such as benzene
- **Sampling:** Collection of VOCs by summa canisters **(6 hr)**
- **Analysis:** Gas Chromatography mass spectrophotometery (GC-MS)

Interpretation of the results

- EPA has set standards for daily (35 μg/m^3) and annual (12 μg/m^3) $PM_{2.5}$ exposure
- However, EPA has not set standards for VOCs for non-industrial settings. Only available federal standards from Occupational Safety and Health Administration (OSHA), which are for an 8-hr work shift.
- For this study, NY state annual and short-time standards will be used, including AGC and SGC, respectively

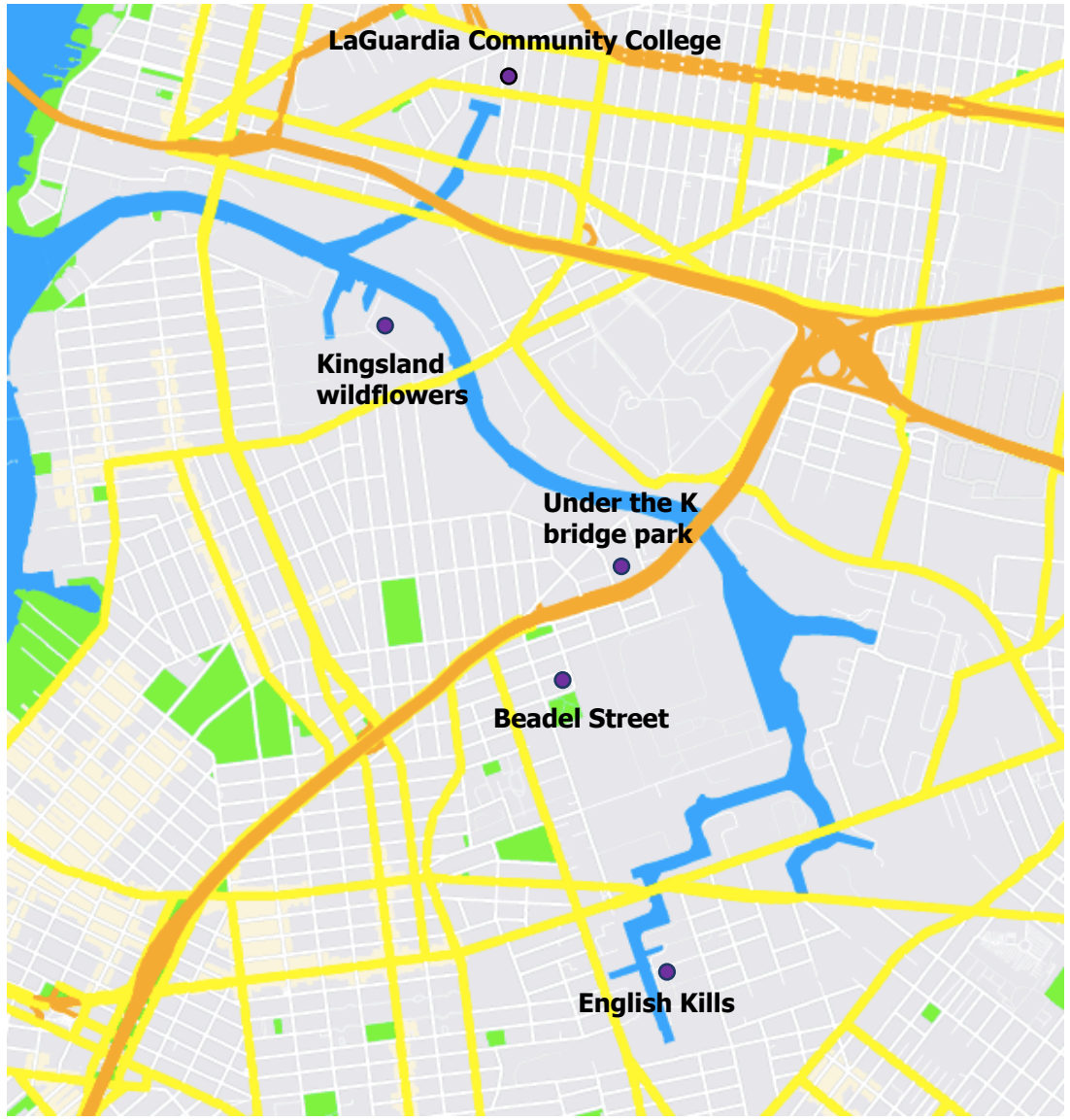


*SGC = Short term guideline (1-hour); AGC = Annual guideline concentration; PEL = Permissible Exposure Limit

Sampling Sites

- Five different sampling sites were selected by NCA based on community concerns and their vicinity to specific industries/traffic areas

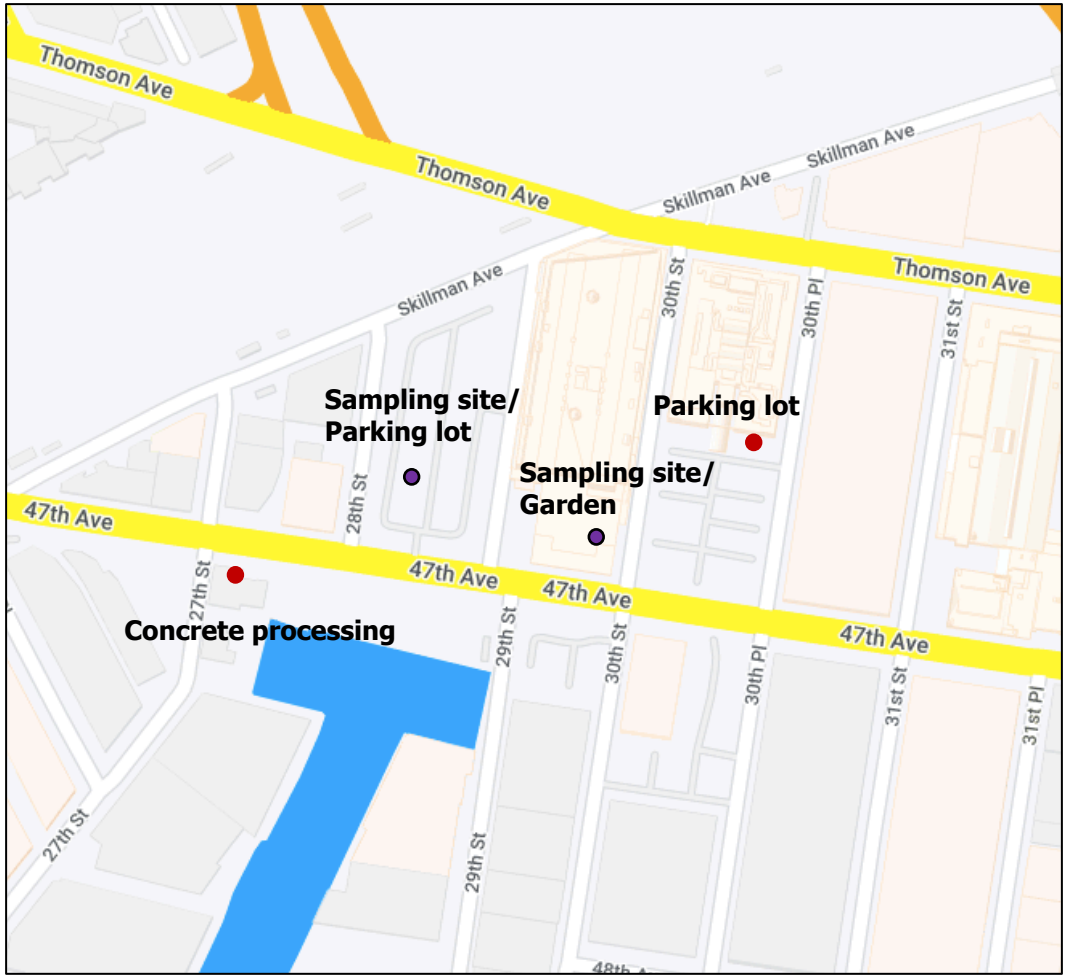
Location	Sampling sites	Frequency
Kingsland Wildflowers	2 (rooftop and ground level)	Once (summer)
Under the K Bridge Park	2	Twice (weekday and weekend)- summer
LaGuardia Community College	2 (Parking lot and Garden)	Twice (summer and winter)
Beadel Street (Close to National Grid)	2 (rooftop and ground level)	Once (summer)
English Kills	2	Once (summer)



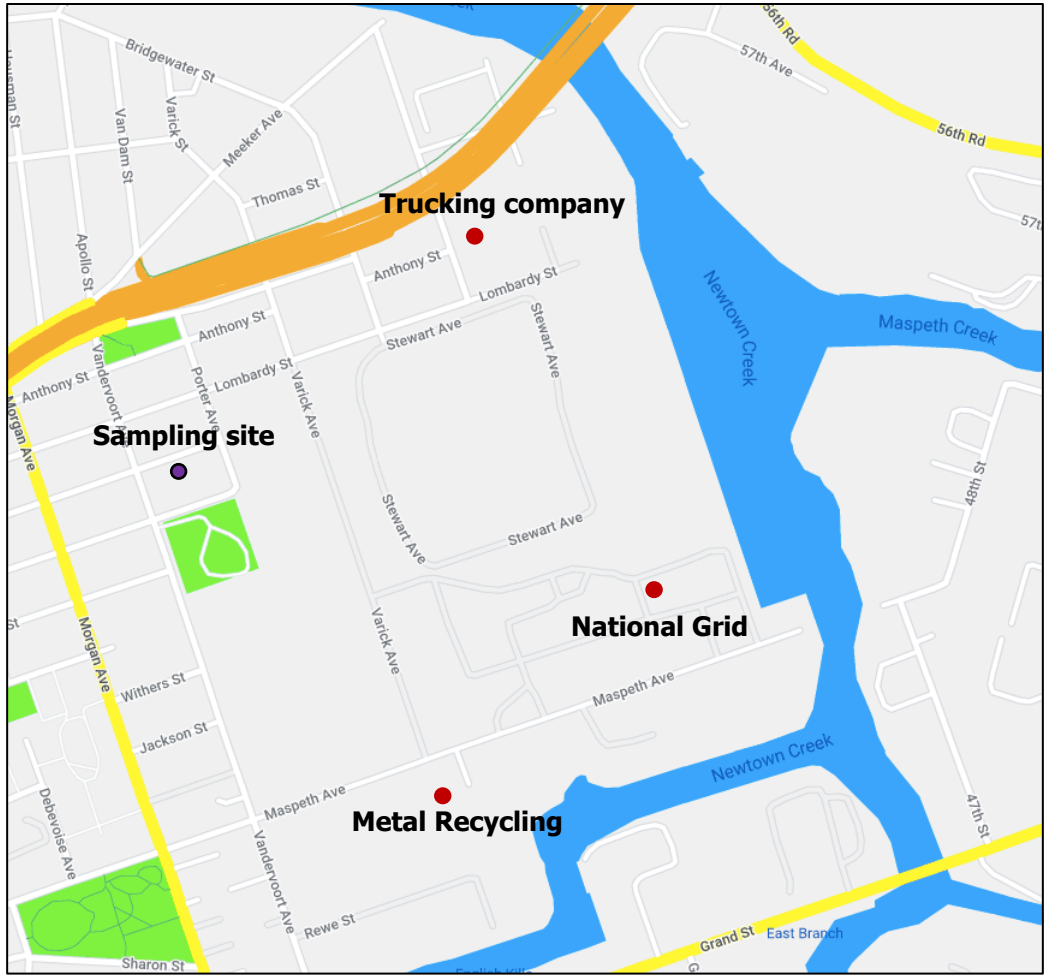
Kingsland Wildflowers

Under the K-Bridge (K-Park)

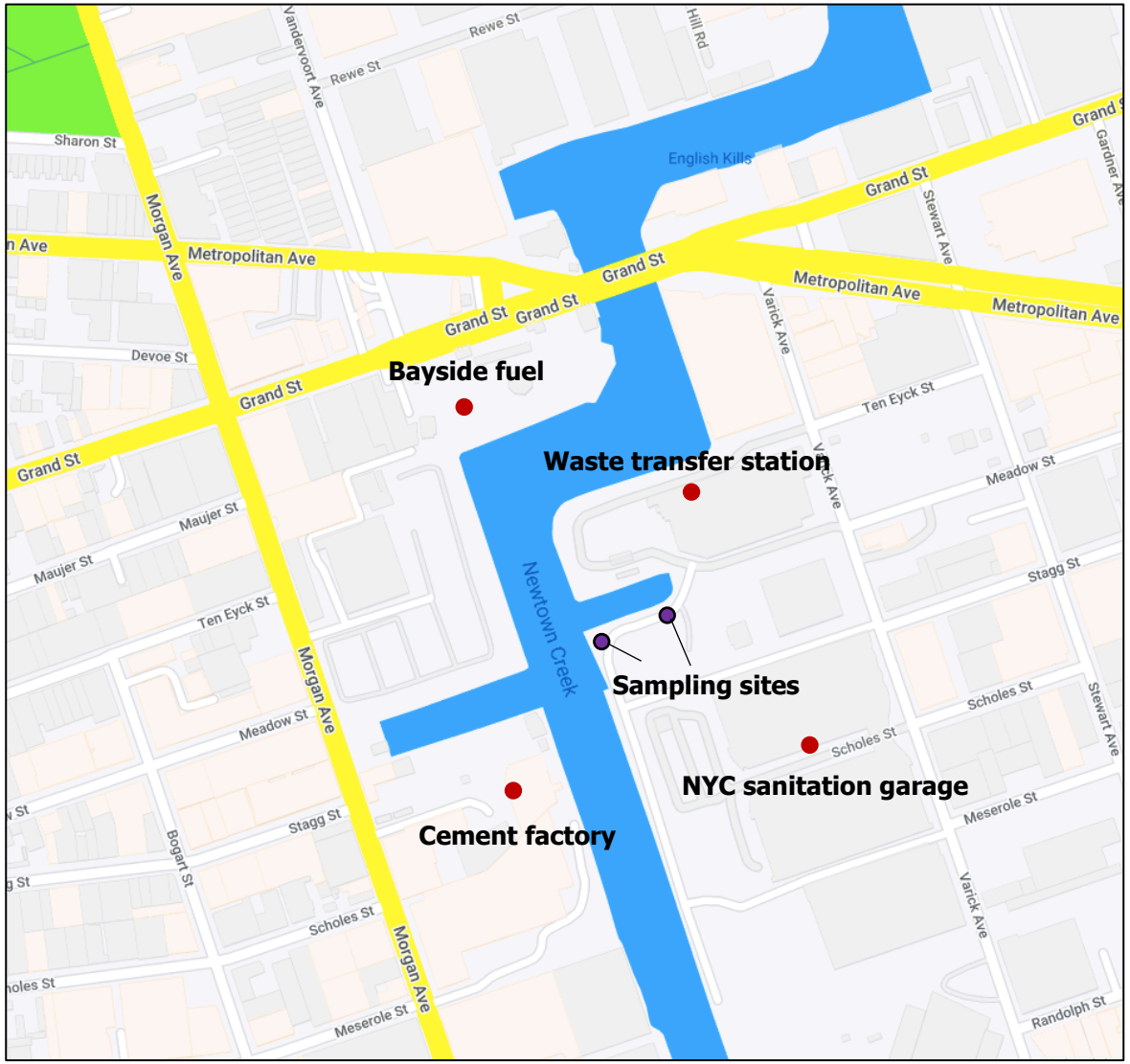
LaGuardia Community College



Beadle Street (Vicinity of National Grid)



English Kills



Results: VOCs

Analyte	Kingsland Wildflower	LaGuardia (winter)	LaGuardia (summer)	K-Park (weekday)	K-Park (weekend)	Beadel Street	English Kills
Acetone	✓	✓	✓	✓	✓	✓	✓
Benzene	×	**>AGC**	**>AGC**	**>AGC**	**>AGC**	**>AGC**	**>AGC**
1,3 Butadiene	×	×	×	✓	×	×	×
2-Butanone (MEK)	×	×	✓	×	✓	×	×
Carbon disulfide	✓	×	×	×	×	×	×
Carbon tetrachloride	×	**>AGC**	**>AGC**	**>AGC**	**>AGC**	**>AGC**	**>AGC**
Chloroform	×	×	✓	×	×	×	×
Chloromethane	✓	✓	✓	✓	✓	✓	✓
Cyclohexane	×	✓	✓	✓	✓	×	×
Dichlorobenzene	×	×	×	×	✓	×	×

✓ = Detected, but below NYS AGC; >AGC = Higher than NYS annual guideline concentration (AGC); × = Below the instrument detection limit

Results: VOCs

Analyte	Kingsland Wildflower	LaGuardia (winter)	LaGuardia (summer)	K-Park (weekday)	K-Park (weekend)	Beadel Street	English Kills
Dichlorodifluoromethane (Freon 12)	✓	✓	✓	✓	✓	✓	✓
1.2-Dichloroethane	×	×	×	×	×	**>AGC**	×
Ethanol	×	✓	✓	✓	✓	✓	✓
Ethyl acetate	✓	×	✓	✓	✓	✓	×
Ethylbenzene	×	✓	✓	✓	✓	✓	✓
4-Ethyltoluene	×	×	×	✓	✓	×	×
Heptane	×	✓	✓	✓	✓	✓	✓
Isopropanol	✓	×	✓	×	×	✓	×
Methylene Chloride	✓	×	✓	✓	×	✓	×
Naphthalene	×	×	×	×	×	✓	✓

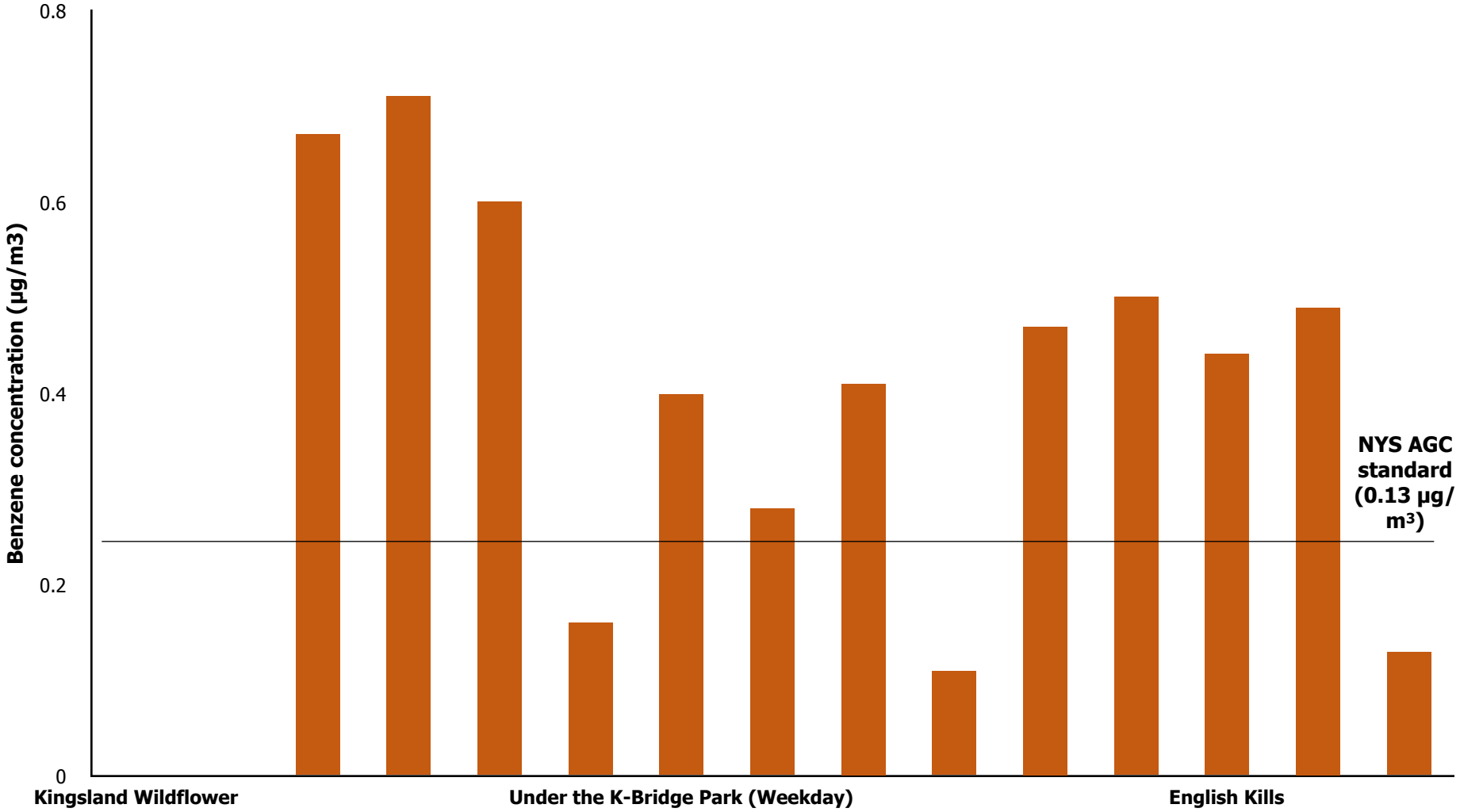
✓ = Detected, but below NYS AGC; >AGC = Higher than NYS annual guideline concentration (AGC); × = Below the instrument detection limit

Results: VOCs

Analyte	Kingsland Wildflower	LaGuardia (winter)	LaGuardia (summer)	K-Park (weekday)	K-Park (weekend)	National Grid	English Kills
4-Methyl-2-pentanone (MIBK)	×	×	×	✓	×	×	×
Propene	✓	×	×	×	×	×	×
Styrene	×	✓	×	×	×	×	×
Tetrachloroethylene	×	✓	✓	**>AGC**	✓	✓	×
Toluene	✓	✓	✓	✓	✓	✓	✓
Trichloroethylene	×	×	×	×	✓	×	×
Trichlorofluoromethane (Freon 11)	×	✓	✓	✓	✓	✓	✓
1,2,4-Trimethylbenzene	×	✓	✓	✓	✓	✓	✓
1,3,5-Trimethylbenzene	×	×	×	✓	✓	✓	×
m&p-Xylene	×	✓	✓	✓	✓	✓	✓
o-Xylene	×	✓	✓	✓	✓	✓	✓

✓ = Detected, but below AGC; >AGC = Higher than NYS annual guideline concentration (AGC); × = Below instrument detection limit.

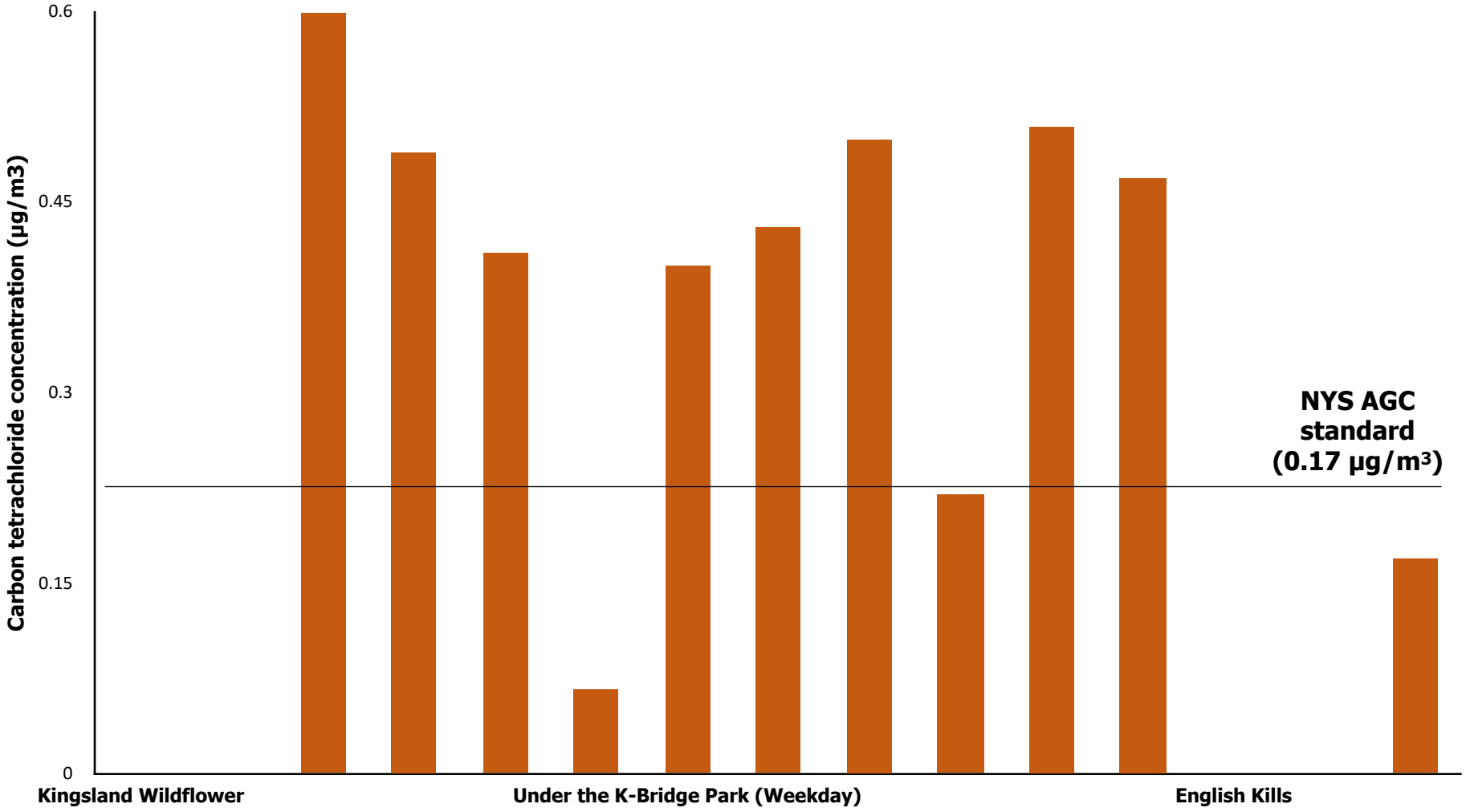
Benzene



Sources:
Tobacco smoke, gas stations, motor vehicle exhaust, and industrial emissions

Health effects:
Immunosuppression, increased chance of infection;
Long term exposure, adverse effect on bone marrow – anemia and carcinogenic

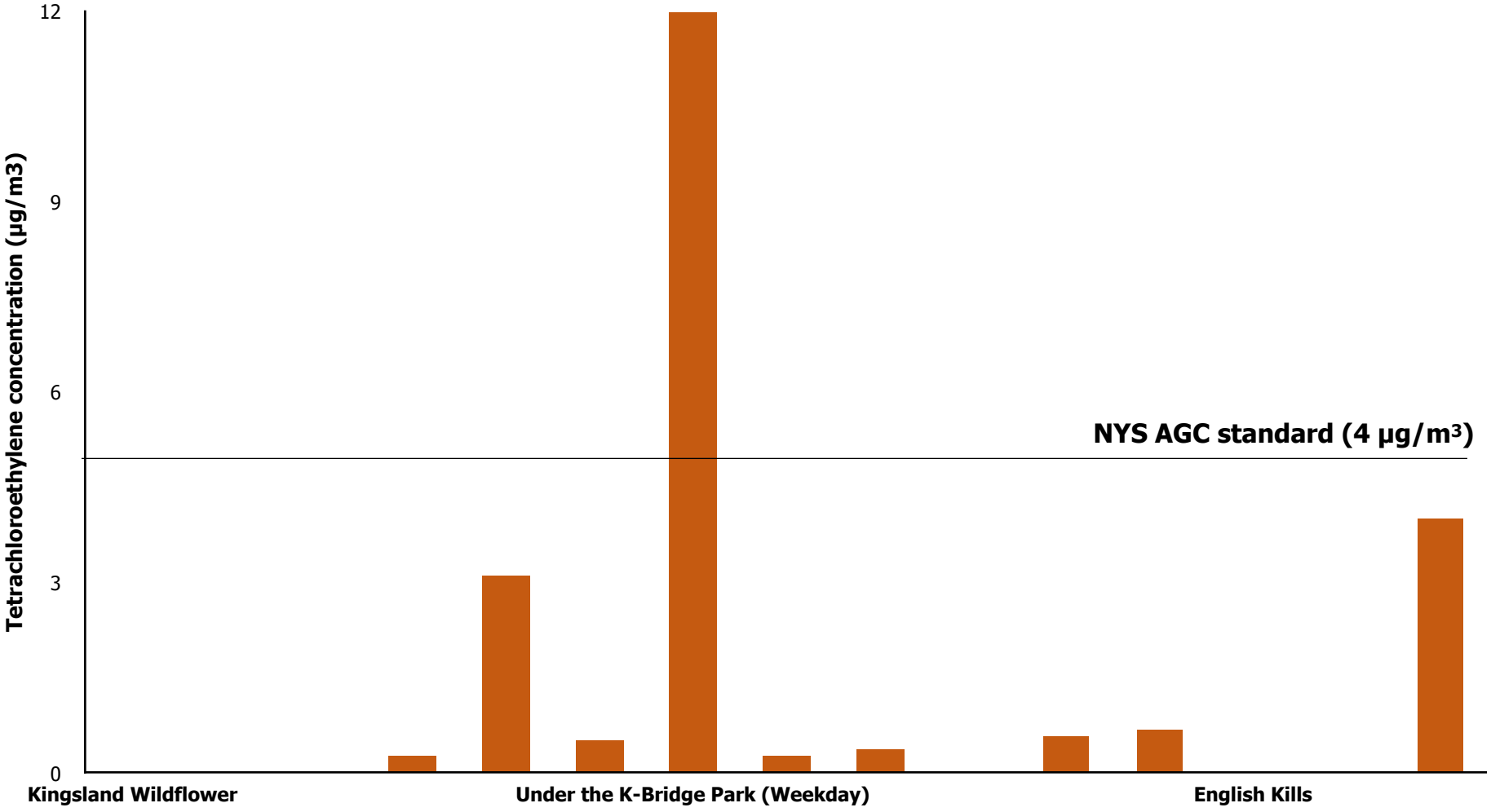
Carbon Tetrachloride



Sources:
Manufacturing and processing facilities, landfills, incomplete combustion of waste incineration, and photochemical decomposition of perchloroethylene,

Health effects:
Liver and kidney damage, neurological disorders, pulmonary edema/fibrosis, carcinogenic

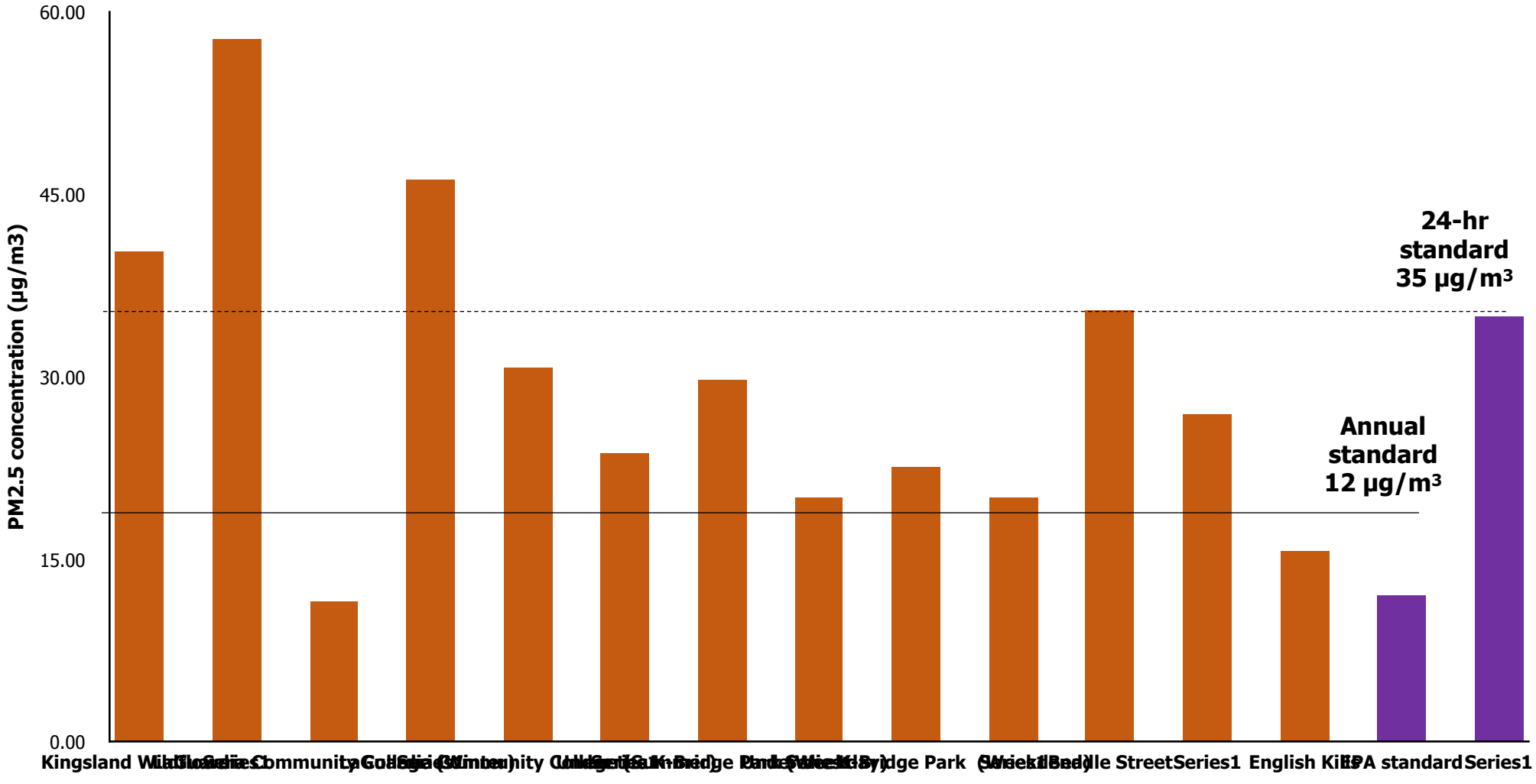
Tetrachloroethylene



Sources:
Dry-cleaning, metal degreasing operations, and manufacturing industries

Health effects:
Neurological effects, liver damage, kidney effects, immune and hematologic effects, developmental and reproductive effects and carcinogenic i.e., bladder cancer, non-Hodgkin lymphoma and multiple myeloma.

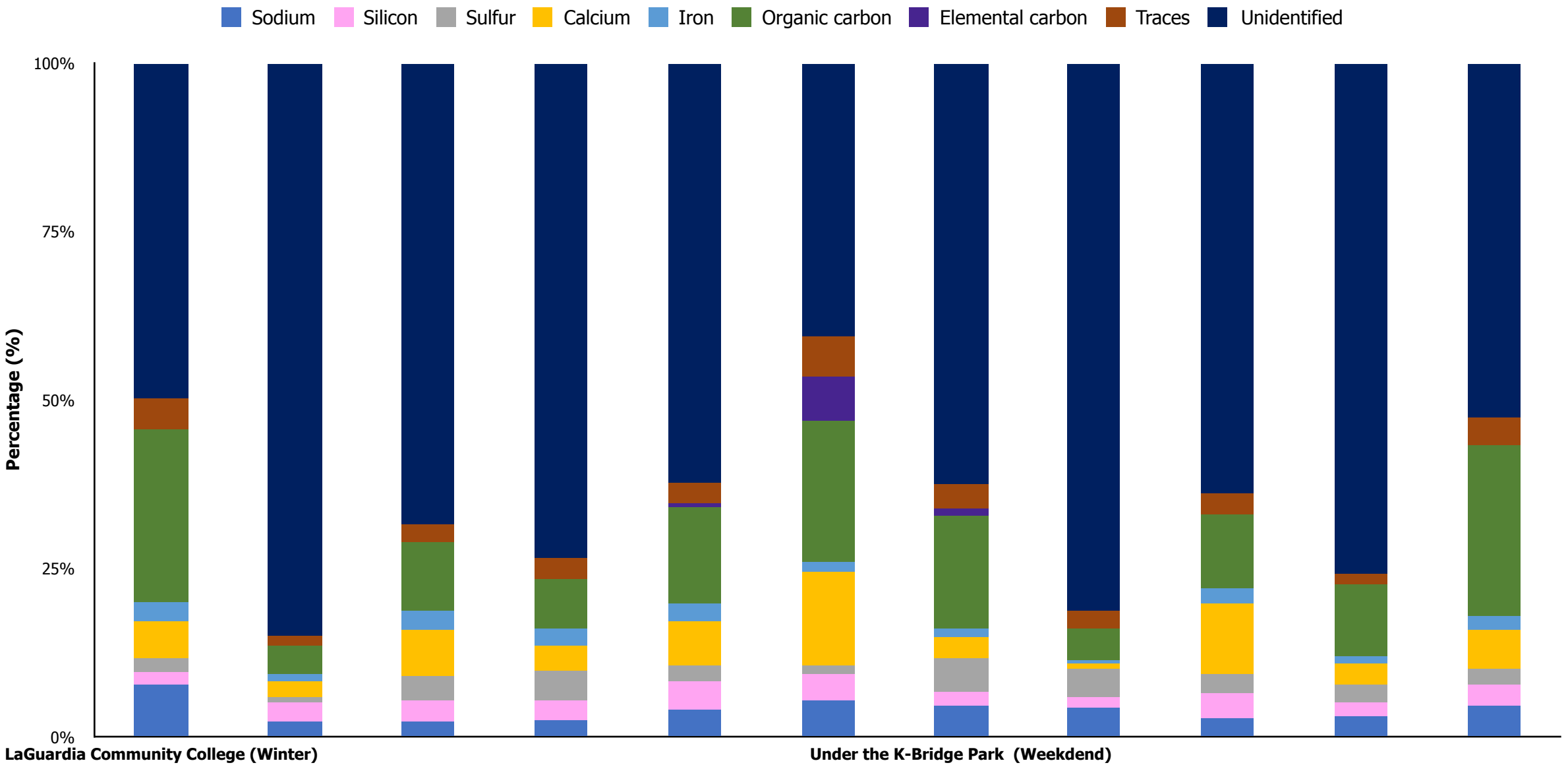
$PM_{2.5}$ Results: Gravimetric Analysis



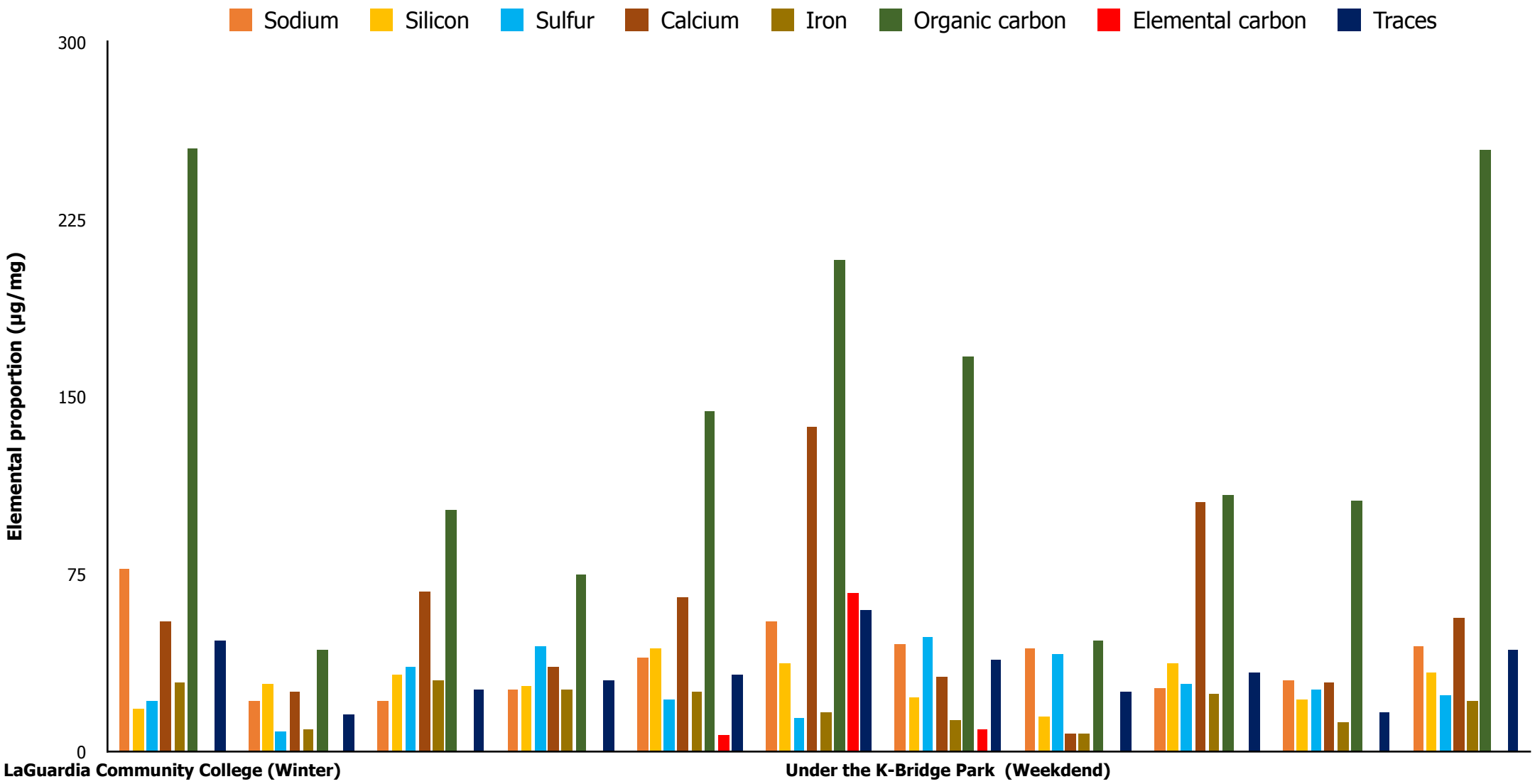
Sources:
Fossil fuel burning, vehicle exhaust, industrial emissions, wildfires, cigarette smoke, cooking

Health Effects:
Eye, nose, throat, and lung irritation, coughing, sneezing, shortness of breath, asthma, chronic obstructive pulmonary disease (COPD), cardiovascular effects, and lung cancer.

$PM_{2.5}$ Results: Speciation



$PM_{2.5}$ Results: Speciation

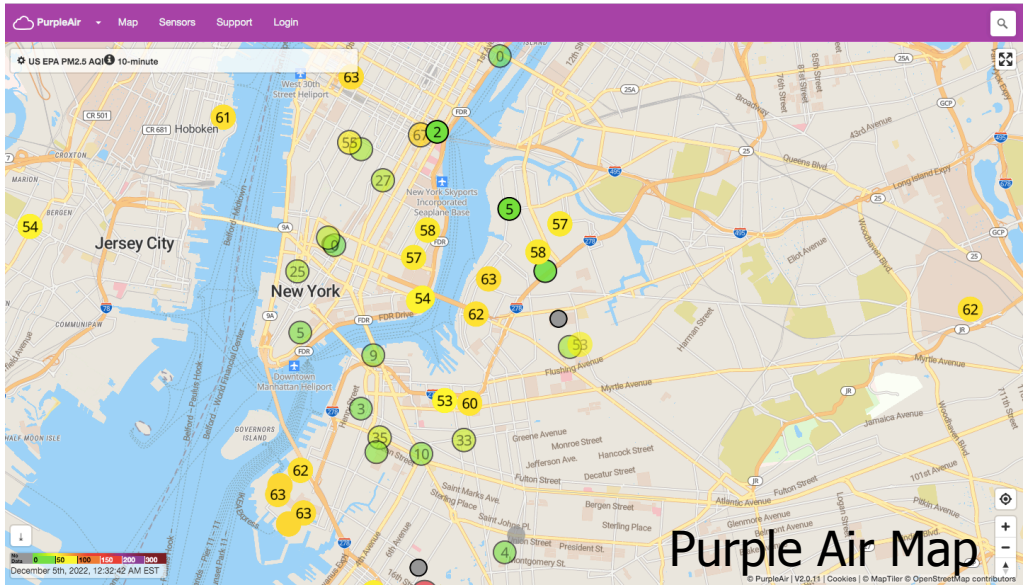


What Does All This Mean and What Can You Do?

First and foremost, no need for alarm!

- Our measurements are snapshots in time, and we are not sure what the long-term exposures might mean
- Our findings call for longer-term studies to better understand the actual impact of observed concentrations on your health
- We recommend that the most susceptible residents (e.g., elderly, co-morbidities, pregnant women, children) are vigilant in watching their local air pollution levels on daily basis
- On high PM days (>35 $\mu g/m^3$), we recommend that windows be closed, and masks be worn while outside

Precautionary Measures: Recommendations



IQAir AirVisual App

Air monitoring: Home monitors such as Airbeams, and Purple Air monitor

Local air quality: IQAir AirVisual App and Purple Air Map

Future Directions

- The data collected here is available to the community for advocating in favor of community protection against local air pollution
- Need for further, intensive study over time
- Daily monitoring is recommended using passive air samplers

Questions, Concerns, & Feedback?