

The NYS Department of Environmental  
Conservation  
Peace Bridge  
Air Quality Monitoring Program Update

Alfred Carlacci, PE October  
24, 2012 NYSDEC Region  
9 Buffalo, NY

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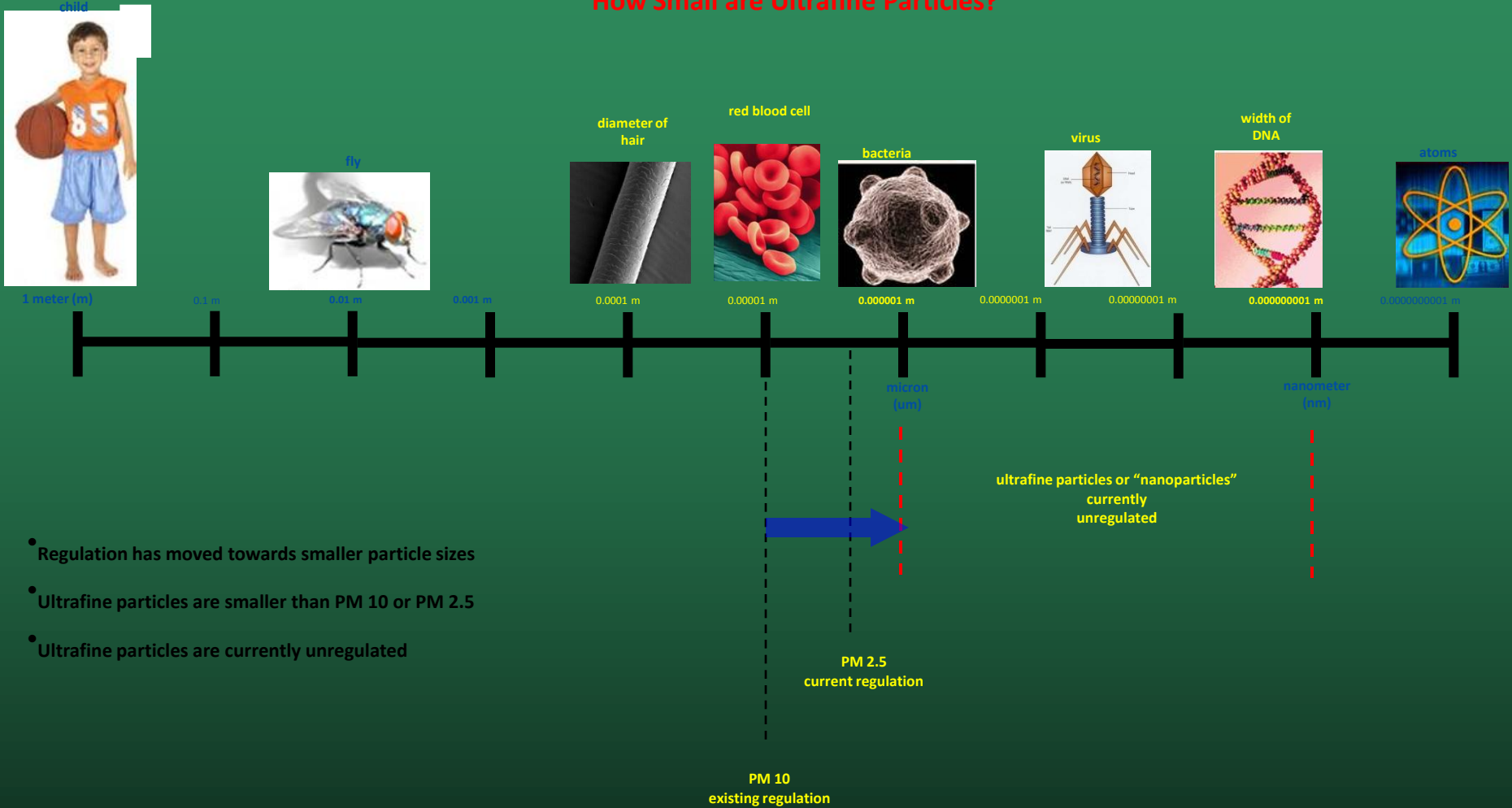




## Diesel truck emissions



# How Small are Ultrafine Particles?



- Regulation has moved towards smaller particle sizes
- Ultrafine particles are smaller than PM 10 or PM 2.5
- Ultrafine particles are currently unregulated



# EPA/Federal Highway Administration (FHWA) Near Road Collaboration Project: National Near-Road MSAT Study

## National Association of Clean Air Agencies Ambient Monitoring Subcommittee Meeting July 19, 2012

*Sue Kimbrough<sup>1</sup>, Gayle Hagler<sup>1</sup>, Richard Baldauf<sup>1</sup>, Neilson Watkins<sup>2</sup>, Tim Hanley<sup>2</sup>, Victoria Martinez<sup>3</sup>.*

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*<sup>3</sup>Federal Highway Administration*



# Heavy Duty Highway Diesel NOx Emission Standards for New Vehicles

- 2010: Full phase-in of NOx emission std
  - 0.2 g/bhp-hr
- prior to 2007: NMHC + NOx std
  - 2.4 g/bhp-hr (or 2.5 w/ 0.5 NMHC limit)
  - most mfg using selective catalytic reduction (SCR)
  - 90% reduction in NOx w/ Model Year 2010 and newer vehicles/engines



# Heavy Duty Highway Diesel PM Emission Standards for New Vehicles

- 2007 EPA emission std for PM
  - 0.01 g/bhp-hr
  - exhaust after-treatment diesel particulate filter (DPF)
- PM std prior to 2007
  - 0.1 g/bhp-hr did not require DPF
  - 90% reduction in PM w/ MY 2007 and newer vehicles/engines



# Ultra Low Sulfur Diesel Fuel Standard

- Reduction from 500 ppm to 15 ppm
- Phase-in between 2006 and 2010
- ULSD helps vehicles meet PM std
- Reduces secondary PM formation
- Improves catalyst efficiency
  - Decreases emissions from old & new vehicles

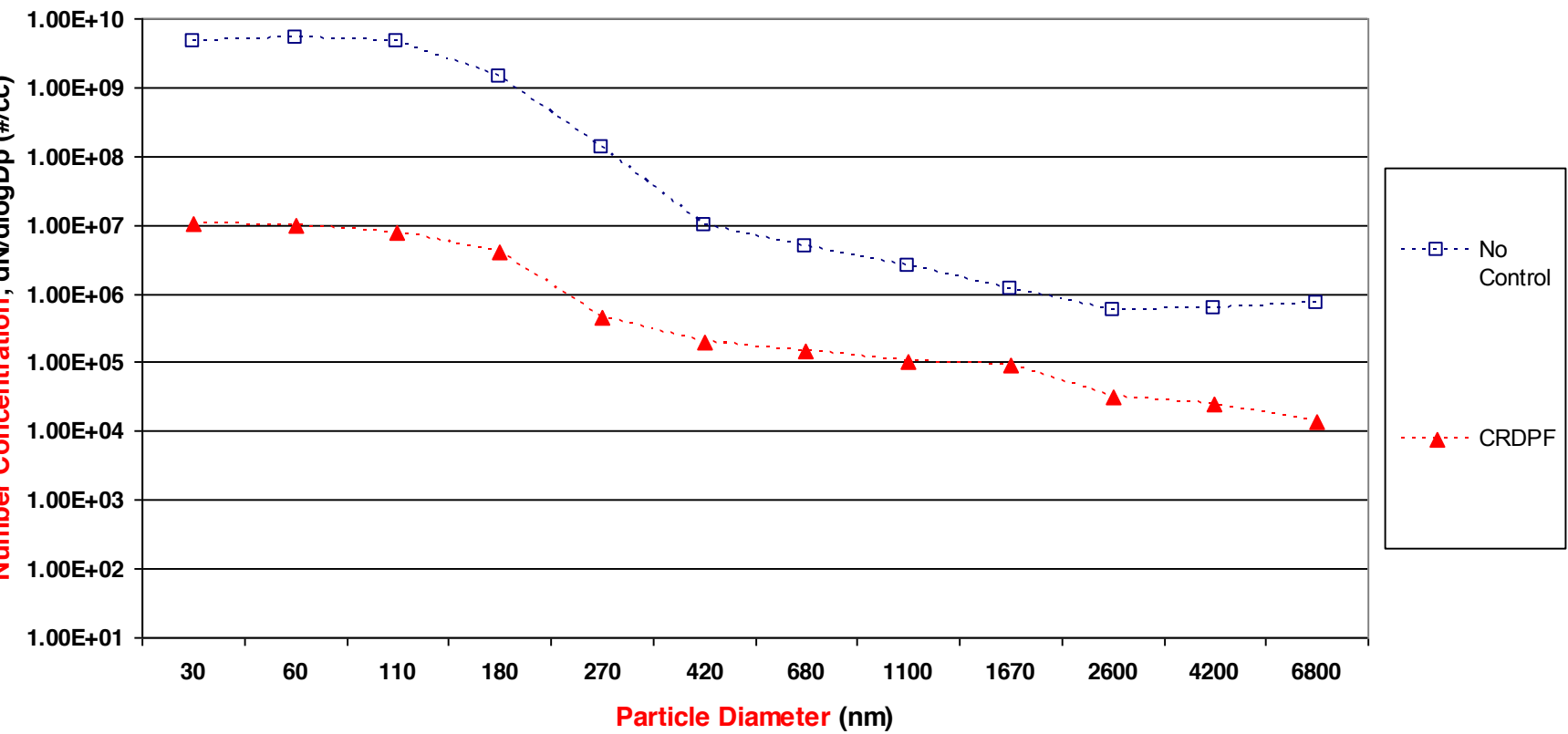


# Heavy Duty Diesel Vehicle Turnover

- ~25% of NYS HD Diesel Vehicle Registrations are MY 2007 or newer
- Canadian Stds consistent with USEPA
- Long-haul trucks tend to be newer than average fleet
- Bridge survey showed nearly 50% MY 2007 or newer







# Sulfur In Gasoline

- Prior to 2004 – no limit
  - EPA data shows typical 330-360 ppm
- 2004 Standard
  - 120 ppm average
  - 300 ppm individual batch limit
- 2007 Standard
  - 30 ppm average
  - 80 ppm maximum batch





# Monitoring Program Overview

- Air Monitoring will be conducted for 6 Months prior to renovations at the plaza and again for 6 Months after the renovations are complete
- The data will be analyzed to determine the impact of the plaza on the neighboring community
- The data will also be compared to health benchmarks and to data collected at other locations in the state

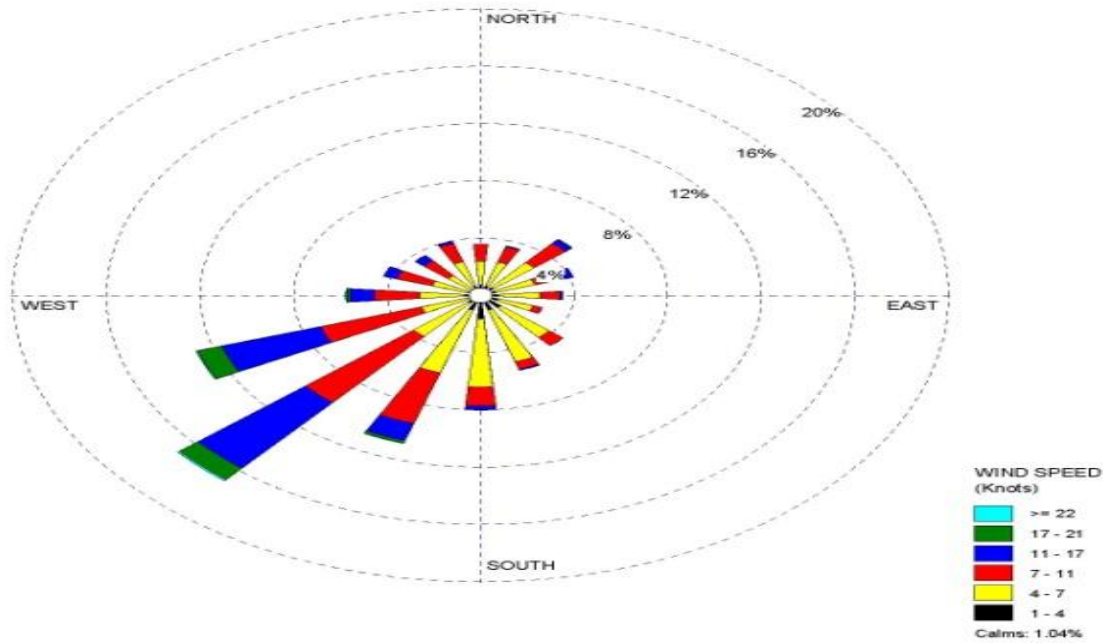


# Monitoring Network Design

- Data is being collected at a site in a location that is predominantly upwind of the plaza in Front Park. Data is also being collected at a site that is downwind of the plaza on Busti Avenue
- The winds in the area are predominantly out of the southwest in the summer months and west-southwest in the winter months
- Windroses were used to help select appropriate sampling locations
- Data will be binned by wind direction for subsequent data analysis



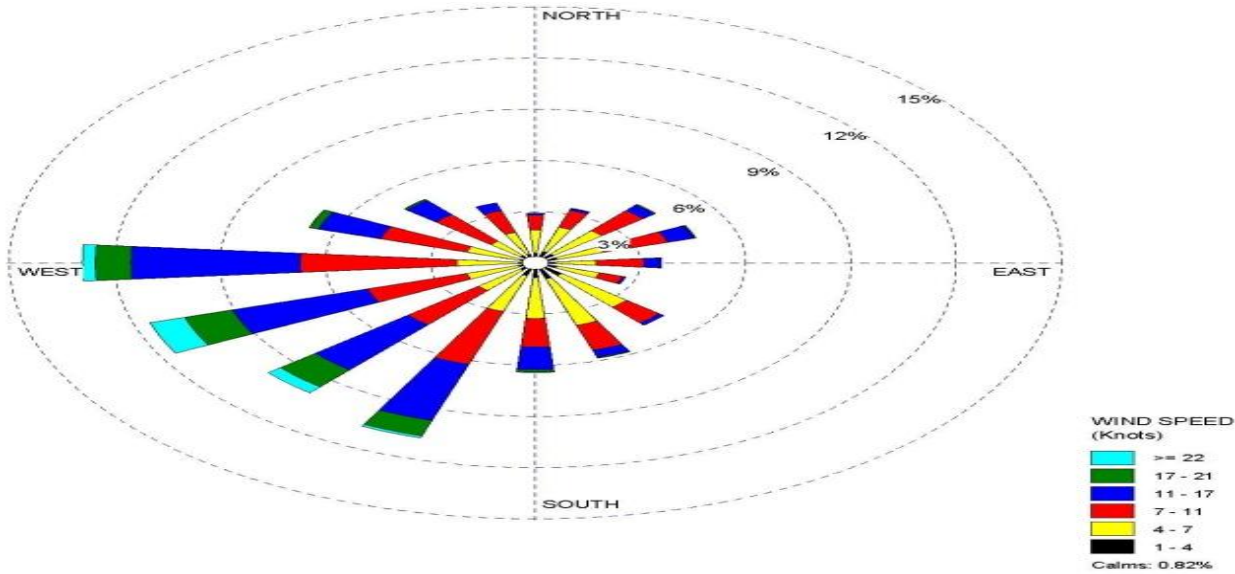
WIND ROSE PLOT:  
**Buffalo Int'l Airport, 2006-2010**  
**July through September**



COMMENTS:	DATA PERIOD: <b>2006-2010</b> Jul 1 - Sep 30 00:00 - 23:00	COMPANY NAME: <b>NYSDEC</b>	
	CALM WINDS: <b>1.04%</b>	TOTAL COUNT: <b>11012 hrs.</b>	
	AVG. WIND SPEED: <b>7.73 Knots</b>		PROJECT NO.:



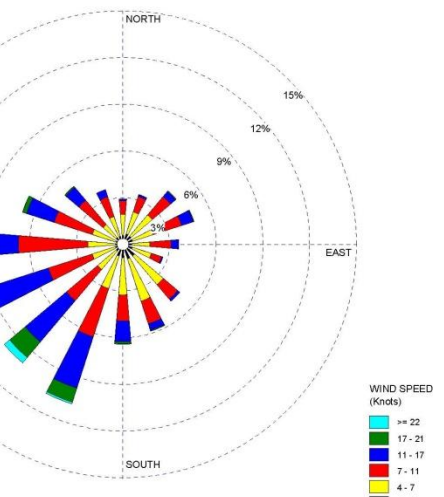
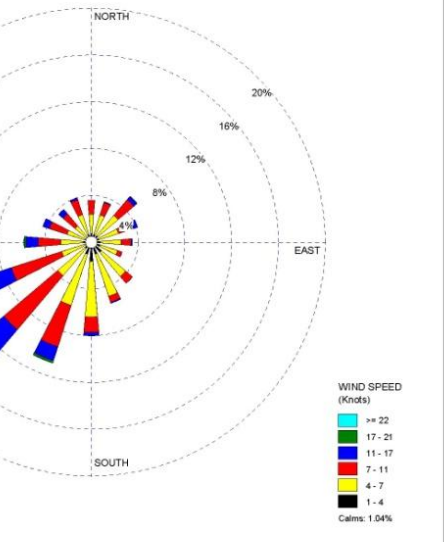
WIND ROSE PLOT:  
**Buffalo Int'l Airport, 2006-2010**  
 October through December



COMMENTS:	DATA PERIOD: <b>2006-2010</b> <b>Oct 1 - Dec 31</b> <b>00:00 - 23:00</b>	COMPANY NAME: <b>NYSDEC</b>	
	CALM WINDS: <b>0.82%</b>	TOTAL COUNT: <b>11025 hrs.</b>	PROJECT NO.:
	AVG. WIND SPEED: <b>9.27 Knots</b>		

WRPLOT View - Lakes Environmental Software







<http://www.dec.ny.gov/airmon/stationStatus>.

- Traffic counts to consider
- I-190 76,900 vehicles per day
- Peace Bridge 16,500
- I-290 136,500



# Upwind Site in Southwest Corner of Front Park





## Downwind, Neighborhood Impact site

- Busti Avenue  
and Vermont  
Street  
Looking North
- This site also  
has a 10 meter  
meteorological  
tower

# Monitoring Instrumentation and Data

- $PM_{2.5}$  (1-Hr Data): 1400AB TEOM
  - Raw 1-Hr Data put on NYSDEC website hourly
- Black Carbon (5 minute Data): AE21Magee Scientific Aethalometer
  - Raw 1-Hr Data put on NYSDEC website hourly
- $PM_{2.5}$  (24-Hr integrated sample every 6<sup>th</sup> day): Partisol 2025 (Reference Method for  $PM_{2.5}$ )  
Samples will also be analyzed for metals by X-Ray Fluorescence (XRF)
  - Filter Mass and Elemental Concentration available after lab analysis and validation



# Partisol<sup>®</sup>-Plus

## Low Volume Air Sampler



The 2025 Partisol collects  
24Hr  $PM_{2.5}$  samples on filters  
every sixth day

# TEOM<sup>®</sup>

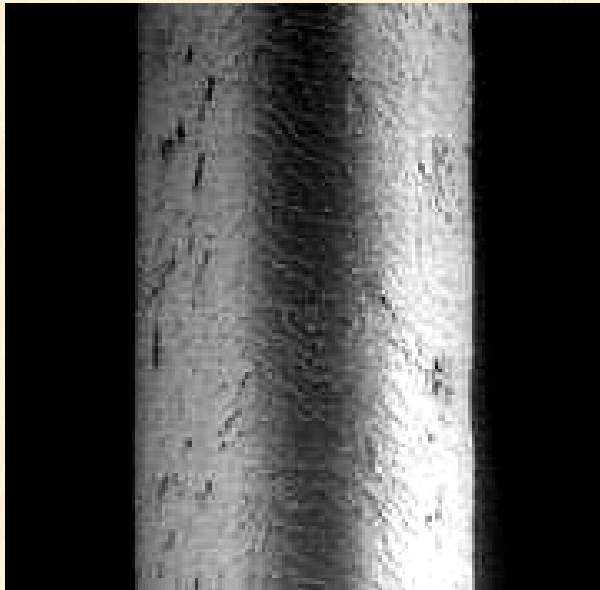
## Automated Ambient Particulate Monitor



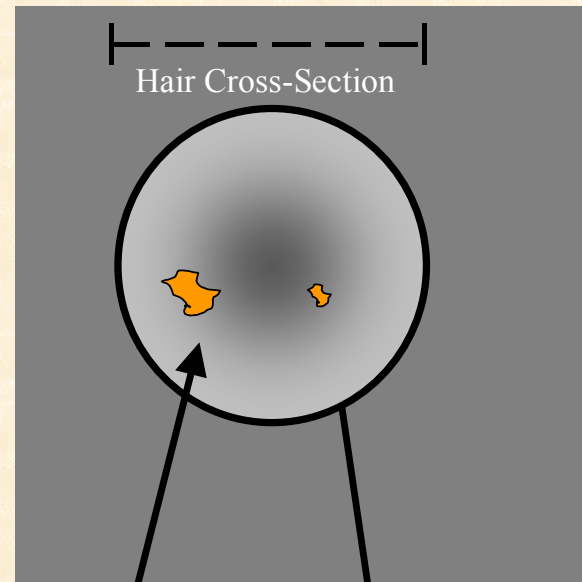
The 1400AB TEOM produces 1-Hr  
data. These instruments are not  
Federal Reference Methods (FRM)

# Particulate Matter – What is it?

A complex mixture of extremely small solid particles and drops of liquid in the air



Human Hair (70  $\mu\text{m}$  diameter)

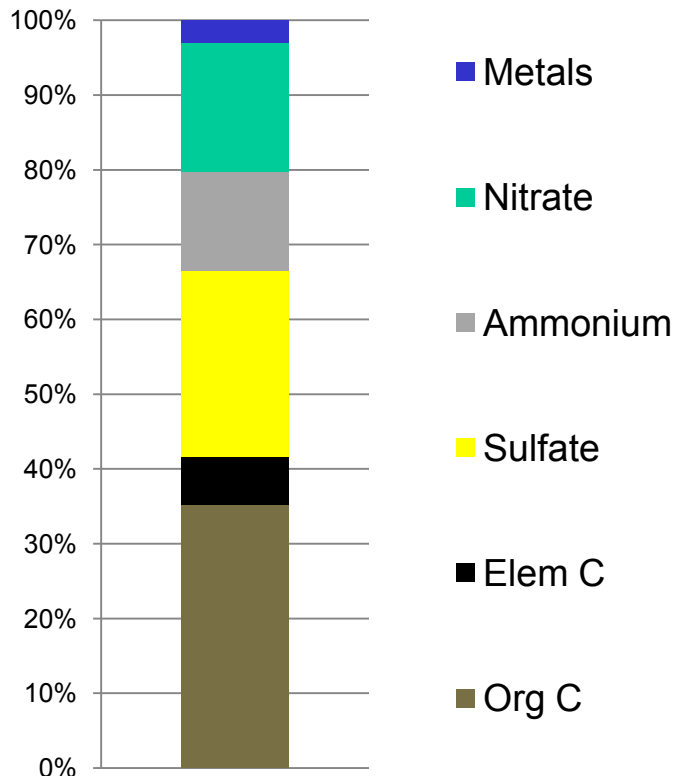


PM<sub>10</sub>  
(10  $\mu\text{m}$ )

PM<sub>2.5</sub>  
(2.5  $\mu\text{m}$ )

# Typical Regional PM<sub>2.5</sub> Composition

**Buffalo: Average PM<sub>2.5</sub> Composition (2008)**



PM<sub>2.5</sub> is Particulate Matter Mass that has a diameter  $\leq 2.5$  microns

It is composed of locally generated and transported solid and semi-volatile materials

Metals are a small percentage of the mass but can be used to identify pollution sources

Elemental Carbon is similar to Black Carbon which is measured in this study

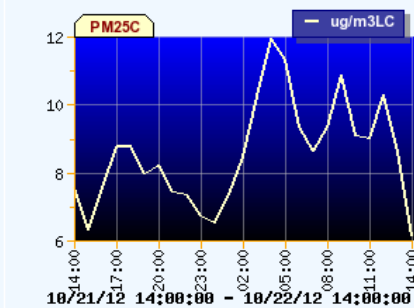
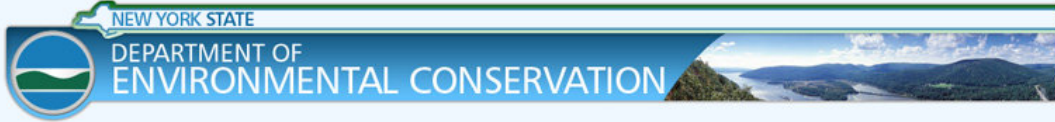


# Interpreting the Preliminary Data

- $PM_{2.5}$  is primarily regional and by itself is not a good indicator of mobile source emissions. It is important because it has a health based National Air Quality Standard
  - (15  $\mu\text{g}/\text{m}^3$  Annual and 35  $\mu\text{g}/\text{m}^3$  Daily)
- Black Carbon (BC) is a product of combustion and is regionally and locally produced. BC has been used to indicate mobile source emissions and short-term peaks in BC indicate the proximity of the emissions.







AQI 27			
Good			
Black Carbon	1.17 ug/m3	WD	228 Deg
WS	4 mph	10/22/12	1.1 ug/m3

[Click Here To Produce Reports](#)

[Hover over the table for instant charts.](#)



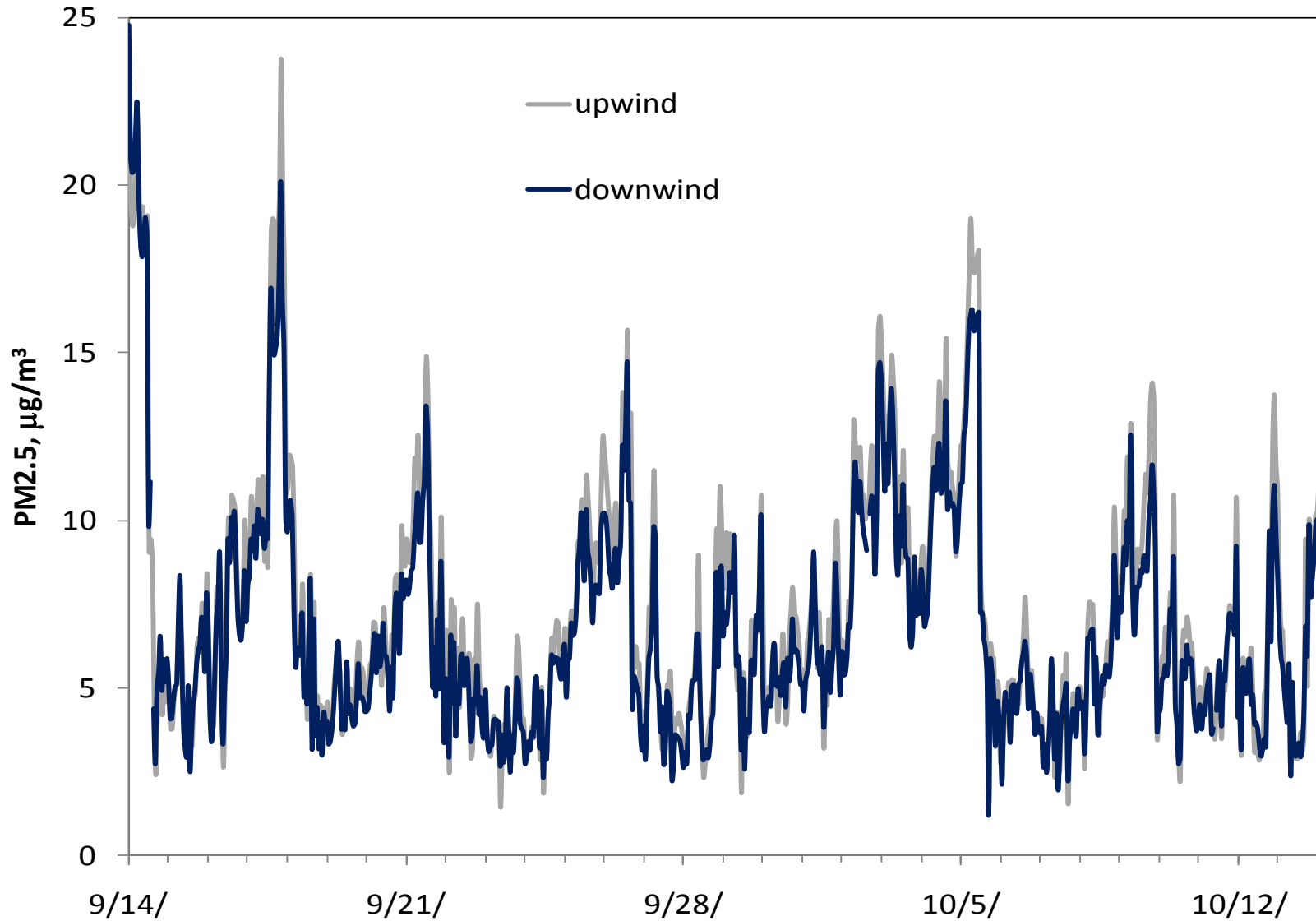
Peace Bridge Busti Ave 11:00:00 AM 10/22/12

The information used is the first available data from our air quality monitoring network. The values have not been verified for accuracy or been through the appropriate quality assurance and control validation procedures.

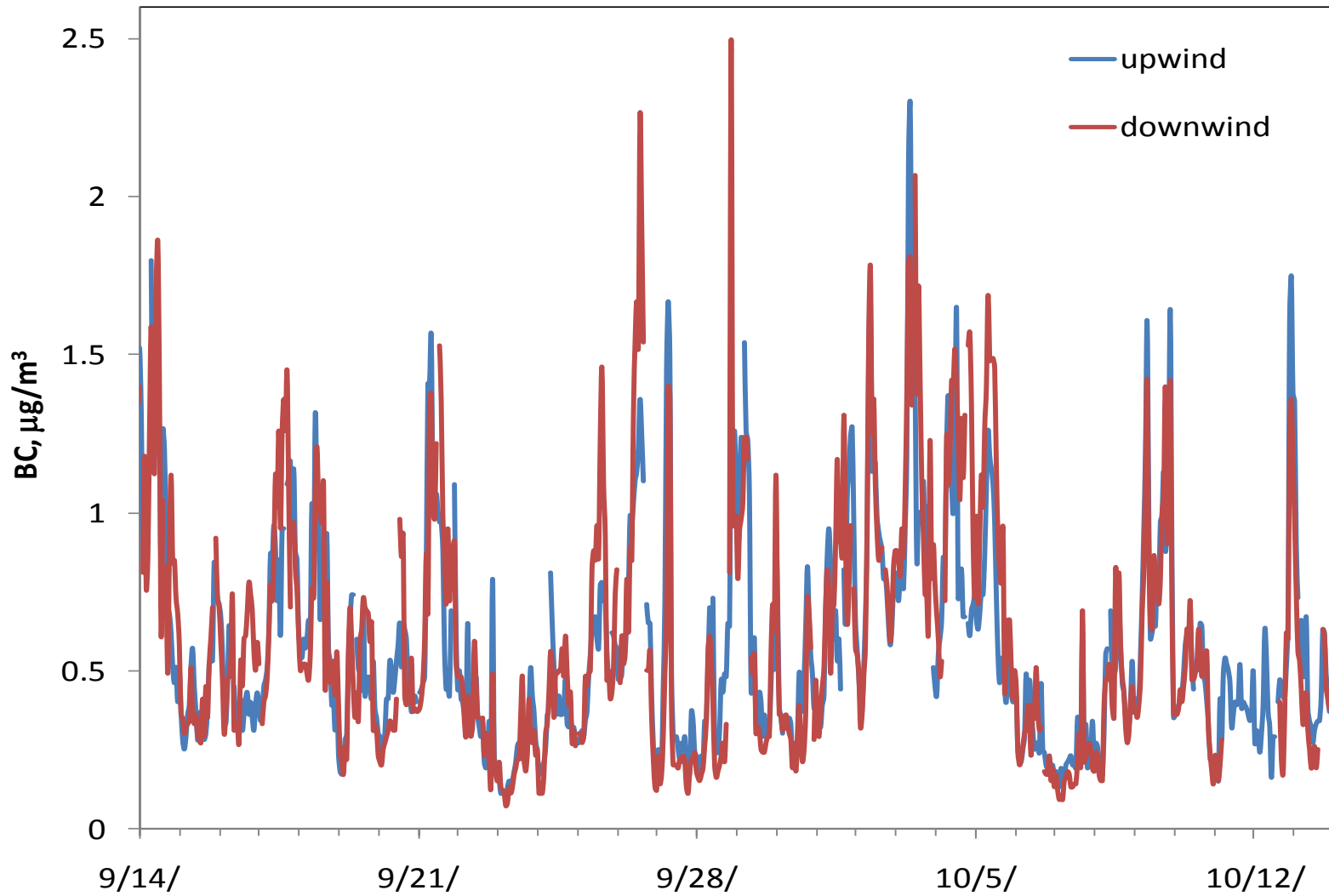
For validated data contact the Bureau of Air Quality Surveillance at (518) 402-8508

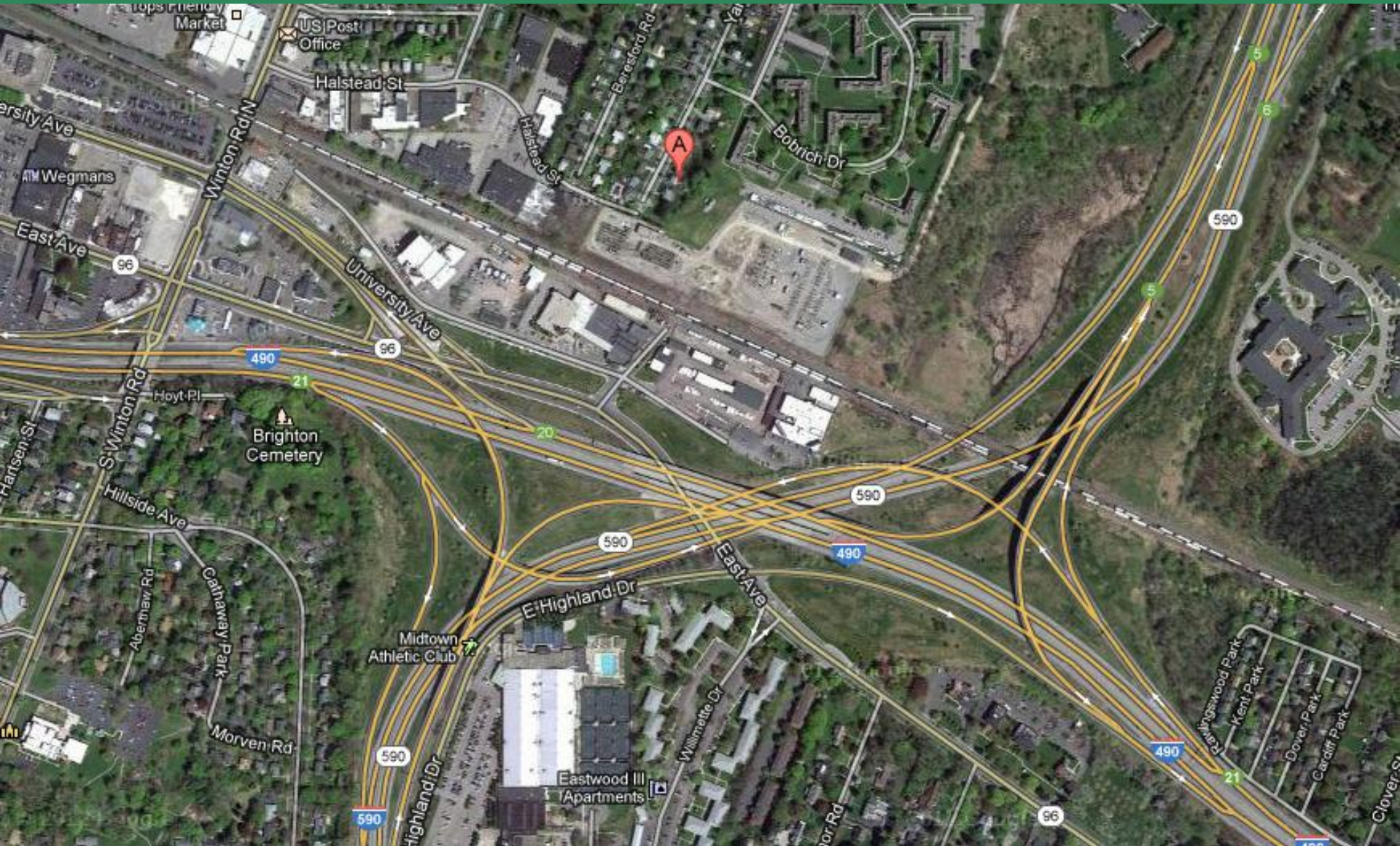
NOTE: SO2 and NO2 data reports prior to 1/1/11 are in units of parts per million

# PM<sub>2.5</sub> Upwind and Downwind

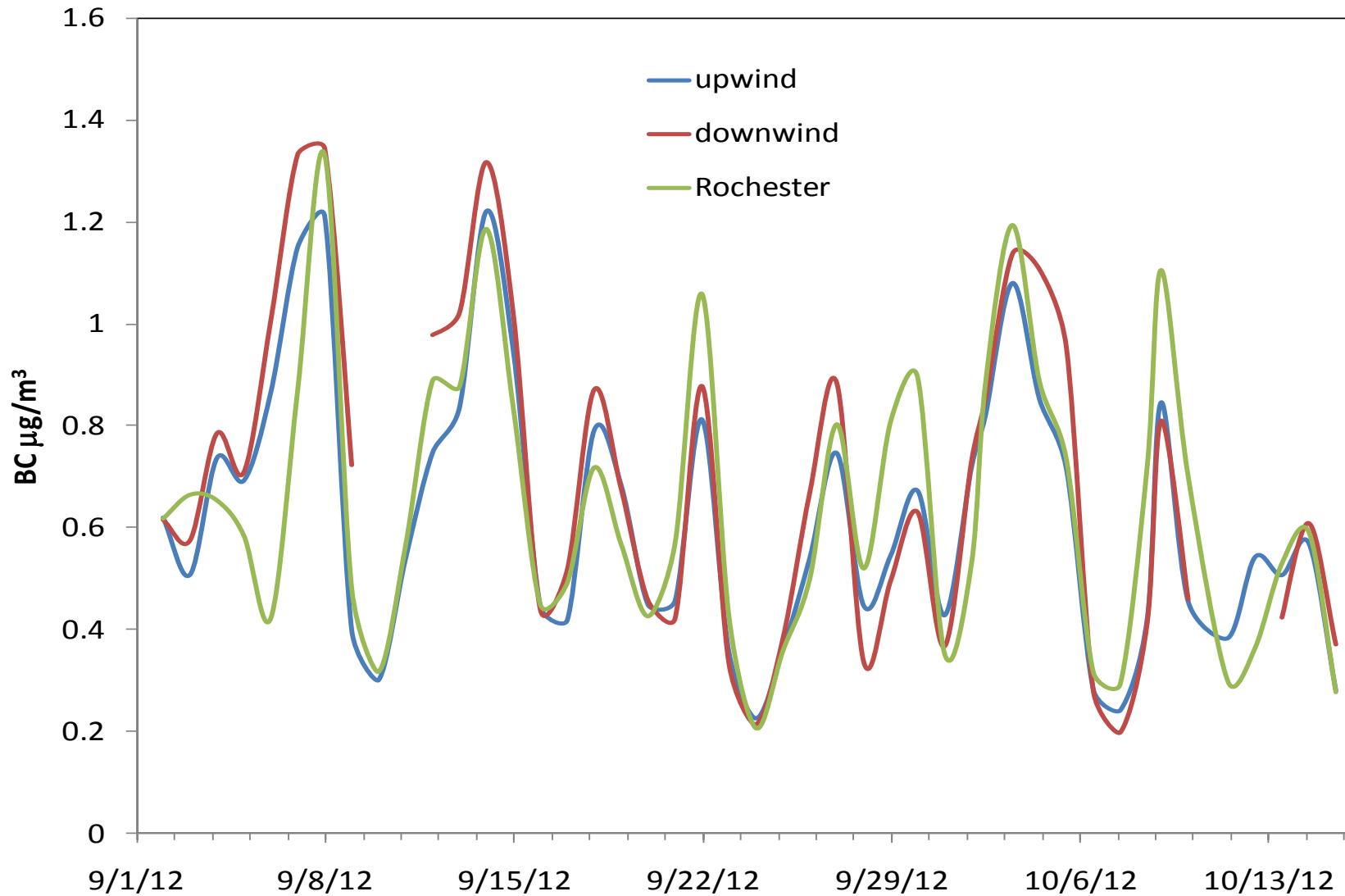


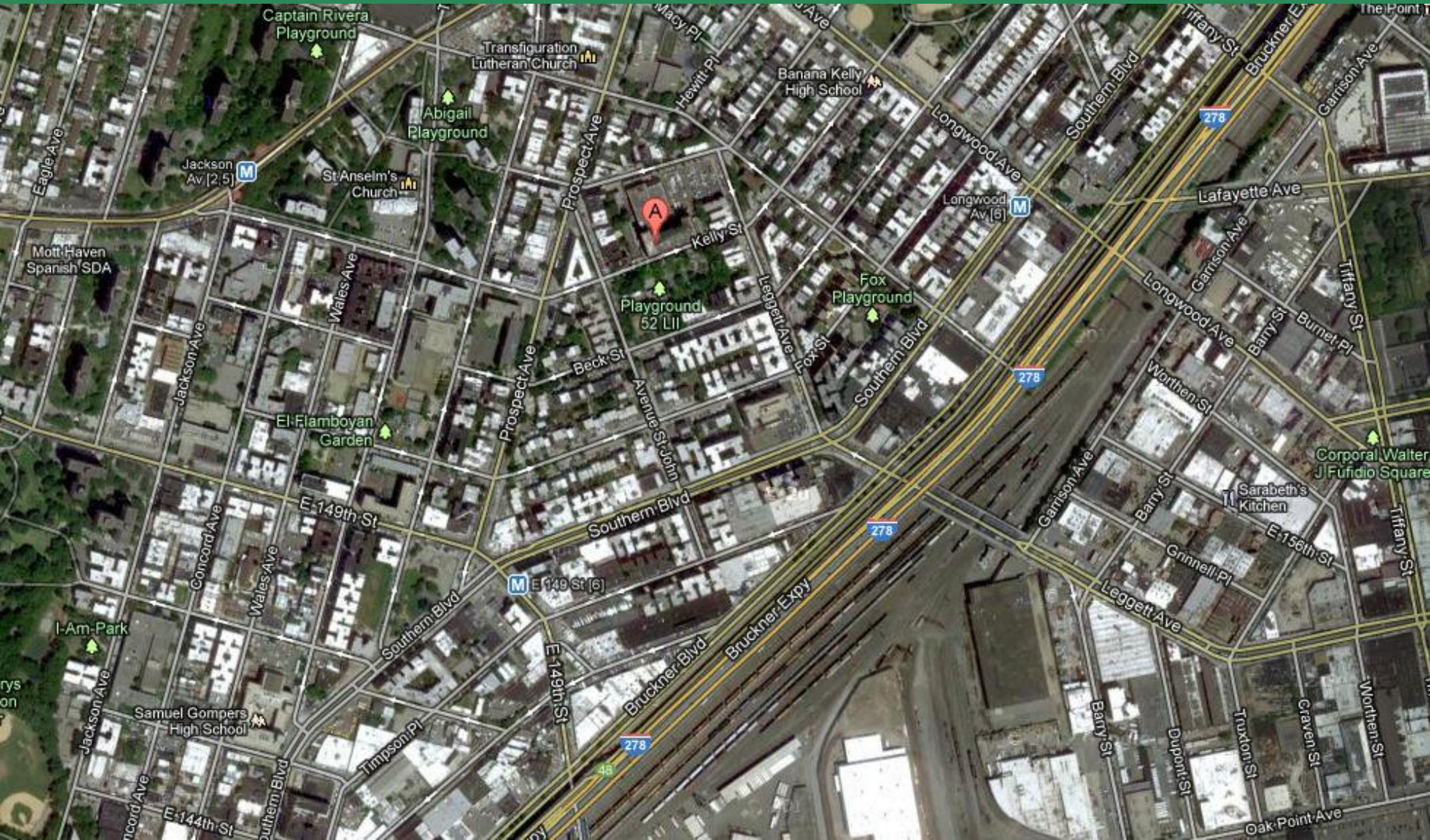
# Black Carbon Upwind and Downwind



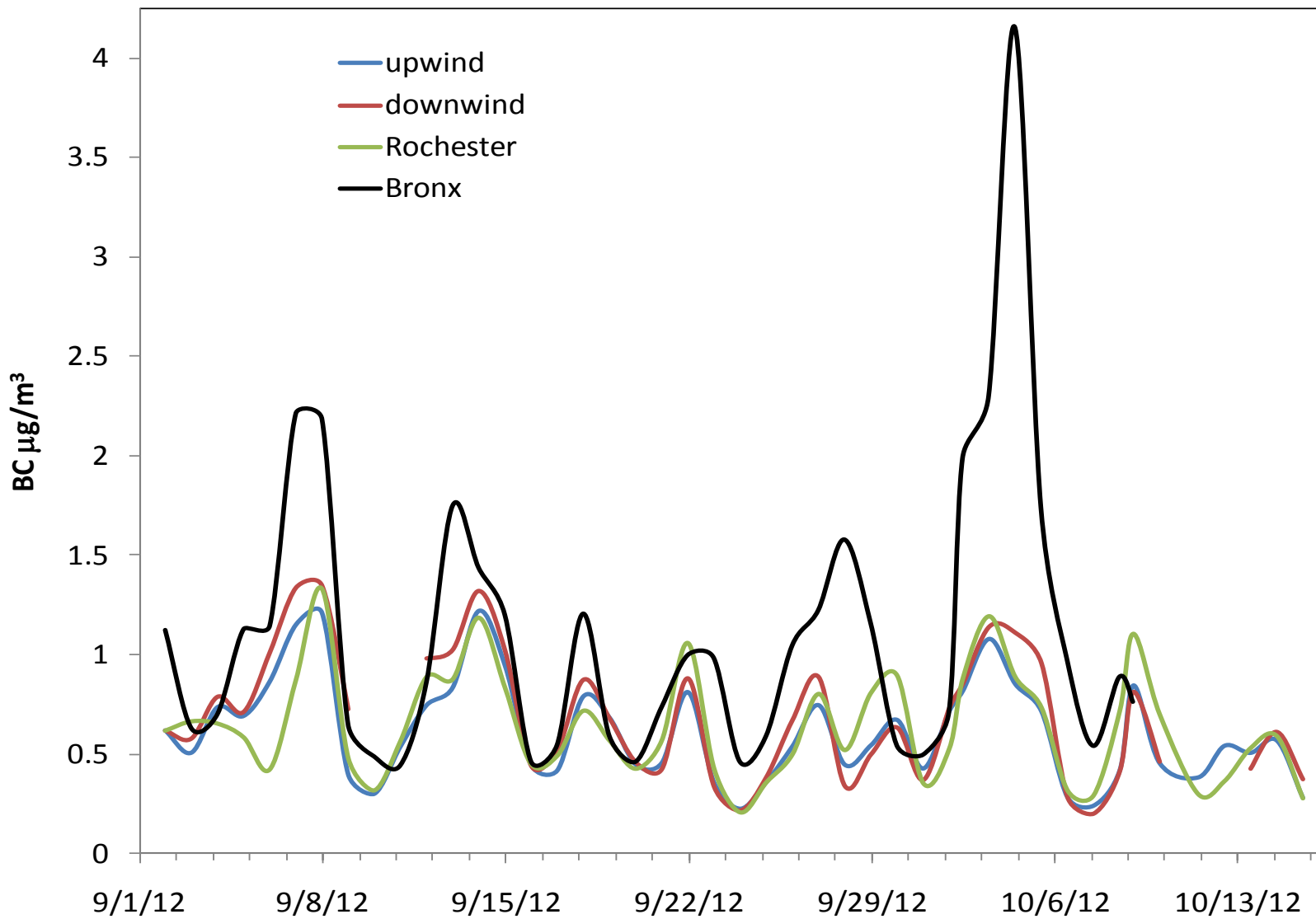


# Black Carbon at Peace Bridge and Rochester

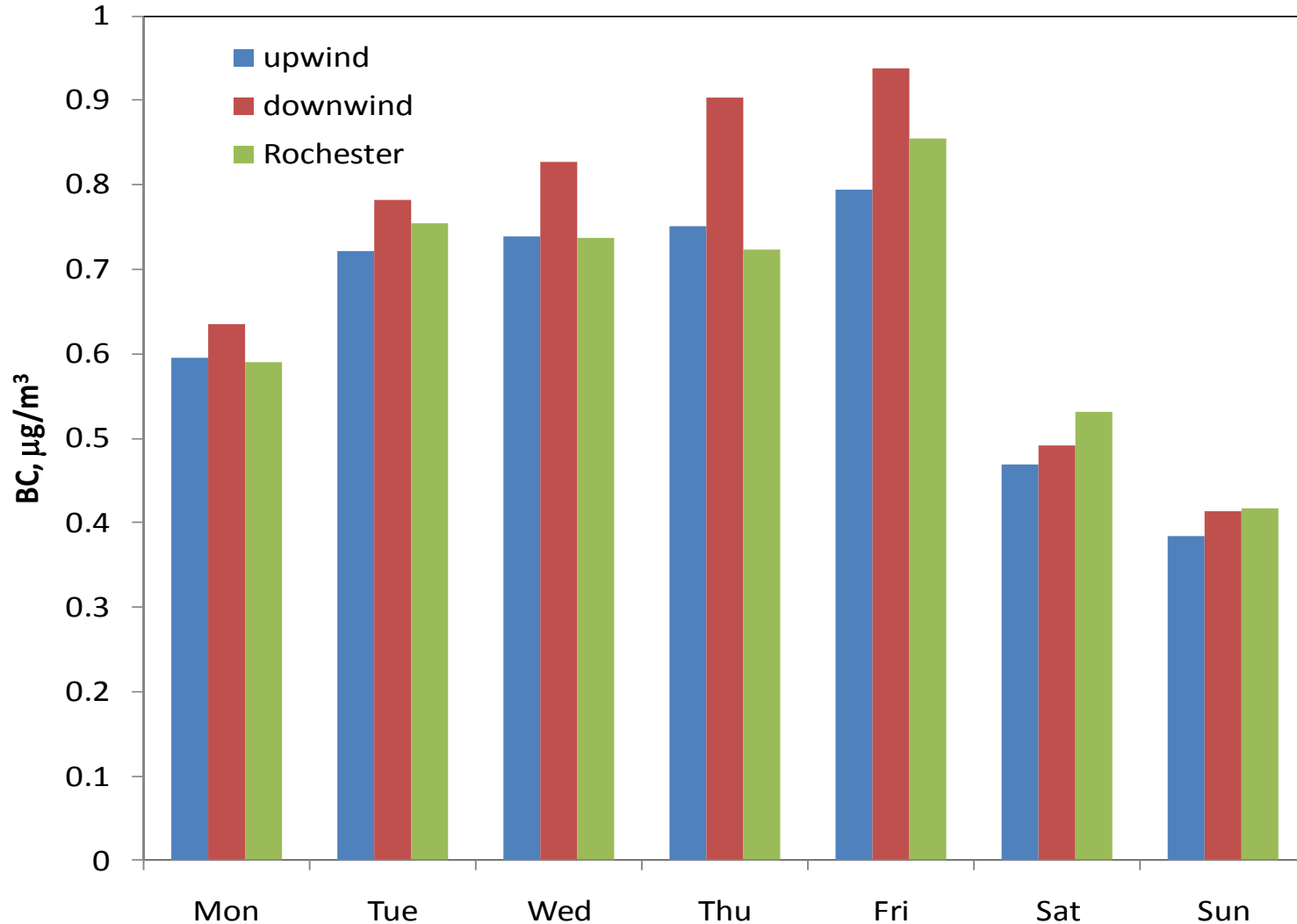




# Black Carbon at Peace Bridge, Rochester and Bronx



# Black Carbon by Day of Week





# Summary

- The data record is too short to draw conclusions, however:
- The preliminary PM<sub>2.5</sub> data indicates nearly identical concentrations at the Front Park and Busti Avenue sites.
- BC may be slightly higher at the Busti Ave site
- The PM<sub>2.5</sub> filter data will be used to compare the local concentrations to the National Air Quality Standards

