



# Rhode Island Air Quality Profile

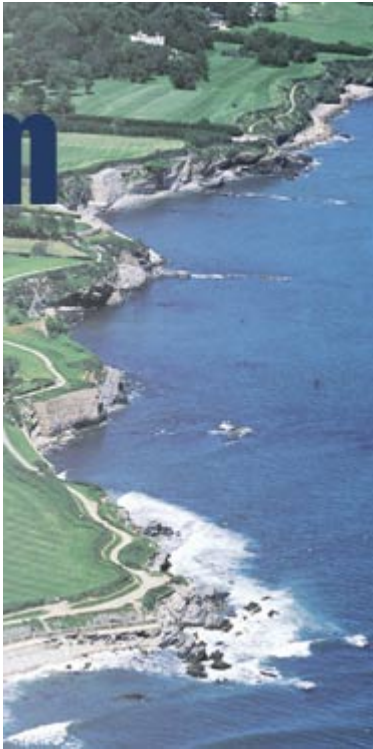
2006 Spring Membership Meeting

STAPPA/ALAPCO

Newport, Rhode Island

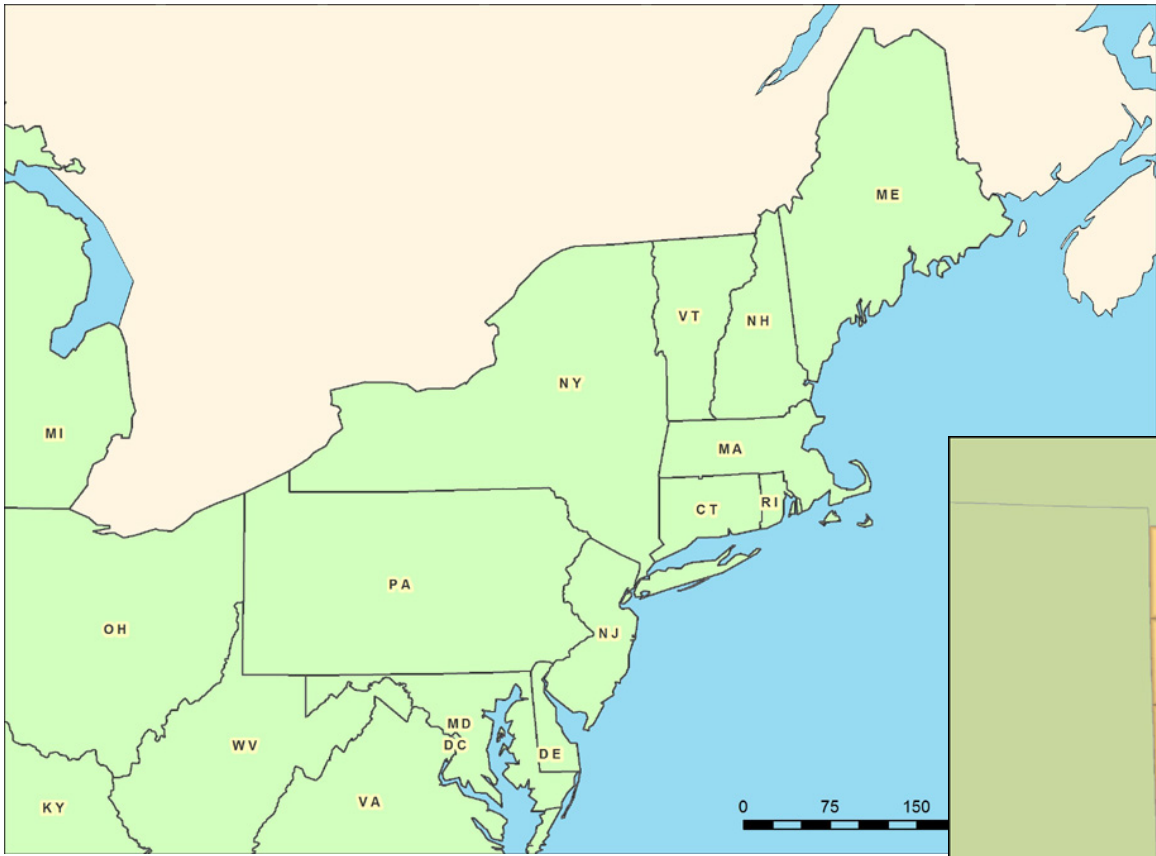
April 30, 2006

Steve Majkut, Chief  
Rhode Island Department of Environmental Management  
Office of Air Resources



*Welcome  
to  
Rhode Island*

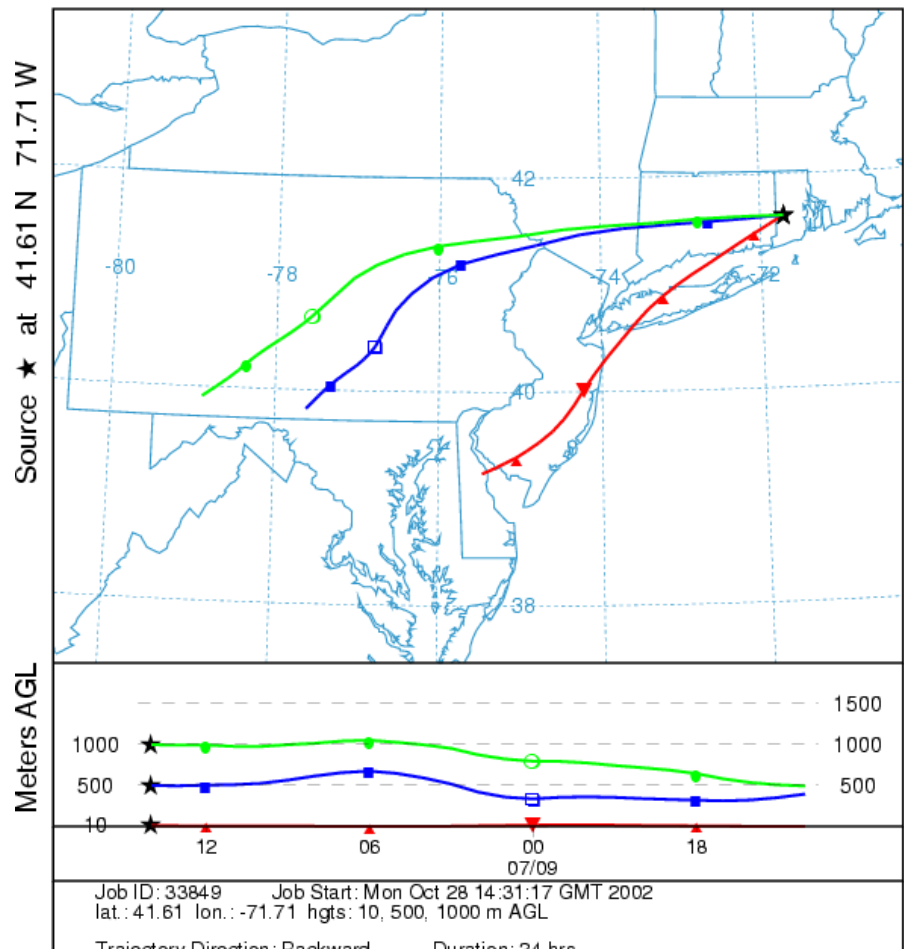




# Rhode Island is nonattainment of the ozone standards

- Monitored attainment of the 1-hr standard
- Moderate nonattainment of the 8-hr standard

NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION  
Backward trajectories ending at 14 UTC 09 Jul 02  
EDAS Meteorological Data





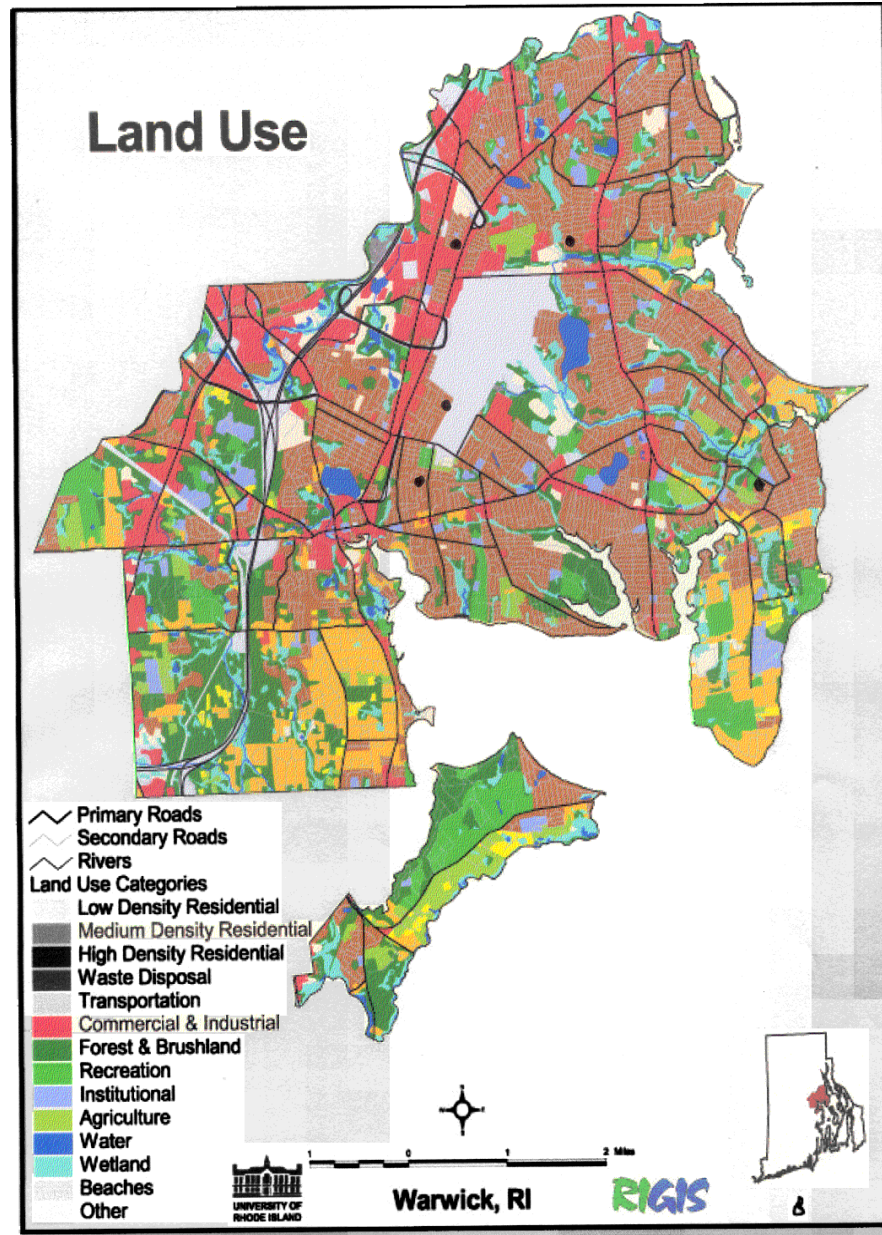
# Ambient Air Toxics Characterization Near T.F. Green Airport in Warwick, RI

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## \$500,000 USEPA Community Assessment Grant

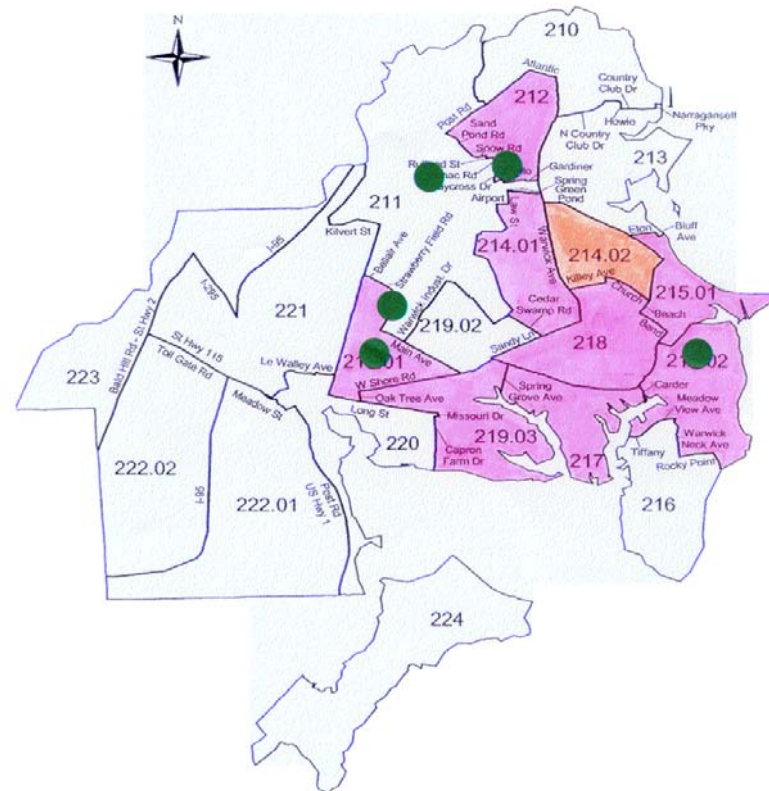
- Characterize air toxics concentrations in Warwick neighborhoods near T.F. Green Airport
- To the extent possible, determine the impact of airport and other activities on neighborhood air quality

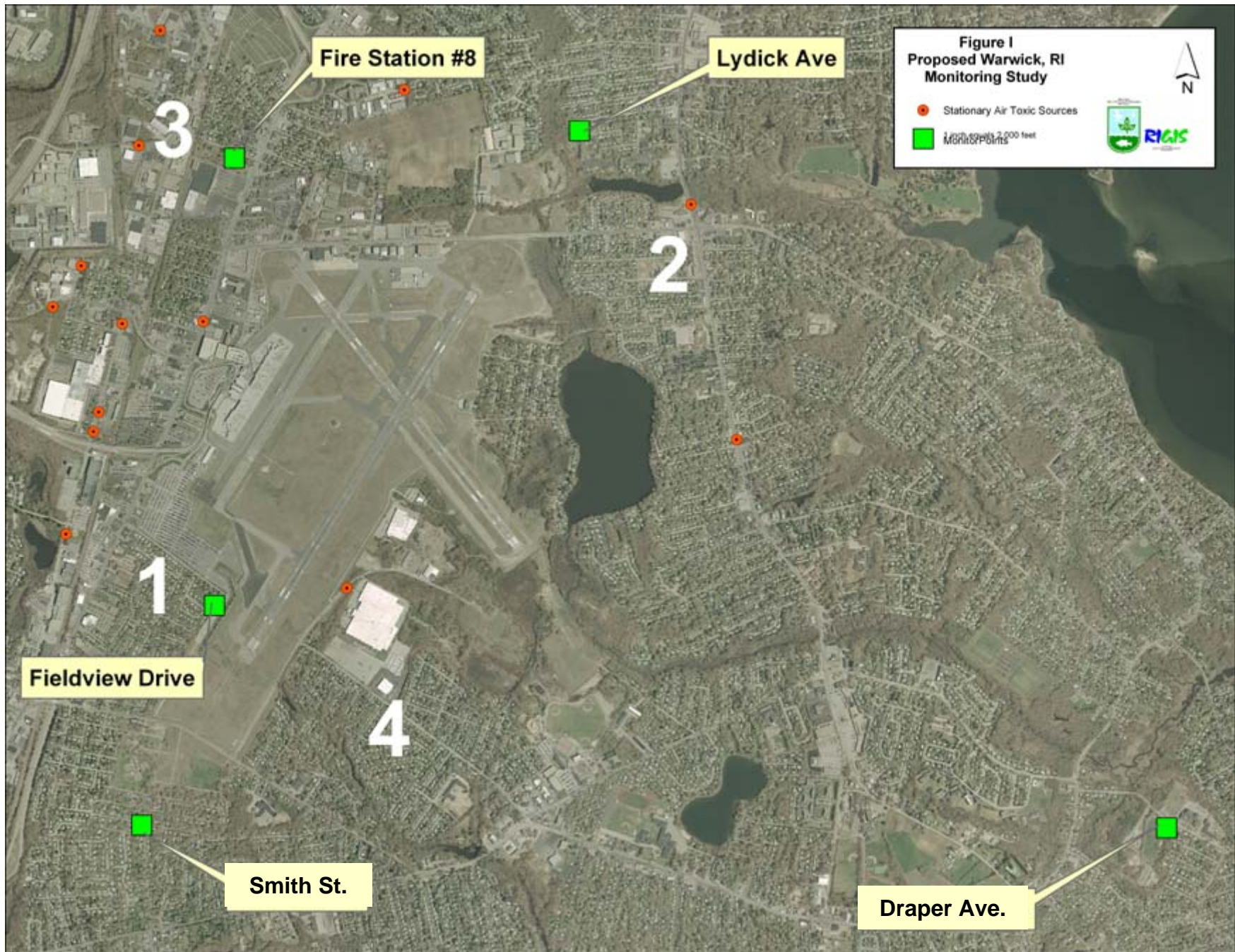
# City of Warwick





# Census Tracts with Elevated Lung Cancer Incidence Rates, City of Warwick







Vertical text on a blue background, likely a watermark or logo, containing the words "Vertical", "Text", "Watermark", and "Logo" in a stylized font.





# Pollutants

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- Black carbon
  - Indicator of jet and diesel exhaust
- Fine particles (PM<sub>2.5</sub>)
- Optical system (one site) measures:
  - benzene, toluene, xylenes, styrene
  - formaldehyde
  - nitrogen dioxide, sulfur dioxide
  - naphthalene



# Pollutants (continued)

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- Volatile Organic Compounds (VOCs)
  - 78 substances
  - Particularly important target VOCs:
    - benzene
    - 1,3-butadiene
- Carbonyls (aldehydes)
  - formaldehyde
  - acetaldehyde
  - acetone (less important)



# Preliminary Early Data

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Note: Data and interpretation of data in this presentation are preliminary and are subject to revision





# Data to be Presented

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- Black Carbon
  - Continuous hourly
  - May through November 2005
- VOC
  - 24-hour samples every 6<sup>th</sup> day
  - May through early December 2005



# Data Not Ready for Presentation

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- Carbonyls
- PM2.5
- Continuous Optical Monitor Data

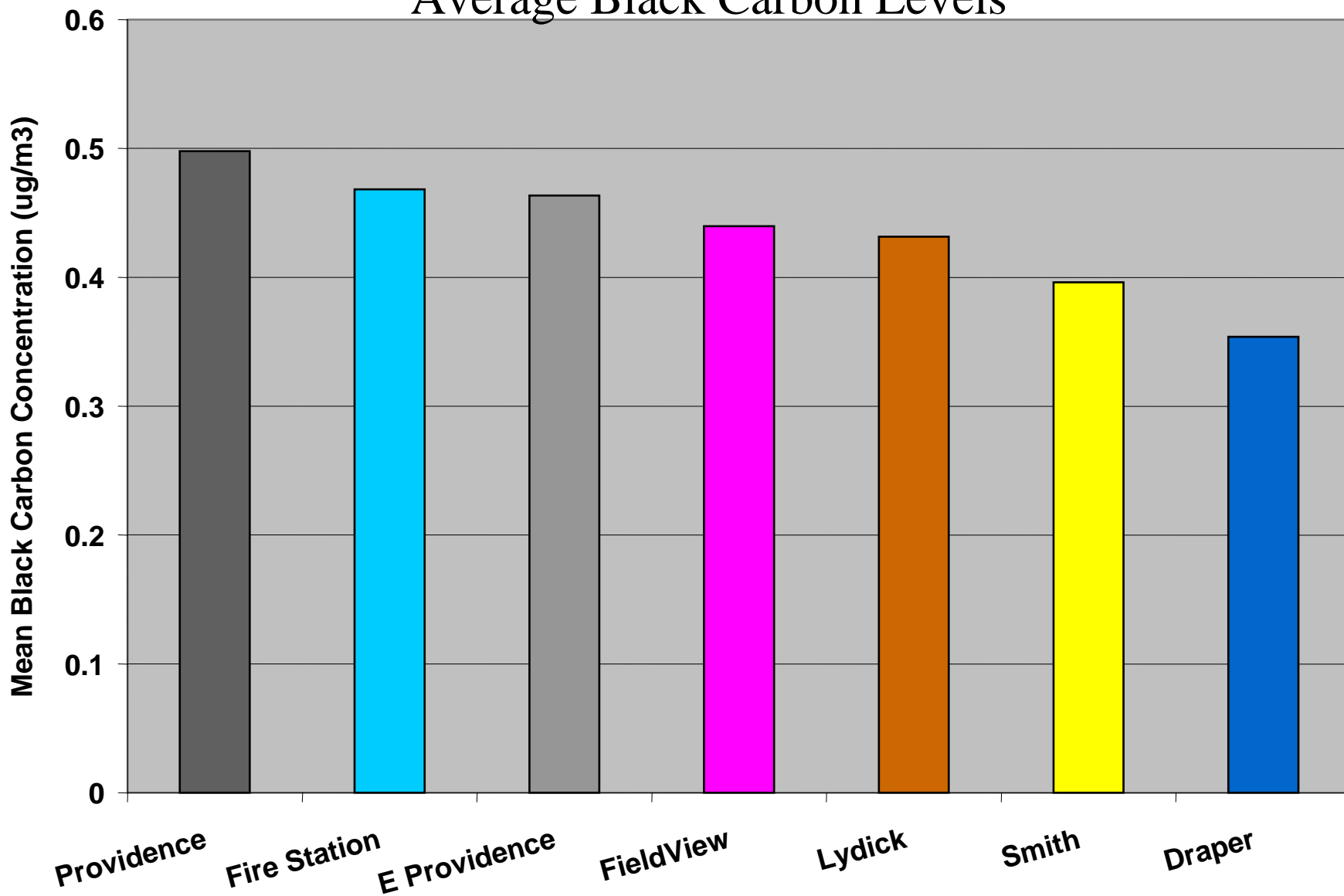


# Average Black Carbon (BC) Levels

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- Warwick sites lower than Providence site
- Highest Warwick site is Fire Station
- Fire Station is about equal to East Providence downwind suburban site
- Mean BC level at Fire Station was 31% higher than at cleanest Warwick site (Draper)

# Average Black Carbon Levels





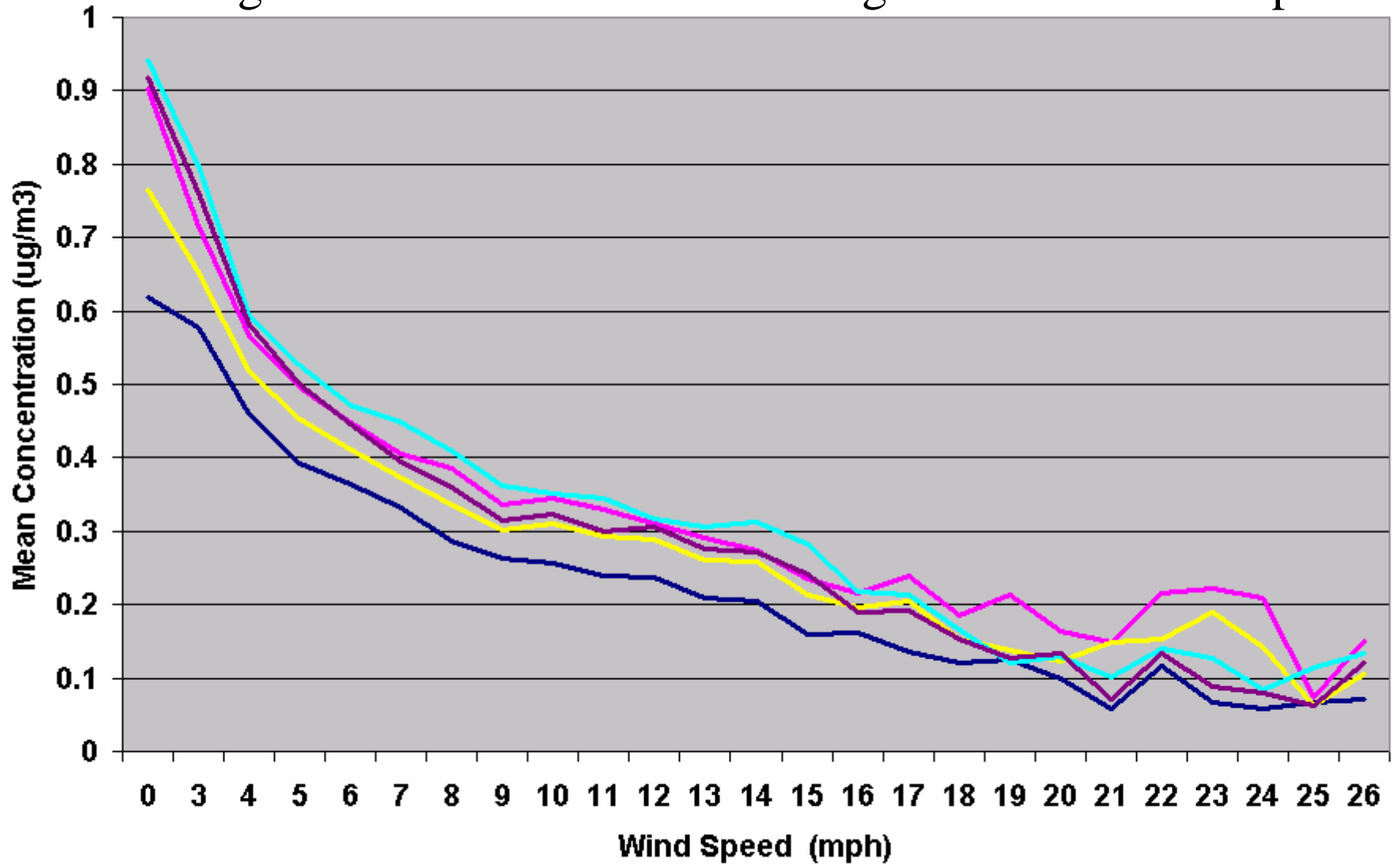


# Factors That Influence BC Levels

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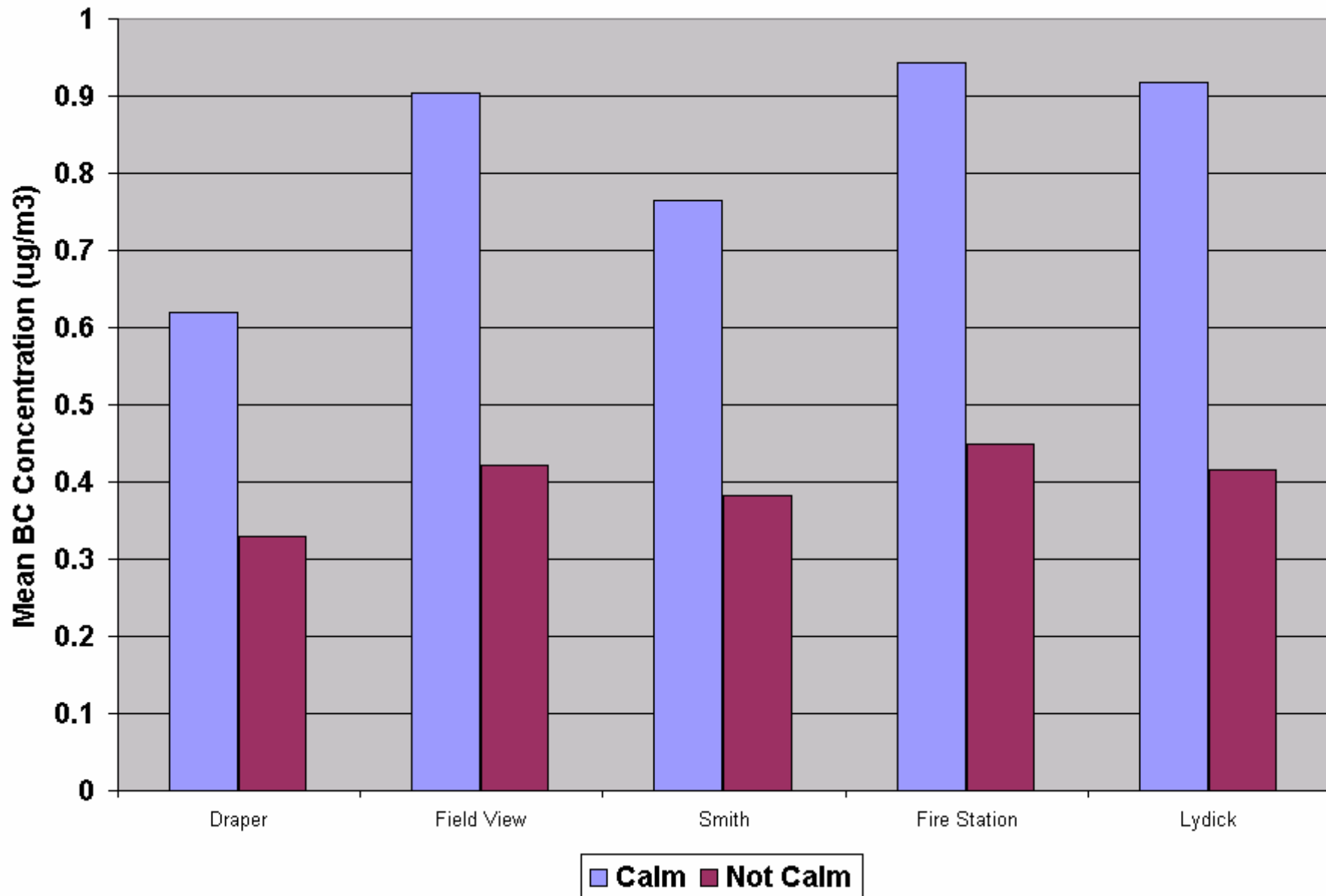
1. **Wind speed** very important influence on black carbon level
  - Lower wind speeds (more stagnant conditions) cause higher levels on average
  - Mean concentrations under calm conditions are 2.5 – 3 times mean concentrations when wind speed is 10 mph

# Average Black Carbon Levels are Higher at Low Wind Speeds



— Draper — Field View — Smith — Fire Station — Lydick

# Average Black Carbon Levels Highest in Calm Conditions





# Factors that Influence BC Level

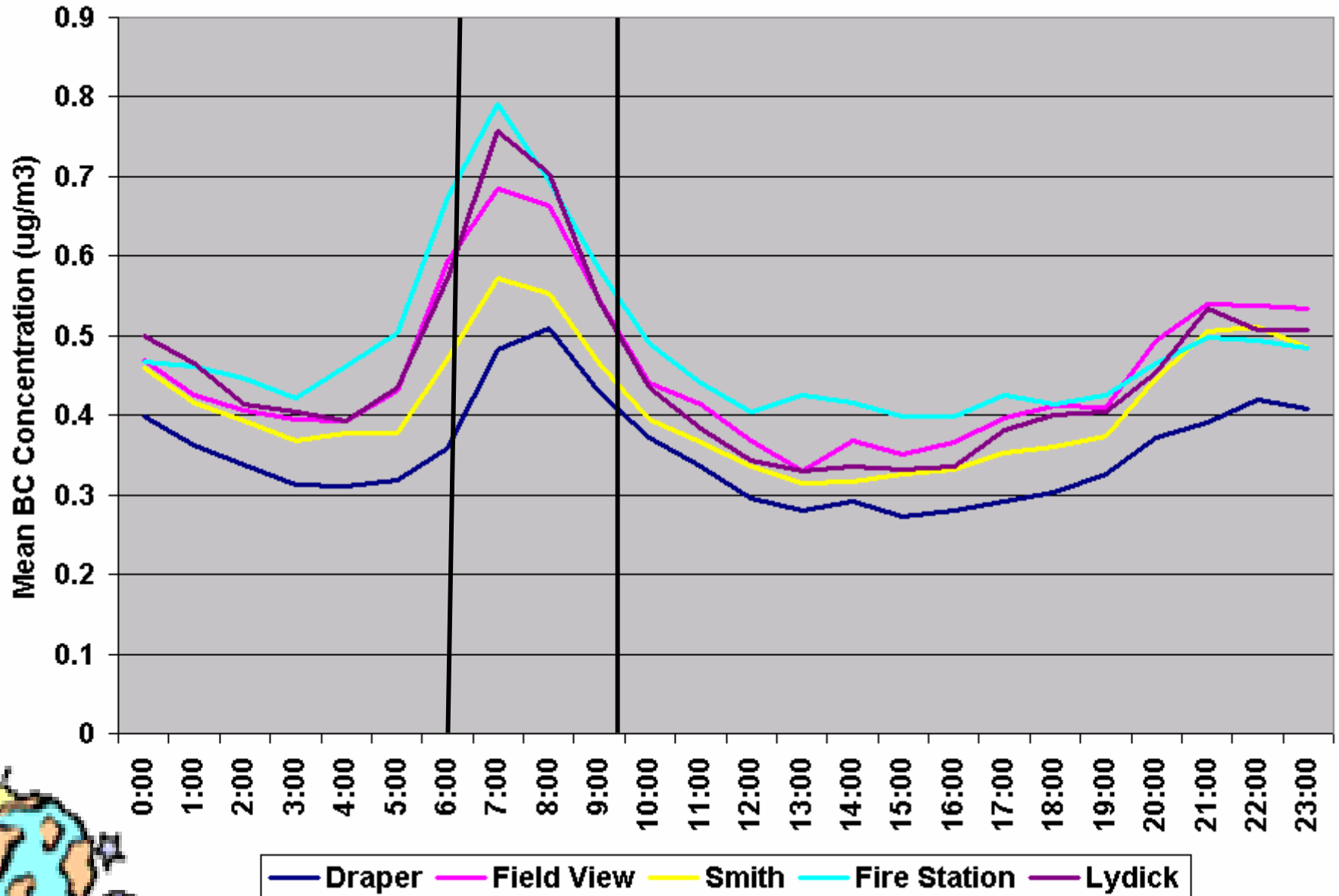
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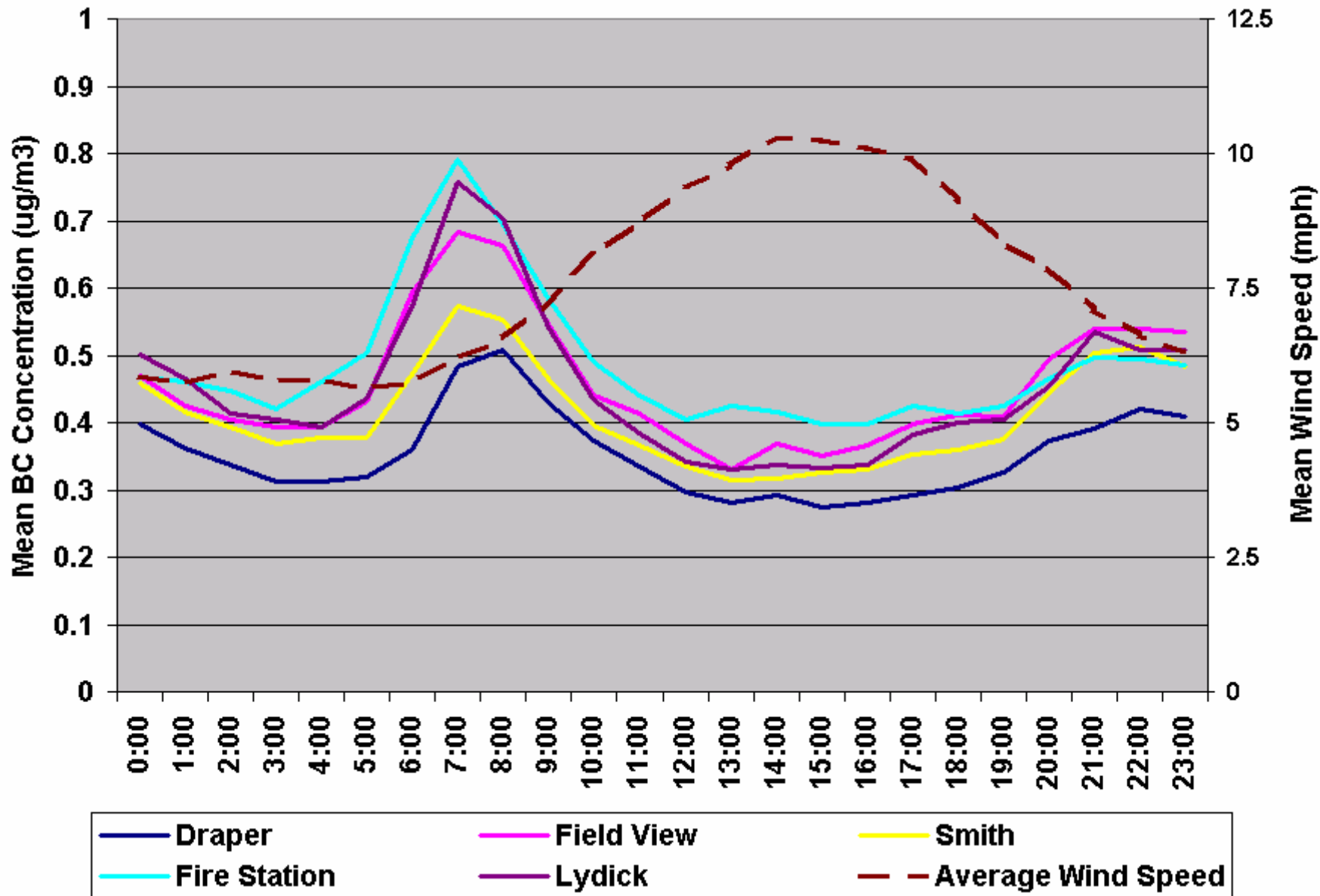
## 2. **Time of Day**

- Average concentrations highest between 6:00 and 9:00 AM
- Average BC concentrations at 7:00 AM approximately twice those at 1:00 PM
- Time of day variation partially caused by wind speed differences
- Activity (traffic) level also important

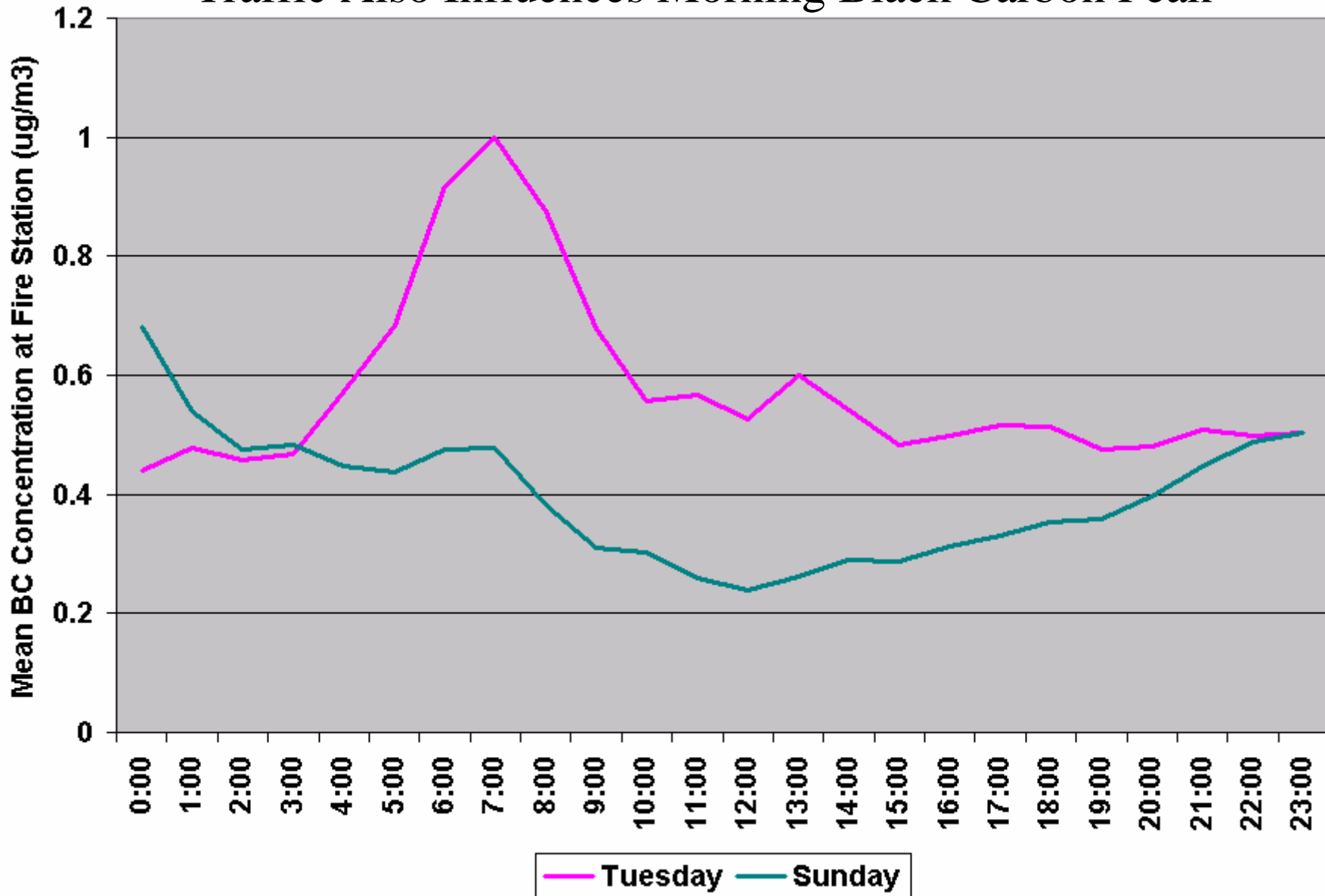


# Average Black Carbon Levels Highest 6:00 – 9:00 AM





# Traffic Also Influences Morning Black Carbon Peak





# Factors that Influence BC Level

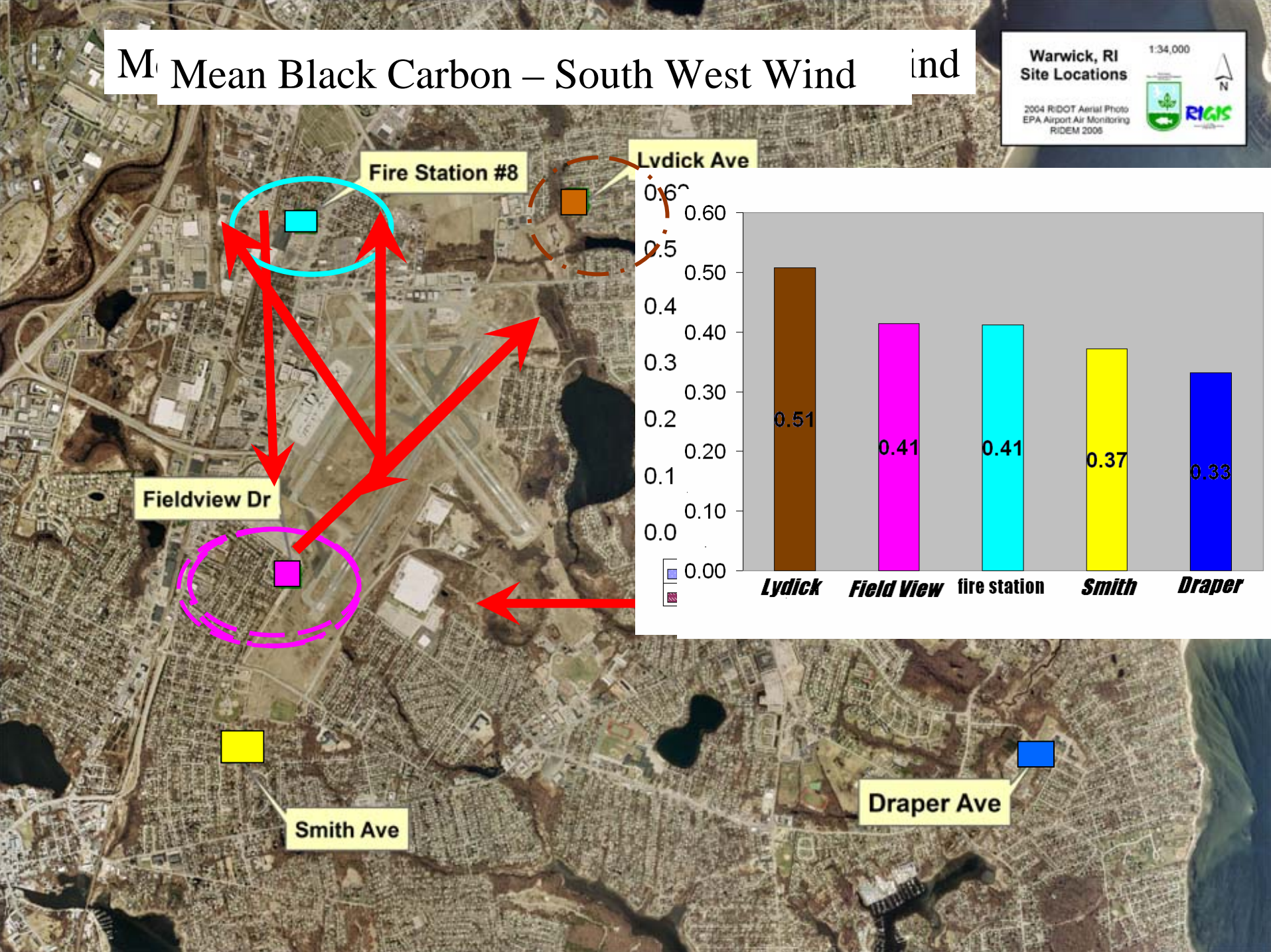
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## 3. **Wind Direction**

- Pollutant levels are higher downwind than upwind of sources of emissions
- Highly time resolved data coupled with meteorological data allows for identification of significant BC sources



# Mean Black Carbon – South West Wind





# Health Implications

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- Black carbon is an indicator of jet and diesel exhaust
- Black carbon levels don't correlate directly with toxicity so no comparison health benchmark is available for BC
- BUT....BC levels tend to correlate with levels of polycyclic aromatic hydrocarbons and ultrafine particulate matter





# Summary of BC results

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- Warwick levels influenced by activities in the vicinity of the airport (mean concentrations higher downwind of airport than upwind)
- Average Warwick levels similar to those in a residential neighborhood in E. Providence often downwind of the Providence metropolitan area
- Average Warwick levels lower than those measured in urban Providence





# VOC Preliminary Results

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- Fewer data for VOCs than Black Carbon
  - VOC samplers collect one 24-hour sample every 6<sup>th</sup> day at each site
- It is harder to identify sources of VOC



# VOC Data

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- However, considerable amount of VOC data have been collected
- 41 sample days mid- April through early December
- 78 substances measured in each sample
  - 30 classified as Hazardous Air Pollutants
  - 25 elevated in a runway sample



# Health Evaluation

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- Maximum concentration of each VOC measured at each site was compared to acute health benchmarks
- Mean concentrations were compared to chronic health benchmarks including, for carcinogens, a target level corresponding to a one in one million lifetime cancer risk



# Comparison to Other Sites

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- Average level of each VOC at each Warwick site was also compared to those measured on same days in:
  - Pawtucket – residential area next to I-95, near industrial area
  - Providence – urban residential area
  - E. Providence – suburban residential area, often downwind of Providence
  - W. Greenwich – rural area



# Organics Results – Short Term

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- Maximum concentrations of all organics were considerably lower than acute health benchmarks
  - Closest – benzene and 2,2,4-trimethylbenzene
  - Both approximately 1% of Unhealthy for Short-term Exposure levels

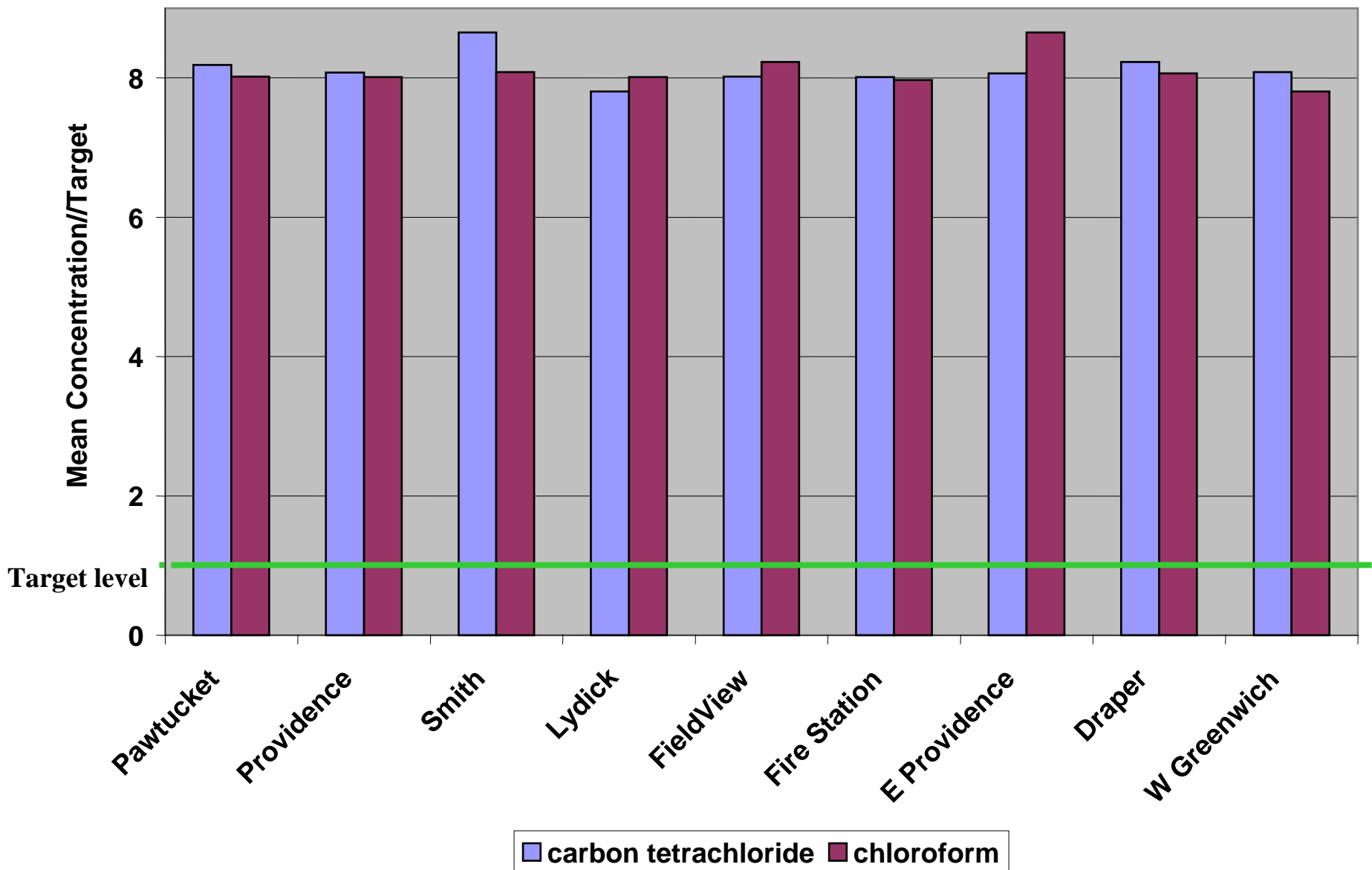


# Comparison to Target Levels

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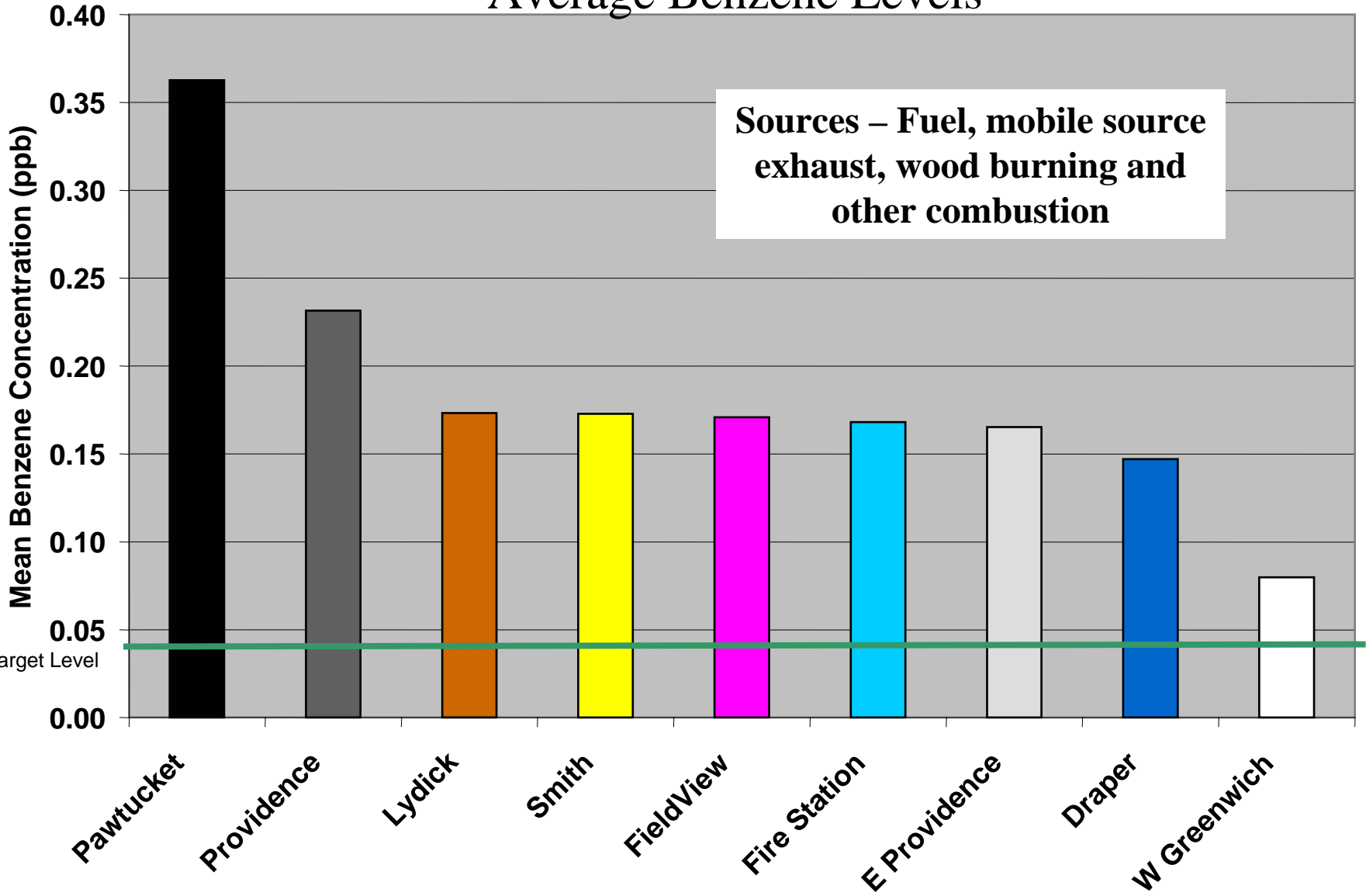
- Mean concentrations of 6 substances over or near the target levels – all known or likely carcinogens
  - 2 background pollutants
    - carbon tetrachloride, chloroform
  - 2 mobile source pollutants
    - benzene, 1,3-butadiene
  - 2 organic solvents
    - trichloroethylene, perchloroethylene

# Carbon Tetrachloride & Chloroform Same at All Sites, 8X Target

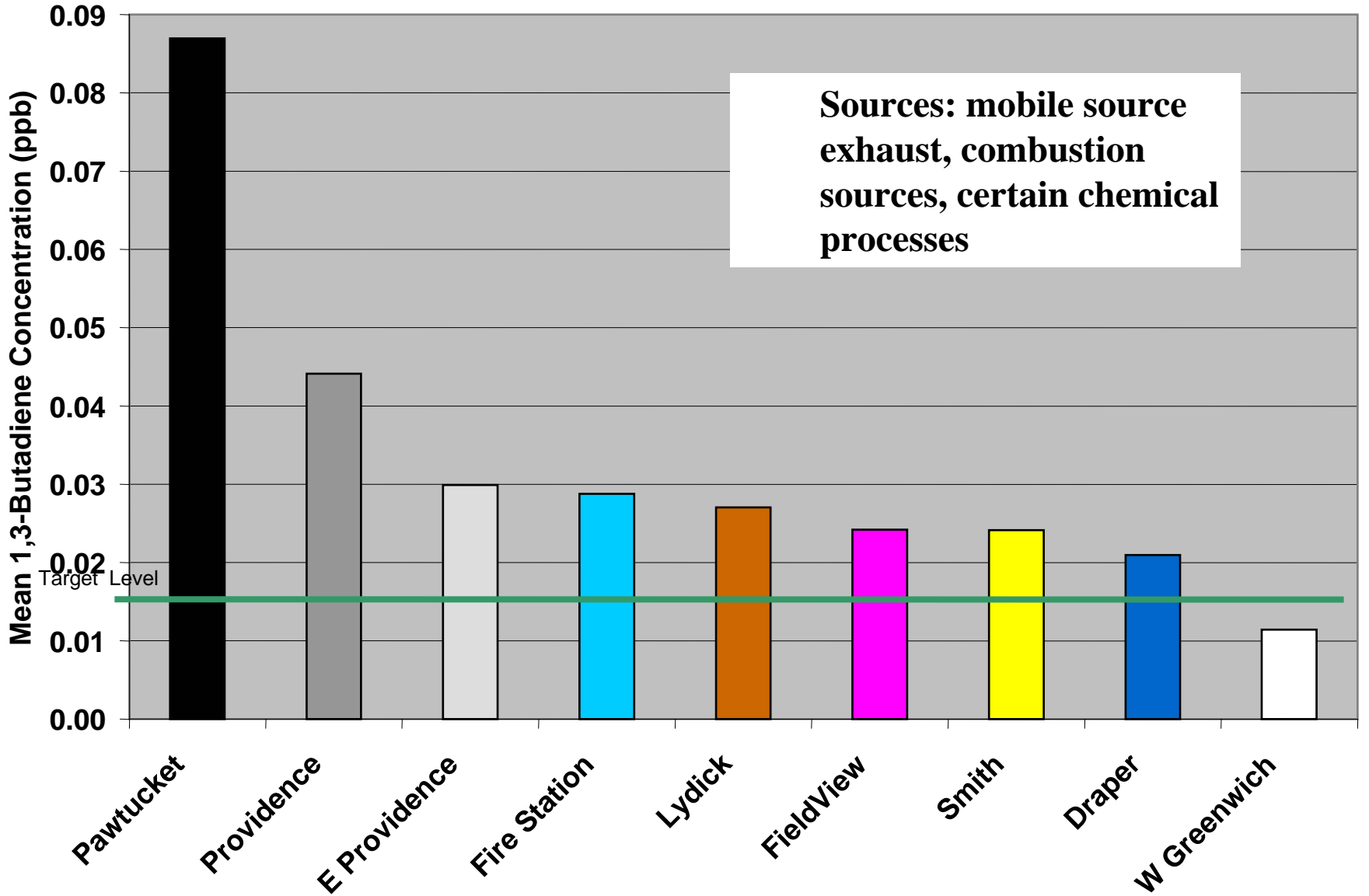




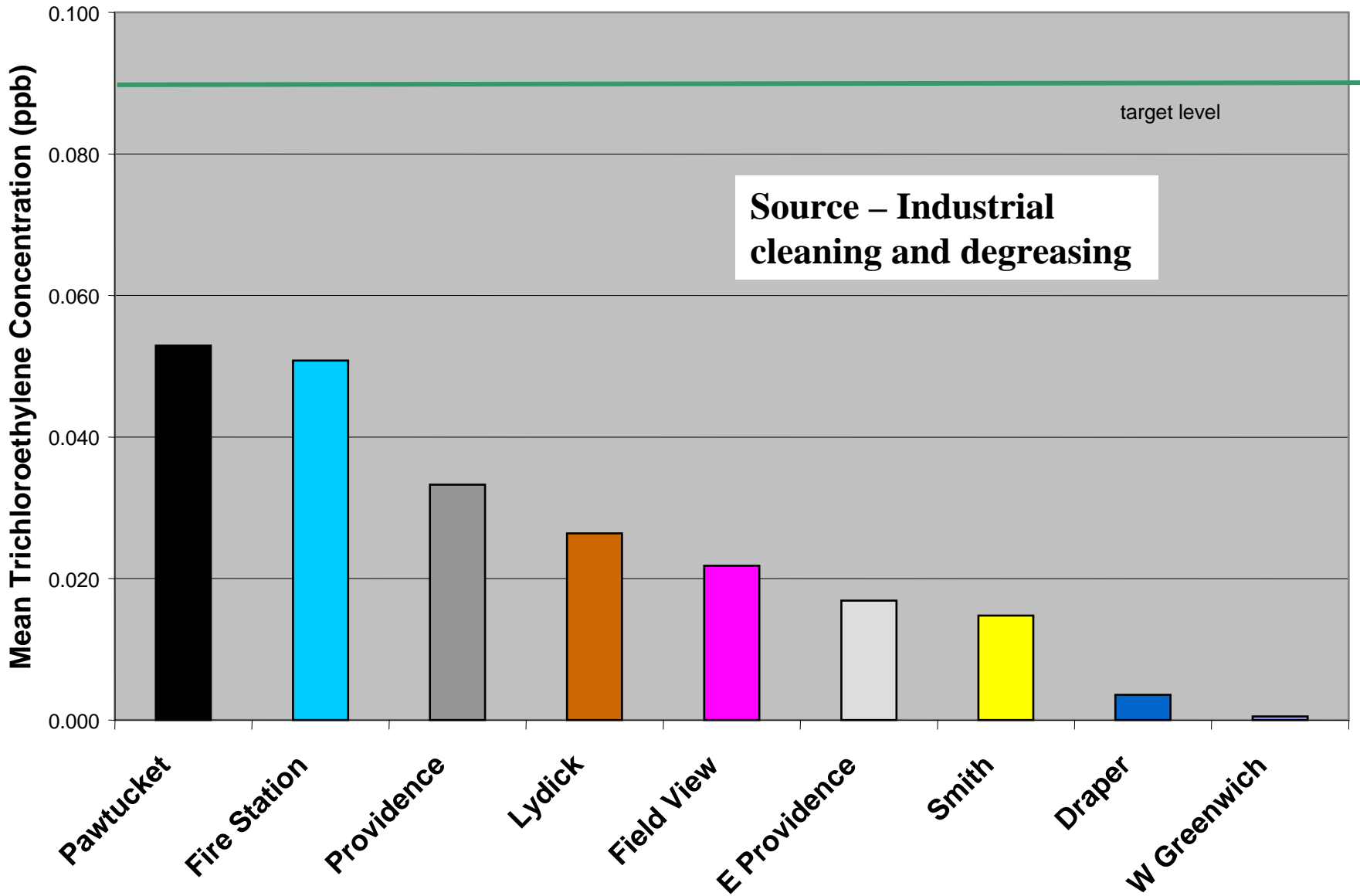
# Average Benzene Levels



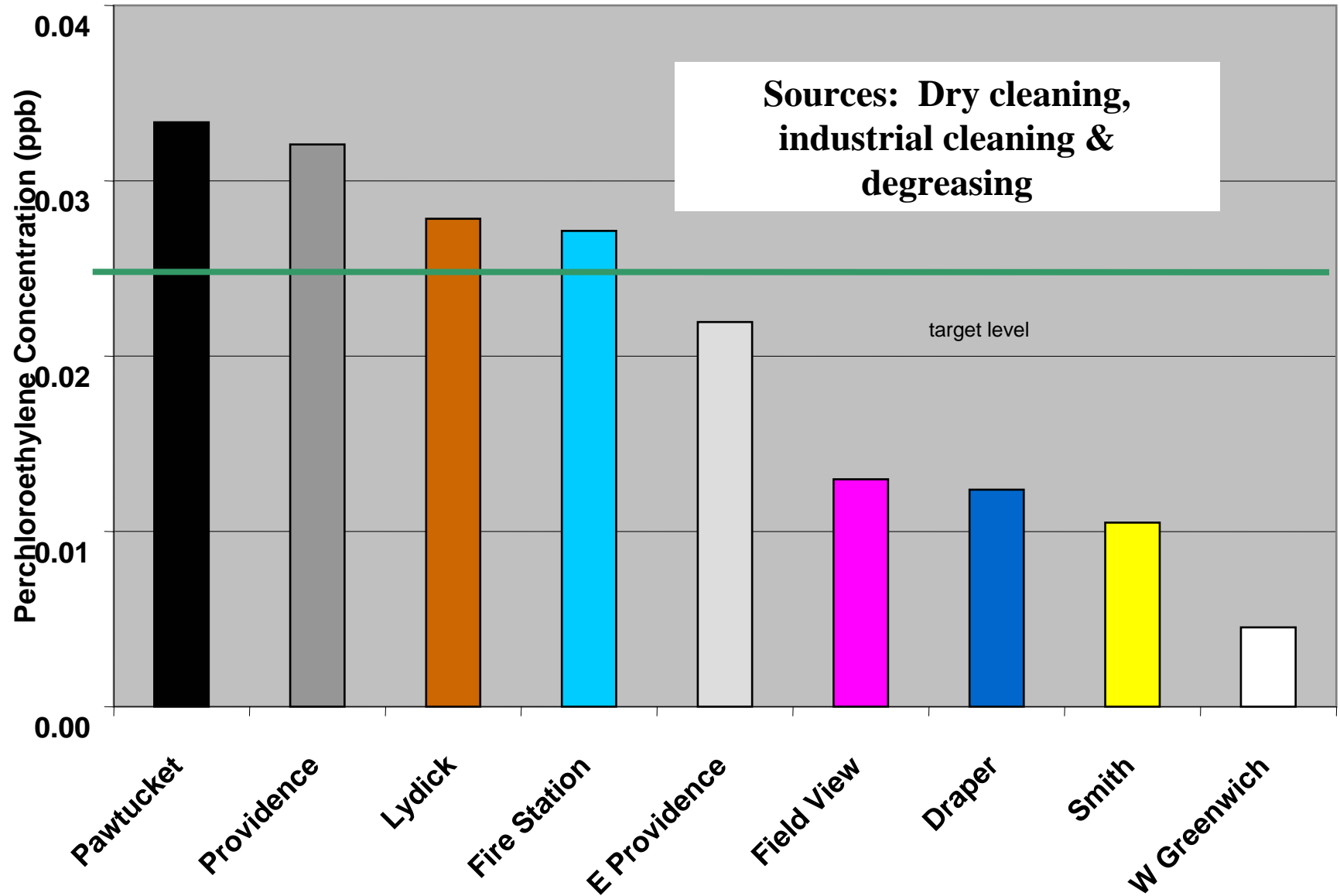
# Average 1,3-Butadiene Levels



# Average Trichloroethylene Levels



# Average Perchloroethylene Levels





# Next Steps – Monitoring Study

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- Continue to collect data through summer 2006
- Analyze and report carbonyl, PM<sub>2.5</sub> and optical system data
- Collect shorter VOC samples to attempt to identify peak levels
- Identify further monitoring needs, other necessary actions

*Welcome to Rhode Island*

*Enjoy your stay*

