

Tonawanda Community Air Quality Study

New York State Department of
Environmental Conservation

National Air Monitoring Conference

November 4, 2009

Gaylord Opryland Hotel - Nashville, TN



Purpose of the Study

- Participate in the National Ambient Air Toxics Monitoring Strategy
- Characterize the degree and extent of local-scale air toxics concerns
- Provide information for the community and State and Local government to identify the need for implementing risk reduction strategies



Why Was Tonawanda Selected ?

- Community concerns about ambient concentrations of benzene and other compounds
- EPA's 1999 National Air Toxics Assessment (NATA) for Erie County
- Coke Oven Residual Risk Assessment prepared by EPA



Tonawanda Study Plan

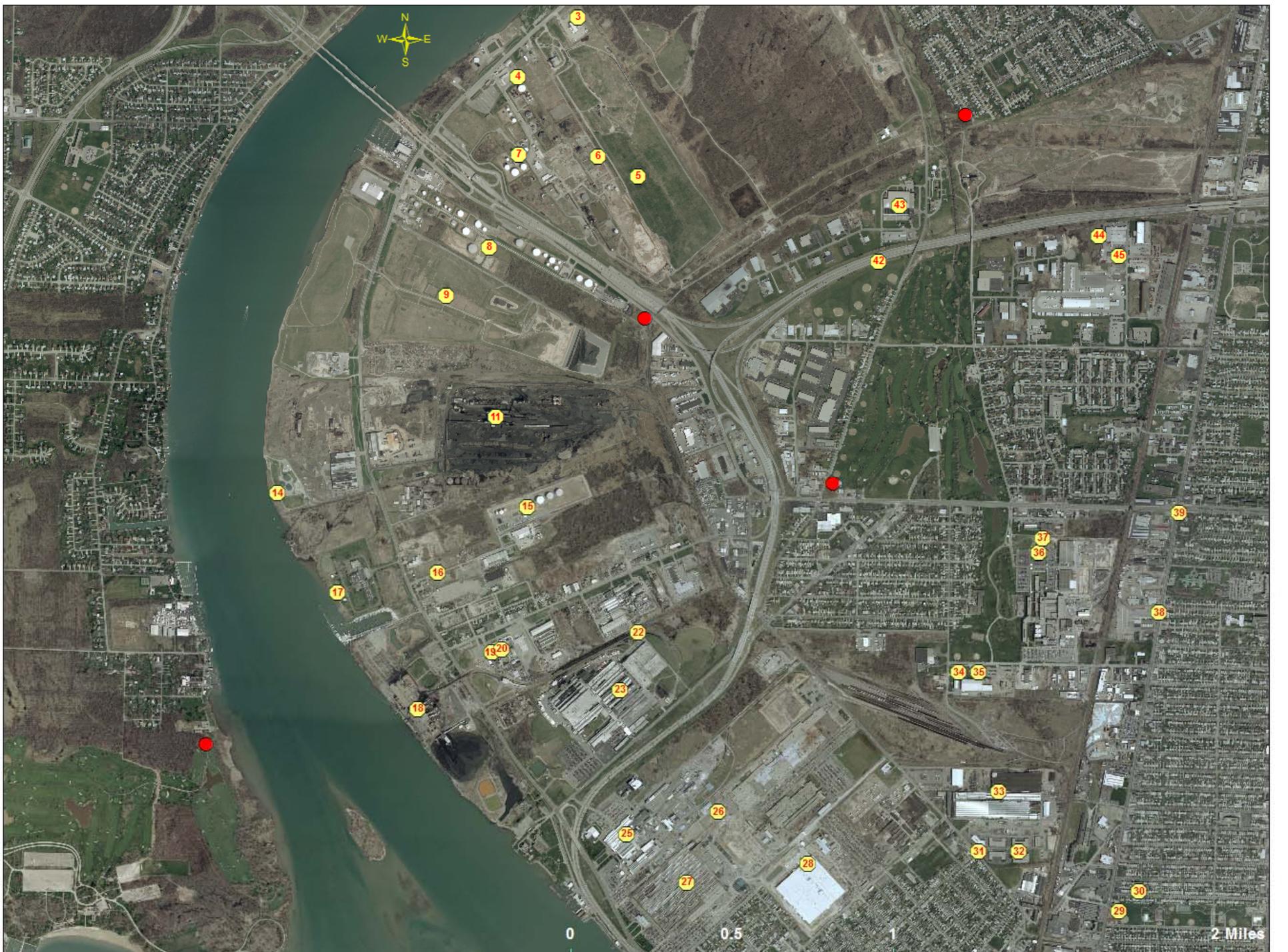
- Collect monitoring data from 4 sites for 1 year
- Analyze pollutant specific data
 - Evaluate influence of wind direction on monitored concentrations
 - Compare annual average concentrations to health-based guidelines and characterize risk
 - Assess emissions and potential contribution to monitored concentrations
 - Mobile sources, large (major) and small (area) industrial, and manufacturing sources



Tonawanda Study Plan

- Enhance emission inventory for large and small sources
- Model these emissions to:
 - Allow for comparison to monitored values
 - Allow for analysis of previously modeled air toxics (EPA's NATA)
 - Evaluate a new multi-facility modeling tool developed by EPA
 - Evaluate previous Coke Oven modeling results, conducted for Residual Risk Assessment



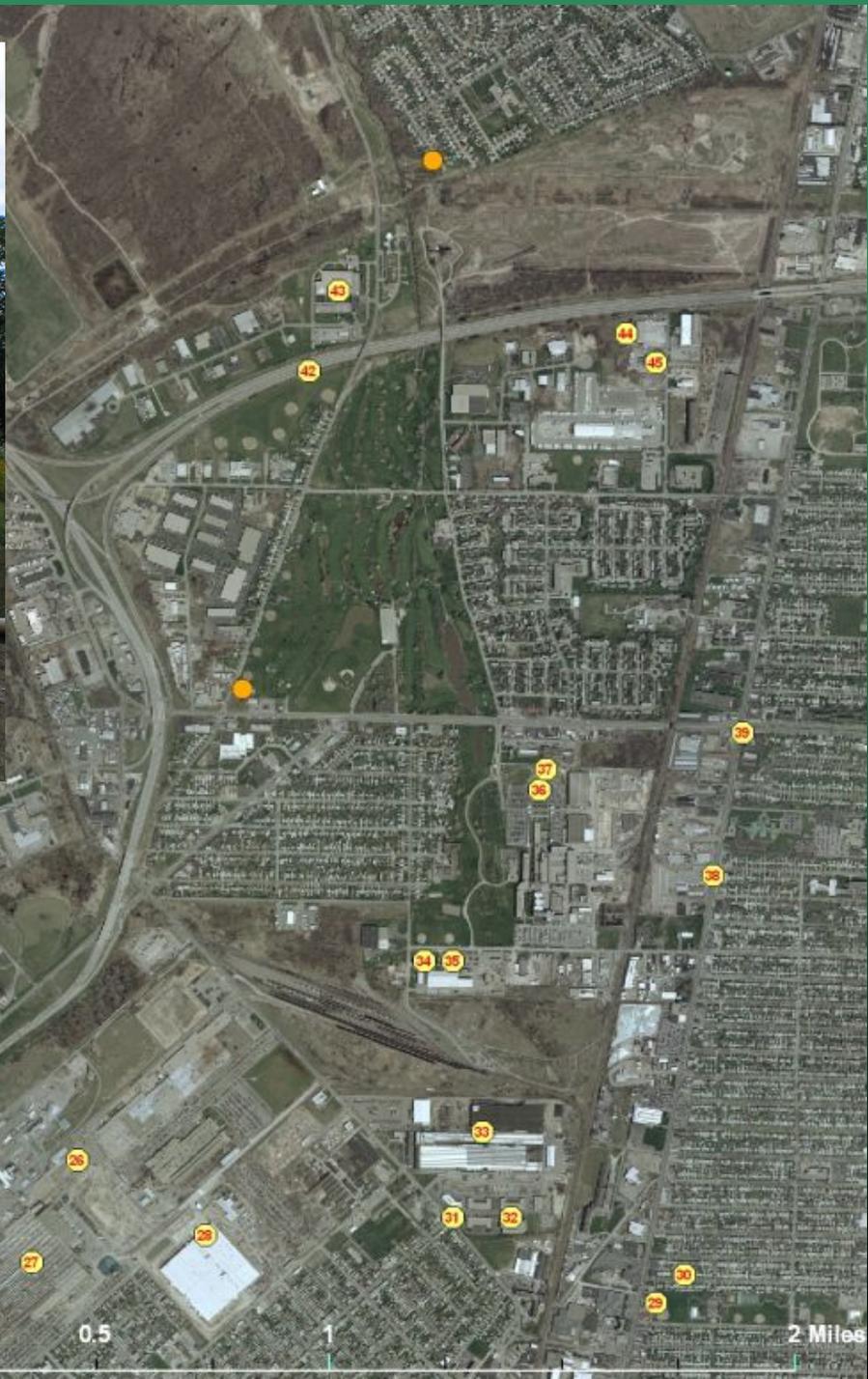


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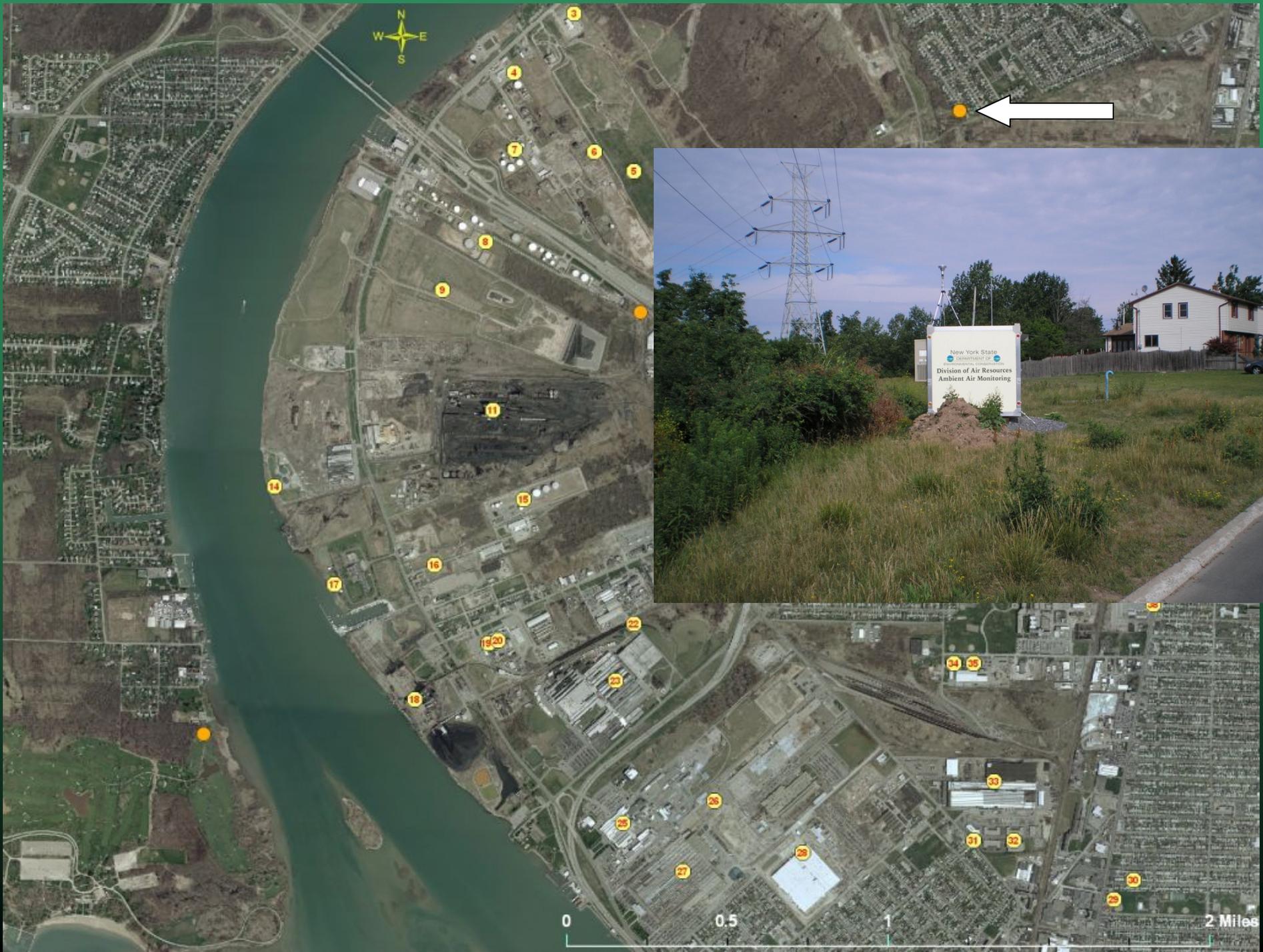
0.5

1

2 Miles









Air Toxics Measured

- 44 Volatile Organic Compounds (VOCs) and 12 Carbonyls
- 1 in 6 day sampling schedule
(24 hour samples)
- 15 of the chemicals are high priority urban air toxics targeted for reductions by the 1990 Clean Air Act



Monitoring Report

- Air monitors and meteorological station operated for one year successfully
- Data capture greater than 90% for all sites
- The comparison of monitored data to:
 - Annual Guideline Concentration (AGC)



Fine Particulate Matter (PM_{2.5})

- New York State and the National Ambient Air Quality Standard (NAAQS), 15 µg/m³
 - Brookside Terrace Yearly average, 12.6 µg/m³
- New York State and NAAQS 24-hour standard, 35 µg/m³ (98th percentile)
 - 24-hour measured concentration at Brookside Terrace, 32.1 µg/m³



Sulfur Dioxide (SO₂)

- New York State and the National Ambient Air Quality Standard (NAAQS), **0.03 ppm**
 - Tonawanda Yearly average, **0.003 ppm**
- New York State and NAAQS 24-hour standard, **0.14 ppm**
 - Sampling days
 - Minimum 24 hour value, **< 0.0003 ppm**
 - Maximum 24 hour value, **0.008 ppm**



Air Toxics Results

- Presenting results for 6 compounds
 - Five had annual results above the AGC
 - One was of concern to the community
- 9 additional compounds had results with consistent detectable concentrations but below the AGC



Conclusion

(given at start of last public meeting)

The results of the community air quality monitoring study and data analysis indicates there is a need for a focused effort to reduce the burden of air toxics in the Tonawanda area.



Compounds greater than the AGC

- Volatile Organic Compounds
 - Benzene
 - Acrolein
 - Carbon tetrachloride
- Carbonyls
 - Formaldehyde
 - Acetaldehyde



Benzene Sources

- Manmade sources include:
 - Tobacco smoke
 - Motor vehicle
 - Oil and natural gas production
 - Petroleum refining & distribution
 - Burning coal, oil and gas
 - Gasoline service stations
 - Coke ovens and coal chemical manufacturing
 - Rubber tire manufacturing
 - Storage or transport of benzene
- Natural sources
 - Emissions from wildfires



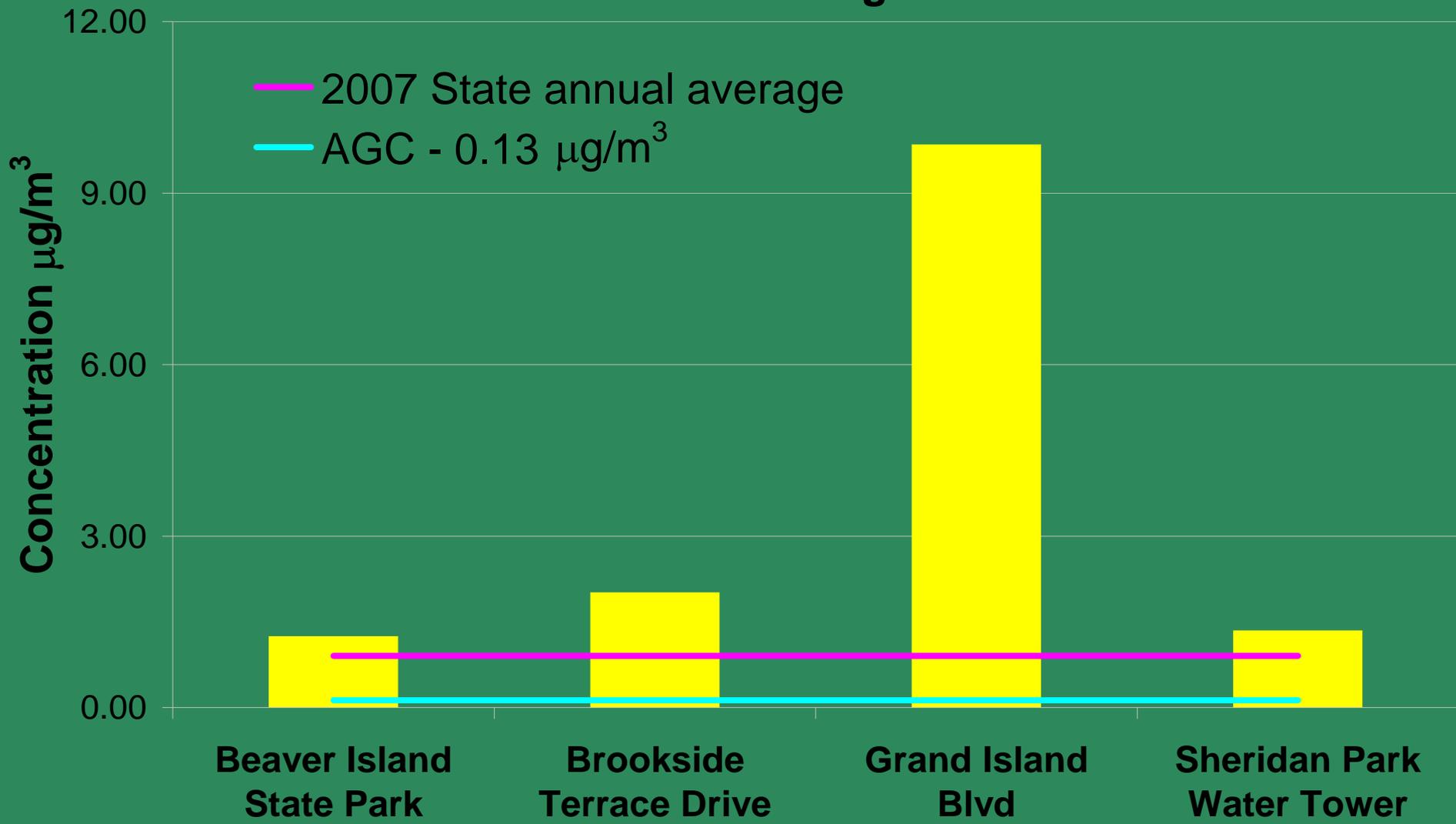
Benzene Sources in Tonawanda

- Point Sources
 - Indeck Yerkes Energy Services
 - Goodyear Dunlop Tires
 - NOCO Energy Corp.
 - NRG Huntley Electric Generating
 - Sunoco Tonawanda Terminal
 - Tonawanda Coke Corp.
- Area Sources
 - Gasoline stations, truck terminals
 - Commercial and Industrial Boilers
- Mobile Sources
 - Car and truck exhaust/evaporative

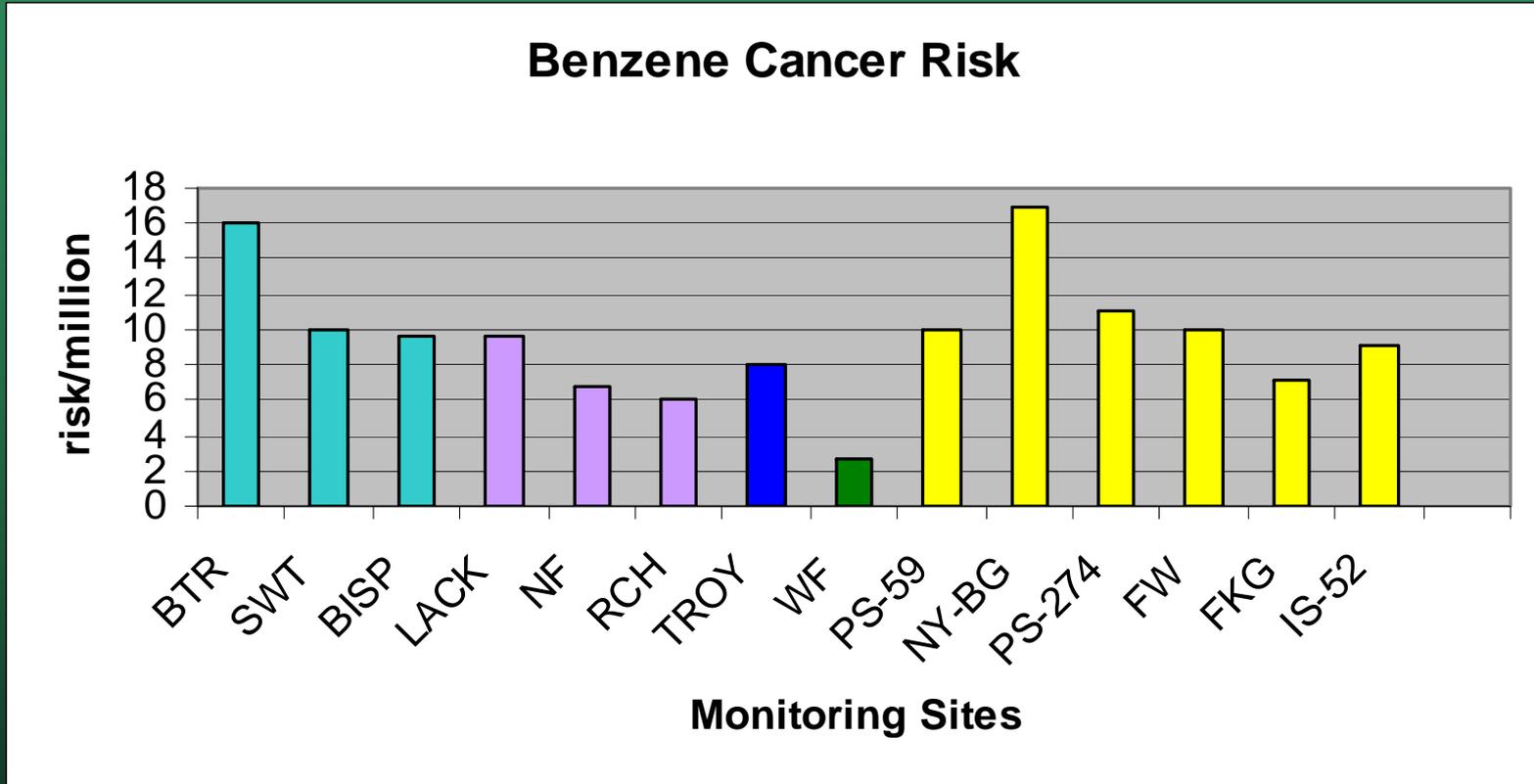


Benzene

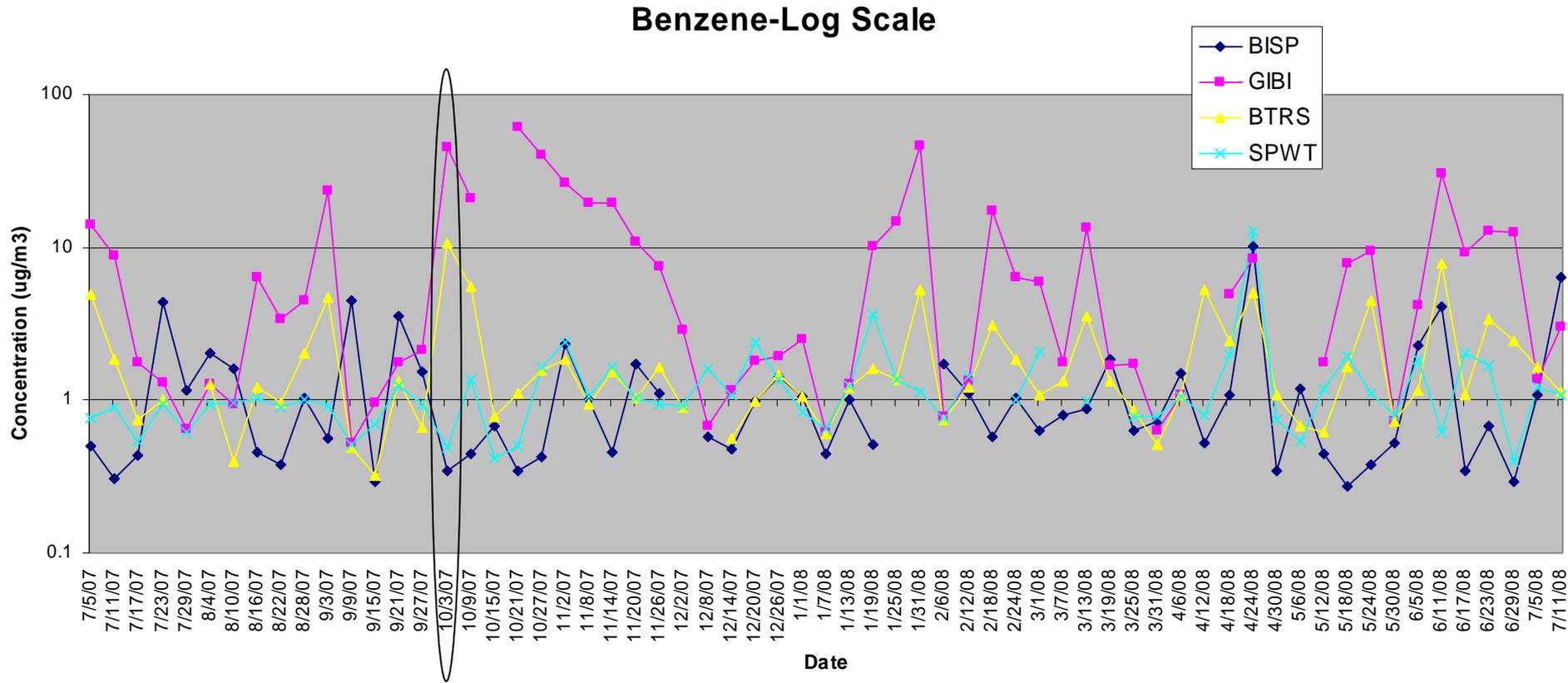
12 month average



NYS Benzene Monitoring Data 2005-2007



Next Steps



Next Steps

October 3, 2007

Benzene Conc.

Beaver Island SP

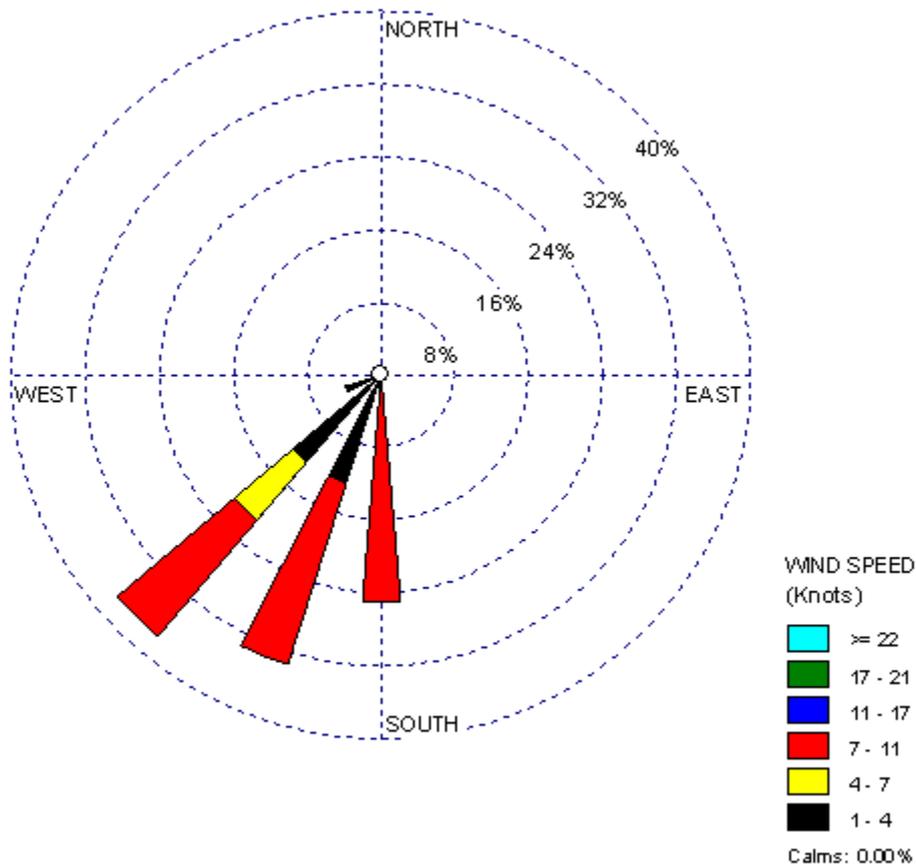
0.56 ug/m³

Grand Island Blvd

45 ug/m³

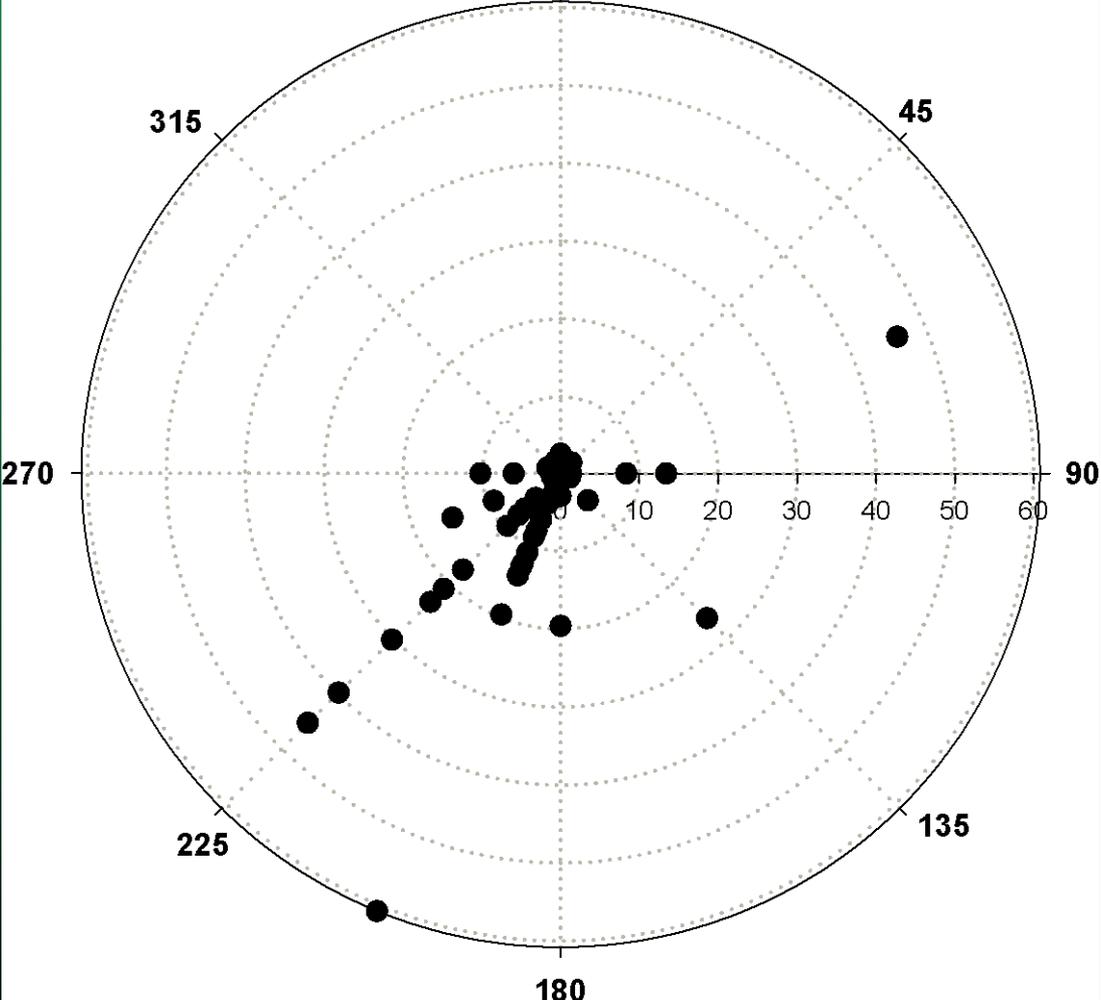
Brookside Terrace

10 ug/m³



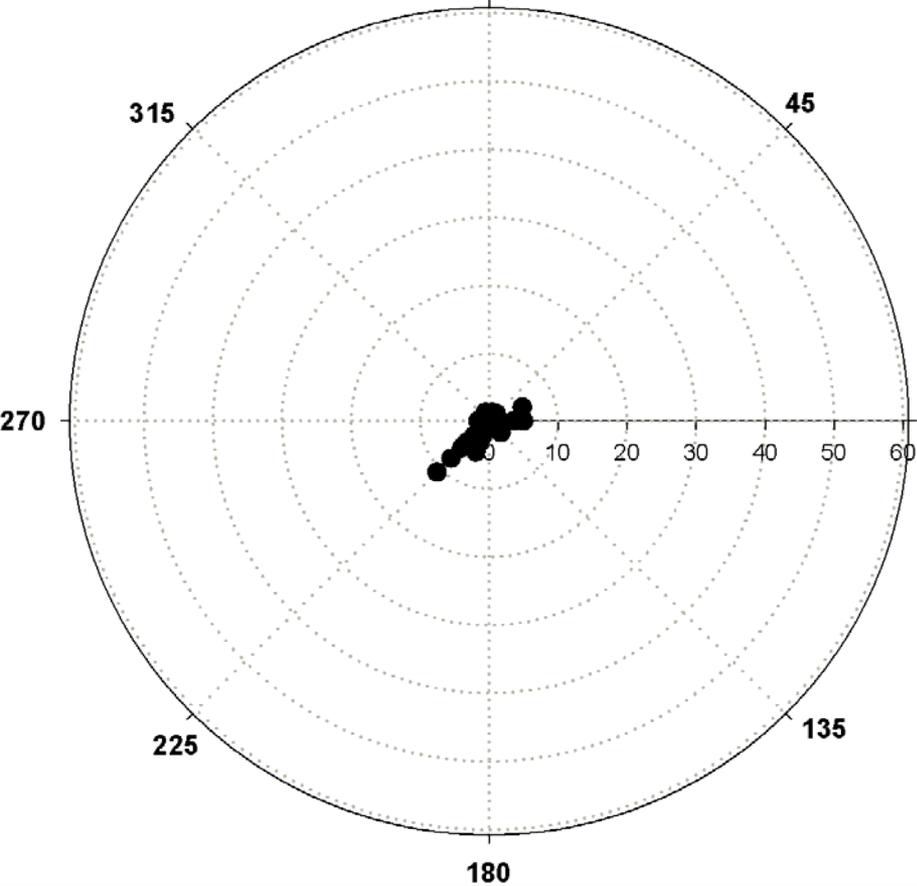
GIBI Benzene

–Scale Max. $\approx 60 \mu\text{g}/\text{m}^3$



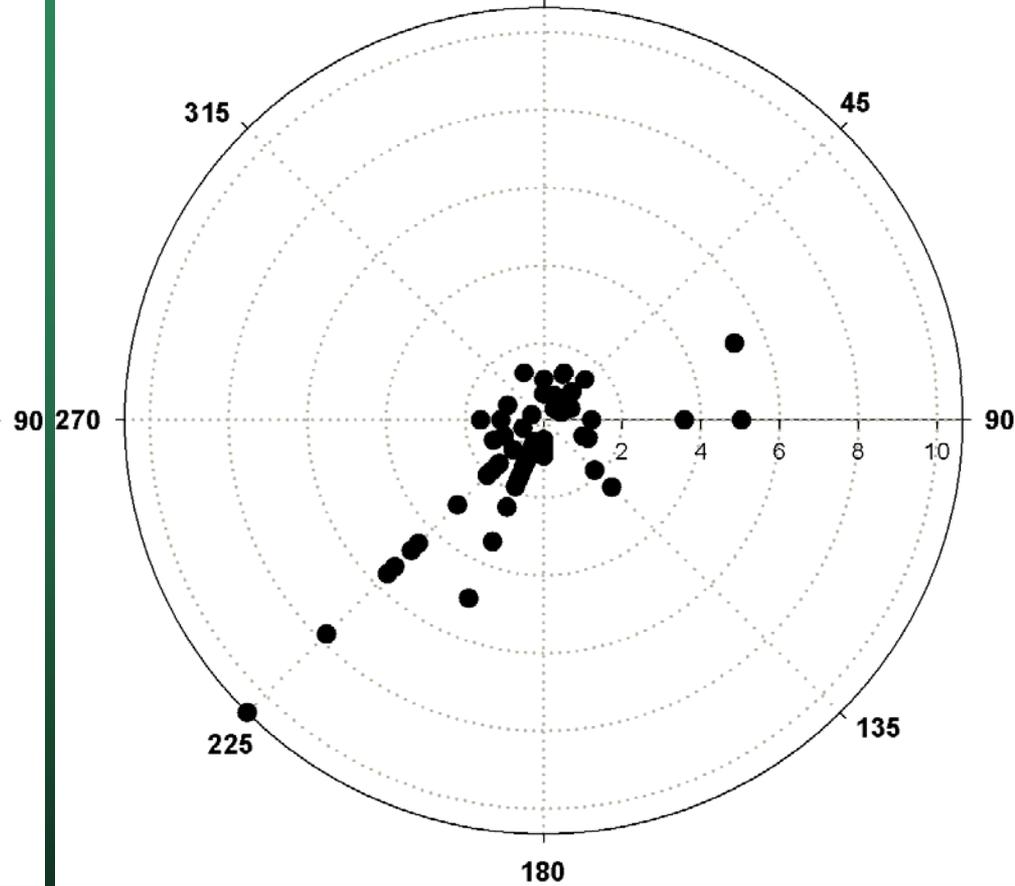
BTRS Benzene

0 -Scale Max. $\approx 60 \mu\text{g}/\text{m}^3$



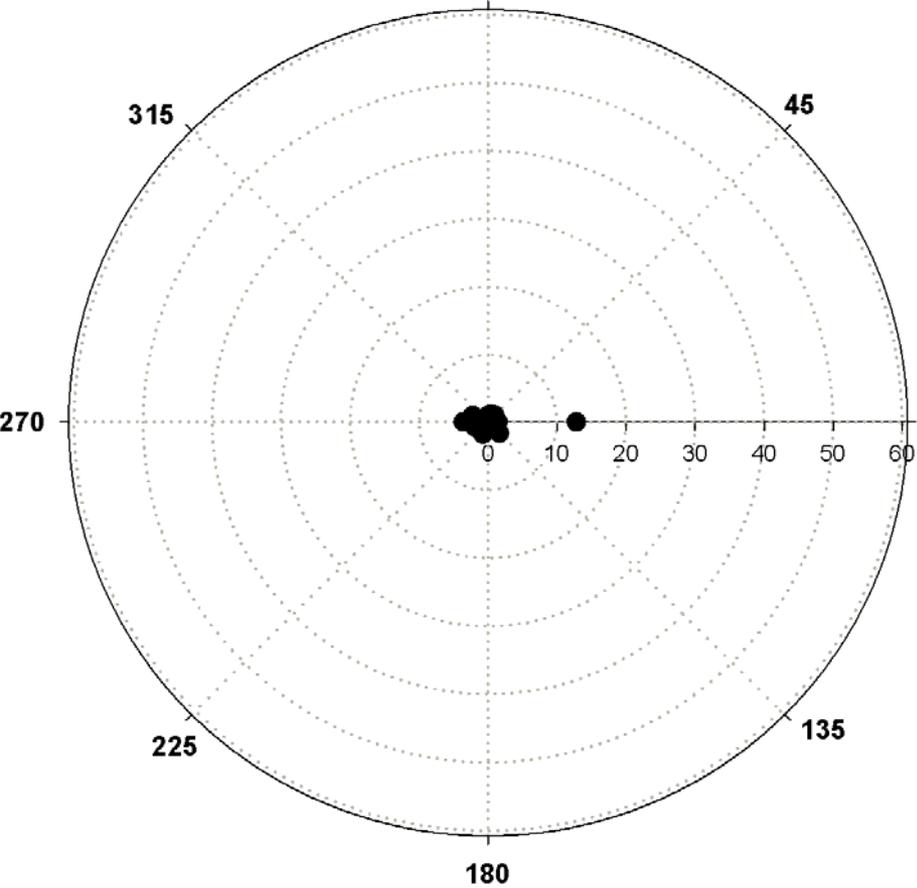
BTRS Benzene

0 -Scale Max. ≈ 10



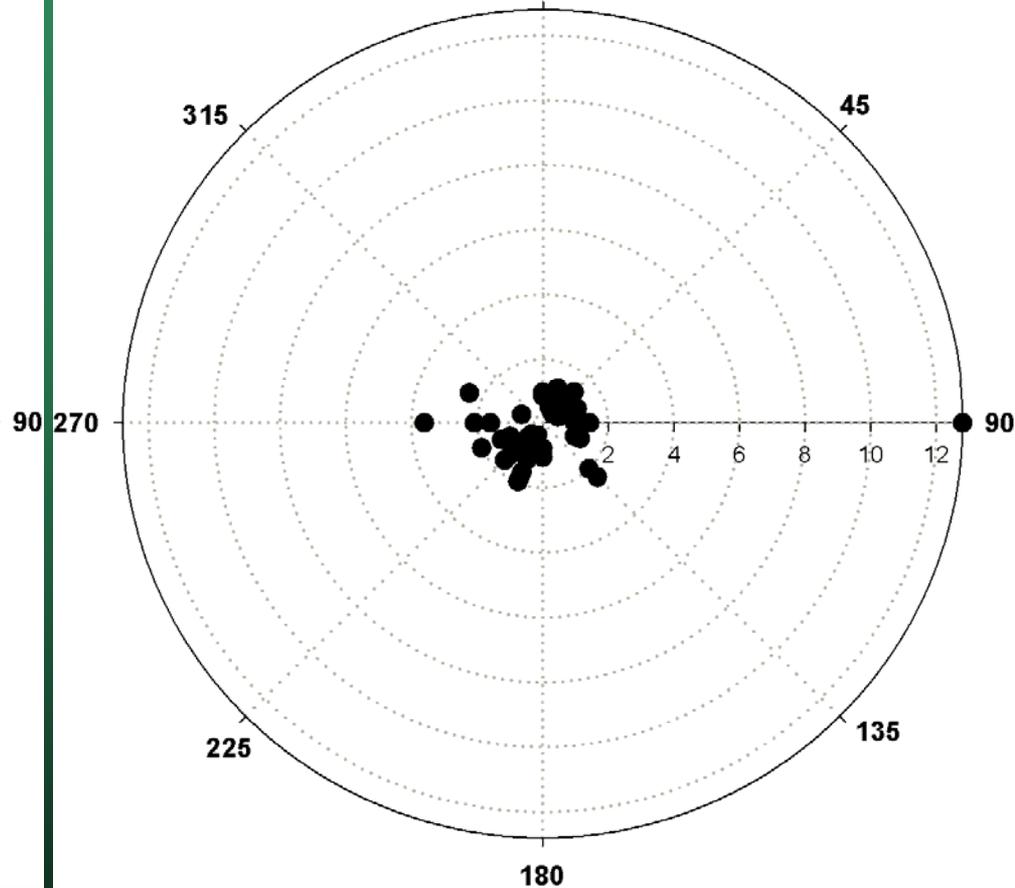
SPWT Benzene

–Scale Max. $\approx 60 \mu\text{g}/\text{m}^3$



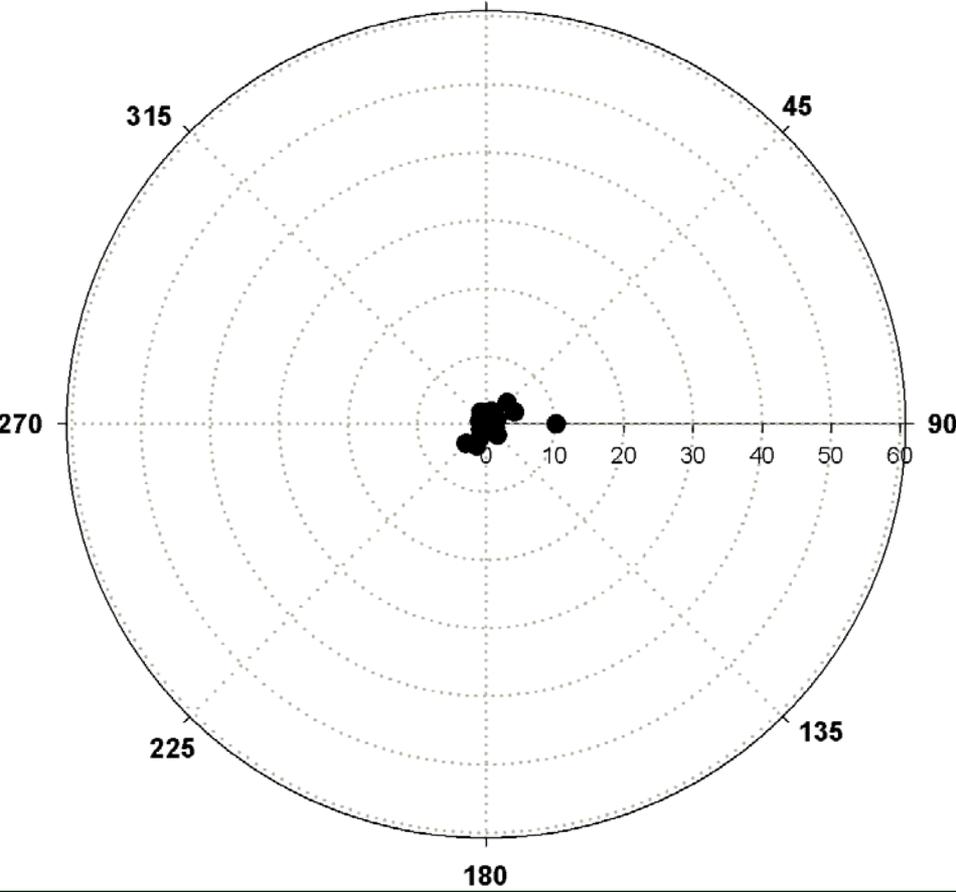
SPWT Benzene

–Scale Max. ≈ 1



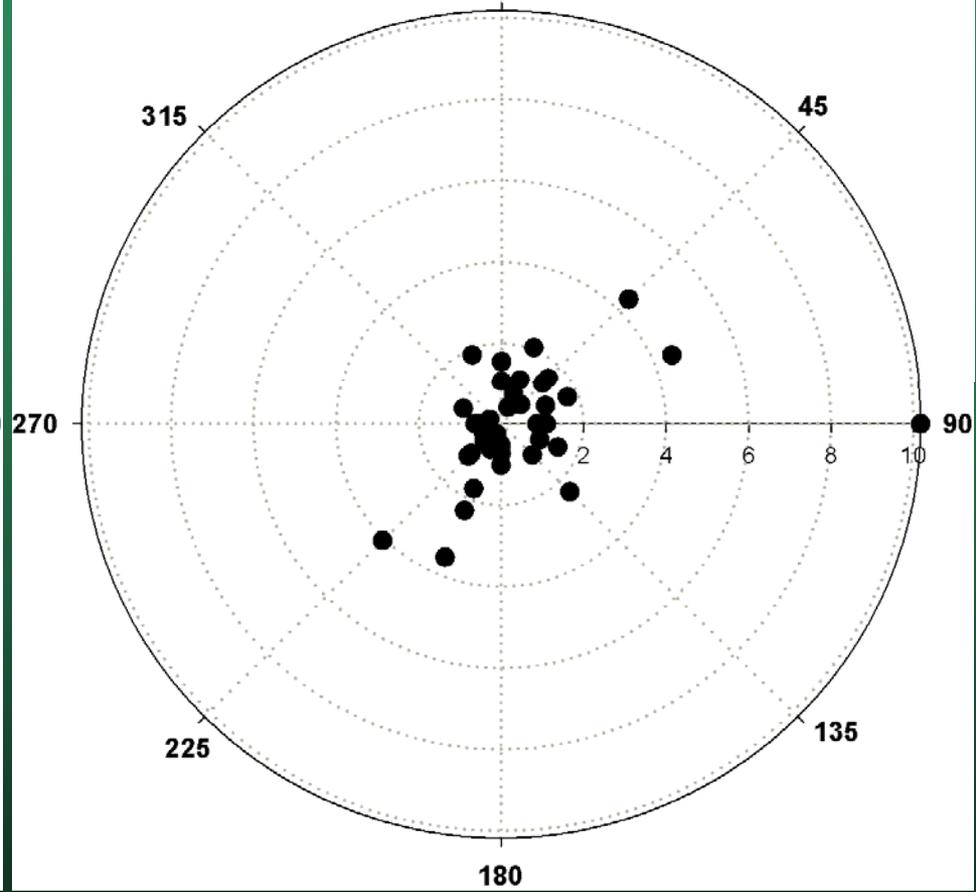
BISP Benzene

–Scale Max. $\approx 60 \mu\text{g}/\text{m}^3$

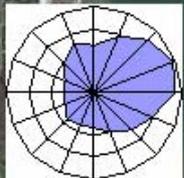
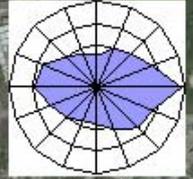
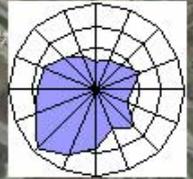
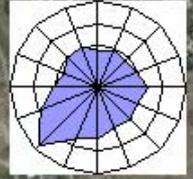


BISP Benzene

–Scale Max. $\approx 10 \mu\text{g}/\text{m}^3$

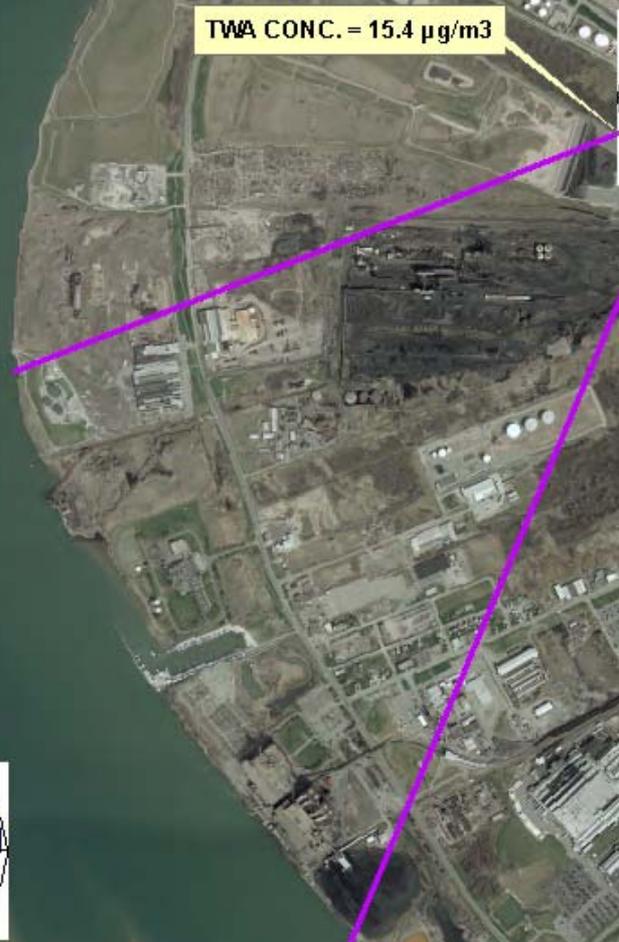
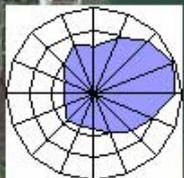
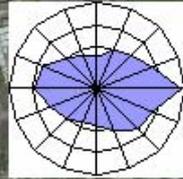
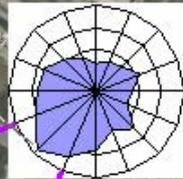
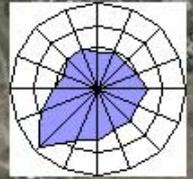


*– Benzene
Pollution Roses*

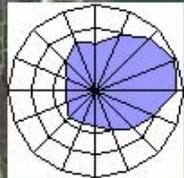


- Benzene Pollution Roses

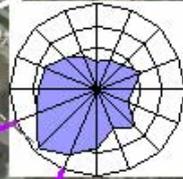
TWA CONC. = 15.4 $\mu\text{g}/\text{m}^3$



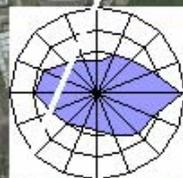
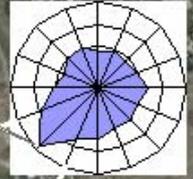
*- Benzene
Pollution Roses*



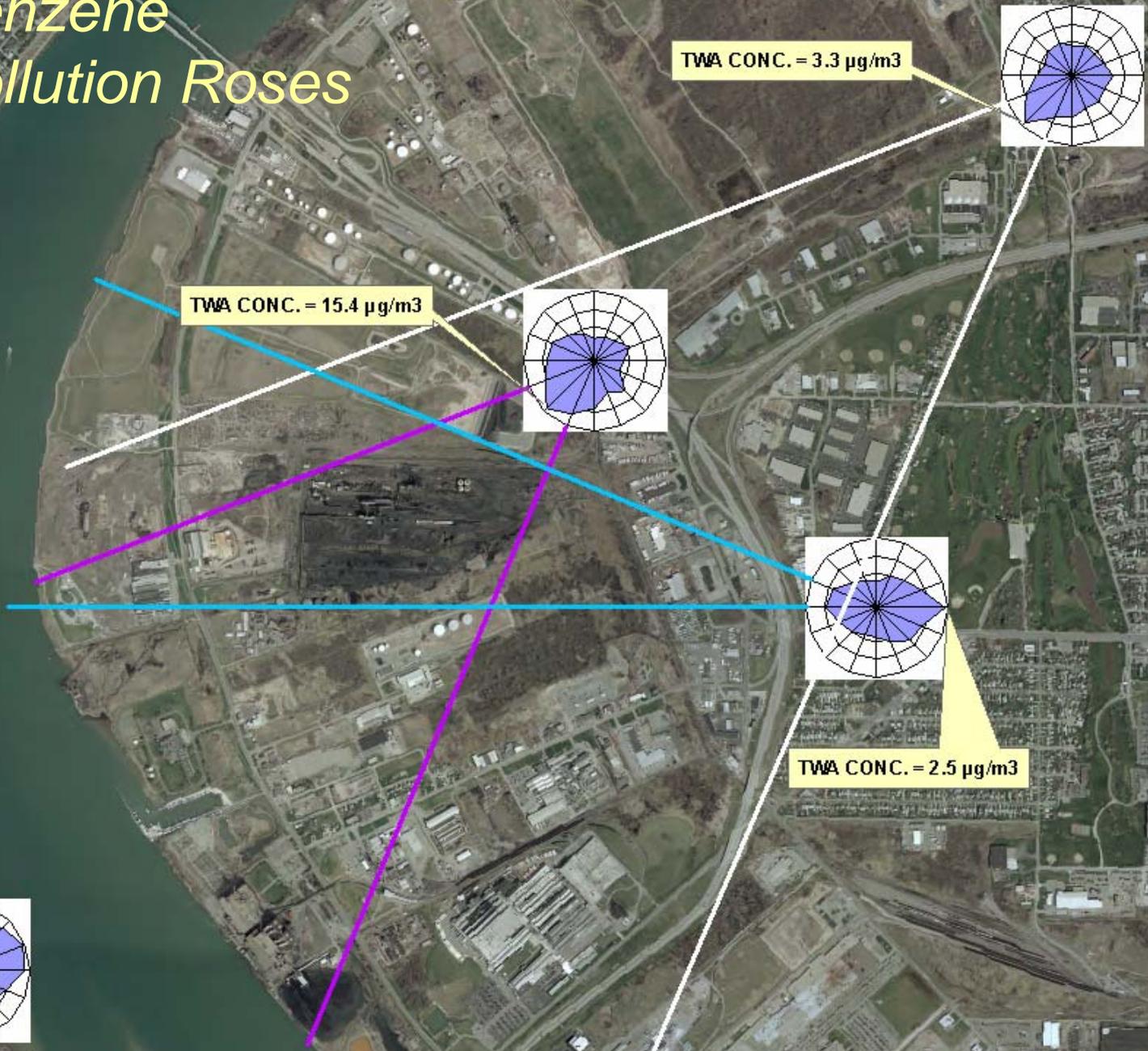
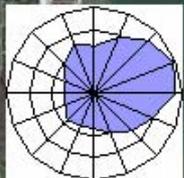
TWA CONC. = 15.4 $\mu\text{g}/\text{m}^3$



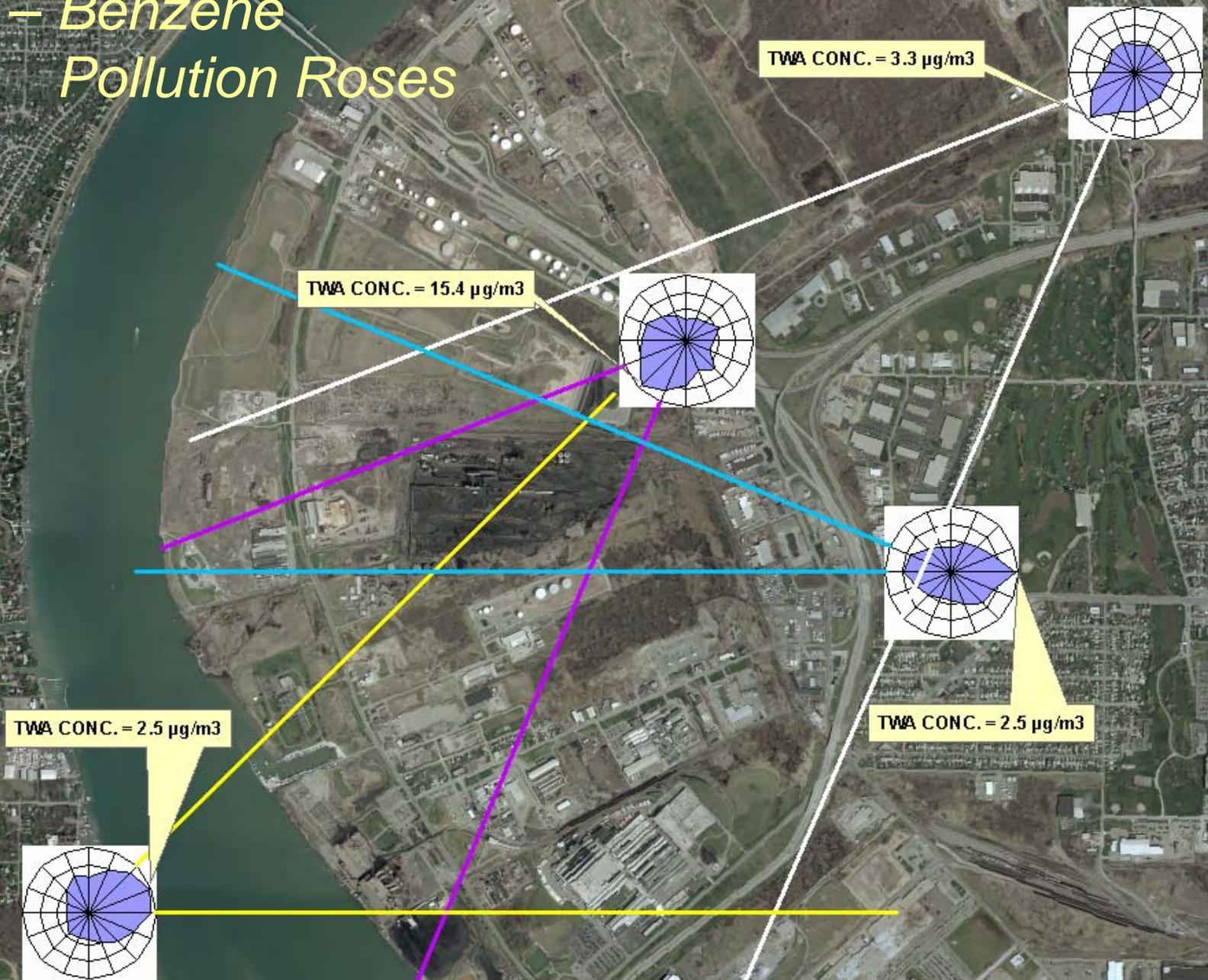
TWA CONC. = 3.3 $\mu\text{g}/\text{m}^3$



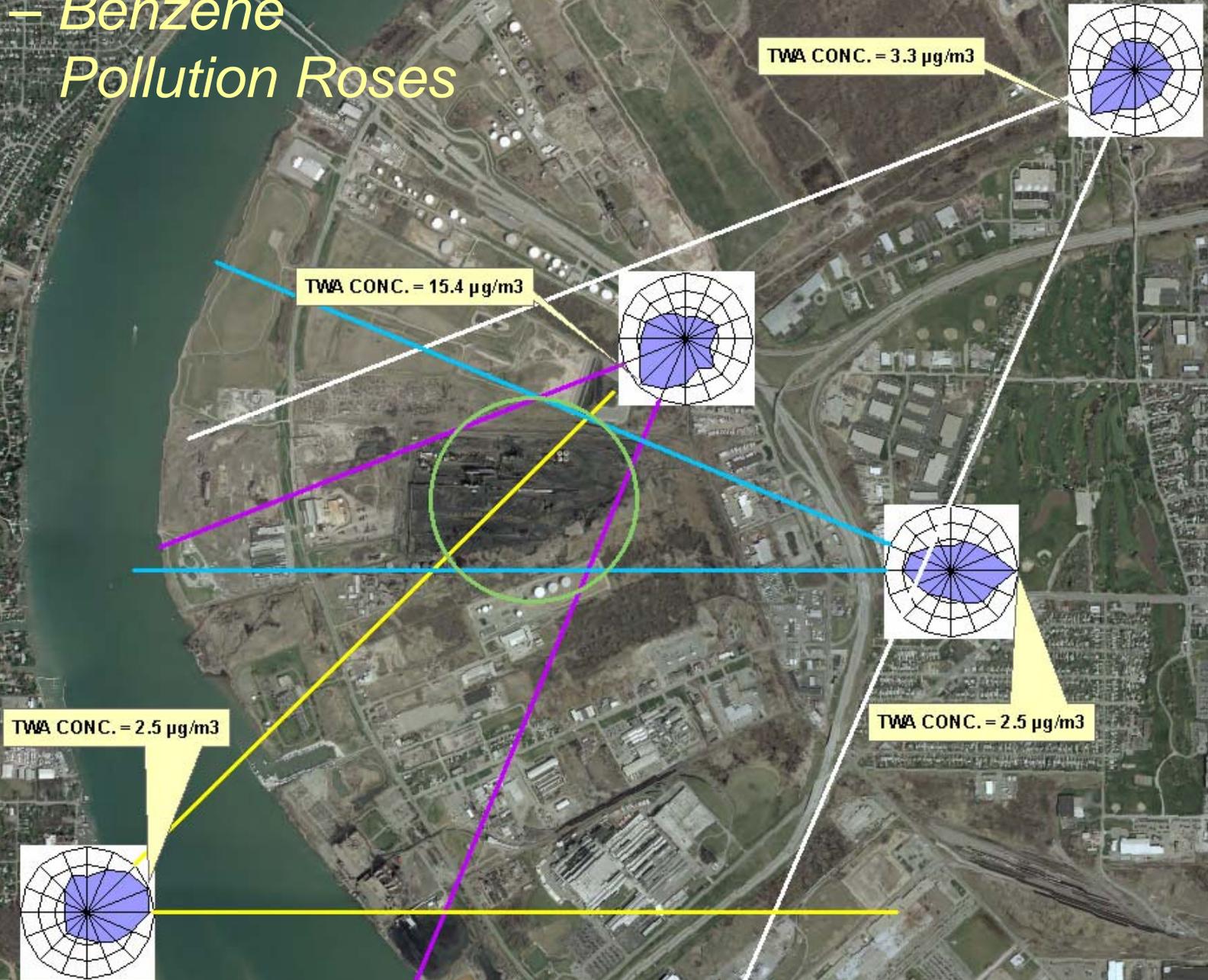
- Benzene Pollution Roses



- Benzene Pollution Roses



- Benzene Pollution Roses



Acrolein

- **Manmade sources**
 - Tobacco smoke
 - Chemical manufacturing (acrylic acid)
 - Combustion of petrochemical fuels and coal
 - Mobile source exhaust (cars, trucks, airplanes)
 - Formed when cooking fats are overheated
 - Breakdown by sunlight of various hydrocarbon pollutants (such as 1,3-butadiene)
 - Used as an herbicide and algicide
- **Natural sources**
 - Product of fermentation and ripening processes
 - Released when organic matter such as trees and other plants, including tobacco, are burned



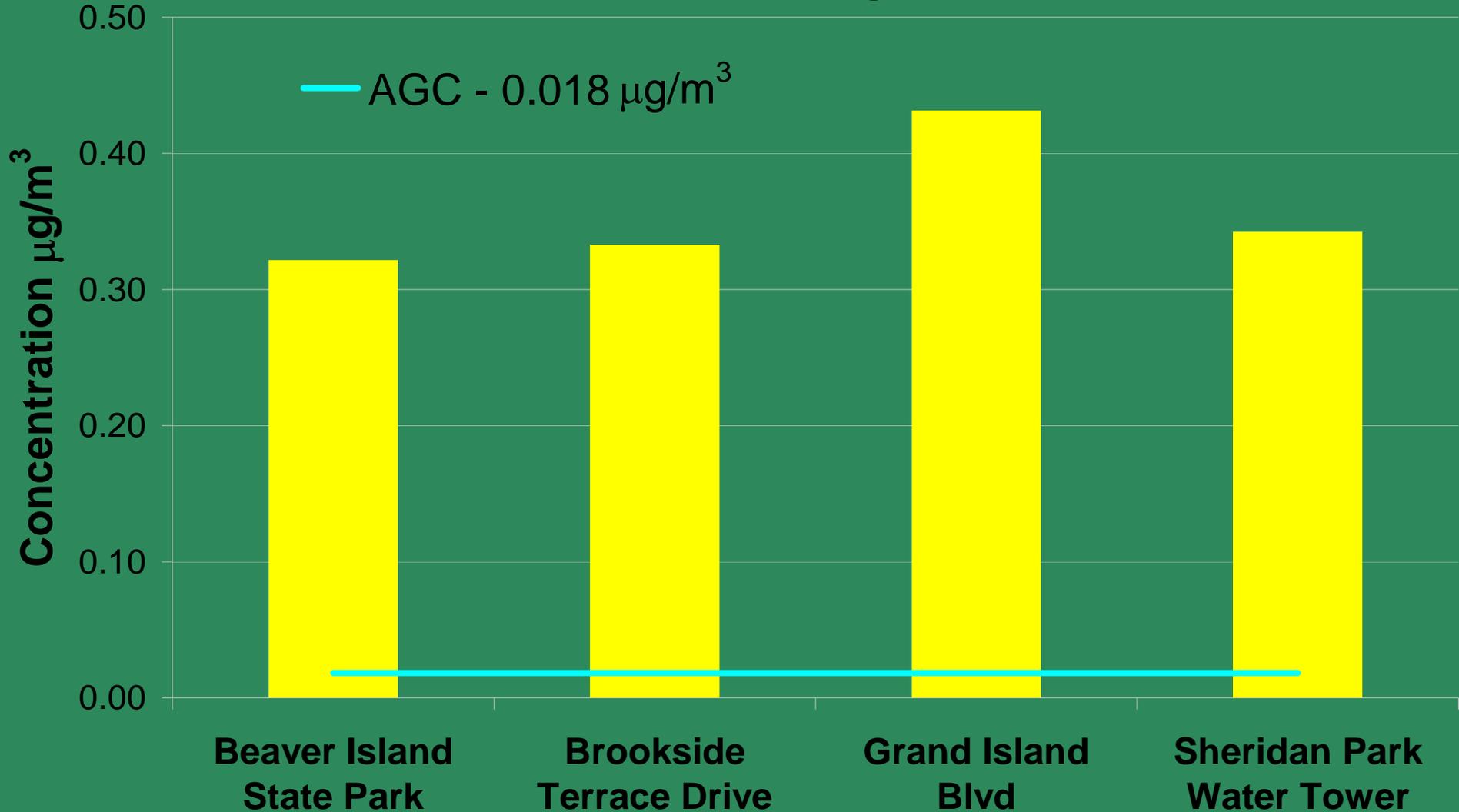
Acrolein Sources in Tonawanda

- Point Sources
 - 3M Tonawanda
 - Indeck Yerkes Energy Services
 - NRG Huntley Electric Generating
 - Tonawanda Coke Corp.
- Area Sources
 - Commercial and Industrial Boilers
- Mobile Sources
 - Car and truck exhaust



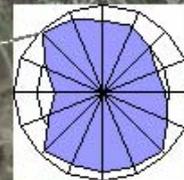
Acrolein

12 month average

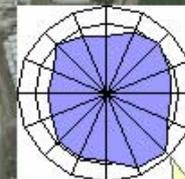
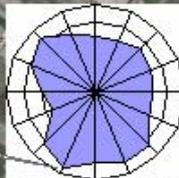


– Acrolein Pollution Roses

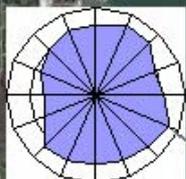
TWA CONC. = 0.4 $\mu\text{g}/\text{m}^3$



TWA CONC. = 0.5 $\mu\text{g}/\text{m}^3$



TWA CONC. = 0.4 $\mu\text{g}/\text{m}^3$



TWA CONC. = 0.4 $\mu\text{g}/\text{m}^3$

Formaldehyde

- Manmade Sources
 - Predominantly used as a chemical intermediate
 - Manufacturing of urea-formaldehyde resins, used in particleboard products
 - Combustion sources, smoking
 - Mobile exhaust emissions
 - Breakdown of other compounds
- Natural Sources
 - Wildfires, animal wastes, plant volatiles



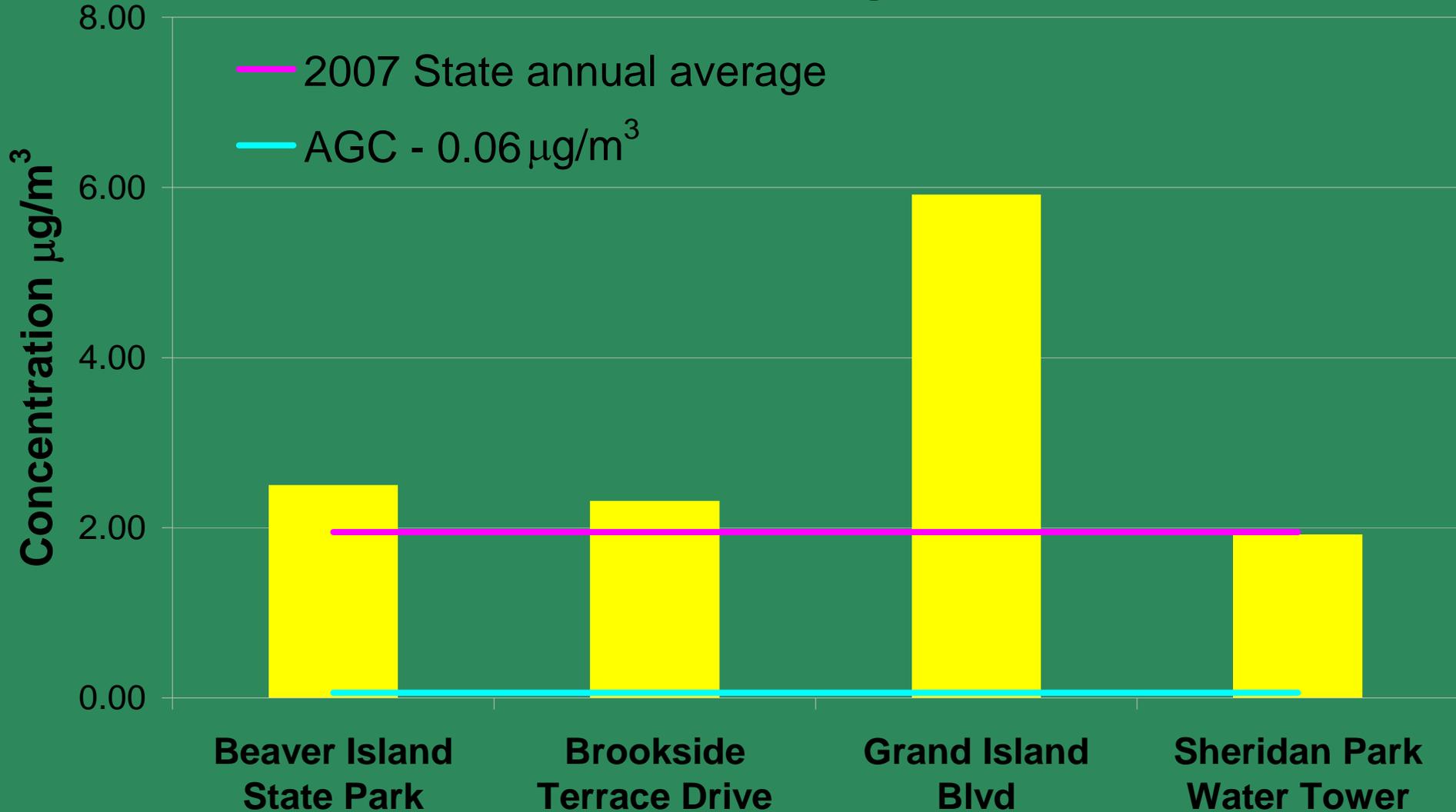
Formaldehyde Sources in Tonawanda

- Point Sources
 - Indeck Yerkes Energy Services
 - NRG Huntley Electric Generating
 - Tonawanda Coke
- Area Sources
 - Industrial Boilers
 - 3M Tonawanda
 - FMC Corp.
 - Goodyear Dunlop Tires
- Mobile Sources
 - Car and truck exhaust

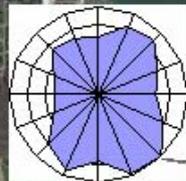


Formaldehyde

12 month average

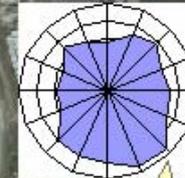
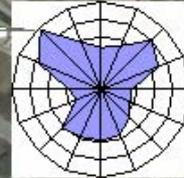


– Formaldehyde Pollution Roses

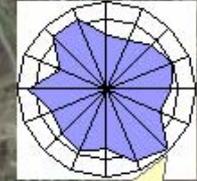


TWA CONC. = 3.2 µg/m³

TWA CONC. = 9.5 µg/m³



TWA CONC. = 2.5 µg/m³



TWA CONC. = 2.9 µg/m³

Acetaldehyde

- Manmade
 - intermediate in the synthesis of other chemicals, perfumes, polyester resins, and basic dyes.
 - solvent in the rubber, tanning, and paper industries
 - product of incomplete combustion
- Natural Sources
 - Wildfires



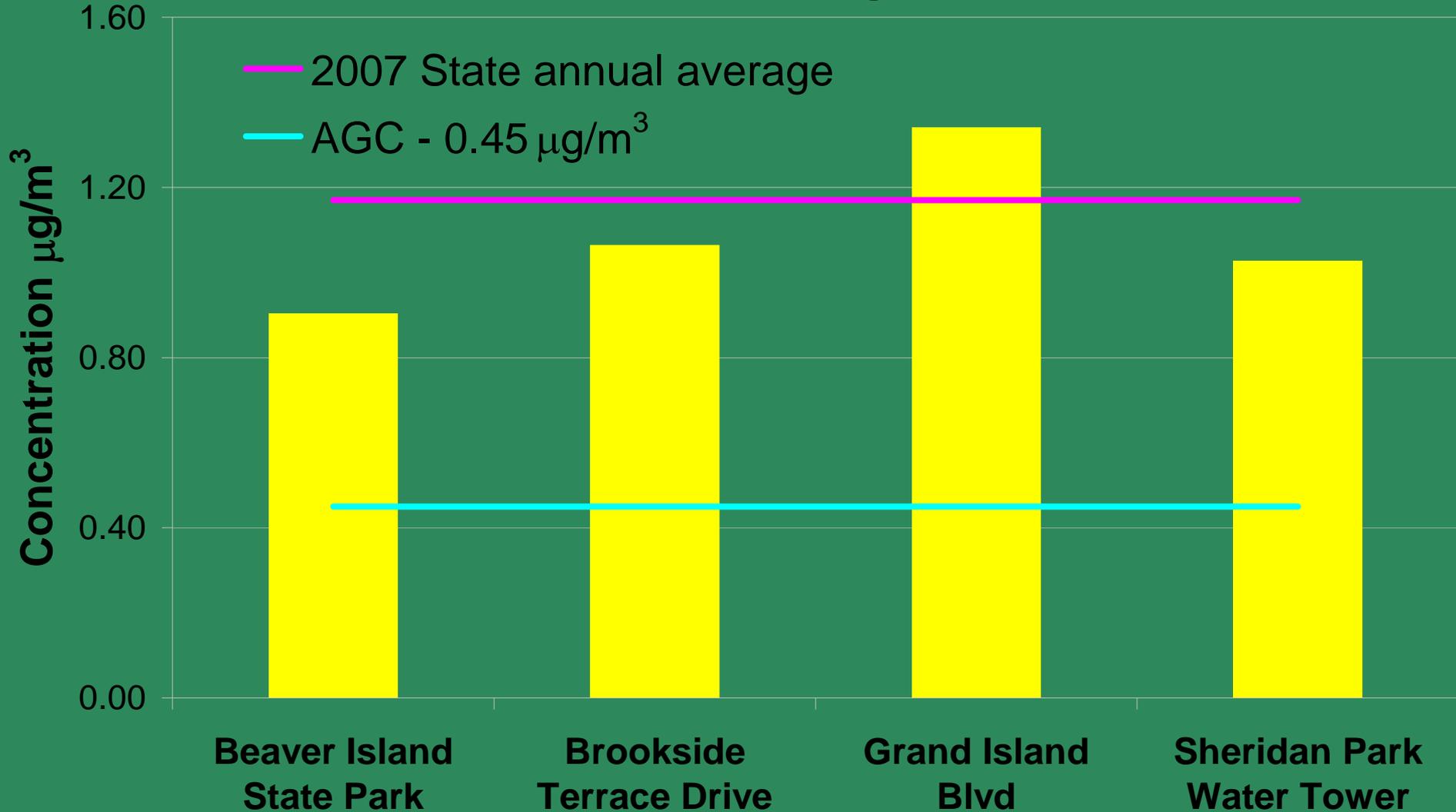
Acetaldehyde Sources in Tonawanda

- Point Sources
 - 3M Tonawanda
 - Goodyear Dunlop
 - Indeck Yerkes Energy Services
- Area Sources
 - Commercial and Industrial Boilers
- Mobile Sources
 - Car and truck exhaust



Acetaldehyde

12 month average



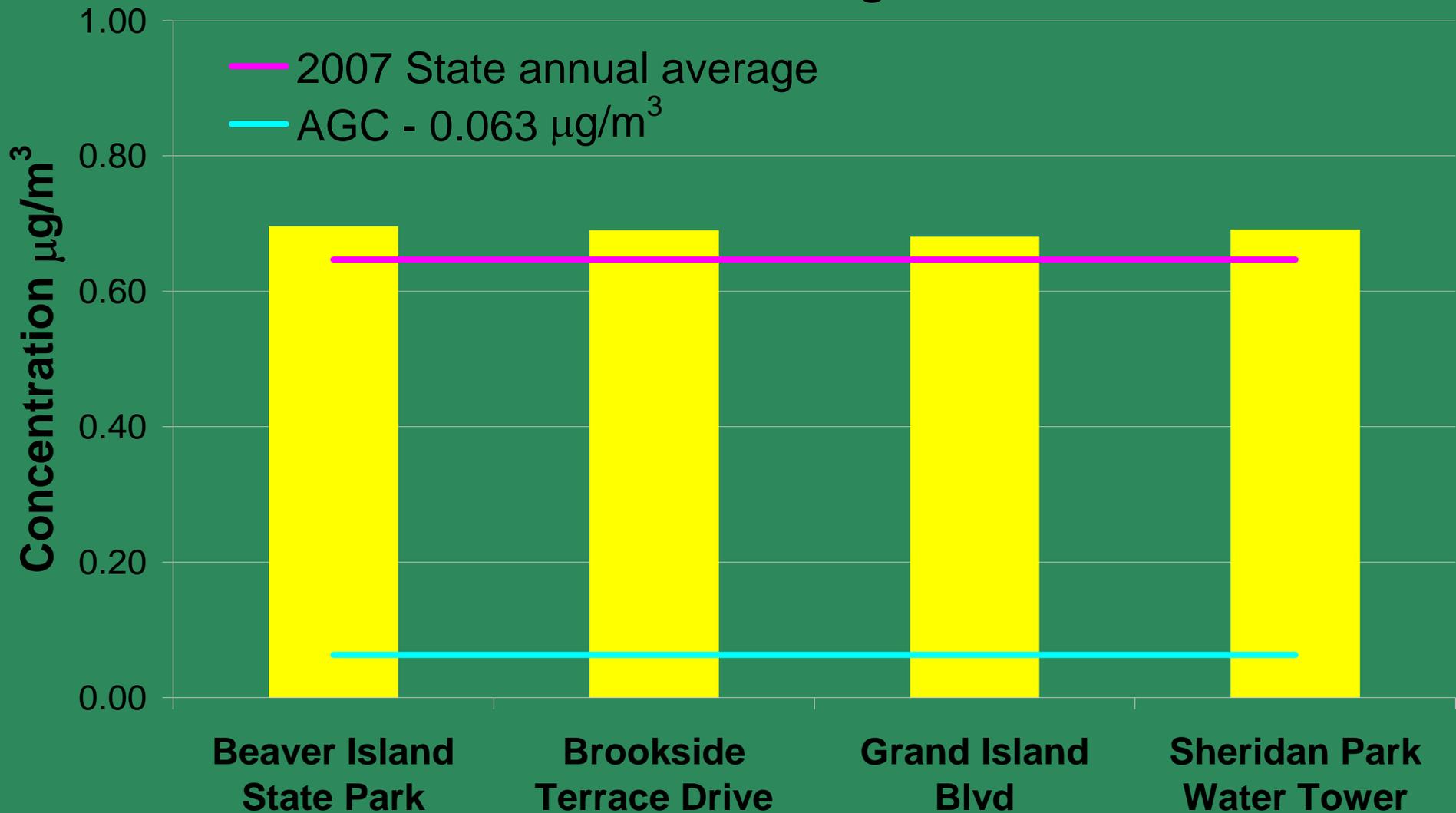
Carbon tetrachloride

- Manmade sources
 - Manufacturing agent for refrigerants and propellants for aerosol cans
 - Solvent for oils, fats, lacquers, varnishes, and resins
 - Grain fumigant
 - Dry cleaning agent
 - Consumer and fumigant uses have been discontinued
 - Production and consumption phased out in U.S in 1999
- Natural Sources
 - No natural sources

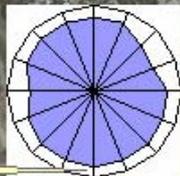


Carbon tetrachloride

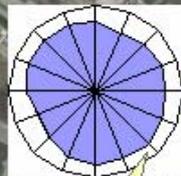
12 month average



– Carbon
Tetrachloride
Pollution Roses

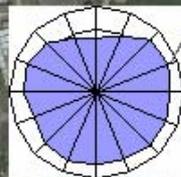


TWA CONC. = 0.7 µg/m3

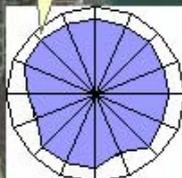


TWA CONC. = 0.7 µg/m3

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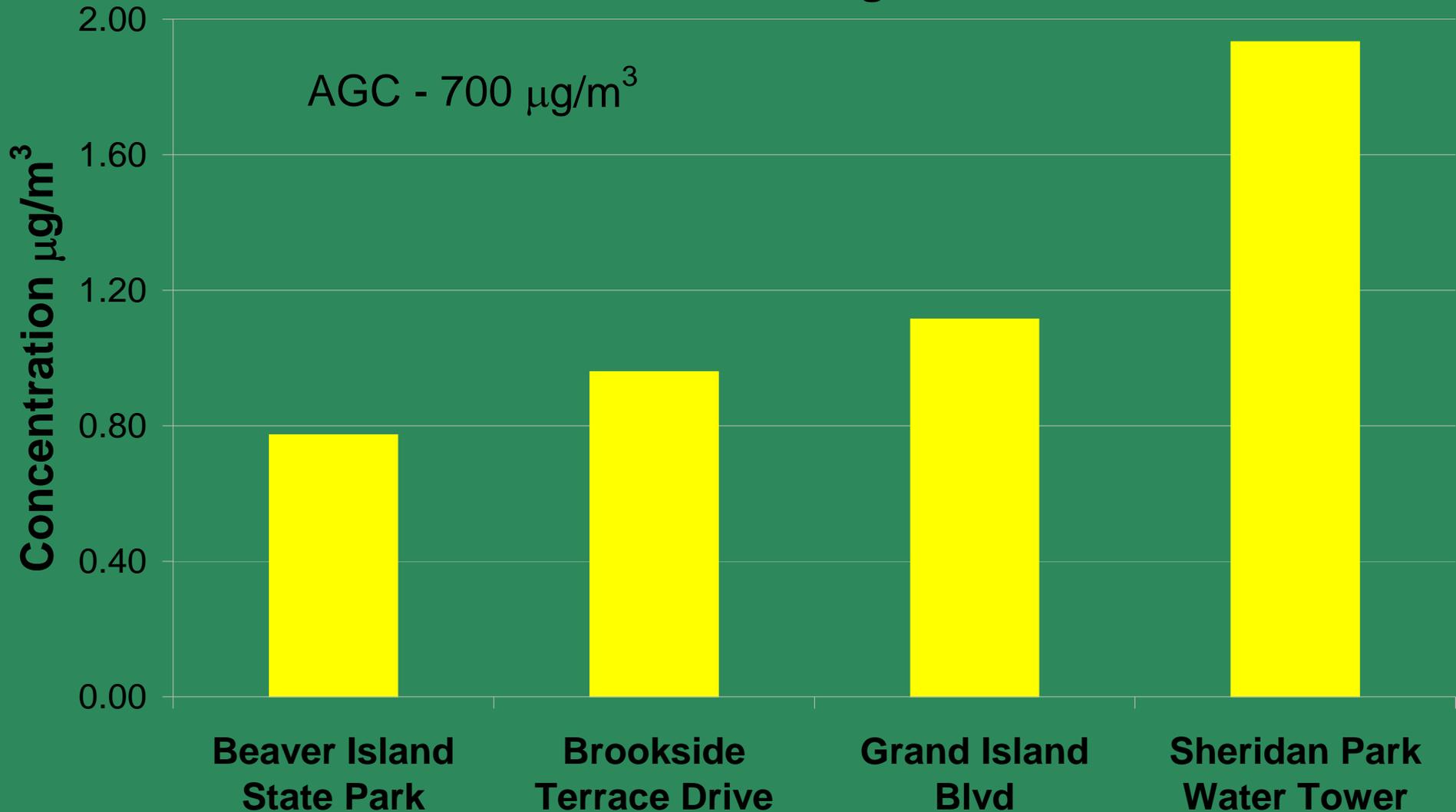


TWA CONC. = 0.7 µg/m3



Carbon disulfide

12 month average



Commitment to the Public

- Keep public informed by holding public meetings to discuss project and results
- Continue to work on air pollution reduction strategies
- Collaborate with the Clean Air Coalition of Western N.Y.



Questions

- About Tonawanda facilities and emissions
Larry Sitzman (716) 851-7130
- About Tonawanda study
Toxics Analysis - Tom Gentile (518) 402-8402
Monitoring - Paul Sierzenga (518) 402-8508
pmsierze@gw.dec.state.ny.us

Final report available at:

www.dec.ny.gov/chemical/55471.html



Risk Assessment Terminology

- What is an Annual Guideline Concentration (AGC)?
- What is non-cancer risk?
- What is cancer risk?



Non-Cancer Risk

The risk associated with health effects other than cancer that have AGCs based on animal or human toxicity studies. The AGC represents a value that is likely to be without appreciable risk of harmful effects during a lifetime.

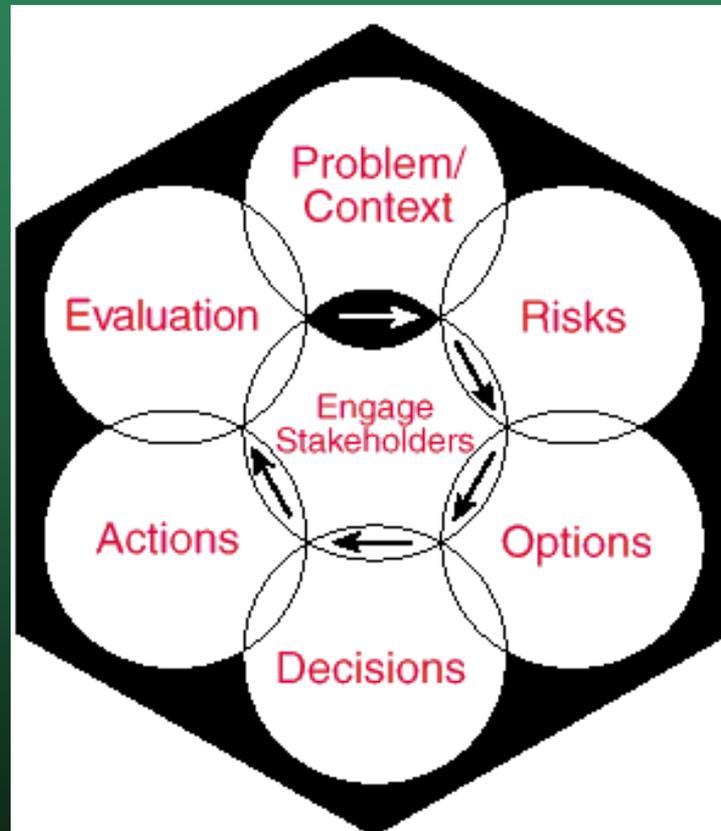


Cancer Risk

One in one million – the AGC represents the likelihood that up to one person, out of one million equally exposed people would contract cancer if exposed continuously (24 hrs/day) to that concentration over a lifetime.

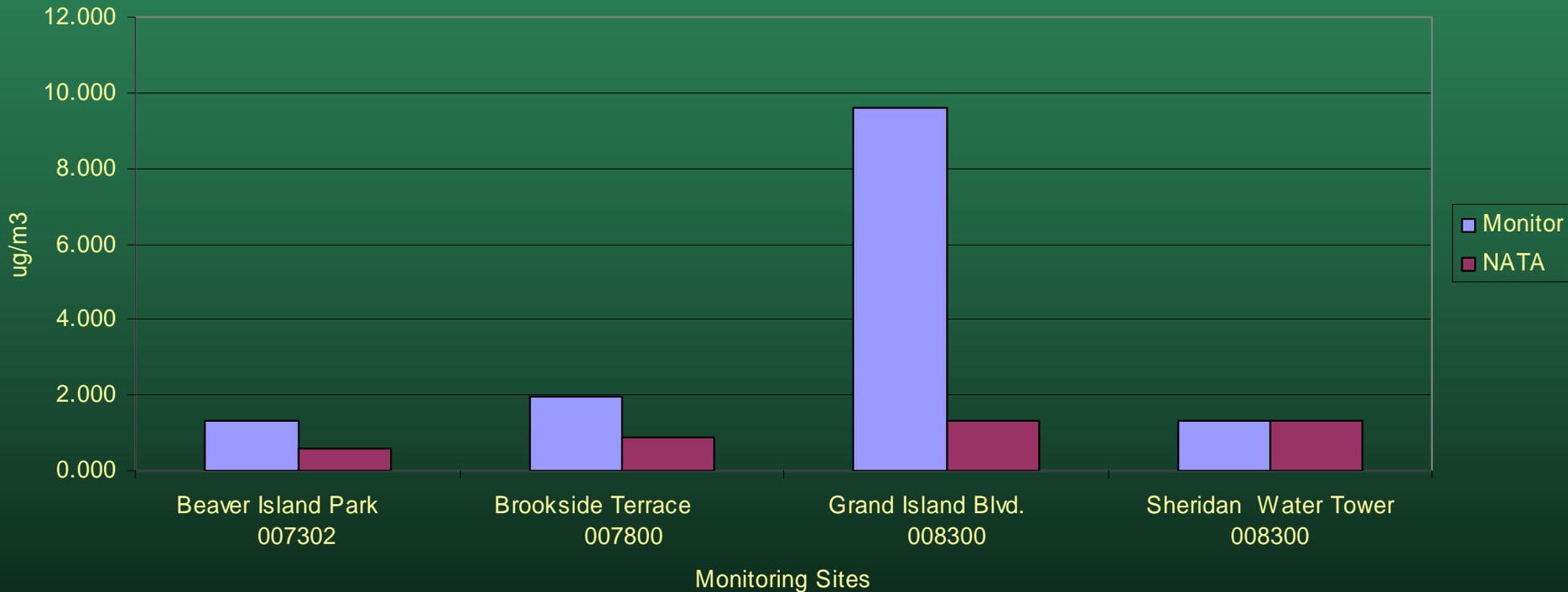


Framework for Risk Management

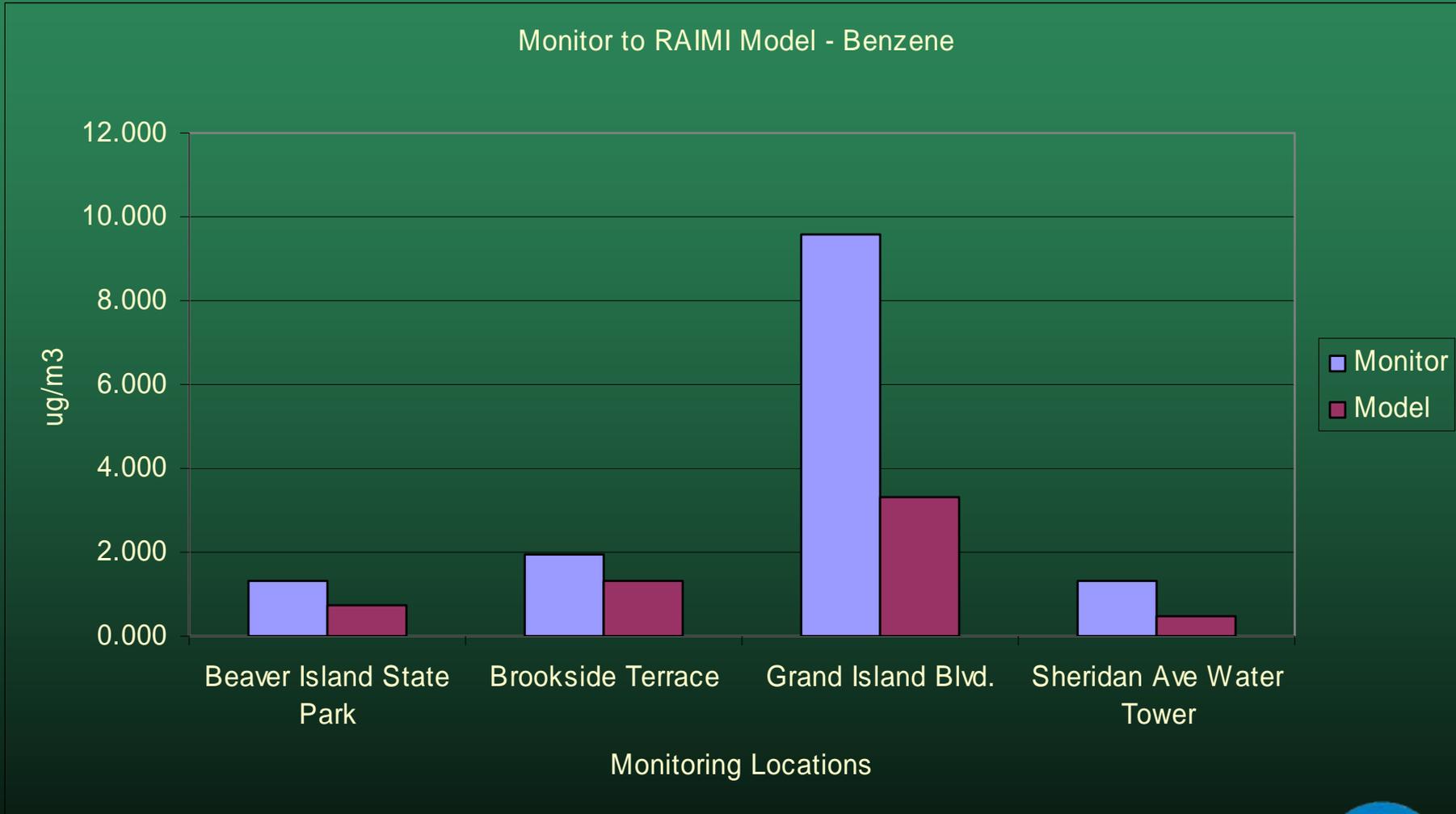


Measured to Modeled NATA

Monitor to NATA 2002 - Benzene

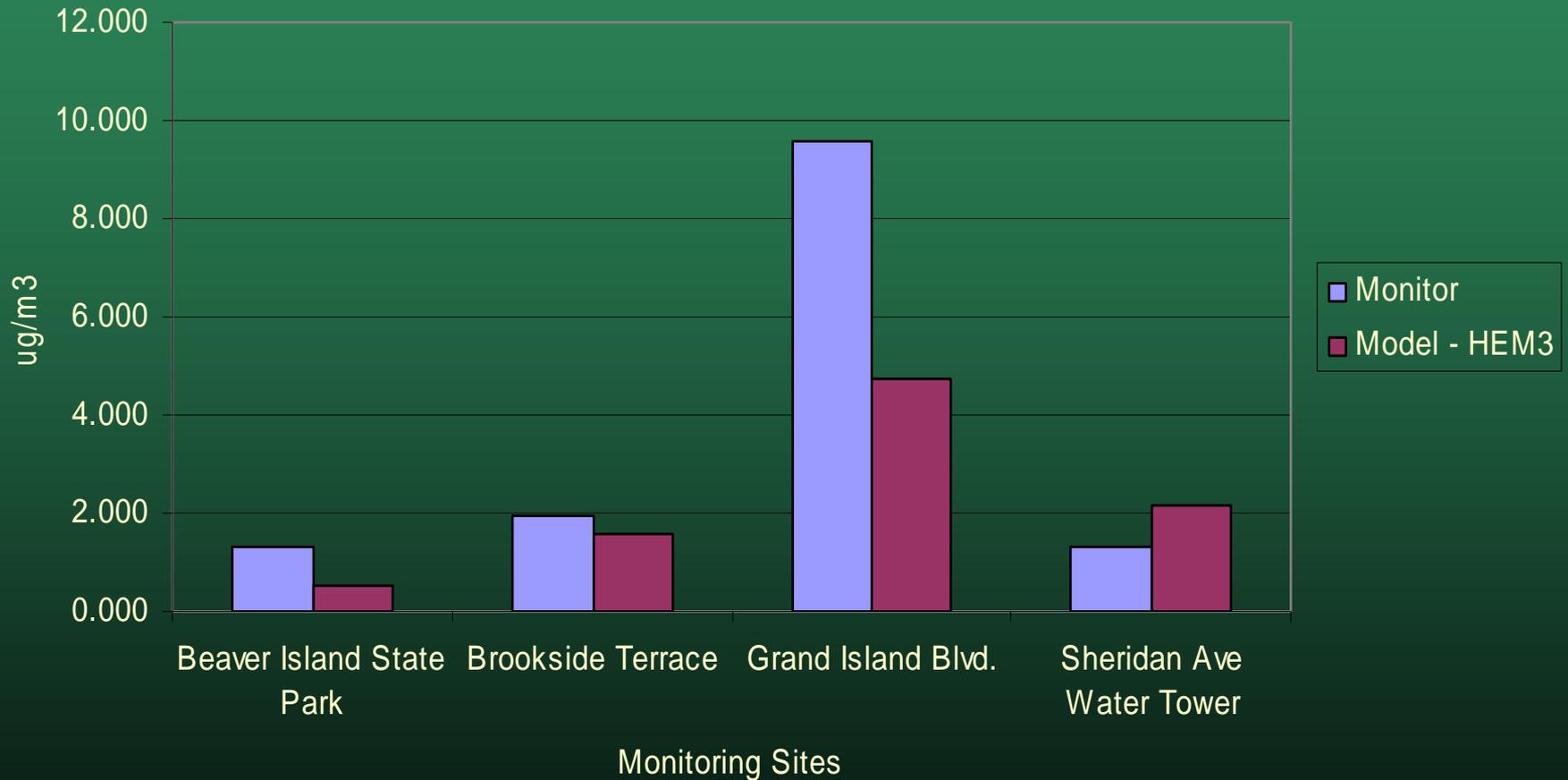


Measured to Modeled - RAIMI



Measured to Modeled – HEM3

Monitor to HEM3 model - Benzene



Measured to Modeled - RAIMI

Monitor to RAIMI Model - Carbon disulfide

