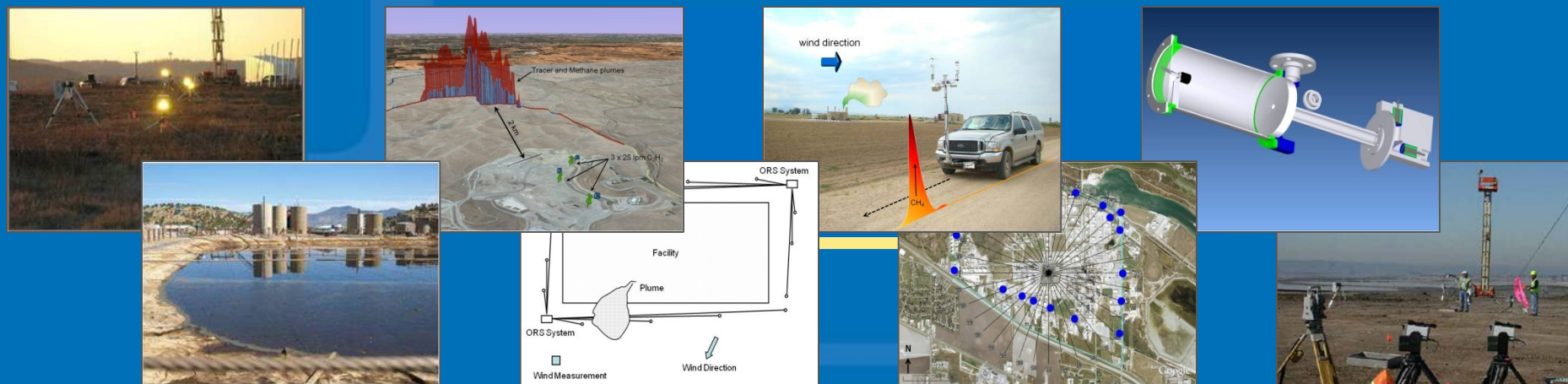


Rubbertown NGEM Demonstration Project Planning meetings, April 18-19, 2017

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Disclaimer: Mention of companies, trade names, or products do not constitute endorsement by U.S. EPA. Information presented does not necessarily reflect the views of U.S. EPA. No policy implications are implied.





Rubbertown NGEM Demonstration Project

Planning Meetings, April 18-19, 2017

Who is this EPA guy?

- A scientist with the research part of EPA (representing a team)
- I research difficult to measure air pollution sources

What is NGEM?

- NGEM stands for Next Generation Emission Measurements
- NGEM can help us understand sources of air pollution

What do you want to do?

- Work together to try new NGEM approaches in Rubbertown
- Learn about new methods and air pollution sources (research)

Air pollution from a stack or a tailpipe *(traditional point and mobile sources)*



Generally, these sources have:

- Definite emission points (easy to measure)
- Predictable emission profiles (easy to model and inventory)

This project is less about these sources

Fugitive emissions, area sources, process upsets

Hard to measure



*Industrial, Agricultural
Landfills, Waste Water,
Oil and Gas*



These source type are hard to understand:

- Where is the emission? Is it even there?
- What causes the emission?.....How to model and inventory?

Consider oil and gas production

> 25,000 active
oil and gas wells

How many have issues?

Denver CO

Oil and Gas Production Well Pad



Example of an oil and gas process upset (rare)
NGEM technique = infrared camera
Everyone wants to find/fix this



An aerial photograph of a large industrial facility, likely a refinery or chemical plant. The image shows a complex network of pipes, storage tanks, and processing units. A white rectangular text box is overlaid in the upper left quadrant.

Facilities - how are we doing?

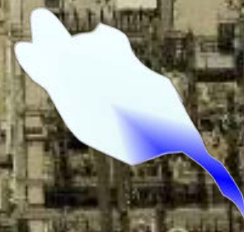
Can we do better?



Ambient monitoring

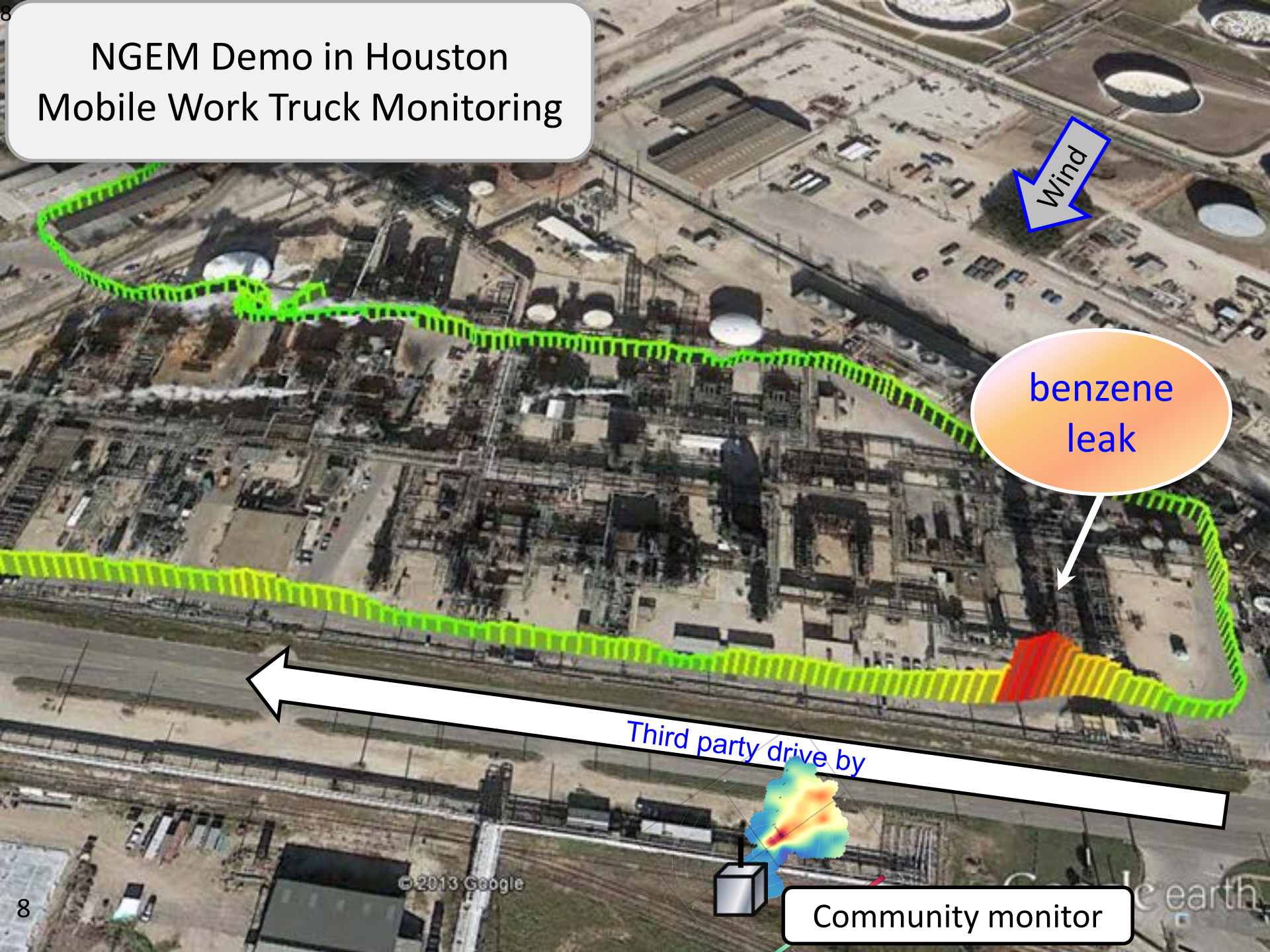


Direct source detection

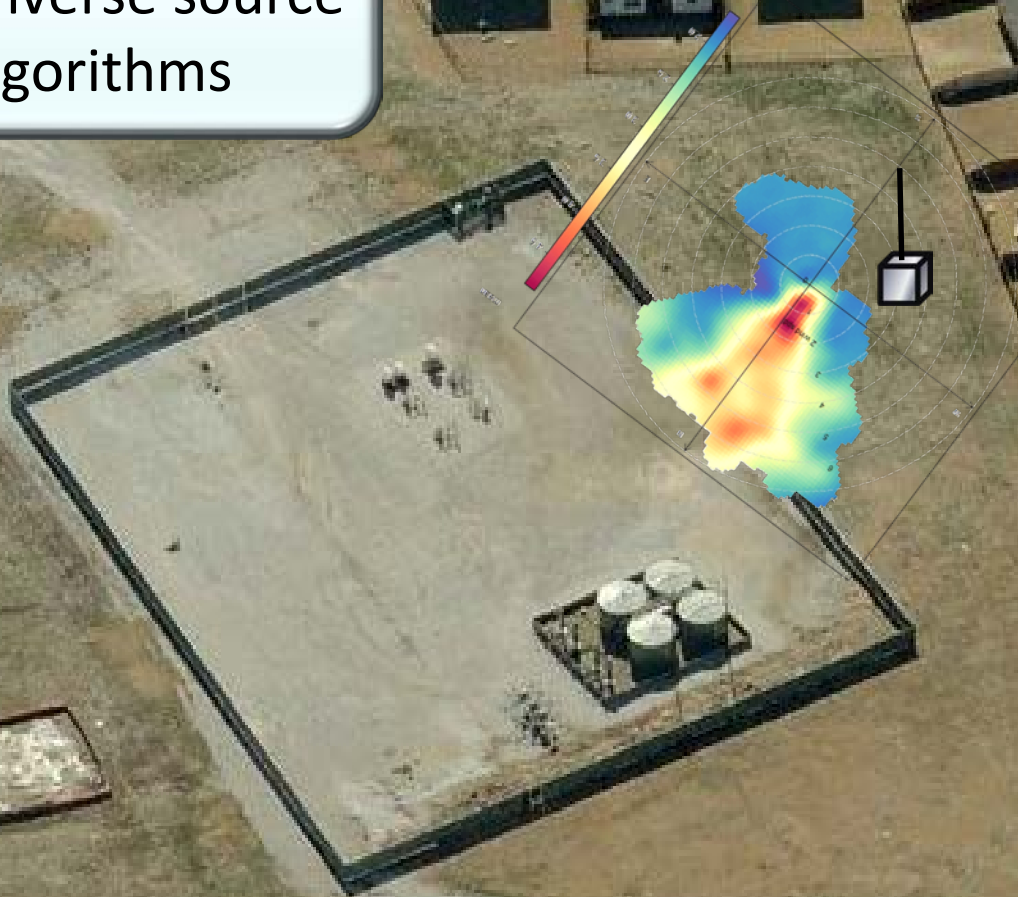


Emission

NGEM Demo in Houston Mobile Work Truck Monitoring

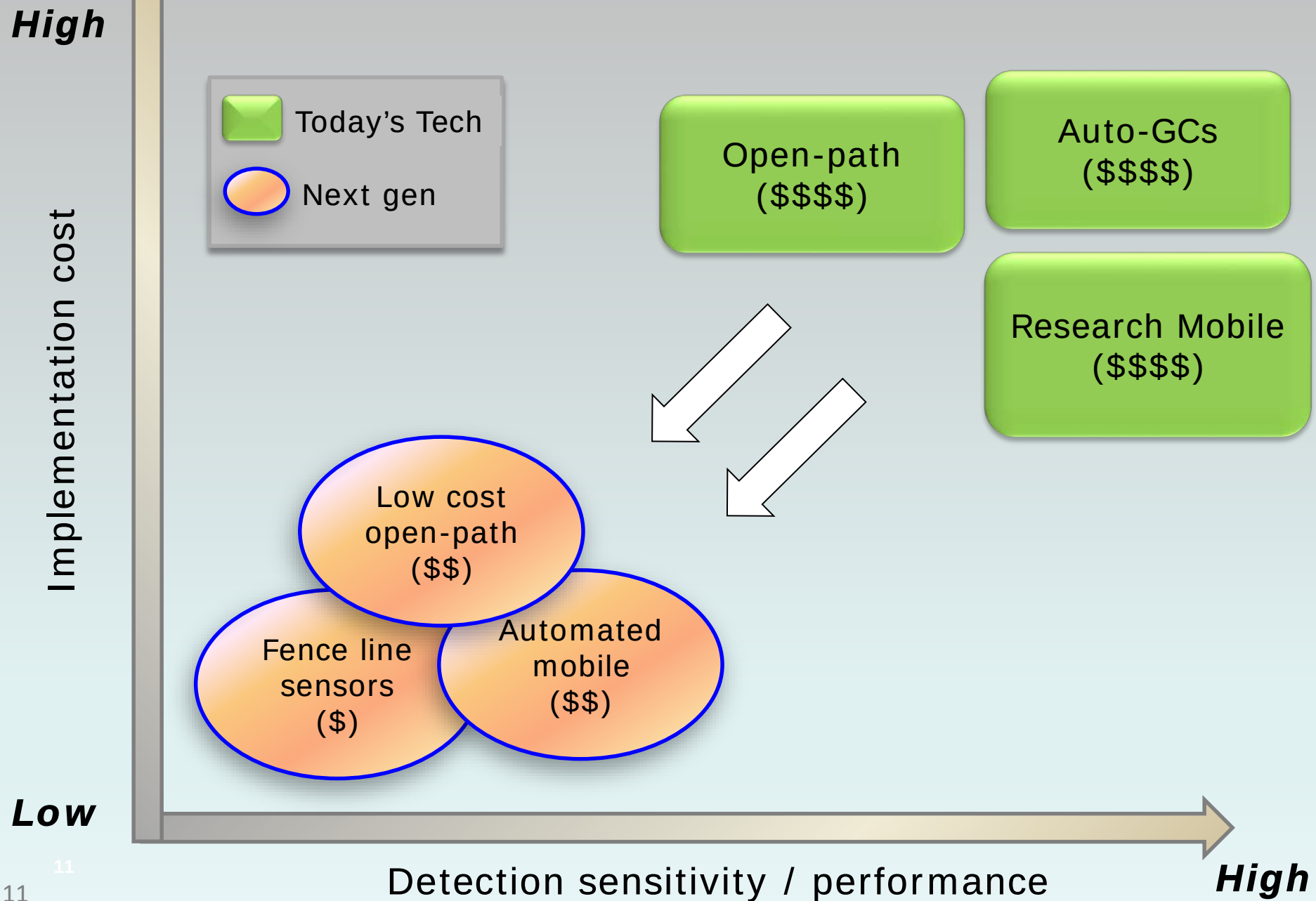


Lower cost sensor
with inverse source
algorithms



- NGEM approaches come in several categories:
 - Time-integrated (long term concentration levels)
 - Time-resolved simple fenceline sensors
 - High performance speciated measures
 - Open-path spectroscopic techniques
 - Mobile survey measurements
- Many NGEM systems are “prototype” and are in development. We don’t know how well they work in all conditions (research needed).

NGEM --- Lower cost is desired





<http://www.goengineer.com/2012/09/13/the-versatility-of-edrawings-for-the-ipad/>

If only we had a tricorder!



Rubbertown NGEM Demonstration Project

Planning Meetings, April 18-19, 2017

Back to the Project Description



Rubbertown NGEM Demonstration Project

Planning Meetings, April 18-19, 2017

Who is part of this effort?

- A team of folks with EPA ORD, EPA Region 4, and LMAPCD
- Rubbertown industries might also participate
- Nearby communities have a vested interest of course

What is the origin of this?

- An internal EPA ORD / R4 research project grant for NGEM Demo

What is the scope of this project?

- A relatively modest scope, partial internal effort
(some budget/resource uncertainty exists)

What is the project focus area?

- NGEM measurements near Rubbertown facilities
- Select gas-phase air pollutants

Is this a community health or exposure study?

- No, this is a NGEM technology demonstration project that may inform some aspects of emissions from Rubbertown facilities

Is this an enforcement or compliance activity?

- No, this is a voluntary research effort
- We will provide information to facilities, communities, and publish

What do you hope to accomplish?

- Work together to try new NGEM approaches in Rubbertown
- Learn about new methods and air pollution sources (research)
- Advance NGEM science
- Understand some issues, document improvements (as possible)

When is this project going to happen?

- Target field work Aug. 2017- Sept. 2018 (pending resources)
- Full data reduction and publishing through 2019

Why do NGEM Research (benefits)?

- Create safer working environments
- Reduce product loss
- Develop more efficient work practices
- Reduce local and regional air shed impacts
- Improve transparency and community relations
- Prepare for the future management strategies



Rubbertown NGEM Demonstration Project

Planning Meetings, April 18-19, 2017

Quality assurance project plan (QAPP) will describe the effort

These meetings help determine the optimal approach

Best use of technologies with available resources



Rubbertown NGEM Demonstration Project
G-APPCD-0021097-EP-2-0, Revision 0
March 30, 2017
Page 1 of 69

NRMRL QUALITY ASSURANCE PROJECT PLAN

Office of Research and Development (ORD)
National Risk Management Research Laboratory (NRMRL)
Air Pollution Prevention and Control Division (APPCD)
Emissions Characterization and Prevention Branch (ECPB)

Rubbertown Next Generation Emission Measurement Demonstration Project

QA Category: B / Measurement

Extramural Research

G-APPCD-0021097-EP-2-0

Revision Number: 0

March 30, 2017

Prepared by
ORD/NRMRL/APPCD/ECPB
Research Triangle Park, NC 27709



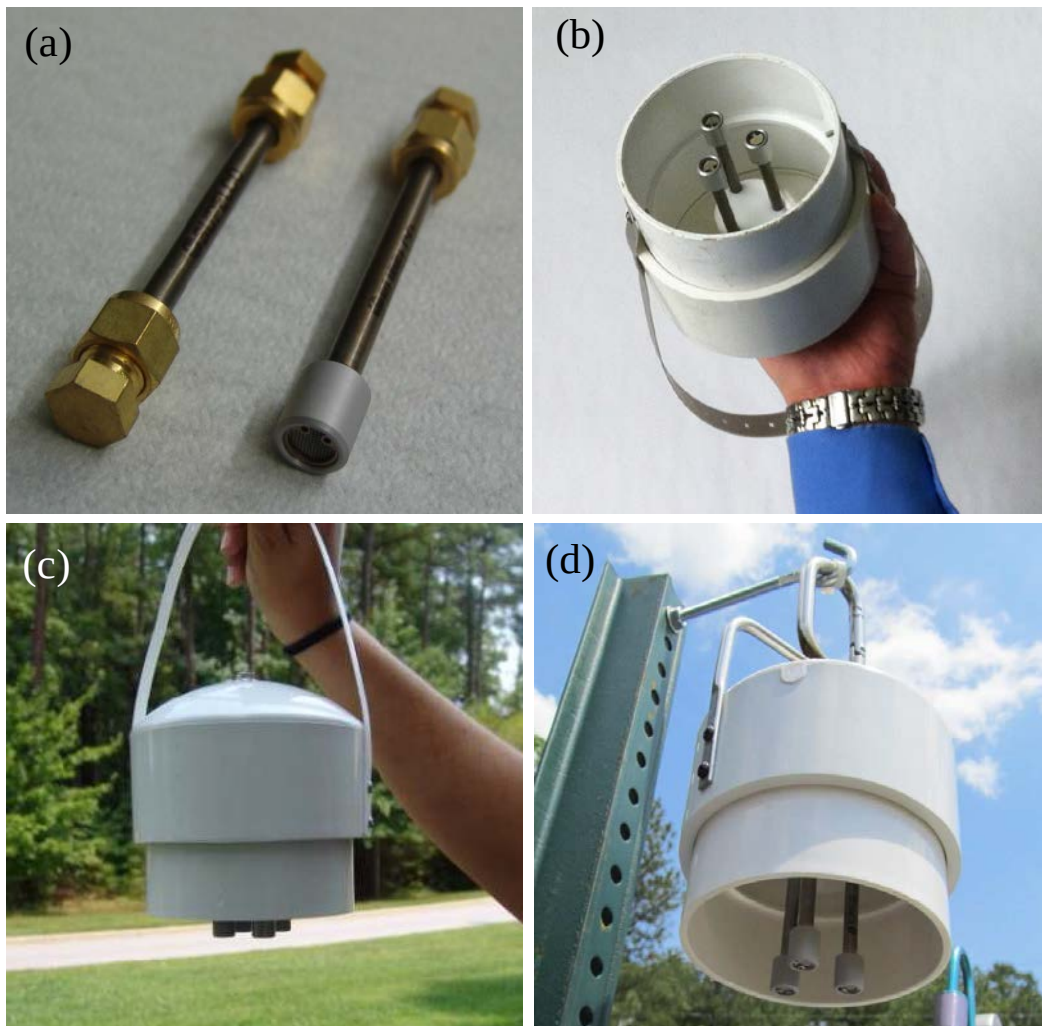
Rubbertown NGEM Demonstration Project

Planning Meetings, April 18-19, 2017

Back-up slides (if time allows)

*More information on potential NGEM
Approaches for project*

Passive Samplers *up to 15 locations*



Compound	Estimated MDL (pptv)
Benzene	21
1,2-Dichloro-1,1,2,2-tetrafluoroethane	18
Trichlorofluoromethane	40
1,1-Dichloroethene	18
1,1,2-Trichloro-1,2,2-trifluoroethane	18
1,1-Dichloroethane	27
cis-1,2-Dichloroethene	61
1,2-Dichloroethane	22
1,1,1-Trichloroethane	18
Carbon Tetrachloride	122
1,2-Dichloropropane	22
Trichloroethene	36
Toluene	18
Tetrachloroethene	18
Chlorobenzene	18
Ethylbenzene	18
m,p-Xylene	36
Styrene	20
o-Xylene	18
4-Ethyltoluene	18
1,3,5-Trimethylbenzene	18
m-Dichlorobenzene	18
o-Dichlorobenzene	18
p-Dichlorobenzene	21
1,3-Butadiene	38
Hexane	N/A*

Deployment Area in South Philly

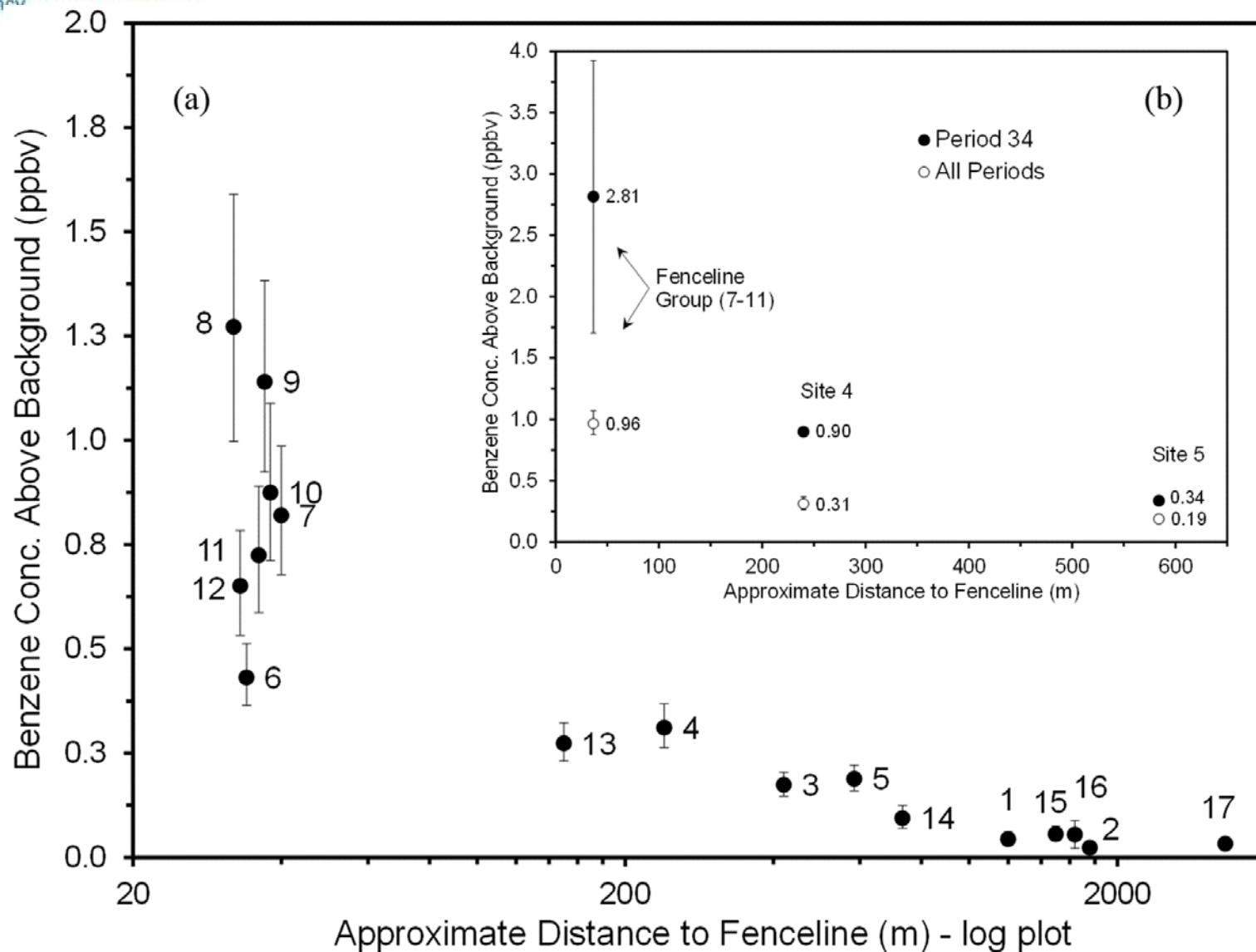
Passive
Samplers



7.2 km

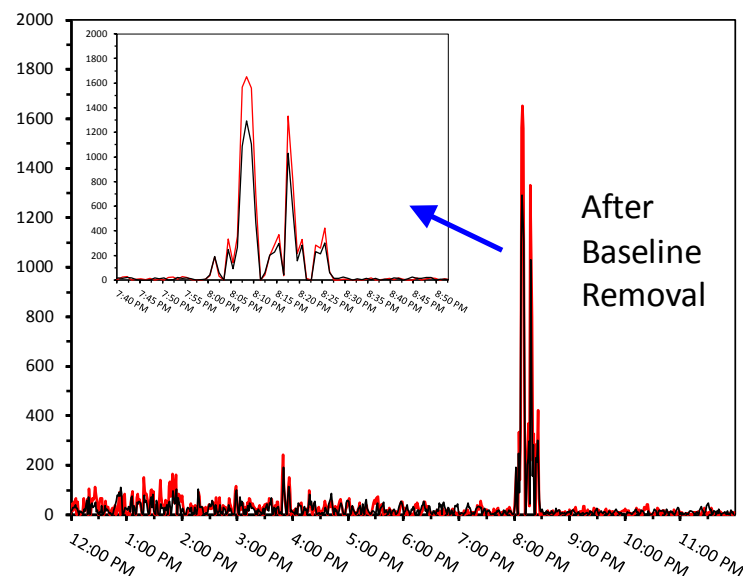
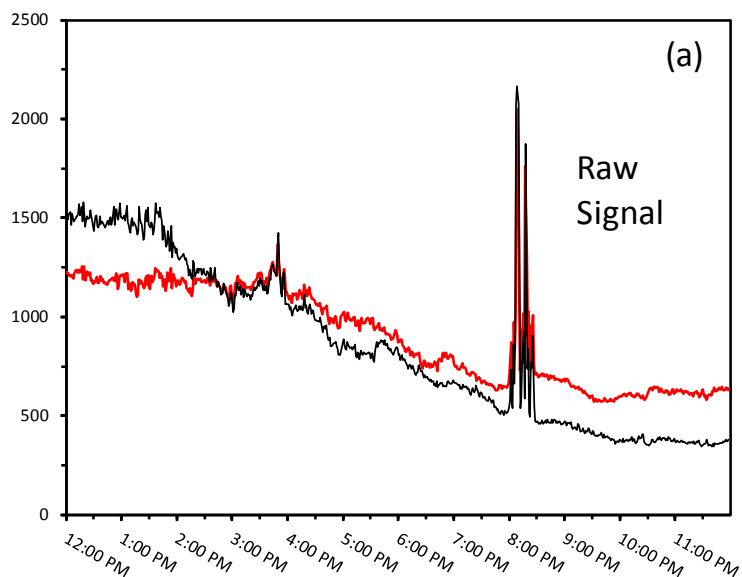
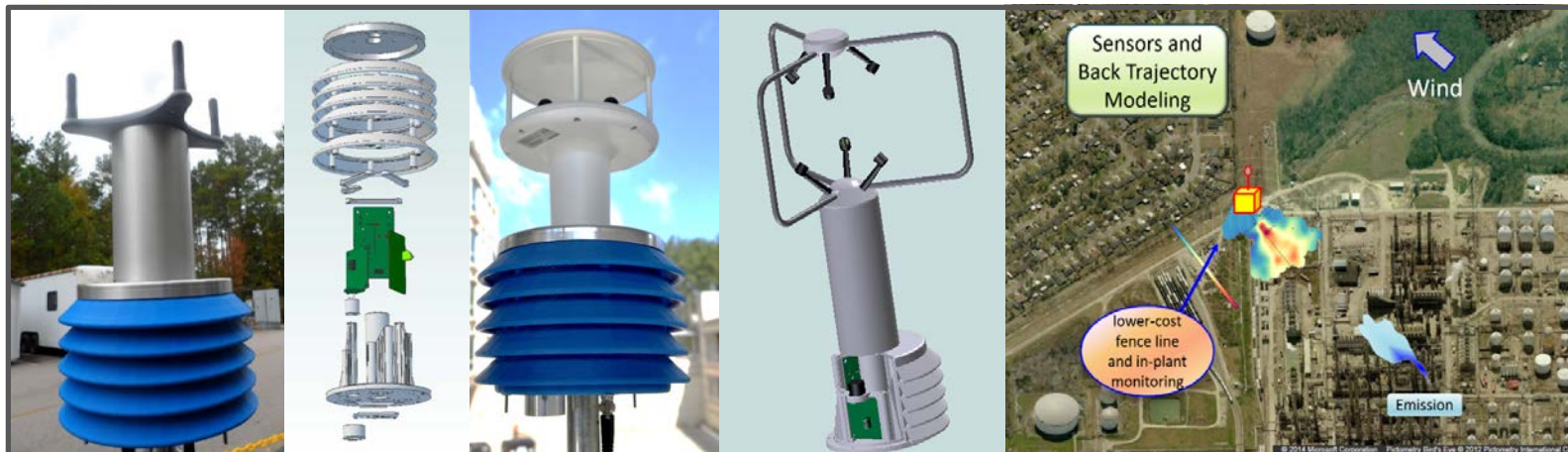
Benzene Concentration Gradients

South Philly passive sampler project

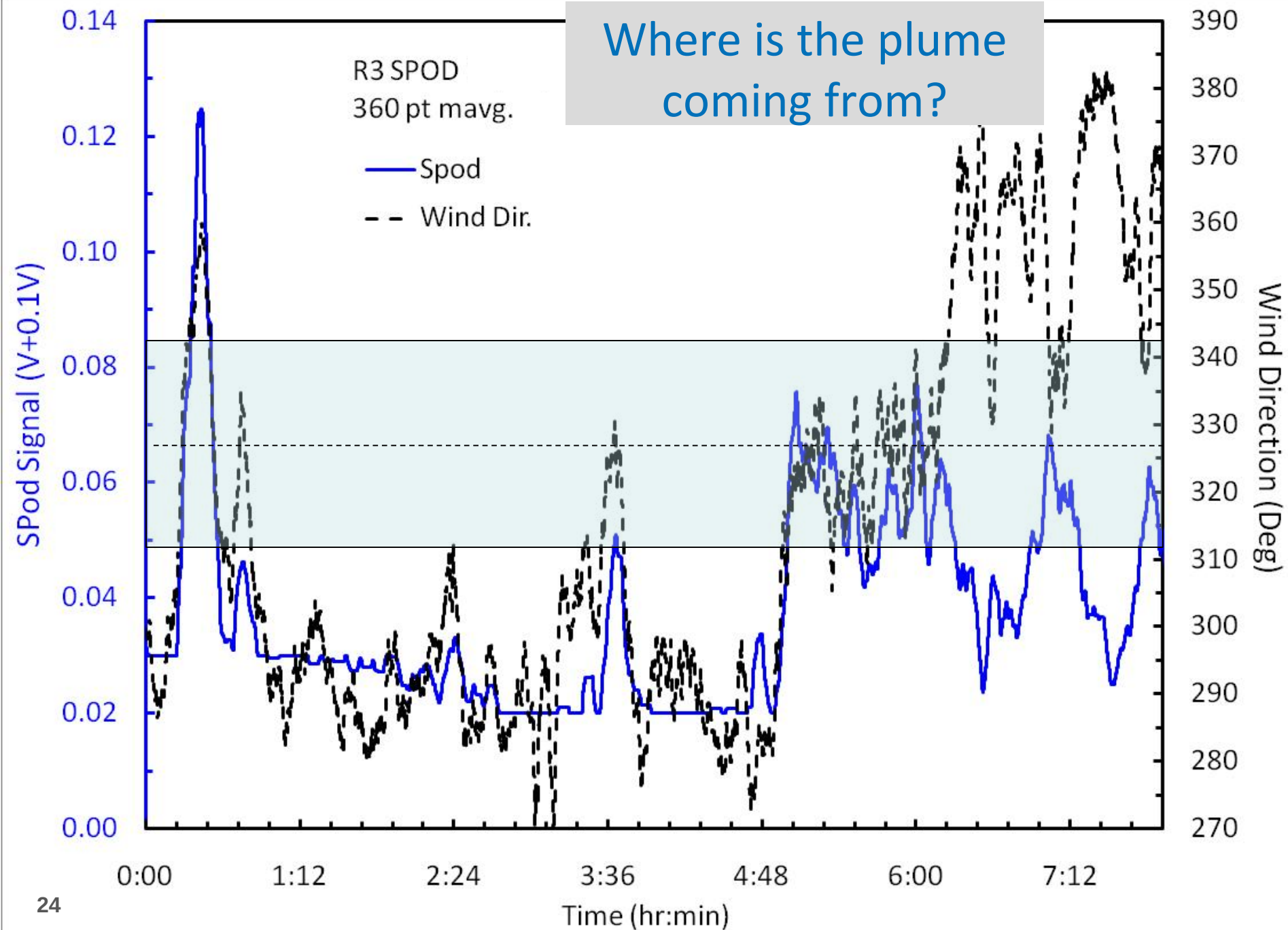


SPOD Fenceline Sensor

detects-locates emission plumes



Where is the plume
coming from?



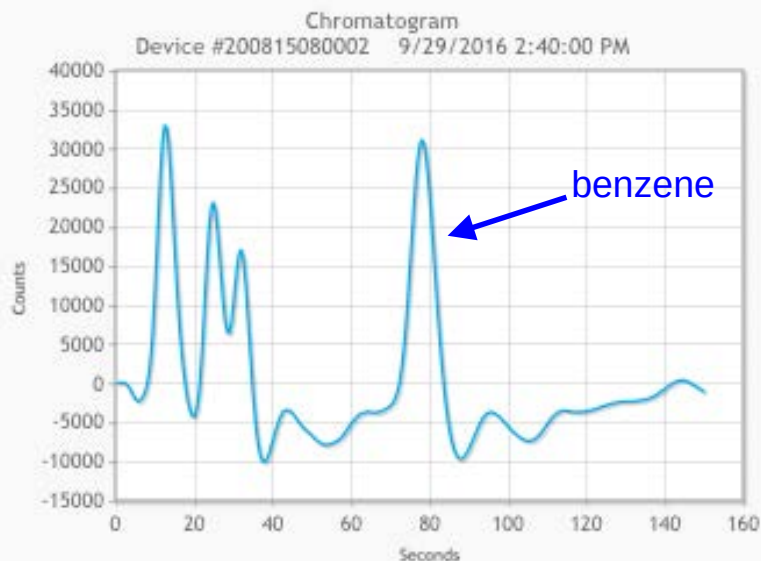
SPod basic back trajectory example



Fenceline GCs

Between PAMs GC and SPod

Prototype Lab Tests at EPA



Peak found at: 130 Height: 50
Peak found at: 156 Height: 40770
Peak found at: 192 Height: 3670
Peak found at: 230 Height: 118
Peak found at: 289 benzene found at 156 with height: 40770



EnMet eGC (environmental GC)

- Designed for autonomous operation
- Operates outdoors from -10° C to +45° C
- Data transmitted via cellular to web-server
- Measures sub-ppb levels of benzene
- 1,3 Butadiene can be determined
- On-board vapor calibrator

Mobile Measurements

Going from research to real world....



Research gear

Research vehicle

Work truck version

Get rid of mast and
\$\$\$ instruments

Put a VOC sensor
under the bumper

driving path

CH_4

*EPA mobile method
OTM 33A*