

Village Green in Philadelphia

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Towson, MD

ABSTRACT

The US EPA's Village Green Project (VGP) is an example of using innovative technology to enable community-level, real time air pollution measurements using low cost sensor technologies. The VGP stations are air monitoring systems configured as park benches and are intended for research and educational purposes. Through partnerships with states, cities, and other organizations, these air monitoring systems are being installed across the country for use by the public.

This presentation will provide information and data on the VGP set up in Philadelphia, PA. It will go over the purpose of the project, challenges and hiccups with equipment, data gathering/handling, web traffic, and general experience so far.

2015: Village Green II Project

State/Local Partnerships – One Year Pilot

- Funding from Next Generation Compliance
- State/local solicitation
 - 22 Proposals submitted
 - Five selected
- Selected Sites
 - Washington, DC – installed in February 2015
 - **Philadelphia, PA – installed in March 2015**
 - Kansas City, KS – installed in March 2015
 - Oklahoma City, OK – installed in Fall 2015
 - Hartford, CT – to be installed in Fall 2015

2015: Pilot Expansion of the Village Green Project

Station at Independence Mall National Park, Philadelphia, PA



Partners: City of Philadelphia, National Park Service

Timeline

- ▶ **September 2014** – Philadelphia Air Management Services awarded grant
- ▶ **October 2014** – Chose monitoring location/partner
- ▶ **November 2014** – Conference Calls with EPA
- ▶ **December 2014** – Meetings with Partner: National Parks Service (NPS)
- ▶ **January 2015** – EPA visits site location
- ▶ **February 2015** – Philadelphia AMS Staff become familiar with equipment manuals, Permit is in place
- ▶ **March 5, 2015** – EPA contractors install the Village Green equipment



- ▶ **March 2015** – Training by webinar/person
Philadelphia Village Green up and running!

Inside the bench



Power module:

Power inputs from solar and/or wind
Rechargeable battery

Instrumentation module

PM2.5 and ozone instruments
Microprocessor
Cellular modem
Internal temperature sensor
Heater (new stations)

SNAPSHOT OF AIR NOW WEBSITE

Village Green Project x

www.airnow.gov/index.cfm?action=airnow.villagegreen

Apps Facebook DIY Stepper Co... iOS Dev Center ... About the John ... iPhone Develop... Manic Rider - Fr... iPhone SDK Arti... Apple Yahoo! Google Maps YouTube Wikipedia News Popular ULTIMATE GUIT...

Select a City ▼ Philadelphia, PA Menu

Village Green Project


Most Recent Observations
Philadelphia, PA

22	Ozone ppb	81.3 °F
17	PM _{2.5} µg/m ³	78.6% humidity
		0.2 mph NE


observed Tue 9:14 AM EDT

Explore Philadelphia, PA >


Welcome to the Village Green Project
a research effort to discover new ways of measuring air quality and weather conditions in community environments.



Measuring and communicating on-the-spot air quality and weather conditions for research and awareness

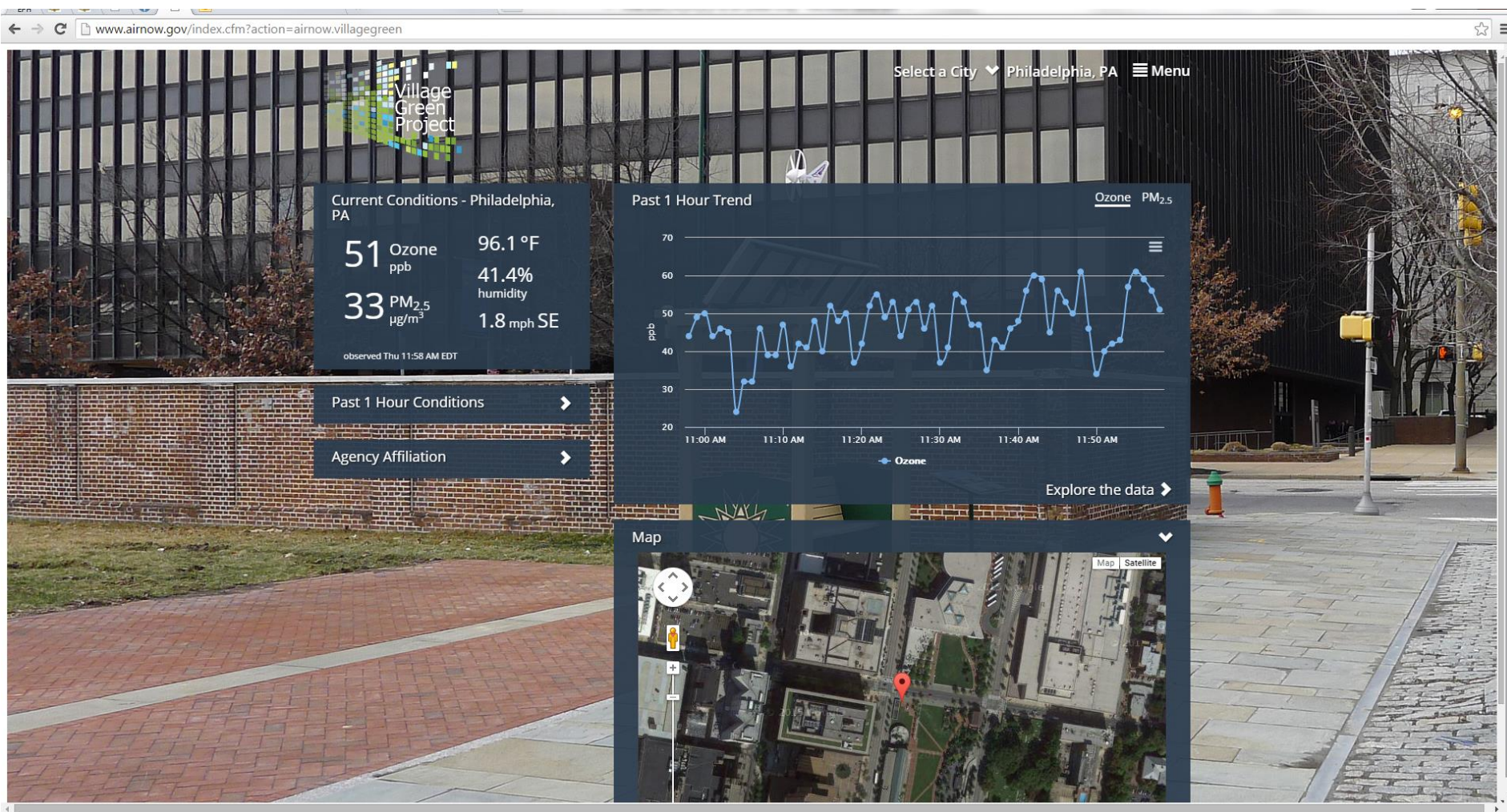


Developing small and rugged data collection systems that can be powered by the wind and sun

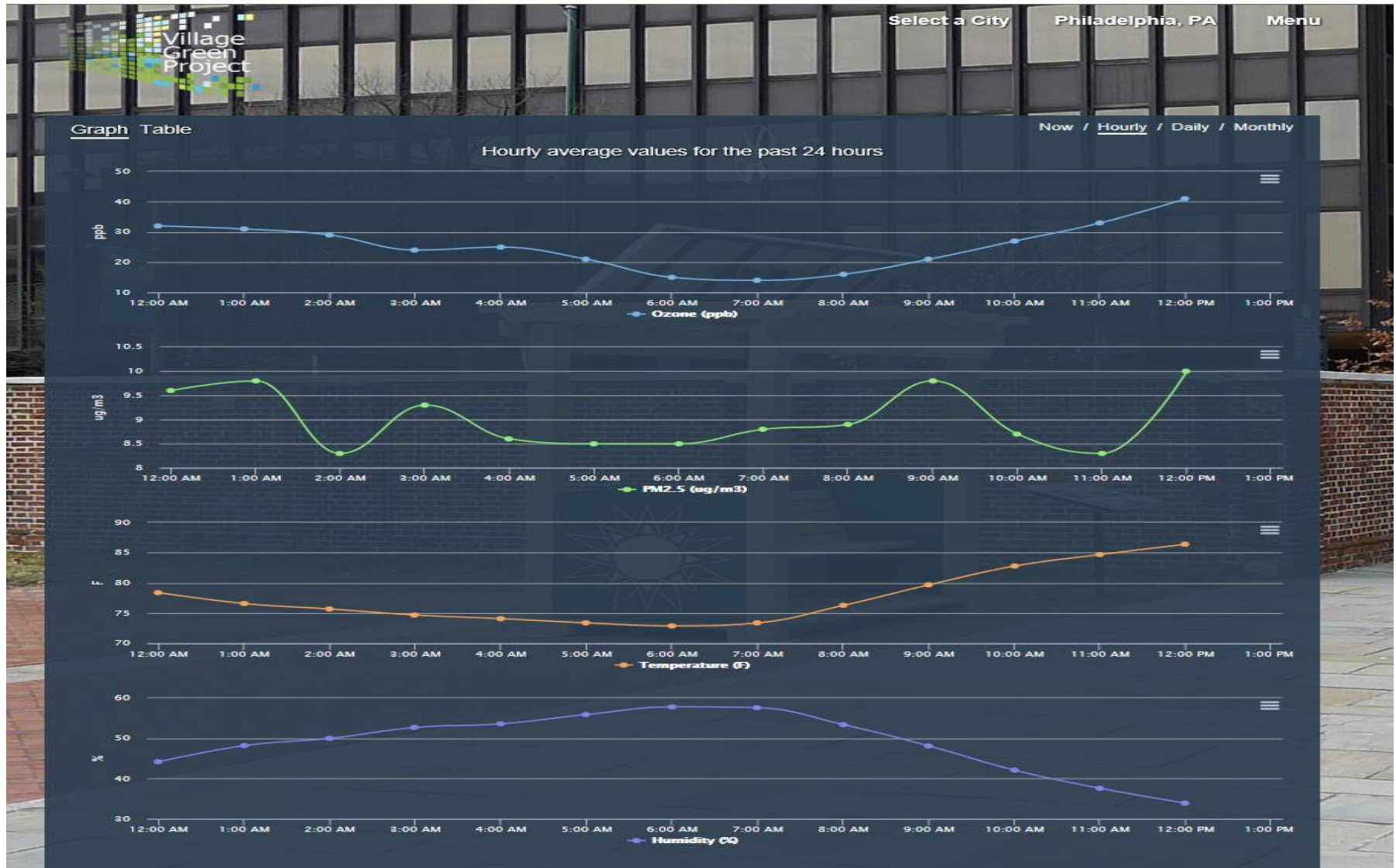


Partnering with communities to pilot test the new technology in outdoor community spaces.

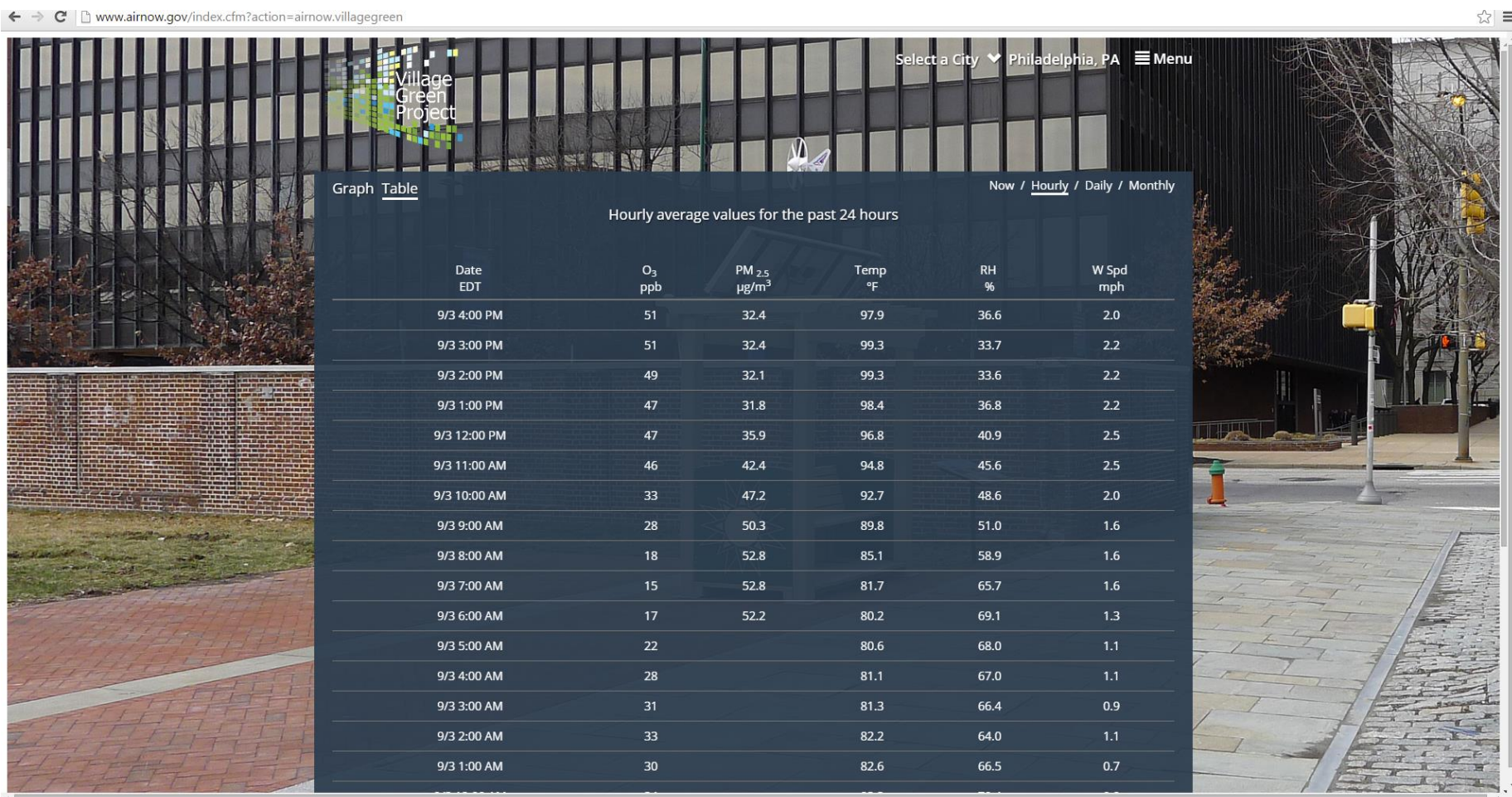
SNAPSHOT OF AIR NOW WEBSITE



SNAPSHOT: Now/Hourly/Daily/Monthly Data



SNAPSHOT: Hourly Average Values (24 hrs)



Timeline

► April 21, 2015 – Ribbon Cutting Ceremony



Operation since April 2015

► Maintaining the station – Keeping a daily log

DATE	COMMENTS
1-Jun	Checked online, both pages looked fine. All parameters are up with once in a while (about every 10- 15 minutes), O3 cell P, diode
2-Jun	Checked online, both pages looked fine. All parameters are up with once in a while (about every 10- 15 minutes), O3 cell P, diode
3-Jun	Checked both pages; they look fine. All parameters are up. Battery appears little bit low in voltage, perhaps due to weather; it's be
4-Jun	Checked both pages; they look fine. All parameters are up.
5-Jun	Checked both pages; they look fine. All parameters are up.
6-Jun	Checked data pages and no missing hours occurred; hourly data appear fine.
7-Jun	Checked data pages and no missing hours occurred; hourly data appear fine.
8-Jun	Checked the data page for 6/8 (Monday), the hourly data for O3 appear fine, while the hourly 8-hr O3 seem having insufficient data for the past 5 hrs (1 AM - 5 AM), will have to check data from GH to confirm.
9-Jun	Checked Village Green websites and both webs appear fine except on the datapage (http://vgapi.sonomatechdata.com/datafilter.aspx), components of O3 such as O3_CellP, O3_Diode, O3_Flow and O3_Temp have
10-Jun	Checked online, both pages appeared fine. All parameters are up. The O3 components that were blank in every 2-3 minutes the day before, have been back up since Tuesday (6/9) evening hours. Will verify if the cal check was done yesterday.
11-Jun	Checked both pages; they look fine. All parameters are up. O3 had some downtime (~ 3 hrs) due to cal check. As of 3:07 pm, O3
12-Jun	Checked the data page for Friday, the hourly PM2.5 looks good, no insufficient hourly data or missing data, but there were insufficient hourly data for hourly O3 from 10 AM - 9 PM. Will need to check the minute data when it's available.

► July 31, 2015, November 15, 2015 – Quarterly Reports Provided to EPA

- Data Completeness
- Quality Checks
- Corrective Action/Comments

Experiences with Equipment

► Maintaining the station

► General maintenance:

- 15 hrs/qtr were spent conducting quarterly quality checks
- Observations: Setting ozone flow rate to 1300 ccm helped keep it within the automatic quality check range
- Aimed to avoid air quality action days for any onsite maintenance that would interrupt data collection.
- AMS purchased back-up air instruments with grant funding to minimize downtime.
- NPS grounds crew notifies Philadelphia AMS if there is any lawn maintenance at the station.
- Screen/metal was installed to control rodents

► Troubleshooting

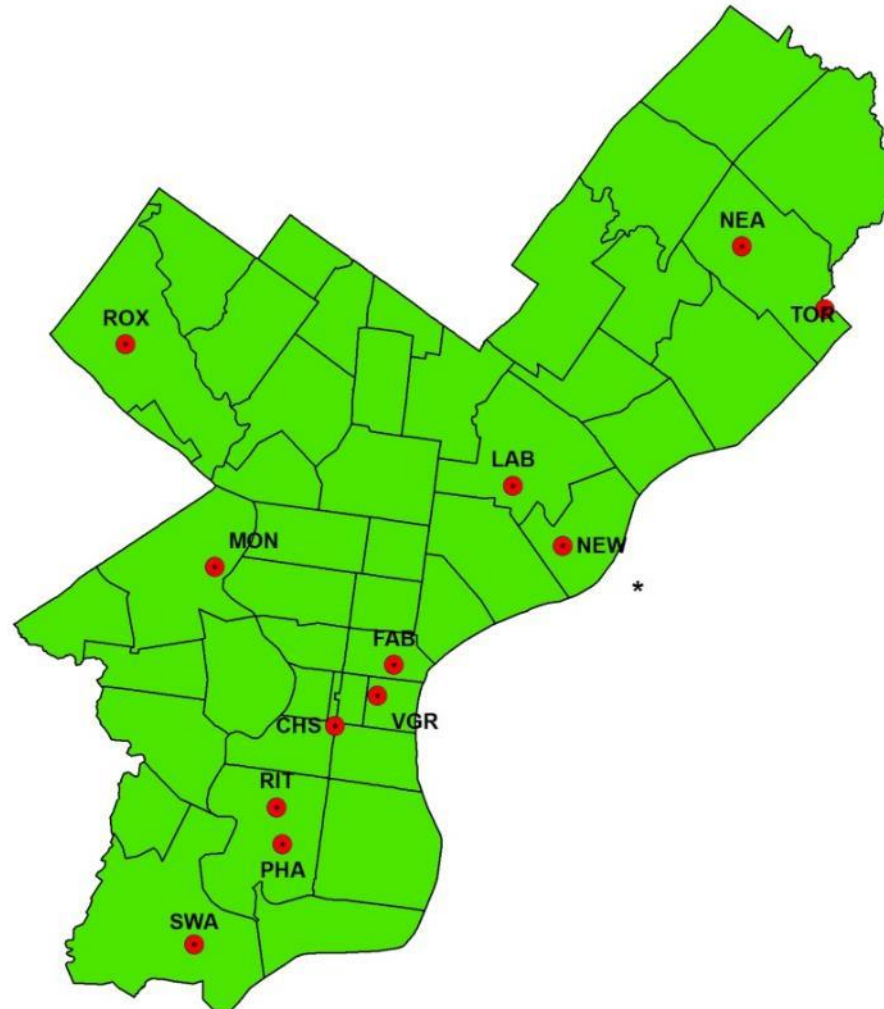
- Remote restarts allowed us to correct some minor issues – interruption in PM_{2.5} data reporting, clock drift. EPA and Philadelphia AMS both have remote-connect capability.
- EPA contractor replaced wind sensor data interface (RS232 converter).

► System performance

- 96% and greater completeness for April 1 through Sept. 1, 2015.

Philadelphia Air Monitoring Network

2015 PHILADELPHIA AIR MONITORING NETWORK

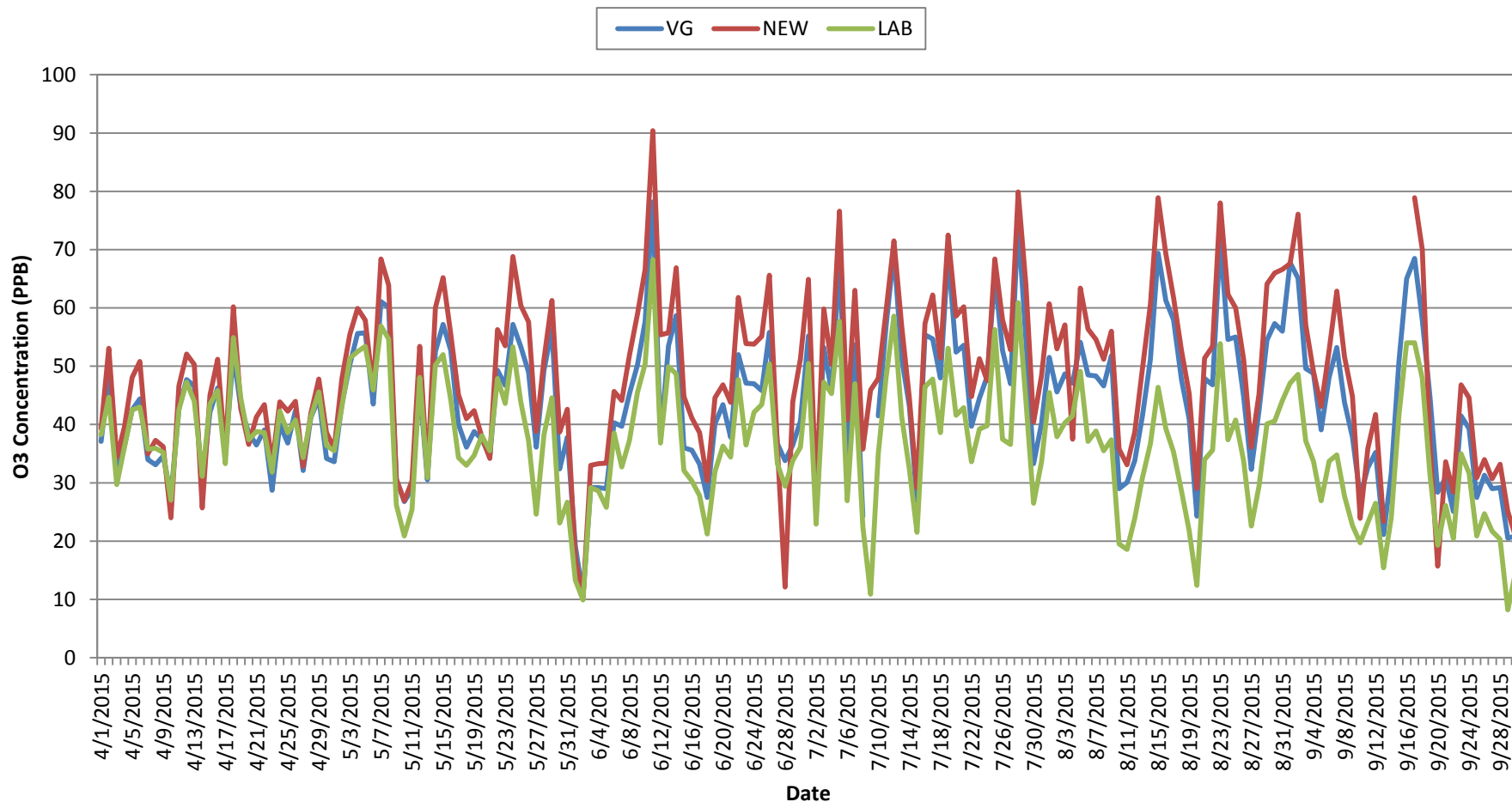


* NCore

Deliberative – Do Not Cite or Quote

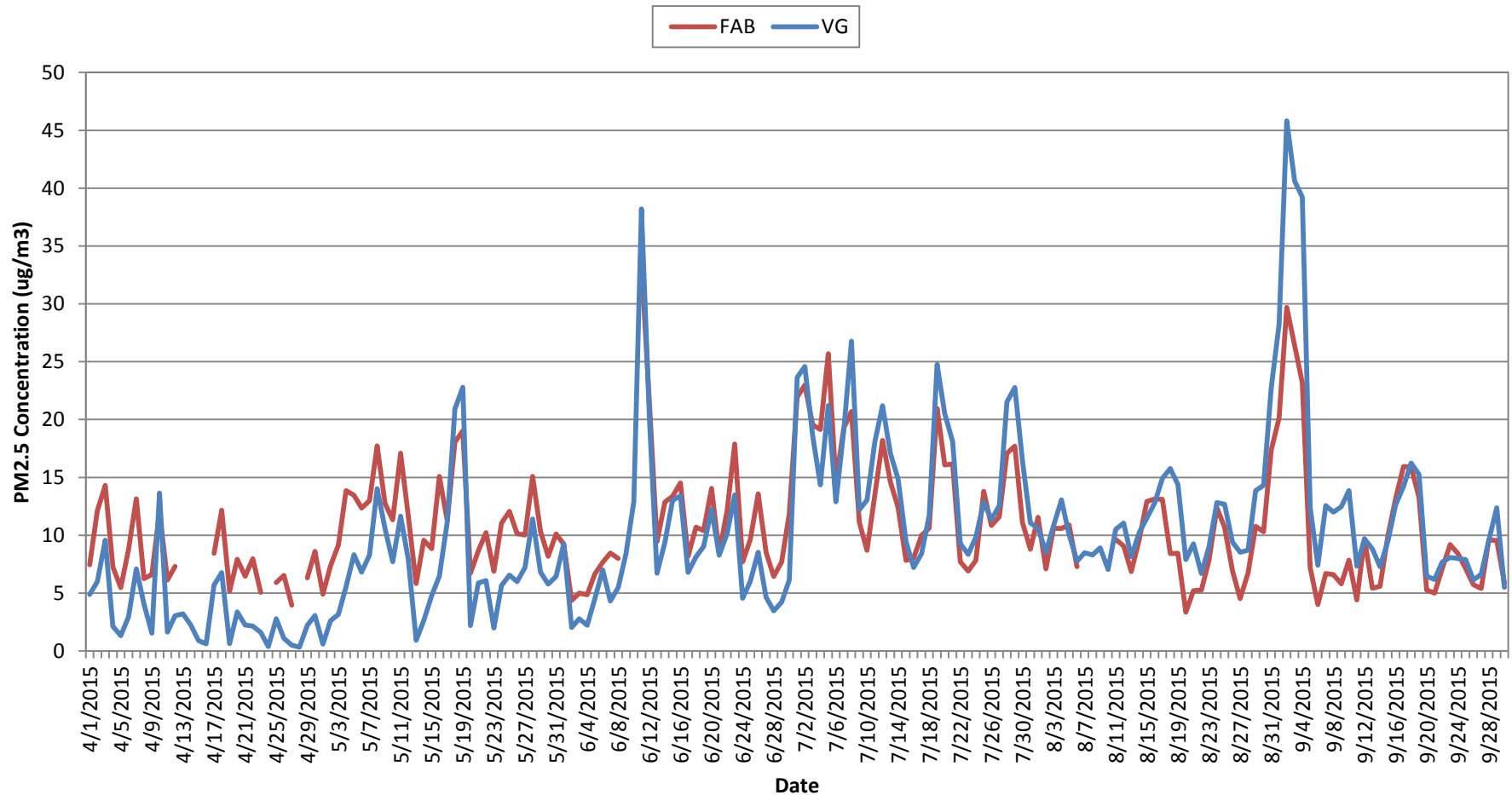
Data - Ozone

**Ozone Comparison
(April 1, 2015 - September 30, 2015)**



Data – PM2.5

**PM2.5 Comparison
(April 1, 2015 - September 30, 2015)**



Collected Data Thoughts

- ▶ Initial assessment in Durham, NC indicated agreement within ~15% with nearby reference instruments (Jiao et al., 2015).
- ▶ Overall, the trends for both PM2.5 and O3 comparisons are quite similar in spite of different magnitudes on some of the months.
- ▶ Met data looks fine.
- ▶ With only two quarters so far, we need further investigation.

General Experience

- ▶ The efforts of our cooperative partner, the National Parks Service, in keeping the Philadelphia Village Green site clean, deserve note. Their team has demonstrated great experience in outreach to the public.
- ▶ EPA has been very helpful and responsive, providing good support to the operation.
- ▶ Philadelphia AMS has been getting some good traffic on the website for the project.
- ▶ Equipment looks dependable; all calibration checks have passed so far.
- ▶ Next Steps
 - ▶ One Year Pilot Study
 - ▶ Future discussions with NPS/EPA
 - ▶ Mobil App
 - ▶ Additional Outreach