COUNTY OF ALLEGHENY

RICH FITZGERALD
COUNTY EXECUTIVE

Air Quality Program
301 39th Street
Pittsburgh, PA 15201

2020 Air Monitoring Network Plan

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KAREN HACKER, MD, MPH, DIRECTOR
ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM
301 39TH STREET • CLACK HEALTH CENTER • BUILDING 7
PITTSBURGH, PA 15201-1811
PHONE (412) 578-8103 • FAX (412) 578-8144
24-HR (412) 687-ACHD (2243) • WWW.ACHD.NET

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1.0 Annual Air Monitoring Network Plan Requirements

The Allegheny County Health Department Air Quality Program Monitoring Section prepared the 2020 Annual Monitoring Network Plan and disseminated the Public Comment Version on May 6, 2019. Every effort has been made to document all air monitoring performed in Allegheny County. The body of the plan discusses the regulatory requirements for our SLAMS sites, whereas the appendices present information not required by the plan. The appendices are included to be transparent about the non-SLAMS monitoring performed in Allegheny County. Monitoring data generated by ACHD is available upon request.

40 CFR Part 58, §58.10 contains the annual monitoring network plan requirements. Each year on July 1, the plan is to be submitted to the USEPA Regional (Region III) Administrator. A summary of the applicable requirements that parallels and condenses the regulatory text follows.

§58.10 (a) requires each agency to prepare an annual plan for an air quality surveillance system that consists of a network of SLAMS monitoring stations that can include FRM, FEM, and ARM monitors that are part of SLAMS, NCORE, CSN, PAMS, and SPM stations. Prior to submittal, the plan must be made available for public inspection and comment for at least 30 days. In addition, the plan shall include:

1. A statement of whether the operation of each monitor meets the requirements of Appendices A, B, C, D, and E of 40CFR58, where applicable.
2. Any proposed SLAMS network modifications (including new or discontinued monitoring sites, new determinations that data are not of sufficient quality to be compared to the NAAQS and changes in identification of monitors as suitable or not suitable for comparison against the annual $PM_{2.5}$ NAAQS). The EPA Regional Administrator has 120 days to approve or disapprove the plan.
3. A plan for making Photochemical Assessment Monitoring Stations (PAMS) measurements as required in 40CFR58, Appendix D, Paragraph 5(a). The PAMS Network Description of Appendix D may be used to meet this requirement. The plan shall provide for the required PAMS measurements to begin by June 1, 2019.
4. An Enhanced Monitoring Plan for O_3 in accordance with the requirements of 40CFR58, Appendix D, Paragraph 5(h). The EMP shall be submitted to the EPA Regional Administrator no later than October 1, 2019.

§58.10 (b) requires that the plan must contain the following information for each existing and proposed site:

1. The Air Quality System (AQS) site identification number.
2. The location, including street address and geographical coordinates.
3. The sampling and analysis method(s) for each measured parameter.
4. The operating schedules for each monitor.
5. Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.
6. The monitoring objective and spatial scale of representativeness for each monitor.
7. The identification of any sites that are suitable and sites that are not suitable for comparison against the annual $PM_{2.5}$ NAAQS (as described in §58.30).

8. The Metropolitan Statistical Area (MSA), Core Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor.
9. The designation of any lead (Pb) monitors as either source-oriented or non-source-oriented.
10. The identification of required NO_2 monitors as near-road, area-wide, or vulnerable and susceptible population monitors.
11. The identification of any $PM_{2.5}$ FEMs and/or ARMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the NAAQS.

§58.10 (c) requires that the plan must document the process for obtaining public comment and include any comments received through the public notification process within their submitted plan.

§58.10 (d) The local agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in Appendix D, whether new sites are needed, whether existing sites are no longer needed and can be terminated and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby states and tribes or health effects studies. The agency must submit a copy of this 5-year assessment along with a revised annual network plan. The next assessment is due to be submitted to the EPA on July 1, 2020.

§58.10 (e) All proposed additions and discontinuations of SLAMS monitors in annual monitoring network plans and periodic network assessments are subject to approval according to §58.14.

2.0 Changes Since the Last Air Monitoring Network Plan

2.1 Monitor Reductions

2.1.1 Avalon $PM_{2.5}$ FRM (sampling frequency)

ACHD reduced the sampling frequency of the Avalon $PM_{2.5}$ FRM monitor. This monitor is a secondary collocated monitor that supports the primary $PM_{2.5}$ FEM continuous monitor at that site. The FRM sampling frequency was reduced from every three days to every six days, which is consistent with the other $PM_{2.5}$ FRM collocated samplers in the network and exceeds minimum EPA requirements for collocated samplers.

2.1.2 Liberty $PM_{2.5}$ Non-FEM

ACHD discontinued the $PM_{2.5}$ Non- FEM (50° TEOM) at Liberty on 01/01/2019. This planned reduction was initiated after the new $PM_{2.5}$ FEM monitor was assigned permanent SLAMS status at Liberty.

2.2 Monitoring Additions

2.2.1 Liberty $PM_{2.5}$ FEM

A Thermo Scientific 5014i $PM_{2.5}$ FEM monitor was installed at the Liberty site during November 2017. This continuous monitor was operated as a special purpose monitor for one year. The 5014i correlated acceptably with the daily filter based $PM_{2.5}$ FRM data generated at that site and it was designated as a SLAMS monitor as of January 1, 2019. The Liberty $PM_{2.5}$ FEM is operated as a collocated monitor and is used to determine the air quality index for the Liberty Borough area.

2.2.2 Special Purpose Sulfur Dioxide Monitors

A major incident occurred at a local plant on December 24, 2018, resulting in damage to its sulfur dioxide control equipment. Sulfur dioxide 1-hour NAAQS violations were measured at the Liberty and North Braddock monitoring sites during the outage and repairs were not projected to be completed to the control equipment until April 15, 2019. Due to community concerns, special purpose sulfur dioxide monitors were deployed in two upwind locations, both areas of increased odor complaints. The locations are Clairton Education Center (section 10.8), and New Emerson Elementary School in West Mifflin (section 10.14). Due to the need for rapid deployment, these monitors do not meet all probe sighting criteria for SLAMS monitors but are exposed to all quality assurance procedures required for SLAMS monitors. Hourly data for both monitors is available on the public website. Neither of the temporary sulfur dioxide monitors have exceeded NAAQS limits to date. The temporary sulfur dioxide monitors will be discontinued after a period not to exceed one year.

3.0 Proposed Changes to the Air Monitoring Network

3.1 Monitor Additions

3.1.1 PAMS (Photochemical Assessment Monitoring Stations)

ACHD plans to adopt the PAMS network design criteria as contained in 40CFR58, Appendix D, Section 5. PAMS monitoring is required at NCORE sites in Core Based Statistical Areas (CBSAs) with a population of 1,000,000 people or more. The Lawrenceville NCORE site meets the requirements for mandatory expansion to a PAMS air monitoring site. Based on 40 CFR part 58, Appendix D, state and local air monitoring agencies are required to begin making PAMS measurements at their NCORE location(s) by June 1, 2019.

The equipment needed to measure PAMS parameters were to be purchased by USEPA using a nationally negotiated contract and delivered to the monitoring agencies. USEPA has announced that due to contract delays, the necessary equipment will not be delivered in time to begin making PAMS measurements by June 1, 2019. USEPA has indicated that it is working on a proposed rule to extend the start date of PAMS measurements and expects that this proposed rule change will be signed by June 1, 2019. As a result of the delay, ACHD will not begin making PAMS measurements at the Lawrenceville NCORE location in 2019 and will work with EPA to begin measurements on or before the final revised start date for this network.

The PAMS monitoring season is three months long (June, July and August). PAMS measurements will include:

- **Hourly Volatile Organic Compounds** using a specifically designed dual column gas chromatograph.

- **Carbonyls** using EPA method TO-11a, DNPH cartridge sampling with subsequent laboratory analysis. Required sampling frequency is every three days at 8-hour intervals.

- **True NO_2 (continuous)** using a new type of monitor that eliminates interference from other oxides of nitrogen species. This monitor will have a USEPA equivalent method designation for ambient NO_2 monitoring.

- **Hourly Mixing Height** using a ceilometer, an instrument that employs an upward facing laser coupled with a lidar receiver to determine atmospheric inversion height on an hourly basis.

- **Meteorological Monitoring** using atmospheric pressure, precipitation, solar radiation and UV radiation sensors. Wind speed, wind direction, ambient temperature and relative humidity are also required, but are currently operated as an NCORE monitoring site requirement.

For information about the national PAMS network see:

https://www3.epa.gov/ttn/amtic/pamsmain.html

3.1.2 EMP (Enhanced Monitoring Plan)

Ozone is a regional pollutant, and Pennsylvania is part of the Ozone Transport Region (OTR), a group of northeast states from Virginia to Maine that are jointly addressing the ozone problem. As required in 40CFR58, Appendix D, Section 5(h), states in the OTR must develop an Enhanced Monitoring Plan (EMP) detailing enhanced O_3 and O_3 precursor monitoring activities to be performed. At a minimum, the EMP shall be reassessed and approved as part of the 5-year network assessments required under 40 CFR 58.10(d). The Department is required to conduct its next 5-year network assessment during 2020, to be included in the Annual Network Plan for 2021.

An effective EMP would involve the cooperation of the state of Pennsylvania as well as bordering states, since the ozone concentrations are affected by transport and secondary atmospheric reactions. The Department's portion of Pennsylvania's proposed EMP is to commence after the 2020 PAMS season, continue indefinitely and include the following activities:

1. Operate all three existing ozone monitoring sites on a year-round basis, commenced 11/01/2017

2. Operate the PAMS true NO_2 monitor on a year-round basis, starting on the final USEPA revised start date for this network.

3. Year-round speciated VOC and carbonyl sampling and analysis will continue at Flag Plaza on a 1 in 6-day frequency (See Section 10.10)

4. Operate the PAMS ceilometer on a year-round basis, starting on the final USEPA revised start date for this network.

5. Continue to operate NO_2/NO_X chemiluminescence monitor at the Harrison ozone monitoring site on a year-round basis

6. Operate PAMS required meteorological sensors on a year-round basis, commenced 1/1/2017

In addition to the parameters mentioned, the Lawrenceville PAMS site is a candidate location for citing a PANDORA spectrometer. The EPA will ultimately decide which candidate sites will be chosen for PANDORA installation and operation. Adequate sky exposure, geographic distribution, suitable topography and compatible internet access are factors that will be considered. The PANDORA Spectrometer was developed by NASA to measure total atmospheric column concentrations of formaldehyde, ozone, sulfur dioxide, BrO, NO_2, and H_2O every 80 seconds. These data can be used to cross reference satellite data for ground comparison. For information about PANDORA, see the following webpage:

https://acd-ext.gsfc.nasa.gov/Projects/Pandora/index.html

3.2 Air Monitoring Site Modifications

3.2.1 Liberty Air Monitoring Station

The Liberty monitoring station is located at the South Allegheny School District's High School in Liberty Borough. Historically, the gaseous analyzers have been operated out of a supply room on the second floor of the school, while the particle monitors have been operated on the roof with access provided by an interior ladder and hatch. Access to these areas requires entry to the school and processing through the district's Raptor verification system as well as the metal detection system. During the process of renewing the letter agreement between ACHD and SASD, school officials indicated that the monitoring site must be redesigned so that ACHD personnel will not have access to the inside of the school. This is in response to increased security policies that are being implemented by the school district.

The current resolution is to purchase and install a small monitoring trailer (8'x14') to house the gaseous monitors, installing it on a concrete pad adjacent to the west wall of the school. The gaseous monitor probe lines will be affixed to the exterior wall of the school and the inlet funnels will be situated at least 5' above the top of the roof. A preexisting external safety ladder near the new trailer location will provide access to the roof. The particle monitors will be moved to the roof area near this exterior ladder. The roof mounted 10-meter meteorological may be upgraded to a new tower with a trolley system, depending on available funds. This new tower would be mounted to a location closer to the new trailer site to facilitate a hardwired connection to the datalogger. The trolley system is an overall improvement to staff safety and requires fewer staff resources to audit and service sensors.

ACHD will complete the Liberty site modifications as soon as possible as requested by the school district. The AQS number designation will remain unchanged. The particle samplers will be moved 570 feet north east. The gas monitor inlets will be moved 160 feet east south east. The new meteorological tower would be moved 100 feet east from the historical location. Gaseous monitor and particle sampler inlets and meteorological sensors will remain at the same height (8 meters above ground level).

4.0 Air Monitoring Network Summary

Figure 4 and Table 4 are provided as overviews of the air monitoring network and presented here to show at a glance the numbers and general types of air monitors currently maintained by the Air Quality Program as well as the general location of each fixed monitoring site. To view live and recent data for all continuous monitors listed in the table, see the Air Quality Program website;

http://www.achd.net/air/air.html

Figure 4 Air Monitoring Network Map

Table 4 Air Monitoring Network Summary (SLAMS and EPA Required Monitors)

	SO_2	CO	NO_2	NO_y	O_3	PM_{10}	$PM_{2.5}$	PM coarse	Air Toxics
Lawrenceville NCORE	CT	CT		CT	C		C I(1), IQA(6) SPC(3)	C	
Liberty	CT					C I(3), IQA(6)	C I(1), IQA(6) SPC(6)		
North Braddock	C					C	I(3)		
South Fayette	C				C	I(6)	I(3)		
Clairton						I(6)	I(6)		
Avalon	C						IQA(6), C		
Flag Plaza		C				C			T15(6) T11(6)
Glassport						C			
Lincoln						C	CN		
Manchester						I(6)			
Harrison			C		C		I(3)		
North Park							I(6)		
Parkway East Near Road		CT	CT				C		Aeth(C)
	SO_2	CO	NO_2	NOy	O_3	PM_{10}	$PM_{2.5}$	PM coarse	Air Toxic
Total	C = 3 CT = 2	C = 1 CT = 2	C = 1 CT=1	CT = 1	C = 3	C = 5 I = 4 IQA=1	C = 4 CN = 1 I = 7 IQA = 3 SPC=2	C = 1	I = 2 C=1

Tabular Summary Key

I = Intermittent or Filter-Based **C** = Continuous **SPC** = PM2.5 Speciation
T = Trace Level Monitor **(1), (3), or (6)** = Sampling Frequency [for example, (**3**) means every third day]
T15 = SUMMA TO15 **T11** = Carbonyl TO11 **Aeth** = **Aethalometer**: Black Carbon, Ultraviolet PM
QA = Collocated QA monitor
N = Non-FEM monitor (Special Study, not for regulatory use)

5.0 Appendix A Requirements

40CFR58, Appendix A specifies the minimum quality system requirements applicable to SLAMS and other monitor types whose data are intended to be used to determine compliance with the NAAQS. ACHD is the Primary Quality Assurance Organization (PQAO) for this data set. A PQAO is also responsible for demonstrating data quality. ACHD has developed a quality system that is described and approved in quality management plans (QMP) and quality assurance project plans (QAPP). The purpose of these documents is to ensure that the monitoring results provide data of adequate quality for the intended monitoring objectives.

ACHD performs the requisite measurement quality checks that are used to assess data quality. ACHD also performs an internal second level audit as an added measure of the data quality. Data from these checks is submitted to the AQS within the same time frame as routinely-collected ambient concentration data. In addition to performing QA and QC checks, ACHD participates in external performance evaluation programs (which are independent assessments) and technical systems audit conducted by the EPA.

Regarding all data generated by the criteria pollutant monitors described in this network review, no later than May 1 of each year, ACHD submits a letter certifying accuracy and reliability of each previous calendar year's criteria air pollutant monitoring data reported to AQS to the Mid Atlantic Regional Administrator in hard copy. An electronic copy of this information will also be sent to the Mid-Atlantic Region Associate Director, Office of Air Monitoring and Planning.

ACHD's data certification will contain all required reports and will be accompanied with a statement from a responsible official who certifies that;

- All ambient concentration data and quality assurance data have been reported to the AQS database.
- The ambient data are accurate to the best of his or her knowledge taking into consideration all applicable quality assurance findings.

6.0 Appendix B Requirements

40CFR58, Appendix B specifies the minimum quality assurance requirements for the control and assessment of the quality of the ambient air monitoring data submitted to a PSD reviewing authority or the EPA by an organization operating an air monitoring station, or network of stations, operated to comply with Part 51 New Source Review (NSR) - Prevention of Significant Deterioration (PSD).

At present, Appendix B requirements are not applicable since there is no PSD monitoring performed by ACHD nor performed by an external PSD PQAO within the county.

7.0 Appendix C Requirements

Appendix C specifies the criteria pollutant monitoring methods (manual methods or automated analyzers) which must be used in SLAMS, NCORE stations (a subset of SLAMS) and PAMS (to be located at the NCORE site and considered to be another subset of SLAMS).

All criteria pollutant monitoring methods in the air monitoring network used for making NAAQS decisions at a SLAMS site are reference (FRM) or equivalent (FEM) methods. The FRM or FEM designation acceptance tests are performed by the manufacturer in accordance with the requirements of 40CFR50 and 40CFR53.

Methods employed at the Lawrenceville NCORE multipollutant site are either reference or equivalent methods. NCORE multipollutant parameters include SO_2, CO, NO_y, O_3, $PM_{2.5}$ and $PM_{10-2.5}$ (aka PM_{coarse}, Coarse PM or PM_c). NO_y and PM_c do not have an associated NAAQS.

Methods to be employed at the proposed Lawrenceville PAMS site will be either reference or equivalent methods (where applicable). PAMS FEM monitoring parameters include O_3 and true NO_2. PAMS monitoring which do not have FEM nor FRM designation include methods for meteorological measurements and speciated VOC monitoring methodologies which are specified in PAMS guidance documents.

- Meteorological monitoring guidance is provided in QA Handbook, Volume IV – Meteorological Measurements found at https://www3.epa.gov/ttn/amtic/qalist.html.

- The Compendium of Methods for the Determination of Toxic Organic (https://www3.epa.gov/ttn/amtic/airtox.html#compendium) can be found on EPA's website. Carbonyl sampling and analysis is based upon TO-11A and the automated gas chromatography method is based upon TO-15.

8.0 Appendix D Requirements

Appendix D describes monitoring objectives and general criteria to be applied in establishing the required SLAMS ambient air quality monitoring stations and for choosing general locations for additional monitoring sites. Appendix D also describes specific requirements for the number and location of FRM, FEM, and ARM sites for specific pollutants, NCORE multipollutant sites, PM_{10} mass sites, $PM_{2.5}$ mass sites, chemically-speciated $PM_{2.5}$ sites, and O_3 precursor measurement sites (PAMS). These criteria are used by EPA to evaluate the adequacy of the ACHD monitoring network.

The ACHD monitoring network provides air pollution data to the public in a timely manner, supports compliance with ambient air quality standards and emissions strategy development and supports air pollution research studies. The location of the monitors in the network were chosen to correctly match the spatial scale represented by the sample of monitored air with the spatial scale most appropriate for the monitoring site type, air pollutant to be measured and the monitoring objective.

General monitoring requirements are based on population density of the monitoring area. For Allegheny County, the Pittsburgh MSA (metropolitan statistical area) is referenced. The latest census (2010) determined the population of the Pittsburgh MSA to be 2,356,285 people. Some monitoring requirements are also based on individual pollutant design values, which are concentrations derived from past data generated by SLAMS monitors in Allegheny County. Air Quality Design Values (DV) referenced in this section are based on tables available at:

http://www.epa.gov/airtrends/values.html

Each state is required to operate at least one NCORE site. States may delegate this requirement to a local agency. The NCORE location is leveraged with other multipollutant air monitoring sites including the proposed PAMS site, CSN monitoring and monitoring performed by academia. Site leveraging includes using the same monitoring platform and equipment to meet the objectives of the variety of programs where possible and advantageous.

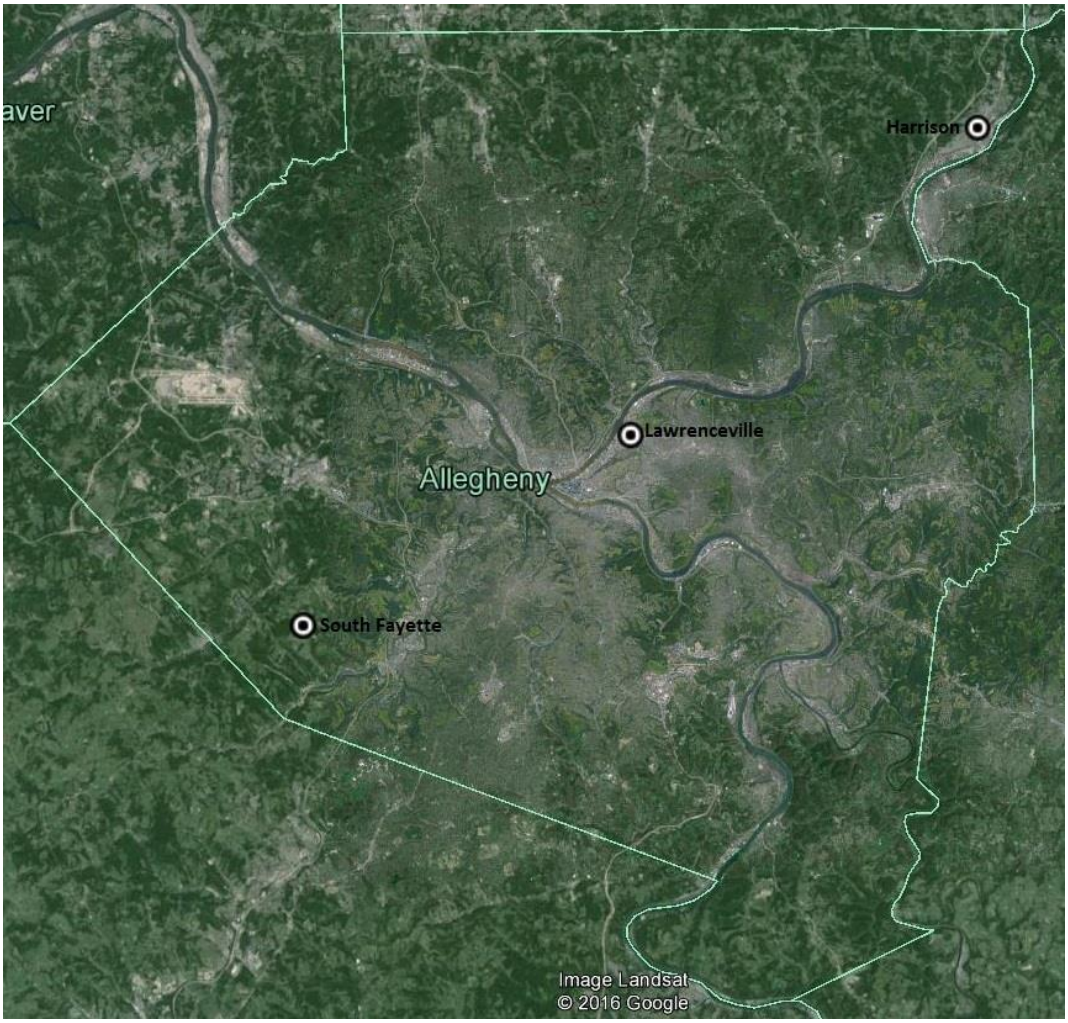
Pollutant specific design criteria for SLAMS sites are codified in 40CFR58, Appendix D, Section 4. EPA updates this document routinely in response to NAAQS revisions and in response to evolving air monitoring network objectives. SLAMS sites are intended to address specific air quality management interests, and as such, are frequently single-pollutant measurement sites. The following sections parallel the CFR citations and provide the current, applicable requirements for each criteria pollutant.

8.1 Ozone Design Criteria

Ozone (O_3) monitoring requirements are determined by the MSA population and ozone design value, as specified in Table D-2 of 40CFR58, Appendix D.

- Based on the population of the Pittsburgh MSA and the latest ozone design value, which is greater than 85% of the ozone NAAQS, ACHD is required to operate two ozone monitors. ACHD satisfies this requirement by operating three ozone monitors.
- Each NCORE site must operate an ozone monitor. ACHD satisfies this requirement by operating an ozone monitor at the Lawrenceville NCORE site.
- Within an ozone network, at least one ozone site for each MSA must be designed to record the maximum concentration for that metropolitan area. The maximum concentration monitor site should be selected in a direction from the city that is most likely to observe the highest ozone concentrations, more specifically, downwind during periods of photochemical activity. The Harrison monitor is assigned this designation.

Figure 8.1 Ozone Monitoring Map

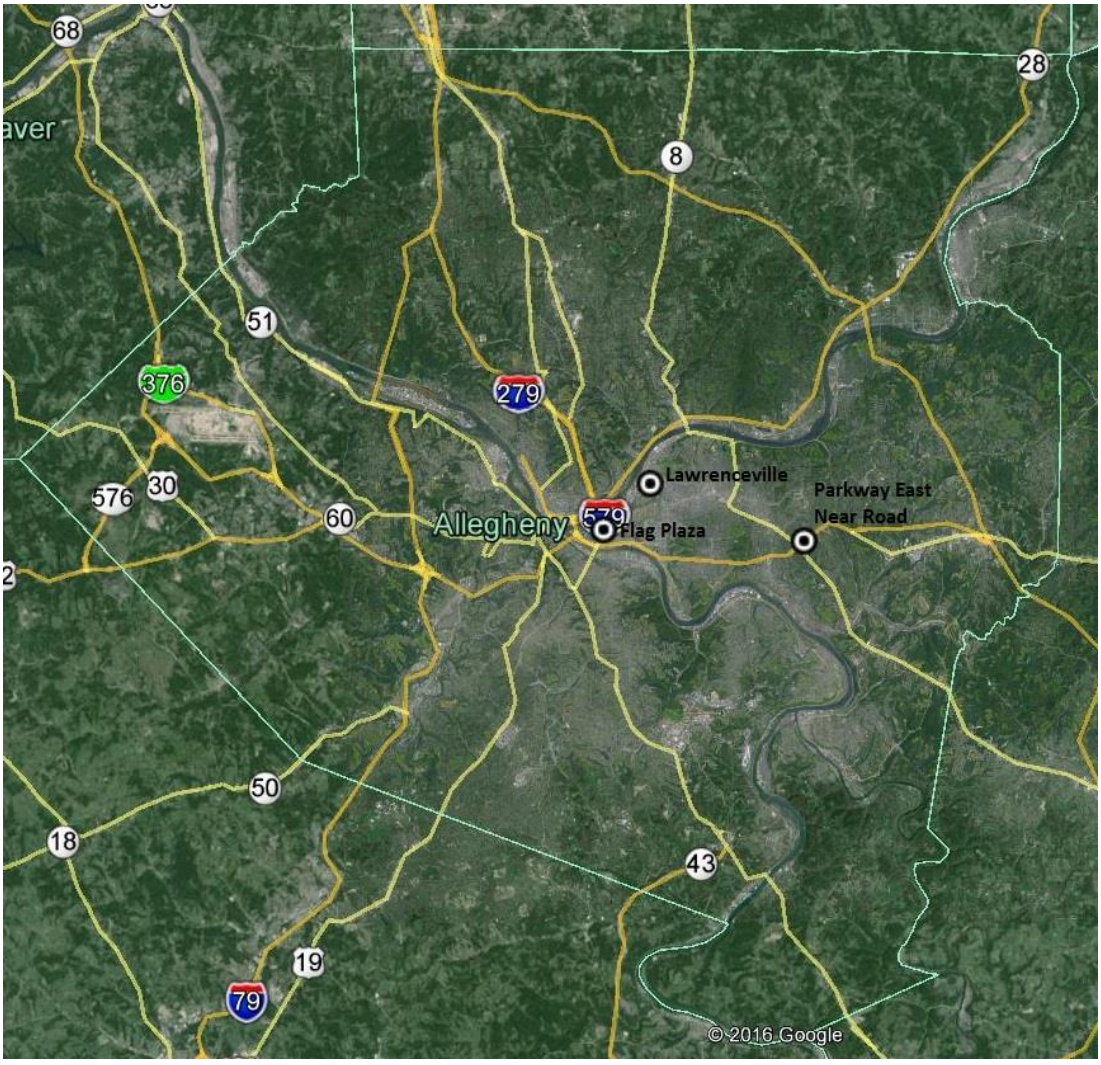


8.2 Carbon Monoxide Design Criteria

EPA revised the minimum monitoring requirements for carbon monoxide (CO) on August 12, 2011 (40CFR58, Appendix D). Applicable requirements are;

- One CO monitor is required to be collocated with a near road NO_2 monitor in urban areas having a population of 1 million or more. ACHD included a CO monitor in the initial configuration of the Parkway East Near Road monitoring site, which was operational on 09/01/2014.
- One CO monitor is required at each NCORE site. ACHD has operated a trace level CO monitor at the Lawrenceville NCORE site since 4/1/2010.
- ACHD operates an additional CO monitor at Flag Plaza. This site is in the Pittsburgh central business district and the CO monitor is operated to access impact from mobile emissions in this congested area. This monitor is in operation to satisfy a CO maintenance plan that will expire after calendar year 2022.

Figure 8.2 CO Monitors and Major Roadways Map



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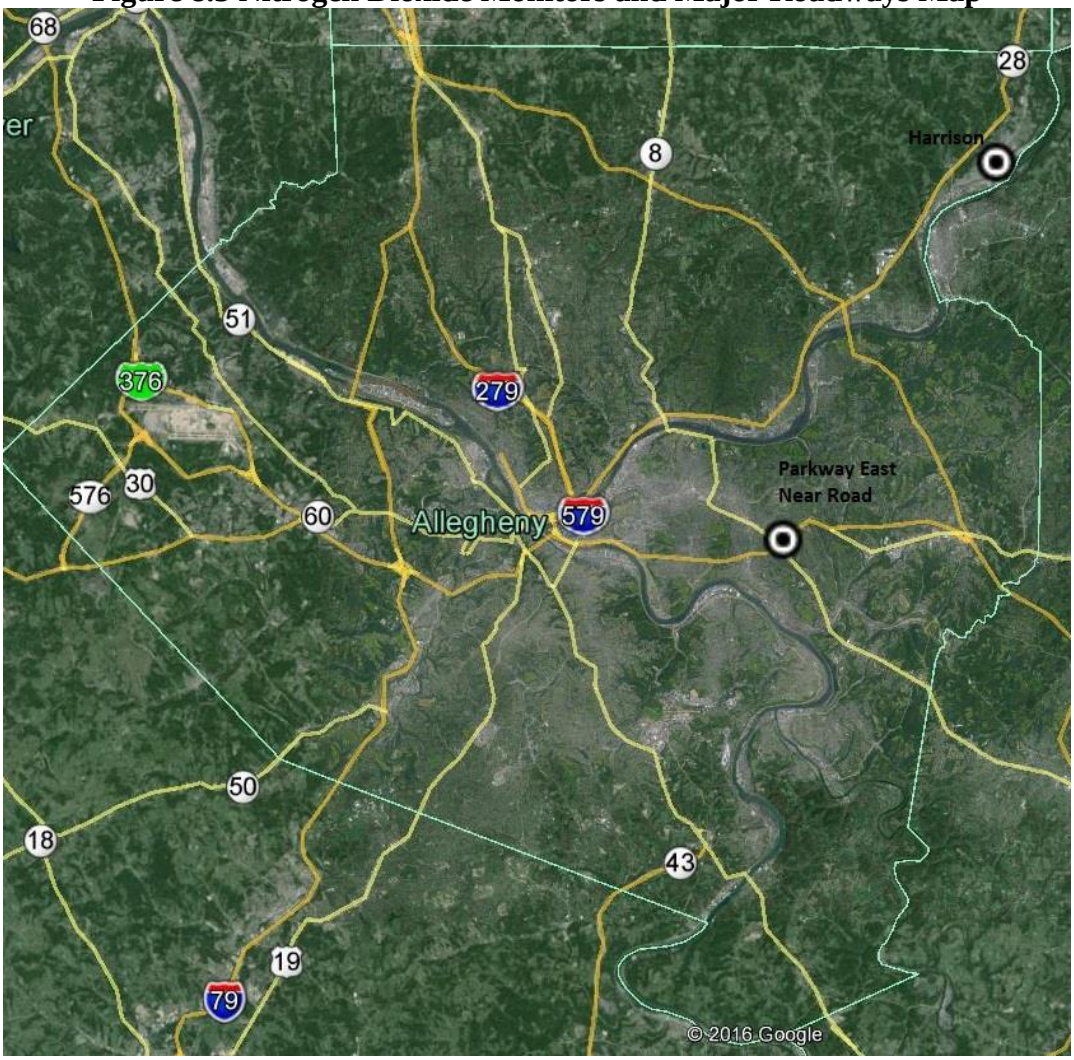
8.3 Nitrogen Dioxide Design Criteria

On January 22, 2010, EPA strengthened the health-based NAAQS for NO_2 by setting a new 1-hour NAAQS at 100 ppb. The existing annual average NAAQS of 53 ppb was retained. In addition, EPA revised the NO_2 monitoring requirements in urban areas. Applicable requirements are as follows;

- One near road NO_2 monitoring site is required in an MSA with a population $\geq$ 500,000 and < 2,500,000 people. Near-road NO_2 monitoring characterizes the maximum expected hourly NO_2 concentration due to mobile source emissions on major roadways.
- One area wide NO_2 monitor in MSA's with a population > 1 million. The Harrison NO_2 monitor has been in operation at the current location since 02/12/2014.
- Although not shown on the map, the Lawrenceville NCORE site performs NOy measurements. NOy measurements produce conservative estimates for NO_2. In addition, the PAMS site (Lawrenceville) will be required to measure true NO_2 starting on the final USEPA revised start date for this network.

Figure 8.3 Nitrogen Dioxide Monitors and Major Roadways Map

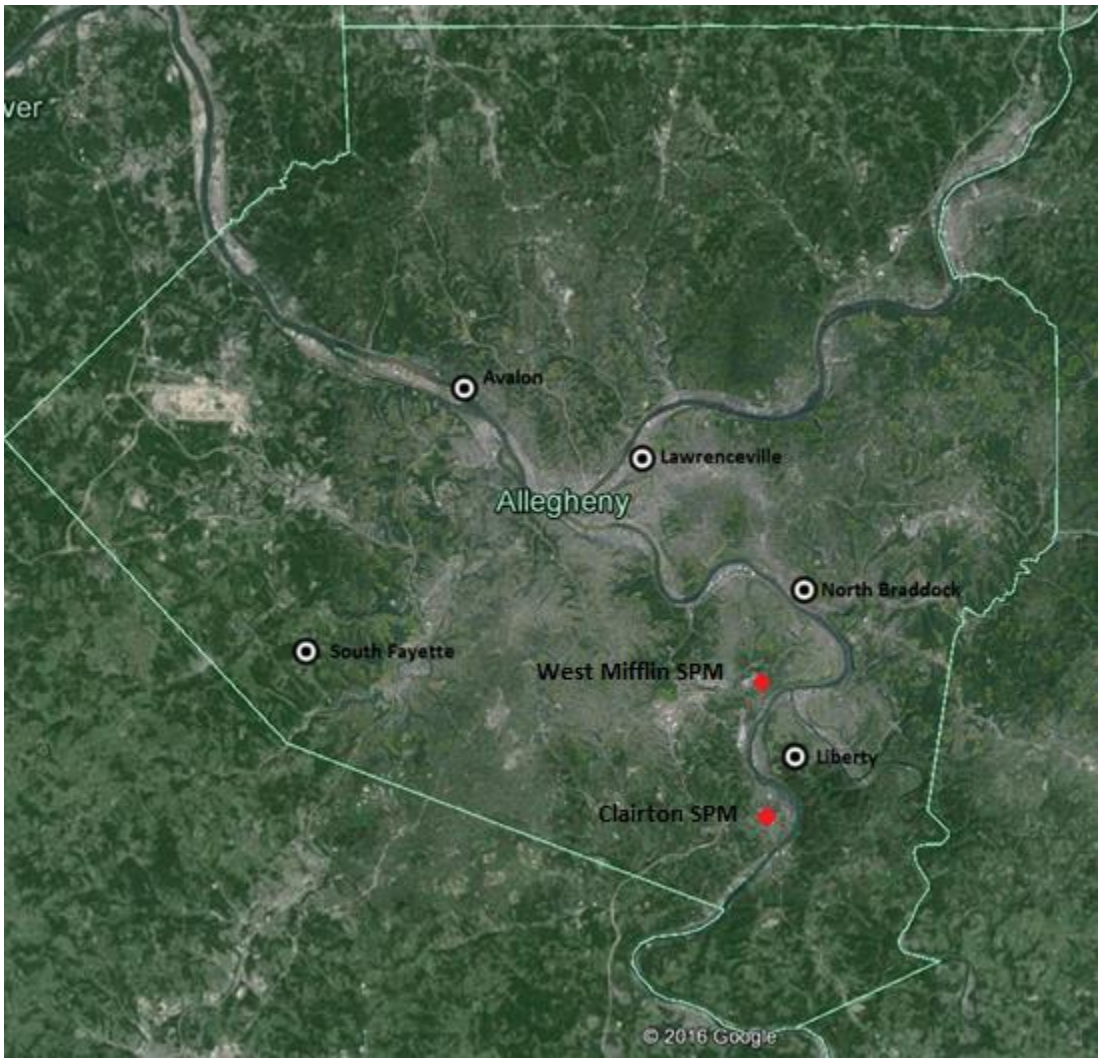


8.4 Sulfur Dioxide Design Criteria

The minimum number of required SO_2 monitors in each MSA is proportional to the product of the total amount of SO_2 emissions in the MSA and its population as specified in 40CFR58, Appendix D, Section 4.4. The resulting value is defined as the Population Weighted Emissions Index (PWEI). Using the ACHD 2014 emission inventory aggregate SO_2 emissions and 2010 census data for the Pittsburgh MSA, the PWEI is calculated at 20,096. SO_2 requirements are as follows;

- For any MSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO_2 monitor is required within that CBSA. ACHD exceeds this minimum requirement with a total of five SO_2 monitors.
- Each NCORE station must operate an SO_2 monitor. ACHD included an SO_2 monitor as part of the initial configuration of the Lawrenceville NCORE site.

Figure 8.4 Sulfur Dioxide Monitors



8.5 Lead (Pb) Design Criteria

40CFR58, Appendix D, Paragraph 4.5 states that local agencies are required to conduct ambient air Pb monitoring near Pb sources which are expected to or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS, considering the logistics and potential for population exposure. At a minimum, there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year based on either the most recent National Emission Inventory (http://www.epa.gov/ttn/chief/eiinformation.html) or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data) taking into account logistics and the potential for population exposure.

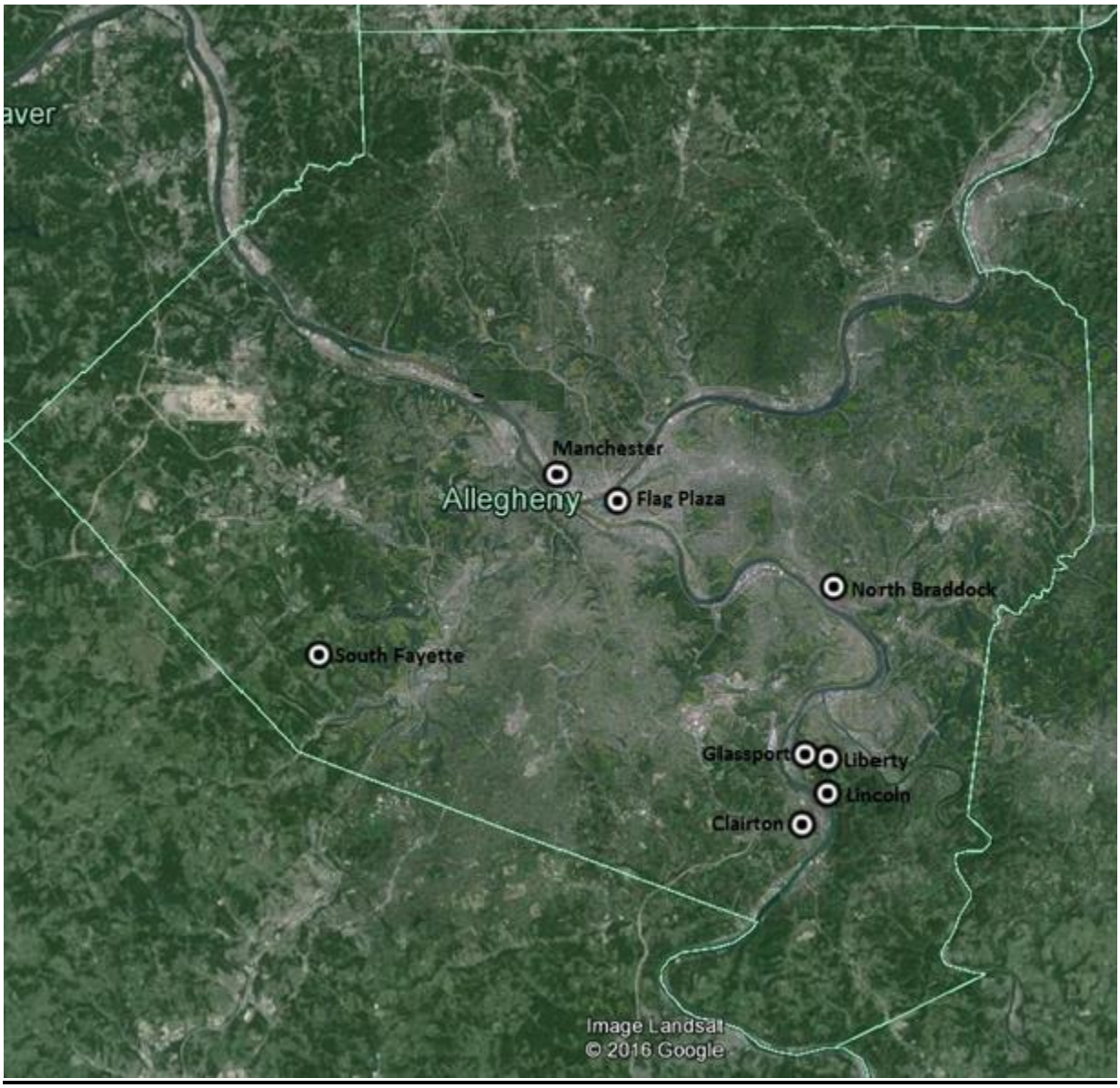
No lead monitoring is performed in Allegheny County. Bridgeville and Lawrenceville sites were discontinued as there are no point sources which emit greater than 0.5 tons per year. EPA approval of the 2018 Annual Network Plan allowed the sampling to end after 2017.

8.6 PM_{10} Design Criteria

The number of required PM_{10} monitors in each MSA is determined by the MSA population and design value, as specified in Table D-4 of Appendix D to 40CFR58.

- The Pittsburgh MSA has ambient PM_{10} concentrations well below 80% of the PM_{10} NAAQS. Table D-4 indicates that 2 to 4 sites must monitor for PM_{10}. ACHD exceeds this requirement with 8 sites that monitor PM_{10}.
- Collocated sampling for PM_{10} is only required for manual samplers. A minimum of 15%, or at least one manual PM_{10} monitor must be collocated as specified in 40CFR58, Appendix A. The Liberty site meets this requirement.

Figure 8.6 PM_{10} Monitoring Map



8.7 Fine Particulate Matter ($PM_{2.5}$) Design Criteria

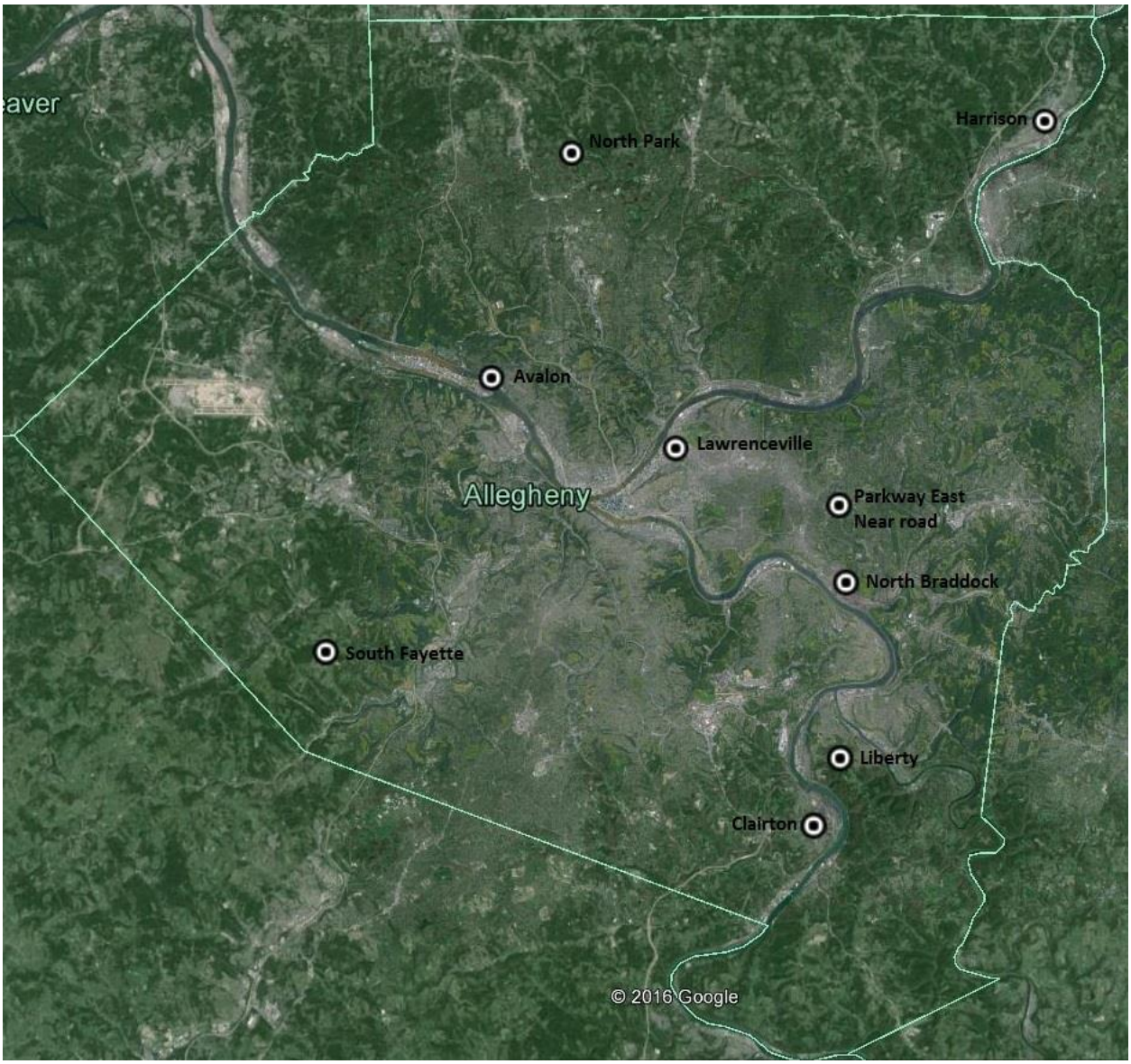
The number of required $PM_{2.5}$ monitors in each MSA is determined by the MSA population and design value, as specified in Table D-5 of 40CFR58, Appendix D.

- Pittsburgh MSA $PM_{2.5}$ 24 hour and annual design values are > 85% of the NAAQS, requiring a minimum of 3 $PM_{2.5}$ sites. ACHD exceeds this requirement with 9 sites that monitor $PM_{2.5}$.
- Regarding FRM $PM_{2.5}$ samplers (eight sites), a minimum of 15%, or at least one, of the $PM_{2.5}$ monitoring sites must be collocated (rounded to one). ACHD exceeds this requirement by having collocated monitors at Liberty and Lawrenceville (two) sites.
- At least one site (15% is required) that features a primary $PM_{2.5}$ FEM monitor must also operate a collocated $PM_{2.5}$ FRM sampler (40CFR58, Appendix A). This requirement is met at the Avalon site. Avalon and Parkway East have the same $PM_{2.5}$ FEM model.
- At least one half of the minimum number of sites per MSA must operate continuous $PM_{2.5}$ monitors, requiring ACHD to operate 2 continuous $PM_{2.5}$ monitors. ACHD operates 4 continuous $PM_{2.5}$ monitors (Liberty, Lawrenceville, Avalon and Parkway East). See Section 10 for each site's detailed information.
- For MSA's above 1,000,000 people, at least one $PM_{2.5}$ monitor must be at a near road site. ACHD conducts continuous $PM_{2.5}$ monitoring at the Parkway East near road site.
- Each monitoring agency shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the $PM_{2.5}$ Speciation Trends Network (STN). ACHD continues to conduct $PM_{2.5}$ speciation at Liberty and Lawrenceville sites.
- Each NCORE site must monitor $PM_{2.5}$. ACHD satisfies this requirement at the Lawrenceville NCORE site using daily filter-based monitoring as well as continuous $PM_{2.5}$ FEM monitoring.
- The required monitoring sites must be located to represent area-wide air quality. These will typically be either neighborhood or urban scale, although micro or middle scale may be appropriate in some urban areas. At least one monitoring site must be neighborhood scale or greater in an area of expected maximum concentration and one site must be sited in an area of poor air quality. At least one $PM_{2.5}$ site must monitor for regional background and at least one $PM_{2.5}$ site must monitor for regional transport. Table 8 shows the $PM_{2.5}$ network site scales and objectives.

Table 8 $PM_{2.5}$ Monitor Scales and Objectives

Site Name	Measurement Scale	Monitor Objective
Lawrenceville	Urban	Population Exposure
Liberty	Neighborhood	Population Exposure, Highest Concentration
North Braddock	Neighborhood	Population Exposure
Harrison Township	Neighborhood	Population Exposure
South Fayette	Neighborhood	Population Exposure, Regional Transport, Upwind Background
Clairton	Neighborhood	Population Exposure, Welfare concerns
Avalon	Neighborhood	Population Exposure
North Park	Neighborhood	Population Exposure, Regional Background
Parkway East Near Road	Microscale	Population Exposure, Source Oriented

Figure 8.7 $PM_{2.5}$ Monitor Map



8.8 Coarse Particulate Matter Design Criteria

The only required monitors for $PM_{10-2.5}$ are those required at NCORE Stations. Note that no NAAQS exists for coarse particulate matter.

Coarse PM monitoring at the Lawrenceville NCORE site employs 2 continuous beta attenuation monitors (BAM). The paired units and the internal algorithms have designation as an approved FEM for PM_c. One unit measures $PM_{2.5}$ and the other PM_{10}. Both units measure separately but are interconnected to share the data. The internal software calculates the PM_c value. The PM_{10} (master unit) internal memory retains the hourly values of $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$ and other meta data.

9.0 Appendix E Requirements

40CFR58, Appendix E contains specific location criteria applicable to SLAMS, NCORE-, and PAMS ambient air quality monitoring probes, inlets and optical paths after the general location has been selected based on the monitoring objectives and spatial scale of representation discussed in Appendix D. Adherence to these siting criteria is necessary to ensure the uniform collection of compatible and comparable air quality data.

Appendix E specifies probe and monitoring path siting criteria for ambient air quality monitoring. The key components of Appendix E include the following:

- Horizontal and Vertical Placement
- Spacing from Minor Sources
- Spacing from Obstructions
- Spacing from Trees
- Spacing from Roadways
- Cumulative Interferences on a Monitoring Path
- Maximum Monitoring Path Length
- Probe Material and Pollutant Sample Residence Time
- Waiver Provisions.

Discussion of Appendix E requirements will be contained in the next section.

10 Detailed Air Monitoring Site Descriptions

The following air monitoring network description discusses each monitoring site in detail. The first information block is labeled with the site name. Inside of the block is listed site specific information as follows:

- **Street Address**
- **AQS #** - unique 9-digit number used to identify the state, county and site in the AQS data base.
- **Municipality** where site is located.
- **MSA**- Metropolitan Statistical Area.
- **Latitude (N), Longitude (W)** – Site coordinates, given in WGS84 datum coordinates.
- **Comments**- Specific site information of importance.

The next blocks are designed to list details of each monitor at the site. Each monitor present at the time of the review is assigned its own block. The following information is listed:

Sensor Type – The name of the pollutant measured by the sampler and to provide further detail, FEM or FRM designation.

Sensor Network Designation – The name of the designated network:

- SLAMS - State or Local Ambient Air Monitoring Station that has EPA reference or equivalent method designation, including Primary, Secondary or Tertiary level of importance, where more than one sensor type is at the site. Waiver provisions.
- OTHER – Monitor that does not have EPA designated reference or equivalent status

Sensor Purpose Description– The purpose of the sensor:

- Population Exposure, such as the Air Quality Index
- Regulatory Compliance with Federal or State regulation
- Research/Scientific Monitoring
- Specific Location Characterization
- Quality Assurance (Collocated)

Sample Frequency – Specifies how often a sample is taken.

- Continuous (also referred to as "Hourly") - operates 24/7; applies predominately to gaseous analyzers, although some particulate samplers (TEOM, BAM, Aethalometer) operate continuously.
- Daily – a discrete sample is taken every day; applies to manual method particulate or toxics samplers.
    - Every Third Day - Manual method samplers that run every third day.
    - Every Sixth Day – Manual method or toxics samplers that run every sixth day.

Appendix A QA Assessment – A "**YES**" indicates the sensor is maintained in accordance with the Quality Assurance (QA) requirements specified in 40CFR58, Appendix A.

Monitor Start Date – Specifies the start date for the current AQS pollutant parameter code. Note that AQS method codes may change, usually due to a change of manufacturer or monitor model employed at the site.

Appendix C Monitoring Classification – Each ambient air monitor is classified using the EPA "List of Designated Reference and Equivalent Methods"

- Reference Method – a method of sampling that is specified in 40CFR53.
- Equivalent Method – a method that is designated as equivalent to the reference method, in accordance with 40CFR53 and 40CFR50.
- Automated – after sampling, the analysis results are available immediately.
- Manual - after sampling, a separate analysis at a laboratory is necessary.
- N/A – appears where there is no reference or equivalent method.

Appendix C Monitoring Method – Each ambient air monitor is classified by a specific method number.

Monitoring Method Description – Table 10 provides details about each type of sampler and analyzer utilized in the air monitoring network.

Probe Height - Distance from ground level that ambient air is sampled. 40CFR58, Appendix E lists acceptable probe heights for individual measurement parameters and spatial scales.

Residence Time - The amount of time that ambient air remains in contact with a probe line or manifold, considering total manifold and probe line inner volume and monitor flow rate. Residence time is applicable to reactive gas monitors that use probe lines or manifolds to deliver ambient air to the monitor. Section 7.2.1 of the QA Handbook Volume II recommends a probe residence time of ten seconds or less as optimal and over 20 seconds as unacceptable due to sample concentration loss at higher residence times.

Appendix D Design Criteria – Appendix D requires a certain number of samplers per geographic area. A "**YES**" indicates that the number of monitors in that area meets or exceeds the requirement of 40CFR58, Appendix D.

Appendix D Scale – The specific "spatial scales of representation" describes the physical dimensions of the air parcel around the monitoring station throughout which actual pollutant concentrations are reasonably similar.

- Microscale - Areas with dimensions up to about 100 meters
- Middle scale - Areas with dimensions from 100 meters to 0.5 kilometers
- Neighborhood - Areas with dimensions from 0.5 to 4.0 kilometers and uniform land use
- Urban scale - Areas with dimensions from 4 to 50 kilometers
- Regional - Areas with dimensions ranging from tens to hundreds of kilometers and usually a rural area of reasonably homogeneous geography without large sources
- National and Global Scales - Measurement scales that represent concentrations characterizing the nation and the globe.

Appendix D Objective – Describes the purpose/objective for monitoring at a site.

- Extreme Downwind
- General/Background Concentration
- Highest Concentration
- Maximum Ozone Concentration
- Maximum Precursor Emissions
- Population Exposure
- Regional Transport
- Source Oriented
- Quality Assurance
- Welfare Related

Appendix E Siting Criteria – Describes certain criteria applicable to ambient air quality sampling probes and monitoring paths, such as distances from trees, obstructions, traffic lanes, etc. A "**YES**" indicates that the sensor at the given site meets or exceeds the requirements of 40CFR58, Appendix E.

Table 10 Monitoring Parameters and Methods

Parameter	Mfg	Model #	Parameter Code	Method Code	Description
$PM_{2.5}$ FRM	R&P	2025	88101	145	Low Volume Sampler (filter) VSCC, very sharp cut cyclone
$PM_{2.5}$ FEM	Thermo	5014i	88101	183	Beta Attenuation Instrumental
	Met One	1020	88101	170	Beta Attenuation Instrumental
PM_{10} FRM	Tisch	TE-6070	81102	141	High Volume Sampler (filter)
PM_{10} FEM	R&P	1400	81102	79	Gravimetric Instrumental (TEOM)
	Met One	1020	81102	122	Beta Attenuation Instrumental
$PM_{2.5}$ Speciation	Met One SASS	SASS	multiple	812	Trace metals, Sulfate, Nitrate
	URG	3000N	multiple	812	Organic/Inorganic Carbon
PM coarse	Met One	1020 (pair)	86101	185	Beta Attenuation Instrumental
Carbon Monoxide	TAPI	300A/E	42101	93	Gas Filter Correlation
Carbon Monoxide (trace)	TAPI	300 EU	42101	593	Gas Filter Correlation
Nitrogen Dioxide	TAPI	200A/E	42602	99	Chemiluminescence
Nitrogen Dioxide (trace)	TAPI	200EU	42602	599	Chemiluminescence
Reactive Oxides of Nitrogen (NOy)	TAPI	200EU/501	42600	699	Chemiluminescence
Sulfur Dioxide	Ecotech	9850	42401	92	Ultra Violet Fluorescent
	Thermo	43i	42401	60	Ultra Violet Fluorescent
Sulfur Dioxide (trace)	TAPI	100EU / T100U	42401	600	Pulsed Fluorescent
Ozone	Ecotech	10	44201	187	Ultra Violet Absorption
	Thermo	49	44201	47	Ultra Violet Absorption
Black Carbon	TAPI	633	84313	894	Aethalometer Instrumental
Air Toxics (VOC)	na	na	multiple	150	6-liter SS canister / TO-15 lab analysis
AIR Toxics (Carbonyl)	na	na	multiple	102	DNPH cartridge / TO-11 lab analysis

10.1 Lawrenceville

Address	Allegheny County Health Department 301 39th Street, Building 7 Pittsburgh, PA 15201		
AQS#	42-003-0008	MSA	Pittsburgh
Latitude (N)	40.465420	Longitude (W)	-79.960757
Comments	This is a population-based, community oriented monitoring site that is an urban area downwind of Central Business District. The Lawrenceville monitoring site was selected as a $PM_{2.5}$ National Trends Site, later as an NCORE site and as the proposed PAMS site in 2019. The most significant local pollution is generated from mobile sources, but light industry scattered throughout the area is also a contributing factor. Lawrenceville is a core $PM_{2.5}$ site that is used to determine compliance with national standards.		

Sensor Type	**Ozone**	Appendix C Method Code	47
Network Designation	SLAMS	Probe Height Residence Time	12 Meters 5.1 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/1/1978	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{10-2.5}$ (coarse)**	Appendix C Method Code	185
Network Designation	Other / (NCORE)	Probe Height	12 Meters
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	4/1/2011	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS Primary	Probe Height	12 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Daily	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	02/23/1999	Appendix E Siting Criteria	Yes

Lawrenceville, continued

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS Secondary	Probe Height	12 Meters
Purpose	QA/Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Every six days	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure / Quality Assurance
Monitor Start Date	1/1/2005	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$** FEM	Appendix C Method Code	170
Network Designation	SLAMS Tertiary	Probe Height	12 Meters
Purpose	QA/Co-located Monitor AQI Reporting	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	08/07/2015	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$ Speciation**	Appendix C Method Code	812
Network Designation	Other (CSN)	Probe Height (m)	12 Meters
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Not Assigned
Appendix A QA Assessment	Yes	Appendix D Objectives	Unknown
Monitor Start Date	6/30/2001	Appendix E Siting Criteria	Yes

Sensor Type	**Carbon Monoxide**	Appendix C Method Code	593
Network Designation	SLAMS	Probe Height Residence Time	12 Meters 8.9 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	4/1/2010	Appendix E Siting Criteria	Yes

Lawrenceville, continued

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	600
Network Designation	SLAMS	Probe Height Residence Time	12 Meters 13.5 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	4/1/2010	Appendix E Siting Criteria	Yes

Sensor Type	**Total Reactive Oxides of Nitrogen (NO_y)**	Appendix C Method Code	699
Network Designation	Other (NCORE)	Probe Height Residence Time	12 Meters 14.7 Seconds
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	4/2/2010	Appendix E Siting Criteria	Yes

Sensor Type	**HAP Metals / TSP (See Section A2.1)**	Appendix C Method Code	N/A
Network Designation	Other (SPM)	Probe Height Residence Time	12 Meters
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	N/A
Sample Frequency	Every Six days	Appendix D Scale	N/A
Appendix A QA Assessment	N/A	Appendix D Objectives	N/A
Monitor Start Date	1/4/2013	Appendix E Siting Criteria	Yes

Lawrenceville Area Information

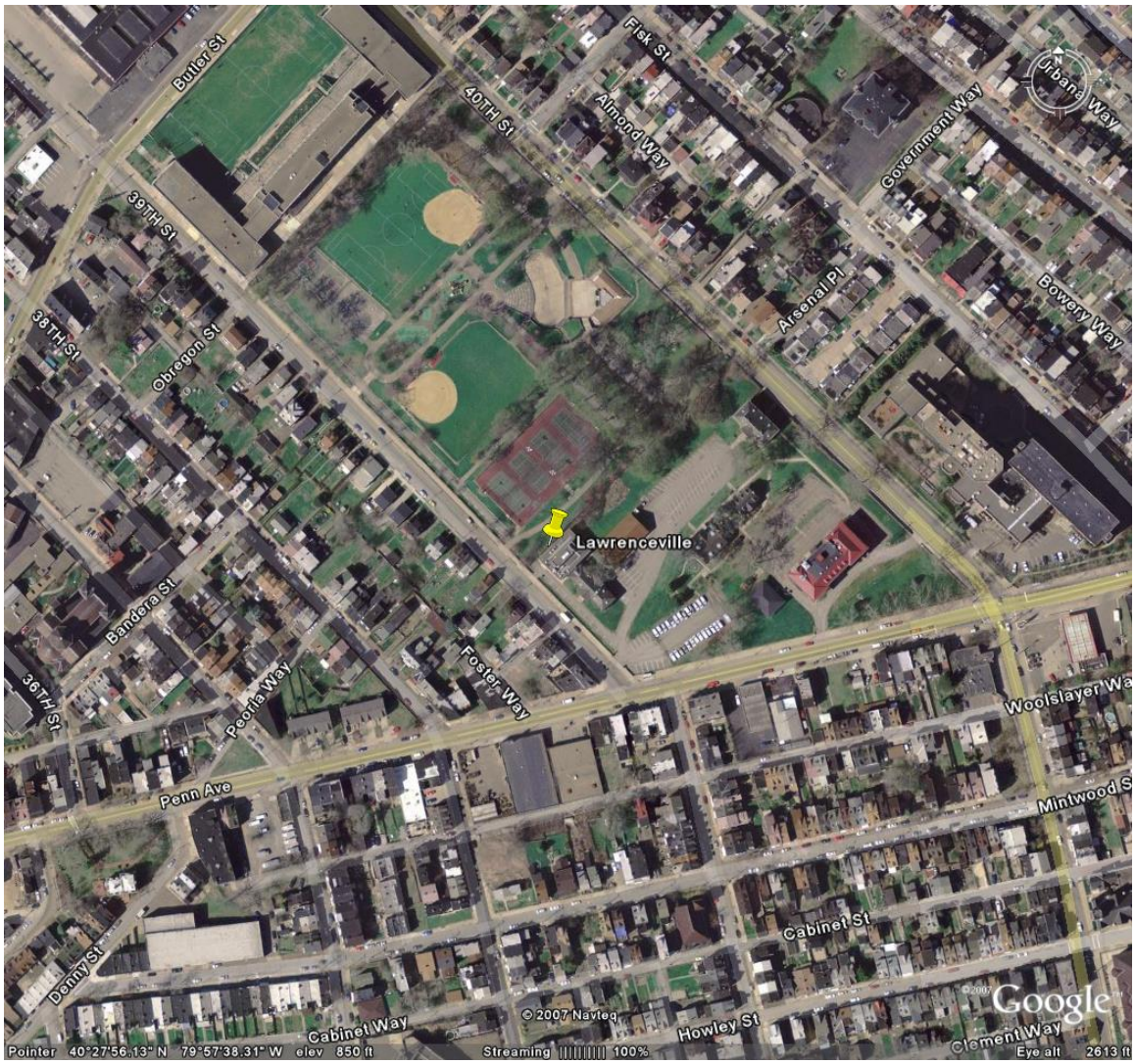
Street Name	Traffic Count (AADT)
39th Street (20 m)	Unavailable
Penn Avenue (86 m)	7,785 (PennDot 2015)
Butler Street (343 m)	7,371 (PennDot 2014)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South	Wall	1	2 to 3 m
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Flat
East		Flat
South		Flat
West		Flat

Figure 10.1 Lawrenceville Location Map



10.2 Liberty

Address	South Allegheny High School 2743 Washington Blvd McKeesport, PA 15133		
AQS#	42-003-0064	MSA	Pittsburgh
Latitude (N)	40.323768	Longitude (W)	-79.868062
Comments	This site is in a suburban area about 3 km downwind of the US Steel Clairton Coke Works. The area around this monitoring site has a long history of higher than average levels of $PM_{2.5}$, PM_{10} and sulfur dioxide. Significant ambient levels of benzene have also been measured and documented at this site. Liberty is a core $PM_{2.5}$ site that is used to determine compliance with national standards. At the request of US Steel, telemetry devices have been installed on the PM_{10}, $PM_{2.5}$ and SO_2 monitors that transmit continuous readings via radio signals to a location within the US Steel facility. Other transmitters are also in use: Lincoln PM_{10} monitor, Glassport PM_{10} monitor and North Braddock SO_2 monitor and sonic anemometer. This real-time data allows US Steel to minimize fugitive emissions and to adjust production levels to keep particulate levels and gaseous emissions within allowable ambient levels in downwind communities.		

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS Primary	Probe Height	8 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Daily	Appendix D Scale	Neighborhood, Highest Concentration
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/23/1999	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS Secondary	Probe Height	8 Meters
Purpose	QA/Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood, Highest Concentration
Appendix A QA Assessment	Yes	Appendix D Objectives	Quality Assurance
Monitor Start Date	1/1/2005	Appendix E Siting Criteria	Yes

Liberty, continued

Sensor Type	**$PM_{2.5}$** FEM	Appendix C Method Code	183
Network Designation	SLAMS Tertiary	Probe Height	8 meters
Purpose	QA/Co-located Monitor AQI Reporting	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood, Highest Concentration
Appendix A QA Assessment	Yes	Appendix D Objectives	Neighborhood, Highest Concentration
Monitor Start Date	11/01/2017	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}** FRM	Appendix C Method Code	141
Network Designation	SLAMS Primary	Probe Height	8 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/1/2005	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}** FRM	Appendix C Method Code	141
Network Designation	SLAMS Secondary	Probe Height	8 Meters
Purpose	QA/Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure / Quality Assurance
Monitor Start Date	4/21/1987	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}** FEM	Appendix C Method Code	79
Network Designation	SLAMS Tertiary	Probe Height	8 Meters
Purpose	Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/1/1992	Appendix E Siting Criteria	Yes

Liberty, continued

Sensor Type	**$PM_{2.5}$ Speciation**	Appendix C Method Code	Multiple
Network Designation	Other (CSN)	Probe Height	8 Meters
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Unassigned
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	10/6/2003	Appendix E Siting Criteria	Yes

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	600
Network Designation	SLAMS	Probe Height Residence Time	8 Meters 11.5 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/1/1969	Appendix E Siting Criteria	Yes

Sensor Type	**Hydrogen Sulfide**	Appendix C Method Code	N/A
Network Designation	Special Purpose monitor	Probe Height Residence Time	8 Meters 11.5 Seconds
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	N/A
Sample Frequency	Hourly	Appendix D Scale	N/A
Appendix A QA Assessment	N/A	Appendix D Objectives	N/A
Monitor Start Date	1/1/1981	Appendix E Siting Criteria	Yes

Sensor Type	**BTEX / Sorbent Tube** See Section A3.1	Appendix C Method Code	N/A
Network Designation	Special Purpose Monitor	Probe Height Residence Time	8 Meters 3.1 Seconds
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	N/A
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	N/A	Appendix D Objectives	N/A
Monitor Start Date	2/1/2014	Appendix E Siting Criteria	Yes

Liberty Area Information

Street Name	Traffic Count (AADT)
Washington Blvd. (283 m)	2080 (PennDot 2013)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Valley	Rough
East		Rolling
South	Valley	Rolling
West		Rolling

Figure 10.2 Liberty Location Map

10.3 Lincoln

Address	Bellbridge Road Elizabeth, PA 15037		
AQS#	42-003-7004	MSA	Pittsburgh
Latitude (N)	40.308219	Longitude (W)	- 79.869134
Comments	This site is at an elevated location, directly across the Monongahela River and downwind from the US Steel Clairton Coke Works. Although this area is not populated, it is upwind of populated areas and it is modeled to be the maximum impact area.		

Sensor Type	**PM_{10}** FEM	Appendix C Method Code	79
Network Designation	SLAMS	Probe Height	5 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Middle
Appendix A QA Assessment	Yes	Appendix D Objectives	Highest Concentration
Monitor Start Date	1/15/1993	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$** Non-FEM	Appendix C Method Code	716
Network Designation	Other (SPM)	Probe Height	5 Meters
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	N/A
Sample Frequency	Hourly	Appendix D Scale	Middle
Appendix A QA Assessment	N/A	Appendix D Objectives	Highest Concentration
Monitor Start Date	11/01/2011	Appendix E Siting Criteria	Yes

Lincoln Area Information

Street Name	Traffic Count (AADT)
Lincoln Blvd. (238 m)	6931 (PennDot 2014)
Bellbridge Rd. (428 m)	2203 (PennDot 2014)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Industrial
West	Industrial

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Valley	Rolling
East	Valley	Rolling
South	Hills	Rough
West	River	Rough

Figure 10.3 Lincoln Location Map

10.4 Glassport

Address	Water Tower on High Street Glassport, PA 15045		
AQS#	42-003-3006	MSA	Pittsburgh
Latitude (N)	40.326008	Longitude (W)	-79.881703
Comments	Located in a residential area, this site is population oriented and is impacted by the US Steel Clairton Coke Works, the Irvin Works and other sources in the Monongahela river valley. Glassport High Street is the site of the County's last documented exceedance of the federal 24-hour PM_{10} standard of 150 µg/m^3 (October, 1997).		

Sensor Type	**PM_{10}** FEM	Appendix C Method Code	79
Network Designation	SLAMS	Probe Height	2 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/6/1995	Appendix E Siting Criteria	Yes

Glassport Area Information

Street Name	Traffic Count (AADT)
High Street (8m)	Unavailable
Scenic Street (53m)	Unavailable
Washington Blvd (140m)	2080 (PennDot 2013)
Pacific Ave. (202m)	4450 (PennDot 2012)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North	Water Tower	25	9
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Flat
East		Flat
South		Flat
West		Flat

Figure 10.4.1 Glassport Location Map

Figure 10.4.2 Liberty, Lincoln and Glassport Location Map

10.5 North Braddock

Address	North Braddock Borough Building 600 Anderson Street Braddock, PA 15104		
AQS#	42-003-1301	MSA	Pittsburgh
Latitude (N)	40.402328	Longitude (W)	-79.860973
Comments	This suburban site is population oriented. The area around this site is impacted by the US Steel Edgar Thomson Works, which is a basic steel production facility, located about 1.5 km away from the monitoring site. North Braddock is a core $PM_{2.5}$ site that is used to determine compliance with national standards.		

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS	Probe Height	7 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/30/1999	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}** FEM	Appendix C Method Code	122
Network Designation	SLAMS	Probe Height	7 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/1/2011	Appendix E Siting Criteria	Yes

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	92
Network Designation	SLAMS	Probe Height Residence Time	7 Meters 14.4 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Highest Concentration
Monitor Start Date	1/1/2014	Appendix E Siting Criteria	Yes

North Braddock Area Information

Street Name	Traffic Count (AADT)
Bell Avenue (13 m)	2882 (PennDot 2012)
Anderson St. (40 m)	Unavailable
Braddock Ave. (370 m)	6349 (PennDot 2015)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential, Industry
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Hills	Rolling
East	Hills	Rolling
South	River	Rolling
West		Rolling

Figure 10.5 North Braddock Location Map

10.6 Harrison

Address	Highlands Senior High School 1500 Pacific Avenue Natrona Heights, PA 15065		
AQS#	42-003-1008	MSA	Pittsburgh
Latitude (N)	40.617488	Longitude (W)	-79.727664
Comments	This suburban site is population-based and community oriented. This is a core $PM_{2.5}$ site used to determine compliance with national standards. This ozone monitoring site is positioned downwind of the Pittsburgh Central Business District and is expected to demonstrate maximum ozone concentrations. The nitrogen oxides monitor adds significant value to the ozone data.		

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS	Probe Height	8 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	2/13/1999	Appendix E Siting Criteria	Yes

Sensor Type	**Ozone**	Appendix C Method Code	47
Network Designation	SLAMS	Probe Height Residence Time	10 Meters 4.5 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Highest Concentration
Monitor Start Date	2/12/2014	Appendix E Siting Criteria	yes

Sensor Type	**Oxides of Nitrogen**	Appendix C Method Code	99
Network Designation	SLAMS	Probe Height Residence Time	10 Meters 14.7 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	2/12/2014	Appendix E Siting Criteria	Yes

Harrison Area Information

Street Name / Distance	Traffic Count (AADT)
Idaho Ave (31m)	Unavailable
Pacific Ave (103m)	Unavailable
Freeport Road (326 m)	8018 (PennDot 2008)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Industrial

Direction	Obstructions	Height (m)	Distance (m)
North	Wall	3	20
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Flat
East		Rough
South	Valley	Rough
West	Valley	Rolling

Figure 10.6 Harrison Location Map

10.7 South Fayette

Address	South Fayette Elementary School 3640 Old Oakdale Road McDonald, PA 15057		
AQS#	42-003-0067	MSA	Pittsburgh
Latitude (N)	40.375644	Longitude (W)	-80.169943
Comments	This suburban site is population-based and is the regional transport site for O_3, SO_2 and $PM_{2.5}$. Located in the western portion of the county, this site monitors pollution levels entering the County on prevailing winds. South Fayette is a core $PM_{2.5}$ site that is used to determine compliance with national standards. The elevation of this site might suggest that elevated overnight ozone concentrations (atypical) are due to stratospheric intrusion.		

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS	Probe Height	8 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Regional Transport, Upwind Background
Monitor Start Date	1/1/1995	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}** FRM	Appendix C Method Code	141
Network Designation	SLAMS	Probe Height	8 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	General/Background
Monitor Start Date	3/27/1987	Appendix E Siting Criteria	Yes

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	60
Network Designation	SLAMS	Probe Height Residence Time	8 Meters 10.2 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	General/Background
Monitor Start Date	7/1/1980	Appendix E Siting Criteria	Yes

South Fayette, continued

Sensor Type	**Ozone**	Appendix C Method Code	187
Network Designation	SLAMS	Probe Height Residence Time	8 Meters 10.2 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Regional
Appendix A QA Assessment	Yes	Appendix D Objectives	General/Background, Regional Transport
Monitor Start Date	1/1/1980	Appendix E Siting Criteria	Yes

South Fayette Area Information

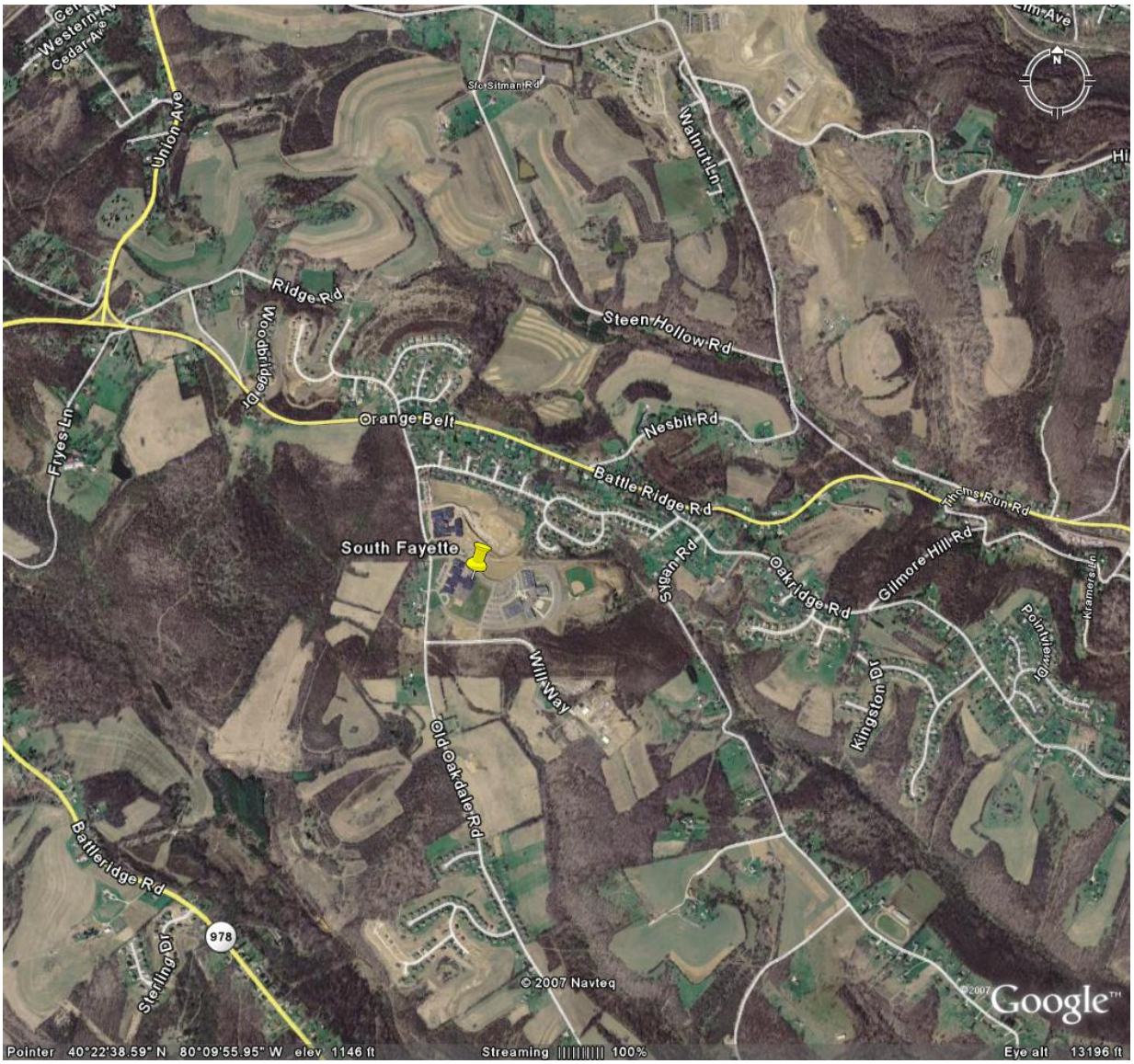
Street Name / Distance	Traffic Count (AADT)
Old Oakdale Rd. (142m)	Unavailable
Cannon Gate Dr. (377m)	Unavailable
Battle Ridge Rd. (554m)	5194 (PennDot 2014)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Agriculture
West	Agriculture

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Rolling
East		Rolling
South		Rolling
West		Rolling

Figure 10.7 South Fayette Location Map



10.8 Clairton

Address	Clairton Education Center 501 Waddel St. Clairton, PA 15025		
AQS#	42-003-3007	MSA	Pittsburgh
Latitude (N)	40.294341	Longitude (W)	-79.885331
Comments	This is a population-oriented, suburban site that is located within an environmental justice area. Site selection was based on this location being within the Monongahela Valley and generally upwind of the USX Clairton Coke Works. During times of temperature inversions and atypical wind direction, the coke works and other sources in the Monongahela River valley impact this site.		

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS	Probe Height	8 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days Waiver Provision	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Welfare Concerns
Monitor Start Date	1/1/2001	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}** FRM	Appendix C Method Code	141
Network Designation	SLAMS	Probe Height	8 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Welfare Concerns
Monitor Start Date	4/8/1992	Appendix E Siting Criteria	Yes

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	600
Network Designation	SPM	Probe Height Residence Time	8 Meters 7.7 Seconds
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	01/14/2019	Appendix E Siting Criteria	**No**

Clairton Area Information

Street Name / Distance	Traffic Count (AADT)
Large Ave (29m)	Unavailable
Waddell Ave. (64m)	Unavailable
6th St. (144m)	Unavailable
Saint Clair Ave. (158m)	1763 (PennDot 2012)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Commercial
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	valley	rolling
East	valley	rolling
South		flat
West	valley	rolling

Figure 10.8 Clairton Location Map

10.9 Avalon

Address	520 Orchard Ave. Avalon, PA 15202		
AQS#	42-003-0002	MSA	Pittsburgh
Latitude (N)	40.499767	Longitude (W)	-80.071337
Comments	This is a population-oriented, suburban site previously impacted by the PM and SO_2 coke works' emissions. Many odor and air pollution complaints were from communities near this monitoring site. However, the coke works permanently ceased operations in 2016. As a result, the 2016 1-hour SO_2 DV is half the 2010 DV. Avalon is a core $PM_{2.5}$ site that is used to determine compliance with national standards.		

Sensor Type	**$PM_{2.5}$** FEM	Appendix C Method Code	183
Network Designation	SLAMS (Primary)	Probe Height	5 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/1/2017	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS (Secondary)	Probe Height	5 Meters
Purpose	QA / Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	6/8/2011	Appendix E Siting Criteria	Yes

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	60
Network Designation	SLAMS	Probe Height Probe Residence	5 Meters 16.2 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/1/2006	Appendix E Siting Criteria	Yes

Avalon, continued

Sensor Type	**Hydrogen Sulfide**	Appendix C Method Code	N/A
Network Designation	Special Purpose monitor	Probe Height Residence Time	5 Meters 16.2 Seconds
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	N/A
Sample Frequency	Hourly	Appendix D Scale	N/A
Appendix A QA Assessment	N/A	Appendix D Objectives	N/A
Monitor Start Date	1/1/2006	Appendix E Siting Criteria	Yes

Avalon Area Information

Street Name / Distance	Traffic Count (AADT)
Spruce St. (7m)	Unavailable
Orchard Ave. (33m)	Unavailable
South Birmingham Ave. (50m)	Unavailable
Ohio River Blvd. (59m)	14,140 (PennDot 2012)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Commercial
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North	Building	2	30
East	Building	4	20
South	Building	3	43
West	Building	4	15

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Hill	Rolling
East		Flat
South	River	Flat
West		Flat

Figure 10.9 Avalon Location Map

10.10 Flag Plaza

Address	Boy Scouts of America Building 1275 Bedford Avenue Pittsburgh, PA 15219		
AQS#	42-003-0031	MSA	Pittsburgh
Latitude (N)	40.443367	Longitude (W)	-79.990293
Comments	This is an urban-based site located at the Central Business District boundary limits. It is in a downwind position between the Central Business District and a densely populated environmental justice area.		

Sensor Type	**PM_{10}** FEM	Appendix C Method Code	79
Network Designation	SLAMS	Probe Height	10 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	4/26/1992	Appendix E Siting Criteria	Yes

Sensor Type	**Carbon Monoxide**	Appendix C Method Code	93
Network Designation	SLAMS	Probe Height Residence Time	10 Meters 9.5 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	5/5/2003	Appendix E Siting Criteria	Yes

Sensor Type	**Air Toxics** VOCs/SUMMA canister	Appendix C Method Code	150
Network Designation	Other	Probe Height	10 Meters
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Not Assigned
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/1/1995	Appendix E Siting Criteria	Yes

Flag Plaza, continued

Sensor Type	**Air Toxics** Carbonyls/DNPH cartridge	Appendix C Method Code	102
Network Designation	Other	Probe Height	10 Meters
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Not assigned
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	1/1/1995	Appendix E Siting Criteria	Yes

Flag Plaza Area Information

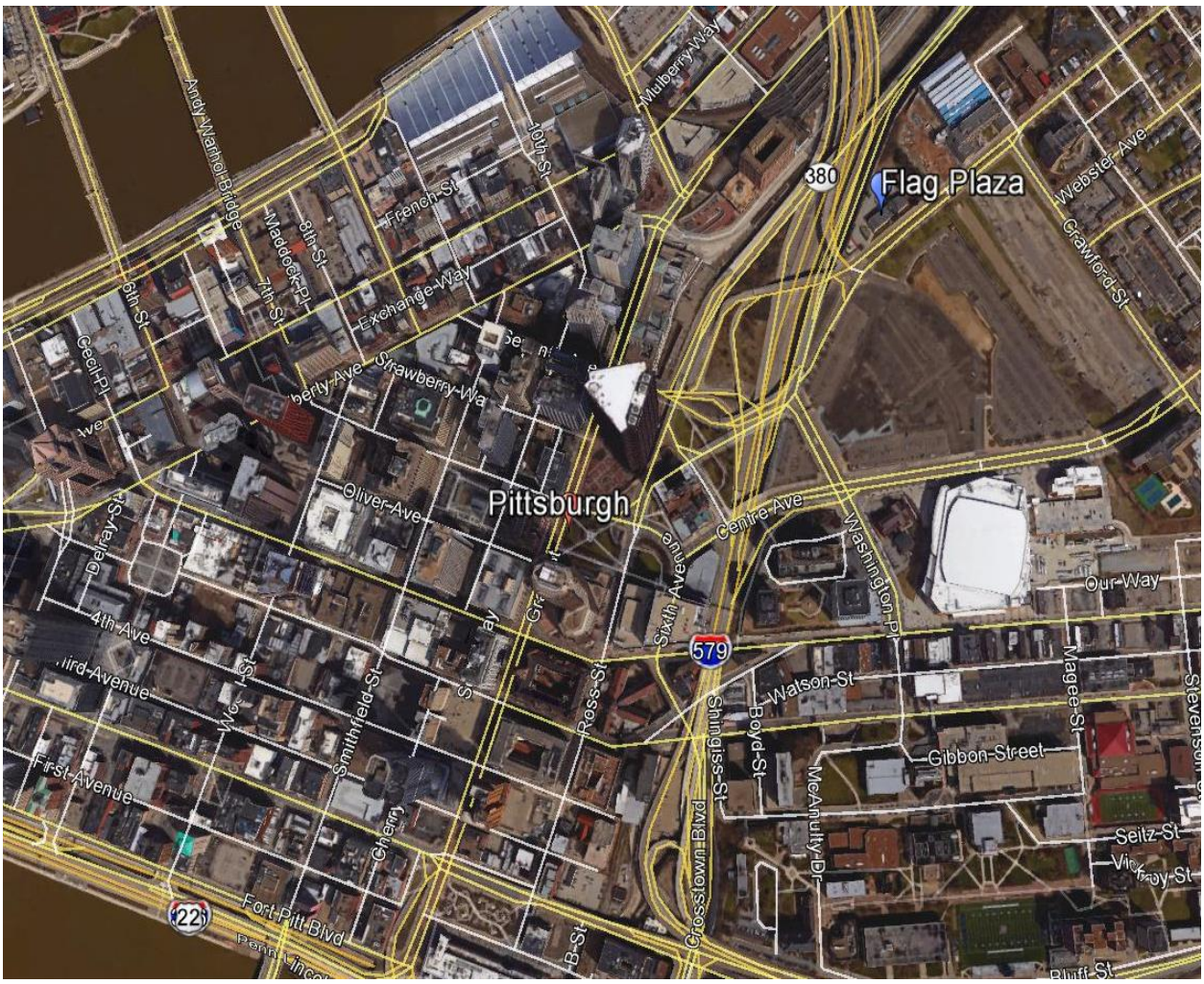
Street Name / Distance	Traffic Count (AADT)
Bedford Ave (17m)	5220 (PennDot 2015)
Rt. 579 (65m)	46,422 (PennDot 2012)
Bigelow Blvd. (105m)	20,221 (PennDot 2015)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Commercial
East	Residential
South	Commercial
West	Commercial

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West	Building	5	130

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	River	Flat
East	City	Flat
South	City	Rough
West	City	Rough

Figure 10.10 Flag Plaza Location Map



10.11 Manchester

Address	Manchester Elementary School 1612 Manhattan Street Pittsburgh, PA 15233		
AQS#	42-003-0092	MSA	Pittsburgh
Latitude (N)	40.456427	Longitude (W)	-80.026740
Comments	Located to the northwest of downtown Pittsburgh, this population oriented suburban site is also an environmental justice area. Sources of influences are numerous, as this community is located near various warehouse/light-industrial facilities along Ohio River valley. There is also a significant contribution by mobile sources.		

Sensor Type	**PM_{10}** FRM	Appendix C Method Code	141
Network Designation	SLAMS	Probe Height	7 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood, Welfare Concerns
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	10/24/1989	Appendix E Siting Criteria	Yes

Manchester Area Information

Street Name / Distance	Traffic Count (AADT)
Manhattan St (50m)	Unavailable
Chateau St (220m)	8565 (PennDot 2011)
Ohio River Blvd. (253)	29,100 (PennDot 2010)

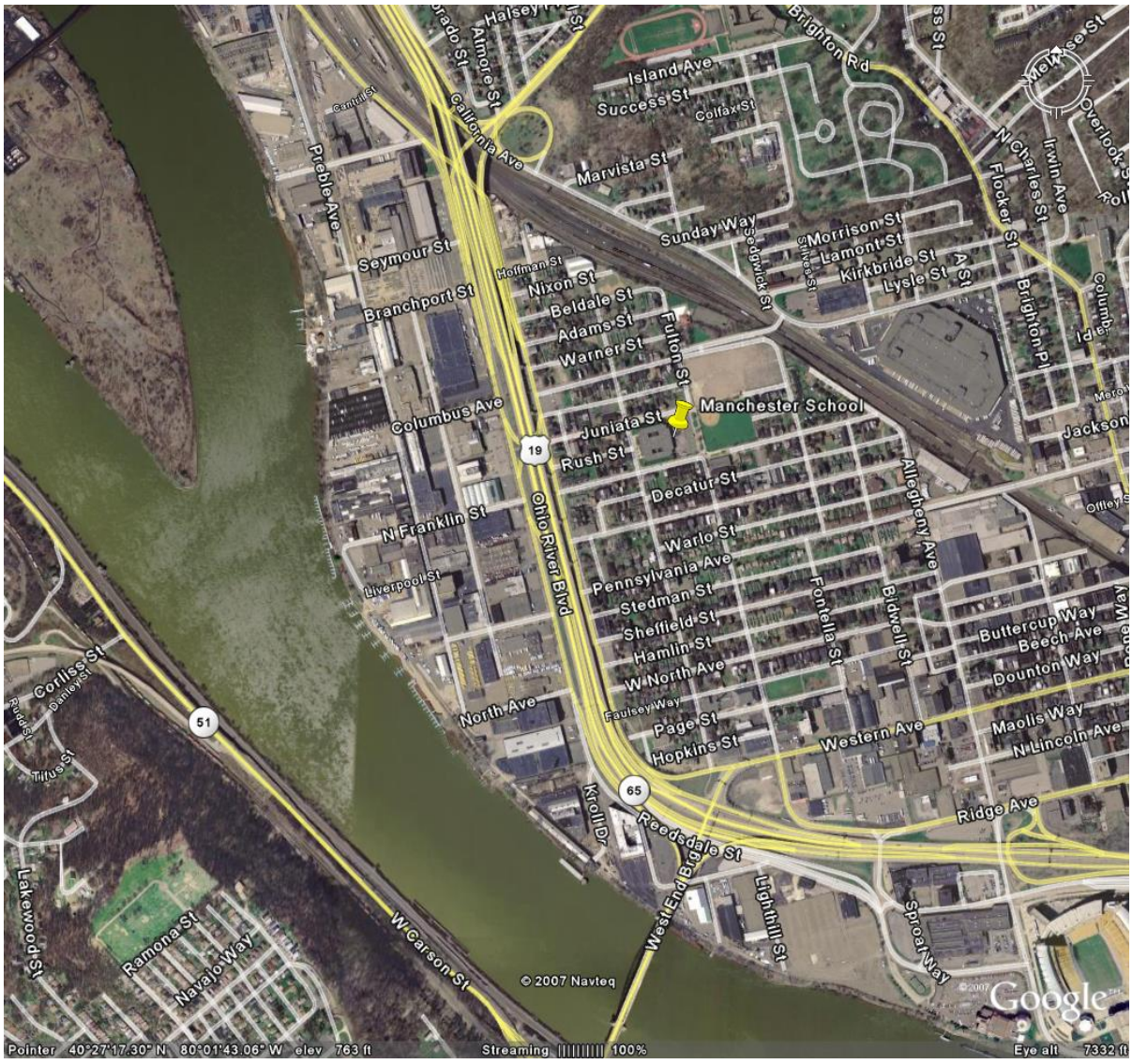
Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Manchester, continued

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Flat
East	Hills	Flat
South		Flat
West	River	Flat

Figure 10.11 Manchester Location Map



10.12 North Park

Address	North Park Golf Course 10200 Kummer Road Wexford, PA 15090		
AQS#	42-003-0093	MSA	Pittsburgh
Latitude (N)	40.606624	Longitude (W)	-80.021669
Comments	Located in the northern residential portion of the County and outside of industrialized river valleys, this suburban site was created as a $PM_{2.5}$ background site and to provide for even geographical distribution of the $PM_{2.5}$ monitoring network.		

Sensor Type	**$PM_{2.5}$** FRM	Appendix C Method Code	145
Network Designation	SLAMS	Probe Height	5 Meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days Waiver Provision	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Regional Background
Monitor Start Date	3/25/1999	Appendix E Siting Criteria	Yes

North Park Area Information

Street Name / Distance	Traffic Count (AADT)
Kummer Rd. (229m)	3583 (PennDot 2014)
Pierce Mill Rd. (580m)	2397 (PennDot 2011)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Agriculture
East	Agriculture
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

North Park, continued

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Rolling
East		Rolling
South		Rolling
West		Rolling

Figure 10.12 North Park Location Map

10.13 Parkway East

Address	Hosanna House Event Center 400 Sherwood Road Pittsburgh, PA 15221		
AQS#	42-003-1376	MSA	Pittsburgh
Latitude (N)	40.437430	Longitude (W)	-79.863572
Comments	This site was installed to comply with NO_2 design criteria. Monitor inlets sample air at 18 meters from the nearest traffic lane of Route 376 (Parkway East). This location was approved by EPA as a near road monitoring site that measures population exposure to roadway emissions. Concentration data for CO and NO_2 are near network maximums.		

Sensor Type	**Oxides of Nitrogen (NO_2)** Trace Level	Appendix C Method Code	599
Network Designation	SLAMS	Probe Height Residence Time	3 Meters 5.3 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Microscale
Appendix A QA Assessment	Yes	Appendix D Objectives	Highest Concentration
Monitor Start Date	9/1/2014	Appendix E Siting Criteria	Yes

Sensor Type	**Carbon Monoxide (CO)** Trace Level	Appendix C Method Code	593
Network Designation	SLAMS	Probe Height Residence Time	3 Meters 3.2 Seconds
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Microscale
Appendix A QA Assessment	Yes	Appendix D Objectives	Highest Concentration
Monitor Start Date	9/1/2014	Appendix E Siting Criteria	Yes

Sensor Type	**Black Carbon Monitor** 7-channel Aethalometer	Appendix C Method Code	894
Network Designation	Other	Probe Height (m)	4 Meters
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Microscale
Appendix A QA Assessment	Yes	Appendix D Objectives	Highest Concentration
Monitor Start Date	9/1/2014	Appendix E Siting Criteria	Yes

Parkway East, continued

Sensor Type	**$PM_{2.5}$** FEM	Appendix C Method Code	183
Network Designation	SLAMS	Probe Height	4 meters
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Microscale
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Source Oriented
Monitor Start Date	1/1/2016	Appendix E Siting Criteria	Yes

Parkway East Area Information

Street Name / Distance	Traffic Count (AADT)
Penn Lincoln Parkway, Rt. I-376 (18 m)	75,971 (PennDot 2014)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East	Trees	15	33
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Rolling
East	Hill	Rough
South		Rolling
West		Rolling

Figure 10.13 Parkway East Location Map

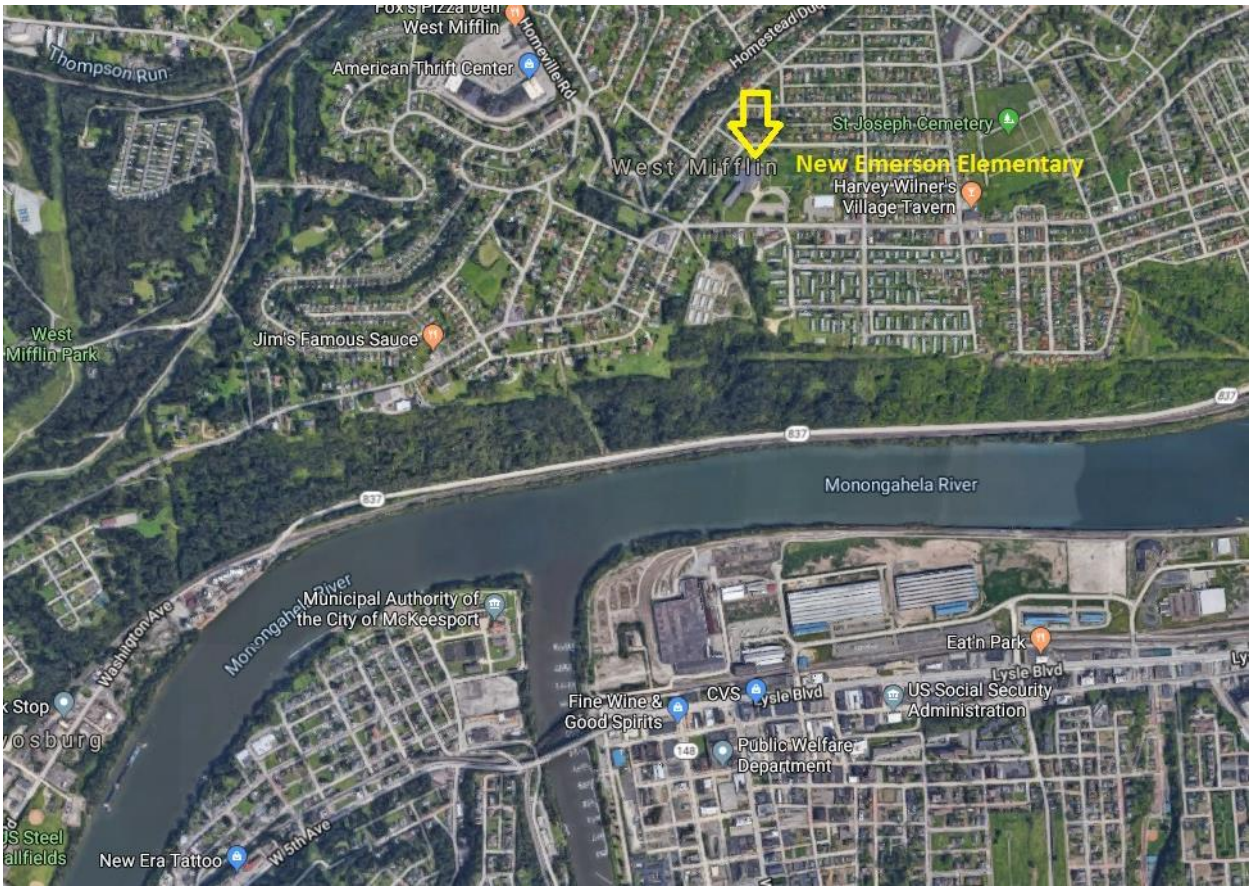
10.14 West Mifflin (Special Purpose Site)

Address	New Emerson Elementary School 1922 Pennsylvania Avenue West Mifflin, PA 15122		
AQS#	N/A	MSA	Pittsburgh
Latitude (N)	40.363144	Longitude (W)	-79.864837
Comments	Installed as a special study site in response to a temporary outage of sulfur dioxide control equipment at a local plant. **This site is scheduled to be discontinued within one year of the installation date.**		

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	600
Network Designation	SLAMS	Probe Height Residence Time	Meters 6 Seconds 6.8
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Hourly	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Start Date	2/11/2019	Appendix E Siting Criteria	No

Sensor Type	**BTEX / Sorbent Tube** See Section A3.1	Appendix C Method Code	N/A
Network Designation	Special Purpose Monitor	Probe Height Residence Time	6 Meters 3.1 Seconds
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	N/A
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	N/A	Appendix D Objectives	Population Exposure
Monitor Start Date	2/11/2019	Appendix E Siting Criteria	No

Figure 10.14 West Mifflin Location Map



11.0 GLOSSARY OF TERMS AND ABBREVIATIONS

NAAQS	National Ambient Air Quality Standards. These standards apply only to the six criteria pollutants
Criteria Pollutants	Air pollutants considered harmful to public health and the environment (carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, lead, particulate matter: PM_{10}, $PM_{2.5}$)
FRM	Federal Reference Method. Primary measurement methods designated by the USEPA for measurement of criteria pollutants and determination of compliance with NAAQS.
FEM	Federal Equivalent Method. Secondary methods approved by the USEPA for measurement of criteria pollutants and determination of compliance with NAAQS.
TSP	Total Suspended Particles. TSP samplers are filter based, operate at a high flow rate and have no particle sizing device. An FRM monitoring method further analyzed for metals.
PM_{10}	All suspended particles equal to or smaller than 10 microns.
$PM_{2.5}$	All suspended particles equal to or smaller than 2.5 microns. Also frequently referred to as fine particulates.
PM (coarse)	All suspended particulates smaller than10 microns but larger than 2.5 microns, also often referred to as $PM_{10\text{-}2.5}$. EPA has not assigned a NAAQS to this parameter as of the date of this document.
Lead (Pb)	Lead Monitoring. Laboratory analysis of TSP filters. This analysis is performed according to the federal reference method for lead monitoring.
Speciation	$PM_{2.5}$ speciation monitor. Multiple filter based samples which yield a breakdown of $PM_{2.5}$ composition. Analytes include heavy metals, sulfates, nitrates and various species of carbon. Analysis is conducted by the US EPA national contract lab.
Aethalometer	A continuous monitor designed to measure diesel mobile emissions by quantifying black carbon particles. This is a research instrument and does not determine compliance with NAAQS.
Benzene	C_6H_6. A six carbon aromatic ring known to be a carcinogen. Emitted by mobile and industrial sources in Allegheny County.
PAMS	Photochemical Assessment Monitoring Stations
VSCC	Very Sharp Cut Cyclone. An particulate sizing device for use with $PM_{2.5}$ FRM and FEM monitors. The VSCC is commonly used to accomplish the final $PM_{2.5}$ size cut in low flow (16.7 lpm), continuous particulate monitors.
CO	Carbon Monoxide. Measured using a continuous automated analyzer.
SO_2	Sulfur Dioxide. Measured using a continuous automated analyzer.
NO_x	Oxides of nitrogen, including nitric oxide and nitrogen dioxide. Measured using a continuous automated analyzer.

NO_y	Total reactive nitrogen. A collective name for oxidized forms of nitrogen in the atmosphere such as nitric oxide (NO), nitrogen dioxide (NO_2), nitric acid (HNO_3), and numerous short lived and reactive organic nitrates (but **not** NH_3). These compounds play important roles in atmospheric ozone and ultra-fine particle formation.
O_3	Ozone. Measured using a continuous automated analyzer.
NCORE	National Core Monitoring Network, consisting of multi-pollutant ambient air monitoring sites, and specializing in $PM_{2.5}$ and associated precursor gases. These sites will be known as "CORE" sites starting 2019.
Near Road	Monitoring site designed to measure peak exposure to roadway emissions. Required monitoring parameters are NO_2, CO and $PM_{2.5}$. Installation of near road monitoring sites were required by revisions to the NO_2 NAAQS during 2010.
SPM	Special Purpose Monitor. An SPM is defined as any network monitor that the agency has designated as a special purpose monitor in its annual monitoring network plan and in AQS. SPMs do not count when showing compliance with the minimum requirements for the number and siting of monitors of various types.
TEOM	(Tapered Element Oscillating Microbalance) this technology is used by the Thermo-Scientific model 1400ab continuous particulate monitor, which has FEM designation for PM_{10} measurement. This monitor is also used as a $PM_{2.5}$ non-regulatory monitor (e.g., AQI purposes) by adding a VSCC.
BAM	Beta Attenuation Monitor. This technology is used by the Met One BAM1020 and the Thermo Scientific 5014i continuous particulate monitors, both which have FEM designation for PM_{10} measurement and for $PM_{2.5}$ measurement with the addition of a VSCC.
Sonic Anemometer	A method to measure wind speed and wind direction that uses ultrasonic sound waves to precisely measure wind speed and wind direction. This method features much better accuracy, sensitivity and longevity as compared to the traditional "cup and vane" wind sensing method. The sonic anemometers utilized by the department are heated to avoid ice accumulation on the sensors.
AADT	Annual Average Daily Traffic count. This is the unit of measure used in this report to indicate vehicular traffic density as received from Penn Dot (Pennsylvania Department of Transportation), and represents the daily two-way traffic count averaged over a calendar year for the indicated roadway segment. The year that the data was collected is included for each count.
TO15	A method of air toxics sampling employed a Flag Plaza air monitoring site. Operated every 6 days for 24 hours, the sample is collected into a special prepared stainless steel canister and is then sent to the laboratory at the Maryland Department of the Environment for analysis. The analysis tests for 62 volatile organic compounds.
TO11	A method of air toxics sampling employed a Flag Plaza air monitoring site. Operated every 6 days for 24 hours, the sample is collected into a 2,4-DNPH (dinitrophenylhydrazine) cartridge and is analyzed by Philadelphia Air Monitoring Section Laboratory. This procedure has been written specifically for the sampling and analysis of formaldehyde, the most important carbonyl that participates in ozone formation. However, the analysis also yields acetone, propionaldehyde acetaldehyde, benzaldehyde, methyl ethyl ketone and methyl isobutyl ketone results

12.0 Public Comment Period

This network review is available for public comment as required by 40 CFR Part 58 §58.10. Comments are accepted by e-mail and conventional mail until the close of business on June 10, 2019. All comments received as well as ACHD responses will be included in the final version submitted to EPA Region III no later than July 1, 2019.

Submit comments by e-mail → darrell.stern@alleghenycounty.us

Submit comments by conventional mail →

Darrell Stern
301 39th Street, Building 7
Pittsburgh, PA 15201

12.1 Allegheny County Health Department Press Release

The Allegheny County Health Department will issue a press release to inform the public of the annual network plan comment period. The press release will provide a web link to the draft annual network plan and will explain how to submit written comments during the comment period.

Appendix A Special Study Projects

A1: Introduction

ACHD frequently conducts investigations and studies using techniques that produce quantifiable results by methods that may not be classified by the USEPA as approved reference or equivalent methods. Often these investigations originate as responses to citizen concerns or complaints. This section briefly describes special studies that are currently ongoing or have been discontinued within the past year. Data from these studies is not submitted to the AQS database, however much of it is available for review on the ACHD webpage or also may be available upon public request.

A2: HAP Metals Sampling

A2.1 Lawrenceville NCORE Site Metals

Since 2013, HAP metals are measured at the Lawrenceville NCORE site on a routine and ongoing basis. The sampler is a high-volume TSP sampler that uses high purity quartz filters. Sampling frequency is every six days and each sample is collected for 24 hours. Analysis is conducted by the West Virginia DEP's Guthrie Laboratory using an ICP/MS analytical method. The analysis includes Be, Cr, Mn, Ni, As, Cd and Pb. Data is available upon request.

A2.2 Lawrenceville Toxic Metals Study

A special study was initiated on 04/30/2011 in Lawrenceville in response to public concern about local exposure to toxic metals potentially being released into the community by a local foundry. Activities at this industrial site include an electric arc furnace and a steel foundry that casts railcar couplings.

ACHD conducts air sampling on plant property using a USEPA reference method PM_{10} sampler and high purity quartz filters. Sampling is conducted every three days and each sample operates for 24 hours at 40 cfm. The filter is analyzed by a contracted laboratory for manganese, lead and total chromium. Updated reports are available on the ACHD webpage.

A2.3 Kopp Glass Metals

Upon request by the USEPA, this study was conducted from April 1, 2017 through October 13, 2017 on the property of Kopp Glass, located in Swissvale PA. The initial sampler was located to the northwest of the plant, approximately 283 feet from the main stack to determine emissions of HAP metals during normal operating conditions at the plant. An additional sampler was added on July 30, 2017 and was located to the east southeast of the plant and 205 feet from the main stack. Both samplers were configured to collect PM_{10} filter samples over a 24-hour period. The exposed samples, along with all relevant flow and sample volume data, were shipped to the EPA contract laboratory (ERG) for analysis by ICP-MS for various HAP metals including Cd, Pb, Co, Mn, Se, As and Cr.

The EPA is currently analyzing the data from this study and will release the final report once completed.

A3 Volatile Organic Compound (VOC) Sampling

A3.1 Charcoal Tube Sampling

Charcoal tube sampling is used by ACHD routinely to measure ambient concentrations of targeted VOC's. 24-hour average samples are collected at Liberty every three days. Charcoal tube sampling was discontinued after December 2018 at the Avalon site due to uniform low results. Sampling was commenced on an every three day sampling schedule at the West Mifflin temporary sulfur dioxide monitoring location during February 2019.

Sampling is accomplished using sampling pumps calibrated to 1 liter per minute. Each tube is exposed for 24 hours, from midnight toil midnight. The exposed sorbent tubes are sent to the Allegheny County Medical Examiner's Laboratory for analysis by a GC/FID method for benzene, ethyl benzene, toluene, xylenes and naphthalene. Charcoal tube samples are also collected by field staff using battery powered personal samplers for shorter durations and higher flow rates during community investigations, usually in response to citizen odor complaints. Data is available upon request.

A3.2 Benzo[a]pyrene Monitoring

Benzo[a]pyrene is a polycyclic aromatic hydrocarbon that is a known human carcinogen and is potentially emitted by the metallurgical coking industry. ACHD currently monitors for this compound using an in-house developed method, analyzing PM_{10} high volume quartz filter samples using high pressure liquid chromatography (HPLC). PM_{10} filters from the Liberty air monitoring site are analyzed for benzo[a]pyrene since this site is impacted by emissions from the Clairton Coke Works. South Fayette station PM_{10} filters are also analyzed for benzo[a]pyrene to serve as an upwind background site. Benzo[a]pyrene was also monitored at the Avalon station until the PM_{10} sampler was removed from the site as of January 2017, in response to the permanent shutdown of Shenango Coke Works, which potentially impacted the Avalon station and the nearby community. Data is available upon request.

A4 Hydrogen Sulfide

Hydrogen Sulfide is an odorous compound that has a very low odor threshold concentration. Expectedly, numerous ongoing community odor complaints are common near industries that release hydrogen sulfide. Traditionally, ACHD has measured H_2S at monitoring sites impacted by the metallurgical coking industry. Hydrogen sulfide is routinely and continuously measured at the Liberty and Avalon air monitoring sites. Recent hourly hydrogen sulfide data is available on the Air Quality Program's portion of the ACHD website and historic data is available to the public upon request. The Department references ambient H_2S standards as listed in the Pennsylvania Code, Title 25, Chapter 131.3 (24-hour average not to exceed 0.005 ppm, 1-hour average not to exceed 0.1 ppm). ACHD is considering the discontinuation of the Avalon H_2S

monitor for 2020 due to uniform low results seen after the 2016 shut down of the near by coke works.

A5 Settled Particulate

Total settled particulate, also commonly referred to as dustfall, is collected and quantified in various locations in Allegheny County using ASTM method D 1793, which yields monthly average concentrations. This simple method is employed in response to complaints of heavy dust deposits in communities. Currently five collectors are maintained at Natrona Heights, Colllier Township and West Deer Township. The Department references settled particulate standards as listed in the Pennsylvania Code, Title 25, Chapter 131.3 (12-month average not to exceed 0.8 mg/cm^2/month, 30-day average not to exceed 1.5 mg/cm^2/month). Data is available upon request.

A6 Lincoln $PM_{2.5}$ Non-FEM

The Lincoln site has historically hosted a continuous non- FEM, $PM_{2.5}$ TEOM operating at 50°C. This non-regulatory monitor was installed for research purposes, with the goal of assessing maximum $PM_{2.5}$ concentrations and PM_{10} / $PM_{2.5}$ ratios in a middle scale environment. ACHD is considering the discontinuation of this monitor during 2019. The continuous PM_{10} FEM monitor will remain at Lincoln as a part of the SLAMS network.

Appendix B

Group Against Smog and Pollution (GASP) Document

GROUP AGAINST SMOG & POLLUTION
1133 South Braddock Ave., Suite 1A
Pittsburgh, PA 15218
412-924-0604
gasp-pgh.org

June 10, 2019

VIA EMAIL (darrell.stern@alleghenycounty.us)

Darrell Stern
Allegheny County Health Department
Air Quality Program
301 39th Street – Building 7
Pittsburgh, PA 15201

Re: Comments on 2020 Air Monitoring Network Plan

Dear Mr. Stern:

Kindly accept the attached comments of the Group Against Smog and Pollution ("GASP") regarding the Allegheny County Health Department ("ACHD") draft 2020 Air Monitoring Network Plan ("Draft Plan").

Thank you in advance for your consideration of these comments.

Very truly yours,

Very truly yours,

/s
Ned Mulcahy
Staff Attorney

attachment

COMMENTS OF GASP REGARDING ACHD'S
DRAFT 2020 AIR MONITORING NETWORK PLAN

The Clean Air Act ("CAA") requires each state implementation plan to "provide for establishment and operation of appropriate devices, methods, systems, and procedures necessary to … monitor, compile, and analyze data on ambient air quality."[1] Title 40 of the Code of Federal Regulations, Part 58, specifies "requirements for measuring ambient air quality and for reporting ambient air quality data and related information."[2] This includes design criteria for "[m]inimum ambient air quality monitoring network requirements used to provide support to the State implementation plans (SIP), national air quality assessments, and policy decisions."[3] In addition, objectives for a monitoring network also include providing "air pollution data to the general public in a timely manner" and supporting "air pollution research studies."[4] To properly serve this "variety of data needs," the total number of monitoring sites within the monitoring network "will be substantially higher than these minimum requirements provide."[5]

I. ACHD must examine the necessity of additional, permanent sulfur dioxide (SO_2) monitoring in the vicinity of Clairton Coke

"SIP control strategies for SO_2 abatement are usually keyed on achieving the [National Ambient Air Quality Standards ("NAAQS")] at … points of maximum concentration," thus the "[m]onitoring sites should be located at or near these points of maximum concentration as

[1] 42 U.S.C. § 7410(a)(2)(B).

[2] 40 C.F.R. § 58.2(a).

[3] 40 C.F.R. § 58.2(a)(5).

[4] 40 C.F.R. Part 58, App. D § 1.1.

[5] 40 C.F.R. Part 58, App. D § 1.1.2.

revealed by modelling to provide a continuing assessment of the situation."[6] When there is a single source "that contributes overwhelmingly to SO_2 pollution" in an area, it is "very desirable to monitor the maximum ground-level contribution from that source since the attainment and maintenance of the NAAQS in the area would be highly dependent on the effectiveness of control measures applied to that source."[7]

Compared to other sources, US Steel's Clairton Coke facility "contributes overwhelmingly to SO_2 pollution" in Allegheny County's Mon Valley.[8] Accordingly, ACHD's Liberty monitor is located to measure the maximum ground concentration.[9] However, this monitor location is based on an annual average of atmospheric conditions.[10] Data revealed by ACHD's additional SO_2 monitoring after the December 24, 2018, fire at Clairton Coke suggests a single site might not be sufficient to monitor for maximum concentration.

In the wake of the Clairton Coke fire, ACHD began monitoring SO2 at two site in the surrounding communities.[11] Neither of the monitors showed an exceedance of the SO_2 NAAQS through May 9, 2019 (the date the Draft Plan was published for public comment). [12] While these

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[6] Robert J. Ball & Gerald E. Anderson, *Optimum Site Exposure Criteria for SO_2 Monitoring*, § 2.3.1, (U.S.E.P.A. Pub. No. EPA-450/3-77-013) (1977). This is consistent with the Clean Air Act's directive that each state, and each local agency designated to implement the requirements of the Clean Air Act within a specific area of a state, must adopt an implementation plan to achieve and maintain the NAAQS "within the entire geographic area" of the state or specific area over which the local agency is responsible. *See* 42 U.S.C. § 7407(a).

[7] Ball & Anderson, *supra*, § 2.3.2.

[8] *See generally* Kelly, Marie, *Allegheny County Health Department Air Quality Program: Point Source Emissions Inventory Report 2015, 2016, 2017*, (date unknown), https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Resources/Data_and_Reporting/Air_Quality_Reports/2015-2017-Emission-Inventory-Report.pdf.

[9] ACHD, *Revision to the Allegheny County Portion of the Pennsylvania State Implementation Plan: Attainment Demonstration for the Allegheny, PA, SO2 Nonattainment Area, 2010 Standards*, September 14, 2017. *See also* Draft Plan § 10.2 (The Liberty "site is in a suburban area about 3 km downwind of the US Steel Clairton Coke Works.").

[10] *Id.* at 4-5.

[11] Draft Plan § 2.2.2.

[12] *Id.*

monitors are "exposed to all quality assurance procedures required for SLAMS monitors," by ACHD's own admission "the monitors do not meet all probe sighting criteria for SLAMS monitors."[13] In spite of this deficiency, the Clairton SO_2 monitor showed SO_2 levels substantially higher than those measured at the Liberty monitor from February 16, 2019, through March 3, 2019.[14] This raises significant concerns that the current SLAMS-compliant SO_2 monitors could be missing peak concentrations in the communities surrounding Clairton Coke. ACHD must examine this issue in greater detail, especially considering the unique and changing atmospheric conditions in the Mon Valley combined with the sporadic nature of SO_2 peak values.

II. EPA mismanagement is not a valid excuse for ACHD delaying its photochemical assessment monitoring station (PAMS) implementation

The original PAMS requirement appeared in the 1990 CAA amendments but only applied to serious non-attainment areas.[15] Updates to the ozone NAAQS in October 2015 included significant revisions to the PAMS requirements.[16] Specifically, EPA expanded the locations subject to PAMS and required "that monitoring agencies identify their plans to implement the PAMS measurements at NCore sites in their Annual Network Plan due July 1, 2018, and to begin making PAMS measurements at NCore sites by June 1, 2019."[17] On May 31, 2019 – just one day before the deadline – EPA published notice of its intent to extend the PAMS implementation

[13] *Id.*

[14] *See* attached Exhibit "A" (graph showing hourly SO_2 monitoring data for the Liberty, Clairton, and North Braddock SO_2 monitors January 20, 2019, through March 31, 2019.)

[15] 42 U.S.C. § 7511a(c)(1) ("In order to obtain more comprehensive and representative data on ozone air pollution, not later than 18 months after November 15, 1990, the Administrator shall promulgate rules, after notice and public comment, for enhanced monitoring of ozone, oxides of nitrogen, and volatile organic compounds.").

[16] 80 Fed. Reg. 65292 (October 26, 2015).

[17] *Id.*, at 65428.

until June 1, 2021.[18] While the EPA provided some attempt at an excuse in the aforementioned Notice, gross mismanagement of the PAMS program does not excuse ACHD from fulfilling its requirement to protect the health of local citizens.

Critical to understanding the potential harm this delay will cause is that – as described in the 2015 ozone NAAQS update – the PAMS program had six objectives, some of which went beyond the science of ozone formation:

> (1) Provide a speciated ambient air database that is both representative and useful in evaluating control strategies and understanding the mechanisms of pollutant transport by ascertaining ambient profiles and distinguishing among various individual volatile organic compounds (VOCs);
>
> (2) provide local, current meteorological and ambient data to serve as initial and boundary condition information for photochemical grid models;
>
> (3) provide a representative, speciated ambient air database that is characteristic of source emission impacts to be used in analyzing emissions inventory issues and corroborating progress toward attainment;
>
> (4) provide ambient data measurements that would allow later preparation of unadjusted and adjusted pollutant trends reports;
>
> (5) provide additional measurements of selected criteria pollutants for attainment / nonattainment decisions and to construct NAAQS maintenance plans; and
>
> (6) provide additional measurements of selected criteria and non-criteria pollutants to be used for evaluating population exposure to air toxics as well as criteria pollutants.[19]

In spite of delaying a program with the potential "to be used for evaluating population exposure to air toxics," EPA merely noted in its Notice that "[t]he main objective of the required PAMS sites is to develop a database of ozone precursors and meteorological measurements to support

[18] 84 Fed. Reg. 25221 (May 31, 2019)

[19] 80 Fed. Reg. 65292, 65420.

ozone model development and track the trends of important ozone precursor concentrations."[20] While technically a true statement, it is woefully short of describing the full value of the data PAMS will provide.

In fact, the same 1990 CAA Amendments that created the PAMS program included a congressional finding that "emissions of hazardous air pollutants from area sources may individually, or in the aggregate, present significant risks to public health in urban areas."[21] In consideration of the "large number of persons exposed and the risks of carcinogenic and other adverse health effects from hazardous air pollutants," Congress established that "ambient concentrations characteristic of large urban areas should be reduced to levels substantially below those currently experienced."[22] Thereafter EPA devised an "integrated strategy for reducing cumulative public health risks in urban areas posed by the aggregated exposures to air toxics from all sources," which came to be defined as the "Integrated Urban Air Toxics Strategy."[23] While the Air Toxics Strategy and the PAMS programs are not formally intertwined, delaying the PAMS program undoubtedly delays ACHD's ability to gather data critical to reducing exposure to air toxics.

Given the potential impact of two more years without PAMS data, ACHD must provide a clear timeline and accurate update as to how EPA's notice will affect ACHD specifically. Part 58 requires that ACHD provide "[t]he operating schedules for each monitor"[24] in the network and ACHD's pledge to "work with EPA to begin measurements on or before the final revised

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[20] 84 Fed. Reg. 25221, 25223.

[21] 42 U.S.C. § 7412(k)(1).

[22] *Id*.

[23] National Air Toxics Program: The Integrated Urban Strategy, 64 Fed. Reg. 38706, 38707 (July 19, 1999).

[24] 40 C.F.R. § 58.10(b)(4).

start date for this network" is not sufficient.[25, 26] In addition, ACHD must advocate for the health of Allegheny County residents and push EPA for faster compliance with the PAMS requirements. EPA's excuse of "budget constraints and delays in … [the] contracting process" cannot impeded ACHD's duty to protect public health.[27]

III. ACHD must undertake additional efforts to provide the public with air quality data and meaningful interpretations thereof

Appendix D to Part 58 requires that "ambient air monitoring networks" be designed to "[p]rovide air pollution data to the general public in a timely manner."[28] There is no doubt that ACHD's hourly monitor data,[29] EPA's AirNow Air Quality Index,[30] and EPA's AQS data mart[31] provide a wide array of information and data concerning air quality instantly to anyone with an internet connection. Anecdotally, it seems as though these sources of information have been expanding continuously over the past few years. Yet, GASP's experience with public outreach – particularly after the Clairton Coke fire – reveal that the public still faces significant hurdles in getting timely, relevant, understandable information about air quality. While leaving the methodology wide open, the air monitoring regulations demand more from ACHD in this regard.

Specifically, Appendix D notes "[d]ata can be presented to the public in a number of attractive ways including through air quality maps, newspapers, Internet sites, and as part of

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[25] Draft Plan § 3.1.1.

[26] GASP is aware EPA's Notice was published after the Draft Plan was finalized. Thus, the Draft Plan was as complete as possible under the circumstances but the Final Plan must address this new information.

[27] 84 Fed. Reg. 25221, 25223.

[28] 40 C.F.R. Part 58, App. D § 1.1.

[29] https://alleghenycounty.us/hd/DailySummary.PDF

[30] https://airnow.gov/

[31] https://aqs.epa.gov/aqsweb/documents/data_mart_welcome.html

weather forecasts and public advisories."[32] Although "attractive" is a puzzling choice of adjective, it should fairly be read here as requiring ACHD to provide data to the public in a manner that is understandable, usable, and relevant. Put differently, there is nothing that would *attract* the public to black and white tables of numbers. Raw data showing hourly measurements of pollutants in micrograms per cubic meter are off-putting and tend to *repulse, rather than attract*, the general public; some context, analysis, and explanation is necessary.

Although the AirNow AQI is the most public-friendly air quality measure, it has distinct limitations. Chief among those limitations is that for Allegheny County it only reflects measurements of pm2.5 and ozone.[33] Moreover, the aforementioned "hurdles" often relate to specific, local issues more than broad, regional air quality. The following list represents matters where ACHD is collecting data but where it should also consider providing additional clarity, access, explanations, etc.:

A. *Hydrogen Sulfide (H_2S) monitoring in the Mon Valley*

The monitoring plan notes, "[t]raditionally, ACHD has measured H_2S at monitoring sites impacted by the metallurgical coking industry."[34] Despite there being only one metallurgical coking facility left in Allegheny County, H_2S remains a pollutant of concern for many residents. The previously-referenced *Point Source Emissions Inventory Report 2015, 2016, 2017* added H_2S analysis "in response to the ongoing issues with this pollutant in the Monongahela River Valley."[35] While the Draft Plan and other ACHD publications acknowledge and include the

[32] 40 C.F.R. Part 58, App. D § 1.1(a).

[33] *See* https://alleghenycounty.us/hd/AQIReport.XLS and https://airnow.gov/index.cfm?action=airnow.local_city&mapcenter=0&cityid=164.

[34] Draft Plan § A4

[35] *See* Kelly *supra*, at 1.

monitored data, none of these documents address the source of the problem or a plan to combat it.

B. *Benzo[a]pyrene and BTEX monitoring in Liberty*

ACHD is collecting data regarding highly toxic substances but not reporting it anywhere publicly. While the Draft Plan correctly notes that the "data is available upon request,"[36] the version GASP received upon request was adequate but not particularly insightful as presented.[37] After a significant amount of reformatting the data could be graphed and analyzed.[38] Determining the relative health impacts of this information is still ongoing but ACHD cannot comply with the goals of Part 58 if Exhibit "B" is the extent of its efforts.

C. *The Lawrenceville Toxic Metals Study*

ACHD heretofore has done a very good job publishing regular data updates.[39] Looking forward, there are still uncertainties regarding the longevity of this study[40] and the community has raised concerns regarding a lack of analysis of the data. ACHD has not explained huge swings in metal concentrations from monitoring period to monitoring period.[41] While the continued reporting is laudable, analysis and explanations should be expanded to address concerned members of the public.

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[36] Draft Plan § A3.1.

[37] *See* attached Exhibit "B" (the original PDF received in response to a request for BTEX monitoring data).

[38] *See* attached Exhibit "C" (graph of benzene data at the Liberty monitor).

[39] https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Resources/Data_and_Reporting/Air_Quality_Reports/050419-Lawrenceville-Toxic-Metals.pdf.

[40] Draft Plan § A2.2.

[41] *See* attached Exhibit "D" (graph of manganese data).

D. *Air Toxics monitoring, filter-based PM monitoring, data "available upon request"*

The Draft Plan shows that ACHD collects a great deal of information but a review of the ACHD Air Program website shows a noticeable portion of that information is not readily accessible. Nearly all of the Special Study Projects in Appendix A have a "data available upon request" notation. In addition, filter-based NAAQS data and all Air Toxics collected at Flag Plaza come with similar disclaimers. Having not reviewed all of this data, it is impossible to say if any of it can or should be made into an "attractive" format for public consumption. At a minimum, ACHD should address its relative public value and consider making it more readily accessible.

Exhibit A

Unofficial ACHD Hourly Ambient Air Monitor Data for SO_2 (ppm)

January 20, 2019 - March 31, 2019

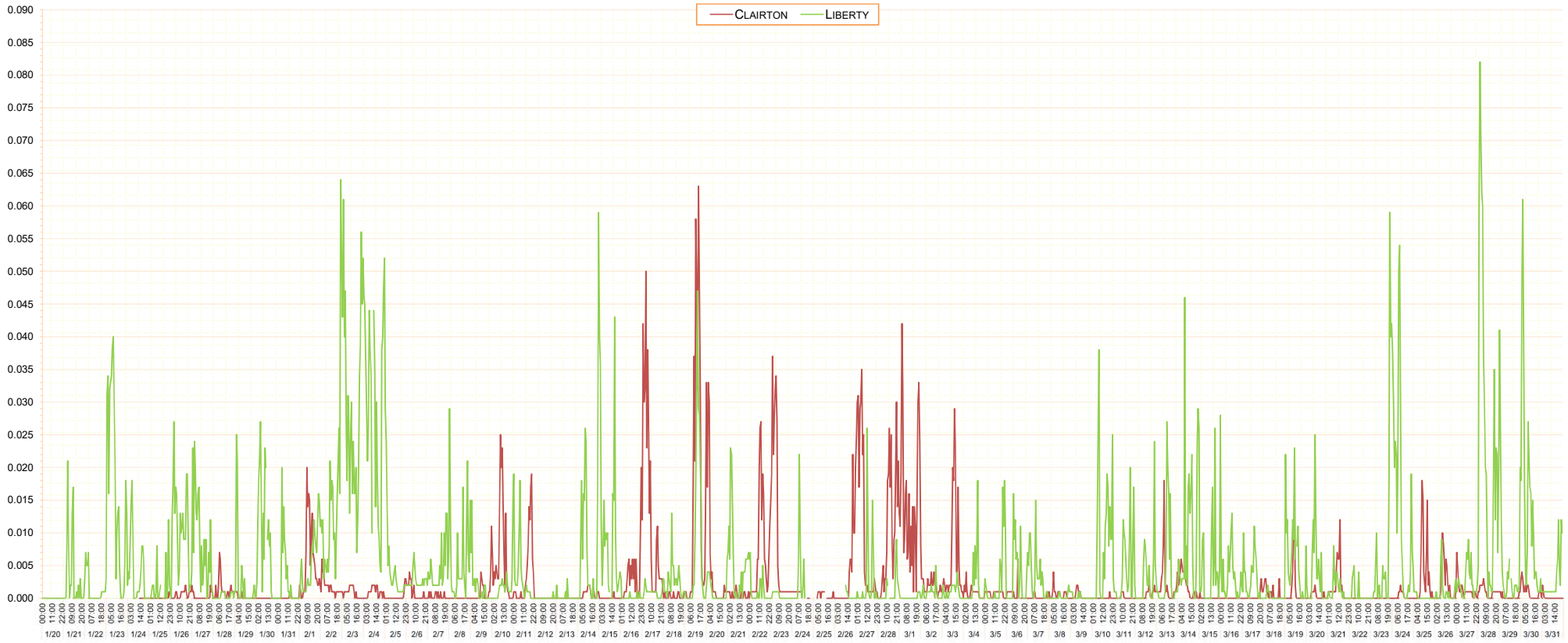

Exhibit B

PPB = (Total ug * 24.45) / (Volume m3 * MW)

South Allegheny High School

Date	Time (min)	Flow (lpm)	Benzene	ppb	Toluene	ppb	Ethylbenzene	ppb	p-Xylene	ppb	m-Xylene	ppb	o-Xylene	ppb	Naphthalene	ppb
mdl	1440	1.04	0.44	0.10	0.43	0.08	0.43	0.07	0.43	0.07	0.43	0.07	0.44	0.07	1.29	0.17
01/23/14	1440	1.04	4.04	0.85	1.23	0.22		0.00		0.00		0.00		0.00	na	#VALUE!
01/29/14	1440	1.04	11.37	2.39	3.66	0.65		0.00		0.00		0.00		0.00	na	#VALUE!
02/04/14	1440	1.04	10.04	2.11	2.50	0.45		0.00		0.00		0.00		0.00	na	#VALUE!
02/10/14	1440	1.04	3.73	0.78	1.52	0.27		0.00		0.00		0.00		0.00	na	#VALUE!
02/16/14	1440	1.04	9.95	2.09	4.44	0.79		0.00		0.00		0.00		0.00	na	#VALUE!
02/22/14	1440	1.04	7.73	1.63	2.28	0.41		0.00		0.00		0.00		0.00	na	#VALUE!
02/25/14	1440	1.13		0.00	0.78	0.13		0.00		0.00		0.00		0.00	na	#VALUE!
02/28/14	1440	1.09		0.00	0.76	0.13		0.00		0.00		0.00		0.00	na	#VALUE!
03/03/14	1440	1.13		0.00	0.62	0.10		0.00		0.00		0.00		0.00	na	#VALUE!
03/06/14	1440	1.09		0.00	0.58	0.10		0.00		0.00		0.00		0.00	na	#VALUE!
03/09/14	1440	1.13	1.90	0.37	2.06	0.34		0.00		0.00		0.00		0.00	na	#VALUE!
03/12/14	1440	1.09		0.00	1.18	0.20		0.00		0.00		0.00		0.00	na	#VALUE!
03/15/14	1440	1.13		0.00	0.38	0.06		0.00		0.00		0.00		0.00		0.00
03/18/14	1440	1.06		0.00	0.59	0.10		0.00		0.00		0.00		0.00		0.00
03/21/14	1440	1.09	14.64	2.93	6.59	1.12		0.00		0.00		0.00		0.00		0.00
03/24/14	1440	1.06		0.00	0.41	0.07		0.00		0.00		0.00		0.00		0.00
03/27/14	1440	1.09		0.00	1.29	0.22		0.00		0.00		0.00		0.00		0.00
03/30/14	1440	1.06		0.00		0.00		0.00		0.00		0.00		0.00		0.00
04/02/14	1440	1.09		0.00		0.00		0.00		0.00		0.00		0.00		0.00
04/05/14	1440	1.06		0.00		0.00		0.00		0.00		0.00		0.00		0.00
04/08/14	1440	1.08		0.00	0.83	0.14		0.00		0.00		0.00		0.00		0.00
04/11/14	1440	1.06	6.48	1.34	2.25	0.39		0.00		0.00		0.00		0.00		0.00
04/14/14	1440	1.08	4.61	0.93	1.13	0.19		0.00		0.00		0.00		0.00		0.00
04/17/14	1440	1.06		0.00	0.60	0.10		0.00		0.00		0.00		0.00		0.00
04/20/14	1440	1.08	1.76	0.36	1.49	0.26		0.00		0.00		0.00		0.00		0.00
04/23/14	1440	1.06		0.00		0.00		0.00		0.00		0.00		0.00		0.00
04/26/14	1440	1.08	5.00	1.01	1.87	0.32		0.00		0.00		0.00		0.00		0.00
05/08/14	1440	1.08	12.22	2.47	4.71	0.81		0.00		0.00	1.45	0.22		0.00		0.00
05/11/14	1440	1.06	2.23	0.46	1.13	0.20		0.00		0.00		0.00		0.00		0.00
05/14/14	1440	1.08		0.00	1.15	0.20		0.00		0.00		0.00		0.00		0.00
04/29/14	1440	1.06		0.00	0.49	0.09		0.00		0.00		0.00		0.00		0.00
05/02/14	1440	1.08	3.77	0.76	1.36	0.23		0.00		0.00		0.00		0.00		0.00
05/05/14	1440	1.06	4.34	0.90	1.60	0.28		0.00		0.00		0.00		0.00		0.00
05/17/14	1440	1.06		0.00	0.63	0.11		0.00		0.00		0.00		0.00		0.00
05/20/14	1440	1.08	45.76	9.26	14.01	2.40		0.00	1.05	0.16	3.38	0.50		0.00		0.00
05/23/14	1440	1.06	26.29	5.42	9.27	1.62		0.00		0.00	2.07	0.31		0.00		0.00
05/26/14	1440	1.08	36.23	7.33	14.50	2.49		0.00	1.01	0.15	3.34	0.50		0.00		0.00
05/29/14	1440	1.01	3.06	0.66	3.60	0.66		0.00	1.08	0.17		0.00		0.00		0.00
06/01/14	1440	1.08	3.88	0.78	1.88	0.32		0.00		0.00		0.00		0.00		0.00
06/04/14	1440	1.01	6.90	1.49	2.57	0.47		0.00		0.00		0.00	0.84	0.13		0.00
06/07/14	1440	1.08	14.90	3.01	4.82	0.83		0.00		0.00	1.26	0.19		0.00	4.83	0.60
06/10/14	1440	1.01	6.45	1.39	2.77	0.51		0.00		0.00		0.00		0.00		0.00
06/13/14	1440	1.08	6.98	1.41	2.46	0.42		0.00		0.00	0.91	0.14		0.00		0.00
06/16/14	1440	1.01	26.86	5.78	8.55	1.56		0.00		0.00	1.71	0.27		0.00	2.53	0.33
06/19/14	1440	1.08	3.32	0.67	1.62	0.28		0.00		0.00		0.00		0.00		0.00
06/22/14	1440	1.01	14.38	3.10	4.45	0.81		0.00		0.00	1.72	0.27		0.00		0.00
06/25/14	1440	1.08	1.36	0.28	1.06	0.18		0.00		0.00		0.00		0.00		0.00
06/28/14	1440	1.01		0.00	0.59	0.11		0.00		0.00		0.00		0.00		0.00
07/01/14	1440	1.05	9.03	1.87	4.14	0.73		0.00		0.00		0.00		0.00		0.00
07/04/14	1440	1.01		0.00		0.00		0.00		0.00		0.00		0.00		0.00
07/10/14	1440	1.01		0.00	0.83	0.15		0.00		0.00		0.00		0.00		0.00
07/13/14	1440	1.05	14.09	2.92	6.85	1.20		0.00		0.00	1.94	0.30		0.00		0.00
07/16/14	1440	1.01	1.99	0.43	1.00	0.18		0.00		0.00		0.00		0.00		0.00
07/19/14	1440	1.05		0.00	0.80	0.14		0.00		0.00		0.00		0.00		0.00
07/22/14	1440	1.01	6.71	1.44	3.52	0.64		0.00		0.00	1.56	0.25		0.00		0.00
07/25/14	1440	1.07	12.27	2.51	4.29	0.74		0.00		0.00	1.72	0.26		0.00		0.00
07/28/14	1440	1.01		0.00	0.54	0.10		0.00		0.00	1.11	0.18		0.00	1.93	0.25
07/31/14	1440	1.07	13.12	2.68	5.16	0.89		0.00		0.00		0.00		0.00		0.00
8/3/2014	1440	1.01		0.00	0.89	0.16		0.00		0.00		0.00		0.00		0.00
8/6/2014	1440	1.07	6.24	1.28	3.97	0.69		0.00		0.00		0.00		0.00		0.00
8/9/2014	1440	1.01		0.00	1.05	0.19		0.00		0.00		0.00		0.00		0.00
8/12/2014	1440	1.07	5.55	1.13	2.11	0.37		0.00		0.00		0.00		0.00		0.00
8/15/2014	1440	1.01	17.03	3.67	7.79	1.42		0.00		0.00	1.47	0.23		0.00	2.06	0.27
8/18/2014	1440	1.07		0.00	1.44	0.25		0.00		0.00		0.00		0.00		0.00
8/21/2014	1440	1.01	11.26	2.42	6.66	1.22		0.00		0.00		0.00		0.00	2.12	0.28
8/24/2014	1440	1.07		0.00	0.52	0.09		0.00		0.00		0.00		0.00		0.00
8/27/2014	1440	1.01	8.65	1.86	4.76	0.87		0.00		0.00		0.00		0.00	1.57	0.21
8/30/2014	1440	1.07	7.98	1.63	3.08	0.53		0.00		0.00		0.00		0.00		0.00
9/2/2014	1440	1.04	19.06	3.99	4.25	0.75		0.00		0.00		0.00		0.00		0.00
9/5/2014	1440	1.06	23.09	4.75	8.76	1.53		0.00		0.00		0.00		0.00	2.92	0.37
9/8/2014	1440	1.04		0.00	0.77	0.14		0.00		0.00		0.00		0.00		0.00
9/11/2014	1440	1.06	3.5	0.72	1.19	0.21		0.00		0.00		0.00		0.00		0.00
9/14/2014	1440	1.04	7.96	1.66	3.51	0.62		0.00		0.00		0.00		0.00	1.35	0.17
9/17/2014	1440	1.06	7.86	1.62	3.74	0.65		0.00		0.00	1.17	0.18		0.00	1.35	0.17
9/20/2014	1440	1.04	4.95	1.04	1.71	0.30		0.00		0.00		0.00		0.00		0.00
9/23/2014	1440	1.06	17.73	3.64	5.22	0.91		0.00		0.00	1.62	0.25		0.00	2.92	0.37
9/26/2014	1440	1.04		0.00	1.45	0.26		0.00		0.00		0.00		0.00		0.00
9/29/2014	1440	1.06	27.71	5.70	8.56	1.49		0.00		0.00		0.00		0.00		0.00
10/2/2014	1440	1.04	6.26	1.31	3.14	0.56		0.00		0.00		0.00		0.00		0.00
10/5/2014	1440	1.06	1.96	0.40	0.8	0.14		0.00		0.00		0.00		0.00		0.00
10/8/2014	1440	1.04	2.72	0.57	0.68	0.12		0.00		0.00		0.00		0.00		0.00
10/11/2014	1440	1.06		0.00	0.55	0.10		0.00		0.00		0.00		0.00		0.00
10/14/2014	1440	1.041		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/17/114	1440	1.059	4.7	0.97	1.48	0.26		0.00		0.00		0.00		0.00		0.00
10/20/2014	1440	1.041	13.6	2.84	4.83	0.86		0.00		0.00		0.00		0.00		0.00
10/23/2014	1440	1.059		0.00	0.71	0.12		0.00		0.00		0.00		0.00		0.00
10/26/2014	1440	1.041	18.4	3.85	4.78	0.85		0.00		0.00	1.28	0.20		0.00		0.00
10/29/2014	1440	1.059		0.00	0.47	0.08		0.00		0.00		0.00		0.00		0.00
11/1/2014	1440	1.041		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/4/2014	1440	1.071	25.72	5.23	7.96	1.37		0.00		0.00	1.79	0.27		0.00		0.00
11/7/2014	1440	0.983	2.38	0.53	1.55	0.29		0.00		0.00		0.00		0.00		0.00
11/10/2014	1440	1.066	10.3	2.10	3.18	0.55		0.00		0.00		0.00		0.00		0.00
11/13/2014	1440	0.983		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/16/2014	1440	1.066	8.23	1.68	2.99	0.52		0.00		0.00		0.00		0.00		0.00
11/19/2014	1440	0.983	4.39	0.97	1.05	0.20		0.00		0.00		0.00		0.00		0.00
11/22/2014	1440	1.066	24.29	4.96	6.91	1.20		0.00		0.00		0.00		0.00		0.00
11/25/2014	1440	0.983	3.86	0.85	1.83	0.34		0.00		0.00		0.00		0.00		0.00
11/28/2014	1440	1.066		0.00	0.72	0.12		0.00		0.00		0.00		0.00		0.00
12/1/2014	1440	0.983		0.00	0.55	0.10		0.00		0.00		0.00		0.00		0.00
12/4/2014	1440	1.066		0.00	1.44	0.25		0.00		0.00		0.00		0.00		0.00
12/4/2014	1440	0.983		0.00	1.46	0.27		0.00		0.00		0.00		0.00		0.00
12/10/2014	1440	1.066		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/13/2014	1440	0.983		0.00	1.25	0.23		0.00		0.00		0.00		0.00		0.00
12/16/2014	1440	1.066	7.7	1.57	3.28	0.57		0.00		0.00		0.00	0.58	0.09		0.00
12/19/2014	1440	1.036		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/22/2014	1440	1.066		0.00	1.81	0.31		0.00		0.00		0.00		0.00		0.00
12/25/2014	1440	1.036		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/28/2014	1440	1.066		0.00	0.92	0.16		0.00		0.00		0.00		0.00		0.00
12/31/2014	1440	1.036		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/3/2015	1440	1.066	10.19	2.08	2.94	0.51		0.00		0.00		0.00		0.00		0.00
1/6/2015	1440	1.036		0.00	0.75	0.13		0.00		0.00		0.00		0.00		0.00
1/9/2015	1440	1.066		0.00	0.66	0.11		0.00		0.00		0.00		0.00		0.00
1/12/2015	1440	1.036		0.00	1.15	0.20		0.00		0.00		0.00		0.00		0.00
1/15/2015	1440	1.066	6.98	1.43	1.80	0.31		0.00		0.00		0.00		0.00		0.00
1/18/2015	1440	1.036		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/21/2015	1440	1.066		0.00	1.68	0.29		0.00		0.00		0.00		0.00		0.00
1/24/2015	1440	1.036		0.00	1.62	0.29		0.00		0.00		0.00		0.00		0.00
1/27/2015	1440	1.066		0.00		0.00		0.00		0.00		0.00		0.00		0.00

2/2/2015	1440	1.066		0.00	0.95	0.16		0.00		0.00		0.00		0.00		0.00		0.00
2/5/2015	1440	1.036	6.02	1.26	0.74	0.13		0.00		0.00		0.00		0.00		0.00		0.00
2/8/2015	1440	1.066	25.22	5.15	10.53	1.82		0.00		0.00	1.77	0.27		0.00	1.74	0.22
2/11/2015	1440	1.036	8.56	1.80	5.14	0.92		0.00		0.00		0.00		0.00		0.00
2/14/2015	1440	1.066	6.38	1.30	1.6	0.28		0.00		0.00		0.00		0.00		0.00
2/17/2015	1440	1.036	3.22	0.68	1.32	0.24		0.00		0.00		0.00		0.00		0.00
2/20/2015	1440	1.066	2.77	0.57	1.47	0.25		0.00		0.00		0.00		0.00		0.00
2/23/2015	1440	1.036		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2/26/2015	1440	1.066		0.00	0.71	0.12		0.00		0.00		0.00		0.00		0.00
3/1/2015	1440	1.036	12.12	2.55	3.92	0.70		0.00		0.00		0.00		0.00		0.00
3/4/2015	1440	1.066		0.00	0.7	0.12		0.00		0.00		0.00		0.00		0.00
3/7/2015	1440	1.036	7.86	1.65	2.03	0.36		0.00		0.00		0.00		0.00		0.00
3/10/2015	1440	1.066	49.9	10.19	13.03	2.26		0.00		0.00	2.92	0.44		0.00	2.21	0.28
3/13/2015	1440	1.036		0.00	0.48	0.09		0.00		0.00		0.00		0.00		0.00
3/16/2015	1440	1.066	14.44	2.95	5.5	0.95		0.00		0.00		0.00		0.00		0.00
3/19/2015	1440	1.036	10.9	2.29	4.52	0.81		0.00		0.00		0.00		0.00		0.00
3/22/2015	1440	1.066		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/25/2015	1440	1.036		0.00	1	0.18		0.00		0.00		0.00		0.00		0.00
3/28/2015	1440	1.066		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/31/2015	1440	1.036		0.00	1.09	0.19		0.00		0.00		0.00		0.00		0.00
4/3/2015	1440	1.066		0.00	0.75	0.13		0.00		0.00		0.00		0.00		0.00
4/6/2015	1440	1.036	23.71	4.98	10.67	1.90		0.00		0.00		0.00		0.00		0.00
4/9/2015	1440	1.066	2.84	0.58	1.48	0.26		0.00		0.00		0.00		0.00		0.00
4/12/2015	1440	1.036	9.78	2.05	4.54	0.81		0.00		0.00		0.00		0.00		0.00
4/15/2015	1440	1.066		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/18/2015	1440	1.036	24.25	5.10	10.2	1.82		0.00	1.72	0.27		0.00		0.00		0.00
4/21/2015	1440	1.066		0.00		0.00		0.00		0.00		0.00	0.54	0.08		0.00
4/24/2015	1440	1.036		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/27/2015	1440	1.066		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/30/2015	1440	1.036		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/3/2015	1440	1.066	19.67	4.02	6.09	1.05		0.00		0.00		0.00		0.00		0.00
5/6/2015	1440	1.036	11.53	2.42	4.27	0.76		0.00		0.00		0.00		0.00		0.00
5/9/2015	1440	1.066		0.00	0.91	0.16		0.00		0.00		0.00		0.00		0.00
5/12/2015	1440	1.036		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/15/2015	1440	1.069	5.77	1.17	2.21	0.38		0.00		0.00		0.00		0.00		0.00
5/18/2015	1440	0.937	6.54	1.52	5.31	1.05		0.00		0.00		0.00		0.00		0.00
5/21/2015	1440	1.069		0.00		0.00		0.00		0.00		0.00		0.00	1.61	0.20
5/24/2015	1440	0.937	17.24	4.01	4.29	0.84		0.00		0.00		0.00		0.00		0.00
5/27/2015	1440	1.069	9.78	1.99	3.66	0.63		0.00		0.00		0.00		0.00		0.00
5/30/2015	1440	0.937		0.00	1.4	0.28		0.00		0.00		0.00		0.00	1.99	0.28
6/2/2015	1440	1.069		0.00		0.00		0.00		0.00		0.00		0.00		0.00
6/5/2015	1440	0.937		0.00	1.05	0.21		0.00		0.00		0.00	0.53	0.09	1.75	0.25
6/8/2015	1440	1.069	12.1	2.46	3.67	0.63		0.00		0.00		0.00		0.00	1.59	0.20
6/11/2015	1440	0.937	5.77	1.34	2.15	0.42		0.00		0.00		0.00		0.00		0.00
6/14/2015	1440	1.069		0.00	1.37	0.24		0.00		0.00		0.00	0.57	0.09		0.00
6/17/2015	1440	0.937		0.00		0.00		0.00		0.00		0.00		0.00		0.00
6/20/2015	1440	1.069		0.00		0.00		0.00		0.00		0.00		0.00	1.29	0.16
6/23/2015	1440	0.937	7.23	1.68	2.44	0.48		0.00		0.00		0.00		0.00		0.00
6/26/2015	1440	1.069		0.00	1.15	0.20		0.00		0.00		0.00		0.00		0.00
6/29/2015	1440	0.937	4.8	1.12	3.31	0.65		0.00		0.00		0.00		0.00		0.00
7/2/2015	1440	1.069	16.71	3.40	11.62	2.01		0.00		0.00		0.00		0.00	1.67	0.21
7/5/2015	1440	0.937		0.00	1.4	0.28		0.00		0.00		0.00		0.00		0.00
7/8/2015	1440	1.069		0.00	1.43	0.25		0.00		0.00		0.00		0.00		0.00
7/11/2015	1440	0.937	11.06	2.57	3.66	0.72		0.00		0.00		0.00		0.00		0.00
7/14/2015	1440	1.069		0.00	1.6	0.28		0.00		0.00		0.00		0.00		0.00
7/17/2015	1440	0.937	7.8	1.81	4.16	0.82		0.00		0.00		0.00		0.00		0.00
7/20/2015	1440	1.069		0.00	5.17	0.89		0.00		0.00		0.00		0.00	1.51	0.19
7/23/2015	1440	0.937	8.57	1.99	3.92	0.77		0.00		0.00		0.00		0.00		0.00
7/26/2015	1440	1.069	9.22	1.88	11.83	2.04		0.00		0.00		0.00		0.00	1.46	0.18
7/29/2015	1440	0.937		0.00	3.77	0.74		0.00		0.00		0.00		0.00		0.00
8/1/2015	1440	1.069	2.85	0.58	3.42	0.59		0.00		0.00		0.00		0.00		0.00
8/4/2015	1440	0.937	14.54	3.38	5.71	1.12		0.00		0.00		0.00		0.00		0.00
8/7/2015	1440	1.069		0.00		0.00		0.00		0.00		0.00		0.00		0.00
8/10/2015	1440	0.937	6.04	1.40	3.19	0.63		0.00		0.00		0.00		0.00		0.00
8/13/2015	1440	1.069	13.79	2.81	12.01	2.07		0.00		0.00		0.00		0.00		0.00
8/16/2015	1440	0.937	28.73	6.67	11.71	2.31		0.00		0.00		0.00		0.00	3.12	0.44
8/19/2015	1440	1.069		0.00	0.72	0.12		0.00		0.00		0.00		0.00		0.00
8/22/2019	1440	0.937		0.00	0.6	0.12		0.00		0.00		0.00		0.00		0.00
8/25/2015	1440	1.069	10.5	2.14	3.8	0.66		0.00		0.00		0.00		0.00		0.00
8/28/2015	1440	0.937		0.00	1.7	0.33		0.00		0.00		0.00		0.00		0.00
8/31/2015	1440	1.069	23.95	4.88	19.26	3.33		0.00		0.00		0.00		0.00	2.89	0.36
9/3/2015	1440	0.937	10.07	2.34	8.62	1.70		0.00		0.00		0.00		0.00		0.00
9/6/2015	1440	1.069	2.71	0.55	2.52	0.44		0.00		0.00		0.00		0.00		0.00
9/9/2015	1440	0.937	12.76	2.96	11.53	2.27		0.00		0.00		0.00		0.00	1.82	0.26
9/12/2015	1440	1.069		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/15/2015	1440	0.937	17.9	4.16	8.4	1.65		0.00		0.00		0.00		0.00	2	0.28
9/18/2015	1440	1.069	33.51	6.82	19.36	3.34		0.00		0.00		0.00		0.00	3.18	0.39
9/21/2015	1440	0.937		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/24/2015	1440	1.069		0.00	1.22	0.21		0.00		0.00		0.00		0.00		0.00
9/27/2015	1440	0.937		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/30/2015	1440	1.069		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/3/2015	1440	0.937		0.00	0.47	0.09		0.00		0.00		0.00		0.00		0.00
10/6/2015	1440	1.069	6.19	1.26	3.59	0.62		0.00		0.00		0.00	0.51	0.08		0.00
10/9/2015	1440	0.937	7.39	1.72	6.14	1.21		0.00		0.00		0.00		0.00		0.00
10/12/2015	1440	1.069	16.32	3.32	8.85	1.53		0.00		0.00	2.02	0.30	0.75	0.11		0.00
10/15/2015	1440	0.937	6.95	1.61	3.99	0.79		0.00		0.00		0.00	0.48	0.08		0.00
10/18/2015	1440	1.069	3.59	0.73	1.61	0.28		0.00		0.00		0.00		0.00		0.00
10/21/2015	1440	0.937	26.67	6.20	13.12	2.58		0.00		0.00	1.17	0.20		0.00		0.00
10/24/2015	1440	1.069	2.28	0.46	2.47	0.43		0.00		0.00		0.00		0.00		0.00
10/27/2015	1440	0.937		0.00	0.75	0.15		0.00		0.00		0.00		0.00		0.00
10/30/2015	1440	1.069		0.00	1.36	0.23		0.00		0.00		0.00	0.5	0.07		0.00
11/2/2015	1440	0.937	16.92	3.93	11.85	2.33		0.00		0.00		0.00		0.00	2.06	0.29
11/5/2015	1440	1.069	18.32	3.73	12.59	2.17		0.00		0.00	1.21	0.18	1.62	0.24	1.85	0.23
11/8/2015	1440	0.937	8.34	1.94	4.55	0.90		0.00		0.00		0.00	0.75	0.13		0.00
11/11/2015	1440	1.069	2.8	0.57	2.07	0.36		0.00		0.00	0.5	0.07		0.00		0.00
11/14/2015	1440	0.937	10.3	2.39	5.19	1.02		0.00		0.00	1.05	0.18		0.00		0.00
11/17/2015	1440	1.069	3.59	0.73	1.64	0.28		0.00		0.00		0.00	0.8	0.12		0.00
11/20/2015	1440	0.937	6.08	1.41	2.98	0.59		0.00	0.57	0.10	0.94	0.16	0.68	0.12		0.00
11/23/2015	1440	1.069	3.22	0.66	0.99	0.17		0.00		0.00		0.00	0.61	0.09		0.00
11/26/2015	1440	0.937	3.61	0.84	1.57	0.31		0.00		0.00		0.00		0.00		0.00
11/29/2015	1440	1.069	0.6	0.12	0.80	0.14		0.00		0.00		0.00		0.00		0.00
12/2/2015	1440	0.937	2.03	0.47	0.54	0.11		0.00		0.00	0.71	0.12	0.57	0.10		0.00
12/5/2015	1440	1.069	24.41	4.97	10.15	1.75	0.55	0.08		0.00	2.48	0.37	2.98	0.45		0.00
12/8/2015	1440	0.937	43.1	10.01	13.23	2.61		0.00	0.54	0.09	1.94	0.33	0.47	0.08	2.42	0.34
12/11/2015	1440	1.069	56.68	11.54	9.15	1.58		0.00		0.00	1.43	0.21	0.68	0.10	1.69	0.21
12/14/2015	1440	0.937	8.6	2.00	3.62	0.71	0.54	0.09		0.00		0.00	0.56	0.10		0.00
12/17/2015	1440	1.069	8.11	1.65	3.03	0.52		0.00		0.00	0.67	0.10	0.47	0.07		0.00
12/20/2015	1440	0.937	34.02	7.90	6.31	1.24		0.00	0.59	0.10		0.00	0.66	0.11		0.00
12/23/2015	1440	1.069		0.00	0.73	0.13		0.00		0.00		0.00	0.68	0.10		0.00
12/26/2015	1440	0.937		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/1/2016	1440	0.937		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/4/2016	1440	1.069	0.69	0.14		0.00		0.00		0.00		0.00	0.48	0.07		0.00
1/7/2016	1440	0.937	13.09	3.04	5.46	1.08		0.00		0.00		0.00		0.00		0.00
1/10/2016	1440	1.069	2.23	0.45	0.94	0.16		0.00		0.00		0.00		0.00		0.00
1/13/2016	1440	0.937	1.57	0.36	0.69	0.14		0.00		0.00	0.54	0.09	0.6	0.10		0.00
1/16/2016	1440	1.069		0.00	0.47	0.08		0.00		0.00		0.00		0.00		0.00
1/19/2016	1440	0.937	2.65	0.62	0.97	0.19		0.00		0.00		0.00		0.00		0.00
1/22/2016	1440	1.069		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/25/2016	1440	0.937	32.24	7.49	12	2.36		0.00	0.43	0.07	1.03	0.18		0.00	1.96	0.28
1/28/2016	1440	1.069	5.07	1.03	3.92	0.68		0.00		0.00		0.00		0.00	1.73	0.21
1/31/2016	1440	0.937	34.31	7.97	11.51	2.27		0.00		0.00	0.59	0.10		0.00	4.28	0.61
2/3/2016	1440	1.069	2.73	0.56	1.06	0.18		0.00		0.00		0.00		0.00		0.00

2/6/2016	1440	0.937	5.52	1.28	4.51	0.89		0.00		0.00		0.00		0.00		0.00		0.00
2/9/2016	1440	1.069		0.00	0.74	0.13		0.00		0.00		0.00		0.00		0.00		0.00
2/12/2016	1440	0.937	9.72	2.26	5.98	1.18		0.00		0.00	0.78	0.13		0.00		0.00		0.00
2/15/2016	1440	1.069		0.00	0.91	0.16		0.00		0.00		0.00		0.00		0.00		0.00
2/18/2016	1440	0.937		0.00	1.04	0.20		0.00		0.00		0.00		0.00		0.00		0.00
2/21/2016	1440	1.069	51.09	10.40	16.08	2.78		0.00	0.58	0.09	1.93	0.29	0.6	0.09	2.55	0.32		0.00
2/24/2016	1440	0.937		0.00	0.57	0.11		0.00		0.00		0.00		0.00		0.00		0.00
2/27/2016	1440	1.069	3.67	0.75	1.73	0.30		0.00		0.00	0.5	0.07	0.53	0.08		0.00		0.00
3/1/2016	1440	0.937	12.05	2.80	4.7	0.93		0.00		0.00		0.00	0.66	0.11		0.00		0.00
3/4/2016	1440	1.069	1.61	0.33	1.18	0.20		0.00		0.00	0.52	0.08	0.64	0.10		0.00		0.00
3/7/2016	1440	0.937	10.58	2.46	5.55	1.09		0.00		0.00	0.52	0.09		0.00		0.00		0.00
3/10/2016	1440	1.069	8.93	1.82	7.82	1.35		0.00		0.00	1.27	0.19	0.57	0.09	1.32	0.16		0.00
3/13/2016	1440	0.937	1.6	0.37	0.92	0.18		0.00		0.00		0.00		0.00		0.00		0.00
3/16/2016	1440	1.069	3.9	0.79	1.79	0.31		0.00		0.00		0.00		0.00		0.00		0.00
3/19/2016	1440	0.937	1.7	0.39	0.96	0.19		0.00		0.00		0.00	0.56	0.10		0.00		0.00
3/22/2016	1440	1.069	18.9	3.85	6.09	1.05		0.00		0.00		0.00		0.00	1.31	0.16		0.00
3/25/2016	1440	0.937	1.5	0.35	0.45	0.09		0.00		0.00		0.00		0.00		0.00		0.00
3/28/2016	1440	1.069	2.31	0.47	0.76	0.13		0.00		0.00	0.53	0.08		0.00		0.00		0.00
3/31/2016	1440	0.937	6.21	1.44	2.54	0.50		0.00		0.00		0.00	0.52	0.09		0.00		0.00
4/3/2016	1440	1.069	0.81	0.16		0.00		0.00		0.00		0.00	0.65	0.10		0.00		0.00
4/6/2016	1440	0.937	0.95	0.22	1.41	0.28		0.00		0.00		0.00	0.69	0.12		0.00		0.00
4/9/2016	1236	1.069		0.00	0.57	0.11		0.00		0.00		0.00		0.00		0.00		0.00
4/12/2016	1440	0.937		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/15/2016	1440	1.069	1.63	0.33	0.68	0.12		0.00		0.00		0.00	0.49	0.07		0.00		0.00
4/18/2016	1440	0.937	31.3	7.27	13.33	2.63	1.06	0.18		0.00		0.00		0.00	2.03	0.29		0.00
4/21/2016	1440	0.997	1.6	0.35	1.5	0.28		0.00		0.00		0.00		0.00		0.00		0.00
4/24/2016	1440	0.905	10.6	2.55	3.29	0.67		0.00		0.00		0.00		0.00	1.82	0.27		0.00
4/27/2016	1440	0.997		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/30/2016	1440	0.905		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/3/2016	1440	0.997	1.96	0.43	1.49	0.28		0.00		0.00		0.00		0.00		0.00		0.00
5/6/2016	1440	0.905		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/9/2016	1440	0.997	8.34	1.82	5.33	0.99		0.00		0.00		0.00		0.00		0.00		0.00
5/12/2016	1440	0.905	2.28	0.55	1.79	0.37		0.00		0.00		0.00		0.00		0.00		0.00
5/15/2016	1440	0.997		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/18/2016	1440	0.905	2.94	0.71	1.37	0.28		0.00		0.00		0.00		0.00		0.00		0.00
5/21/2016	1440	0.997		0.00	0.54	0.10		0.00		0.00		0.00		0.00		0.00		0.00
5/24/2016	1440	0.905	18.7	4.50	12.14	2.48		0.00		0.00	0.84	0.15	0.47	0.08	3.76	0.55		0.00
5/27/2016	1440	0.997	8.79	1.92	6.84	1.27		0.00		0.00		0.00	0.47	0.08	2.14	0.28		0.00
5/30/2016	1440	0.905	10.85	2.61	4.57	0.93		0.00		0.00	1.2	0.21		0.00	2.57	0.38		0.00
6/2/2016	1440	0.997	1.08	0.24	1.39	0.26		0.00		0.00		0.00		0.00		0.00		0.00
6/5/2016	1440	0.905	3.48	0.84	1.8	0.37		0.00		0.00	0.56	0.10		0.00		0.00		0.00
6/8/2016	1440	0.997	2.03	0.44	2.26	0.42		0.00		0.00		0.00	0.68	0.11		0.00		0.00
6/11/2016	1440	0.905	7.77	1.87	4.63	0.94		0.00		0.00		0.00		0.00	1.65	0.24		0.00
6/14/2016	1440	0.997	1.29	0.28	0.62	0.11		0.00		0.00		0.00		0.00		0.00		0.00
6/17/2016	1440	0.905	7.22	1.74	5.15	1.05		0.00		0.00		0.00		0.00	1.85	0.27		0.00
6/20/2016	1440	0.997	26.04	5.69	16.48	3.05		0.00		0.00		0.00	0.53	0.09	3.15	0.42		0.00
6/23/2016	1440	0.905	3.97	0.95	3.1	0.63		0.00		0.00		0.00	0.57	0.10	1.66	0.24		0.00
6/26/2016	1440	0.997	1.73	0.38	0.95	0.18		0.00		0.00		0.00		0.00		0.00		0.00
6/29/2016	1440	0.905	3.83	0.92	2.27	0.46		0.00		0.00		0.00		0.00		0.00		0.00
7/2/2016	1440	0.997		0.00	1.47	0.27		0.00		0.00		0.00		0.00		0.00		0.00
7/5/2016	1440	0.905	3.51	0.84	2.12	0.43		0.00		0.00	0.61	0.11		0.00		0.00		0.00
7/8/2016	1440	0.997	9.58	2.09	5.51	1.02		0.00		0.00		0.00		0.00	4.19	0.56		0.00
7/11/2016	1440	0.905	4.45	1.07	5.02	1.02		0.00		0.00		0.00		0.00		0.00		0.00
7/14/2016	1440	0.997	2.6	0.57	2.15	0.40		0.00		0.00		0.00		0.00	2.6	0.35		0.00
7/17/2016	1440	0.905	9.87	2.37	7.07	1.44		0.00		0.00		0.00		0.00	1.58	0.23		0.00
7/20/2016	1440	0.997	6.24	1.36	4.23	0.78		0.00		0.00		0.00		0.00	1.79	0.24		0.00
7/23/2016	1440	0.905	10.72	2.58	8.39	1.71		0.00		0.00	0.72	0.13		0.00	1.9	0.28		0.00
7/26/2016	1440	0.997	6.95	1.52	5.8	1.07		0.00		0.00		0.00		0.00	1.84	0.24		0.00
7/29/2016	1440	0.905	1.39	0.33	2.18	0.44	0.47	0.08	0.72	0.13	1.35	0.24	0.9	0.16		0.00		0.00
8/1/2016	1440	0.997	3.78	0.83	3.62	0.67	0.45	0.07	0.5	0.08		0.00	0.54	0.09		0.00		0.00
8/4/2016	1440	0.905	0.99	0.24	0.56	0.11		0.00		0.00		0.00	0.55	0.10		0.00		0.00
8/7/2016	1440	0.997	13.01	2.84	7.03	1.30		0.00	0.66	0.11	1.42	0.23	0.85	0.14		0.00		0.00
8/10/2016	1440	0.905	3.47	0.83	2.18	0.44		0.00		0.00		0.00	0.66	0.12		0.00		0.00
8/13/2016	1440	0.997	6.08	1.33	6.21	1.15		0.00		0.00	0.82	0.13	0.52	0.08		0.00		0.00
8/16/2016	1440	0.905	3.87	0.93	2.24	0.46	0.68	0.12		0.00	1.12	0.20	0.67	0.12		0.00		0.00
8/19/2016	1440	0.997	14.47	3.16	10.39	1.92	0.65	0.10	0.87	0.14	2.51	0.40	0.64	0.10		0.00		0.00
8/22/2016	1440	0.905		0.00	1.46	0.30	0.7	0.12	1.58	0.28		0.00		0.00		0.00		0.00
8/25/2016	1440	0.997	6.54	1.43	3.9	0.72		0.00		0.00	1.12	0.18	0.49	0.08		0.00		0.00
8/28/2016	1440	0.905	4.75	1.14	4.26	0.87		0.00	0.62	0.11	1.23	0.22	0.87	0.15		0.00		0.00
8/31/2016	1440	0.997	16.97	3.71	12.57	2.33	0.73	0.12	0.97	0.16	2.56	0.41	0.49	0.08		0.00		0.00
9/3/2016	1440	0.905		0.00	0.99	0.20		0.00		0.00	0.76	0.13	0.63	0.11		0.00		0.00
9/6/2016	1440	0.997	18.5	4.04	14.03	2.60		0.00	0.85	0.14	2.48	0.40	0.48	0.08		0.00		0.00
9/9/2016	1440	0.905	1.03	0.25	1.49	0.30		0.00		0.00		0.00		0.00		0.00		0.00
9/12/2016	1440	0.968		0.00	1.08	0.21		0.00		0.00		0.00		0.00		0.00		0.00
9/15/2016	1440	0.845		0.00	0.49	0.11		0.00		0.00	0.71	0.13		0.00		0.00		0.00
9/18/2016	1440	0.968	2.85	0.64	2.47	0.47		0.00		0.00	0.6	0.10	0.52	0.09		0.00		0.00
9/21/2016	1440	0.845	1.25	0.32	3.65	0.80		0.00	0.69	0.13	1.32	0.25		0.00		0.00		0.00
9/24/2016	1440	0.968	0.97	0.22	1.75	0.33		0.00	0.49	0.08		0.00		0.00		0.00		0.00
9/27/2016	1440	0.845	10.22	2.63	5.61	1.23		0.00		0.00	0.7	0.13	0.62	0.12		0.00		0.00
9/30/2016	1440	0.968		0.00	0.55	0.10		0.00		0.00		0.00	0.46	0.08		0.00		0.00
10/3/2016	1440	0.845	2.49	0.64	2.59	0.57		0.00	0.67	0.13	1.07	0.20		0.00		0.00		0.00
10/6/2016	1440	0.968		0.00	1.09	0.21		0.00		0.00		0.00	0.54	0.09		0.00		0.00
10/9/2016	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/12/2016	1440	0.968	10.2	2.29	6.34	1.21		0.00		0.00	1.07	0.18	0.57	0.09		0.00		0.00
10/15/2016	1440	0.845	8.08	2.08	3.68	0.80		0.00		0.00	1.51	0.29	0.76	0.14		0.00		0.00
10/18/2016	1440	0.968	10.56	2.37	5.07	0.97		0.00		0.00	0.81	0.13	0.55	0.09		0.00		0.00
10/21/2016	1440	0.845		0.00	0.54	0.12		0.00		0.00	1.11	0.21	0.64	0.12		0.00		0.00
10/24/2016	1440	0.968		0.00		0.00		0.00		0.00	0.45	0.07	0.51	0.08		0.00		0.00
10/27/2016	1440	0.845	2.36	0.61	1.3	0.28		0.00		0.00		0.00	0.53	0.10		0.00		0.00
10/30/2016	1440	0.968		0.00	0.56	0.11		0.00		0.00		0.00		0.00		0.00		0.00
11/2/2016	1440	0.845	19.85	5.11	7.98	1.74		0.00	1.11	0.21	2.25	0.43	0.57	0.11	1.3	0.20		0.00
11/5/2016	1440	0.968	33.04	7.43	10.84	2.07		0.00	0.95	0.16	2.87	0.47	0.6	0.10	2.56	0.35		0.00
11/8/2016	1440	0.845	36.14	9.31	12.92	2.82		0.00	1.38	0.26	2.83	0.54	1.27	0.24	2.1	0.33		0.00
11/11/2016	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/14/2016	1440	0.845	37.34	9.62	18.01	3.93	1.08	0.20	1.49	0.28	3.6	0.68	1.08	0.20	2.13	0.33		0.00
11/17/2016	1440	0.968	33.27	7.48	14	2.67		0.00	0.75	0.12	2.2	0.36		0.00		0.00		0.00
11/20/2016	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/26/2016	1440	0.845		0.00	0.71	0.16		0.00		0.00		0.00		0.00		0.00		0.00
11/29/2016	1440	0.968	16.93	3.81	5.65	1.08		0.00	0.46	0.08	1.58	0.26	0.54	0.09		0.00		0.00
12/2/2016	1440	0.845		0.00	0.92	0.20		0.00		0.00		0.00		0.00		0.00		0.00
12/5/2016	1440	0.968	1.86	0.42	0.64	0.12		0.00		0.00		0.00	0.5	0.08		0.00		0.00
12/8/2016	1440	0.845		0.00		0.00		0.00		0.00	0.5	0.09		0.00		0.00		0.00
12/11/2016	1440	0.968		0.00	0.88	0.17		0.00	0.91	0.15		0.00		0.00		0.00		0.00
12/14/2016	1440	0.845		0.00		0.00		0.00		0.00	0.59	0.11		0.00		0.00		0.00
12/17/2016	1440	0.968	11.08	2.49	5.15	0.98		0.00		0.00	0.79	0.13	0.56	0.09	2.4	0.33		0.00
12/20/2016	1440	0.845	9.8	2.52	4.61	1.01		0.00		0.00	0.89	0.17		0.00	1.64	0.26		0.00
12/23/2016	1440	0.968	4.28	0.96	2.2	0.42		0.00		0.00		0.00	0.53	0.09		0.00		0.00
12/26/2016	1440	0.845	1.67	0.43	1	0.22		0.00		0.00		0.00	0.87	0.16		0.00		0.00
12/29/2016	1440	0.968	1.21	0.27	1.33	0.25		0.00		0.00	0.54	0.09	0.5	0.08		0.00		0.00
1/1/2017	1440	0.845		0.00	0.72	0.16		0.00		0.00		0.00	0.49	0.09		0.00		0.00
1/7/2017	1440	0.968		0.00	0.48	0.09		0.00		0.00	0.62	0.10	0.54	0.09		0.00		0.00
1/10/2017	1440	0.845	4.56	1.17	3.49	0.76		0.00		0.00		0.00	0.47	0.09		0.00		0.00
1/13/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/16/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/19/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/22/2017	1440	0.845	0.51	0.13	1.49	0.33		0.00		0.00		0.00	0.59	0.11		0.00		0.00
1/25/2017	1440	0.968	2.41	0.54	1.18	0.22		0.00		0.00		0.00	0.46	0.08		0.00		0.00
1/28/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/31/2017	1440	0.845	0.69	0.18	0.93	0.20		0.00		0.00		0.00	0.48	0.09		0.00		0.00
2/3/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2/6/2017	1440	0.845	12.71	3.27	12.03	2.63		0.00		0.00	1.53	0.29		0.00	1.62	0.25		0.00
2/9/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00

2/12/2017	1440	0.845	2.08	0.54	1.82	0.40		0.00		0.00		0.00	0.5	0.09		0.00
2/15/2017	1440	0.968	0.49	0.11	0.78	0.15		0.00		0.00		0.00		0.00		0.00
2/18/2017	1440	0.845	12.2	3.14	6.16	1.35		0.00		0.00	0.61	0.12	0.66	0.13		0.00
2/21/2017	1440	0.968	0.76	0.17	1.5	0.29		0.00		0.00	0.78	0.13		0.00		0.00
2/24/2017	1440	0.845	4.36	1.12	5.15	1.12		0.00		0.00		0.00	0.71	0.13		0.00
2/27/2017	1440	0.968	10.27	2.31	8.23	1.57		0.00	0.62	0.10	1.42	0.23		0.00		0.00
3/2/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/5/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/8/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/11/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/14/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/17/2017	1440	0.968	8.07	1.81	7.51	1.43		0.00		0.00	0.74	0.12		0.00		0.00
3/20/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/23/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/26/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/29/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/1/2017	1440	0.845		0.00	0.74	0.16		0.00		0.00		0.00		0.00		0.00
4/4/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/7/2017	1440	0.845	1.26	0.32	0.83	0.18		0.00		0.00		0.00		0.00		0.00
4/10/2017	1440	0.968	11.68	2.63	5.1	0.97		0.00		0.00	0.87	0.14	0.46	0.08		0.00
4/13/2017	1440	0.845	2.5	0.64	1.12	0.24		0.00		0.00		0.00	0.47	0.09		0.00
4/16/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/19/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/22/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/25/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/28/2017	1440	0.968	3.17	0.71	3.27	0.62		0.00		0.00		0.00		0.00		0.00
5/1/2017	1440	0.845	1.64	0.42	0.69	0.15		0.00		0.00		0.00		0.00		0.00
5/4/2017	1440	0.968		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/7/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/10/2017	1440	0.968	6.88	1.55	5.1	0.97		0.00		0.00	0.59	0.10	0.53	0.09		0.00
5/13/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/16/2017	1440	0.968	17.3	3.89	10.14	1.93		0.00		0.00	1.53	0.25		0.00		0.00
5/19/2017	1440	0.845		0.00	2.27	0.50		0.00		0.00	0.78	0.15	0.5	0.09		0.00
5/22/2017	1440	0.968	2.04	0.46	1.38	0.26		0.00		0.00	0.49	0.08	0.6	0.10		0.00
5/25/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/28/2017	1440	0.968	1.37	0.31	1.75	0.33		0.00		0.00	0.78	0.13	0.68	0.11		0.00
5/31/2017	1440	0.845	7.39	1.90	3.03	0.66		0.00		0.00		0.00		0.00		0.00
6/3/2017	1440	0.968	21.9	4.92	6.61	1.26		0.00		0.00	1.37	0.23		0.00		0.00
6/6/2017	1440	0.845		0.00		0.00		0.00		0.00		0.00		0.00		0.00
6/9/2017	1440	0.968	5.52	1.24	3.54	0.67		0.00		0.00		0.00		0.00		0.00
6/12/2017	1440	0.845	11.16	2.87	5.49	1.20		0.00	0.55	0.10	1	0.19	1.1	0.21		0.00
6/15/2017	1440	0.7		0.00	1.22	0.32		0.00		0.00		0.00		0.00		0.00
6/18/2017	1440	0.845	4.65	1.20	2.57	0.56		0.00		0.00		0.00		0.00		0.00
6/21/2017	1440	0.7	9.8	3.05	6.7	1.77		0.00		0.00		0.00	0.52	0.12		0.00
6/24/2017	1440	0.845		0.00	0.75	0.16		0.00		0.00		0.00		0.00		0.00
6/27/2017	1440	0.7	4.32	1.34	4.26	1.12		0.00		0.00		0.00		0.00		0.00
6/30/2017	1440	0.845		0.00	1.06	0.23		0.00		0.00		0.00	0.6	0.11		0.00
7/6/2017	1440	0.845		0.00	0.59	0.13		0.00		0.00		0.00		0.00		0.00
7/9/2017	1440	0.963	11.43	2.58	7.12	1.36		0.00	0.59	0.10	1.27	0.21	0.95	0.16		0.00
7/12/2017	1440	0.827	8.48	2.23	3.07	0.69		0.00		0.00		0.00		0.00		0.00
7/15/2017	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
7/18/2017	1440	0.827		0.00	1.14	0.25		0.00		0.00		0.00	0.66	0.13		0.00
7/21/2017	1440	0.963	5.16	1.17	2.6	0.50		0.00		0.00		0.00	0.56	0.09		0.00
7/24/2017	1440	0.827		0.00		0.00		0.00		0.00		0.00		0.00		0.00
7/27/2017	1440	0.963	10.01	2.26	3.34	0.64		0.00		0.00		0.00		0.00		0.00
7/30/2017	1440	0.827	2.78	0.73	1.88	0.42		0.00		0.00		0.00		0.00		0.00
8/2/2017	1440	0.963		0.00	6.51	1.25		0.00	0.96	0.16		0.00		0.00		0.00
8/5/2017	1440	0.827		0.00	1.3	0.29		0.00		0.00		0.00		0.00		0.00
8/8/2017	1440	0.963	5.56	1.26	2.29	0.44		0.00		0.00	0.79	0.13		0.00		0.00
8/11/2017	1440	0.827		0.00	1.57	0.35		0.00		0.00		0.00	0.48	0.09		0.00
8/14/2017	1440	0.963		0.00	1.26	0.24		0.00		0.00		0.00		0.00		0.00
8/17/2017	1440	0.827		0.00	1.10	0.25		0.00	0.61	0.12		0.00		0.00		0.00
8/20/2017	1440	0.963	4.33	0.98	3.11	0.60		0.00	0.49	0.08		0.00		0.00		0.00
8/23/2017	1440	0.827		0.00	1.36	0.30		0.00		0.00		0.00		0.00		0.00
8/26/2017	1440	0.963		0.00	1.25	0.24		0.00		0.00		0.00		0.00		0.00
8/29/2017	1440	0.827		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/1/2017	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/4/2017	1440	0.827	7.88	2.07	2.6	0.58		0.00		0.00		0.00	0.53	0.10		0.00
9/7/2017	1440	0.963		0.00	1.12	0.21		0.00		0.00		0.00		0.00		0.00
9/10/2017	1440	0.827		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/13/2017	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/16/2017	1440	0.827	3.32	0.87	3.58	0.80		0.00		0.00		0.00		0.00		0.00
9/19/2017	1440	0.963		0.00	1.79	0.34		0.00		0.00		0.00		0.00		0.00
9/22/2017	1440	0.827		0.00	2.04	0.46		0.00		0.00		0.00		0.00		0.00
9/25/2017	1440	0.963	12.23	2.76	4.91	0.94		0.00	0.99	0.16		0.00	0.53	0.09		0.00
9/28/2017	1440	0.827		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/1/2017	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/04/17	1440	0.827	28.65	7.54	11.96	2.67		0.00	0.76	0.15	1.98	0.38	0.81	0.16	2.04	0.33
10/07/17	1440	0.963		0.00	1.81	0.35	0.65	0.11		0.00	0.45	0.07	0.49	0.08		0.00
10/10/17	1440	0.827		0.00	0.71	0.16		0.00		0.00		0.00		0.00		0.00
10/13/17	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/16/17	1440	0.827		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/19/17	1440	0.963	18.53	4.19	8.7	1.67		0.00		0.00		0.00	0.54	0.09		0.00
10/22/17	1440	0.827	6.29	1.66	2.47	0.55		0.00		0.00		0.00		0.00		0.00
10/25/17	1440	0.963		0.00	0.83	0.16		0.00		0.00		0.00		0.00		0.00
10/28/17	1440	0.827	1.03	0.27	0.81	0.18		0.00		0.00		0.00		0.00		0.00
10/31/17	1440	0.963		0.00	0.47	0.09		0.00		0.00		0.00		0.00		0.00
11/03/17	1440	0.827		0.00	0.96	0.21		0.00		0.00		0.00		0.00		0.00
11/06/17	1440	0.963		0.00	3.46	0.66		0.00		0.00		0.00		0.00		0.00
11/09/17	1440	0.827		0.00	0.48	0.11		0.00		0.00		0.00		0.00		0.00
11/12/17	1440	0.963		0.00	2.19	0.42		0.00		0.00		0.00		0.00		0.00
11/15/17	1440	0.827		0.00	0.49	0.11		0.00		0.00		0.00		0.00		0.00
11/18/17	1440	0.963	7.44	1.68	2.63	0.50		0.00		0.00	0.52	0.09		0.00		0.00
11/21/17	1440	0.827	19.54	5.14	5.13	1.14		0.00		0.00	0.79	0.15		0.00		0.00
11/24/17	1440	0.963	15.67	3.54	8.63	1.65		0.00		0.00		0.00		0.00		0.00
11/27/17	1440	0.827	11.85	3.12	4.03	0.90		0.00		0.00		0.00		0.00		0.00
11/30/17	1440	0.963	7.54	1.70	4.39	0.84		0.00		0.00		0.00		0.00		0.00
12/03/17	1440	0.827	40.86	10.76	12.99	2.90	0.62	0.12	0.5	0.10	1.9	0.37	1.08	0.21	2.95	0.47
12/06/17	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/09/17	1440	0.827		0.00	0.57	0.13		0.00		0.00		0.00		0.00		0.00
12/12/17	1440	0.963		0.00	0.54	0.10		0.00		0.00		0.00		0.00		0.00
12/15/17	1440	0.827		0.00	1.56	0.35		0.00		0.00		0.00		0.00		0.00
12/18/17	1440	0.963	9.69	2.19	3.75	0.72		0.00		0.00		0.00		0.00		0.00
12/21/17	1440	0.827		0.00	0.51	0.11		0.00		0.00		0.00		0.00		0.00
12/24/17	1440	0.963		0.00	0.51	0.10		0.00		0.00		0.00		0.00		0.00
12/27/17	1440	0.827		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/30/17	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
01/02/18	1440	0.827		0.00	0.6	0.13		0.00		0.00		0.00		0.00		0.00
01/05/18	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
01/08/18	1440	0.827	12.42	3.27	3.22	0.72		0.00		0.00		0.00		0.00		0.00
01/11/18	1440	0.963		0.00	2.15	0.41		0.00		0.00		0.00		0.00		0.00
01/14/18	1440	0.827		0.00	1.58	0.35		0.00		0.00		0.00		0.00		0.00
01/17/18	1440	0.963		0.00	1.89	0.36		0.00		0.00		0.00		0.00		0.00
01/20/18	1440	0.827	11.15	2.93	4.9	1.09		0.00		0.00	0.85	0.16		0.00		0.00
01/23/18	1440	0.963		0.00	0.46	0.09		0.00		0.00		0.00		0.00		0.00
01/26/18	1440	0.827	12.67	3.33	6.2	1.38		0.00		0.00	0.82	0.16		0.00		0.00
01/29/18	1440	0.963		0.00	1.29	0.25		0.00		0.00	0.6	0.10		0.00		0.00
02/01/18	1440	0.827		0.00	2.9	0.65		0.00		0.00		0.00		0.00		0.00
02/04/18	1440	0.963		0.00	1.99	0.38		0.00		0.00		0.00		0.00		0.00
02/07/18	1440	0.827		0.00		0.00		0.00		0.00		0.00		0.00		0.00
02/10/18	1440	0.963	21.1	4.77	9.28	1.78		0.00		0.00	1	0.17		0.00	1.56	0.21
02/13/18	1440	0.806		0.00	2.15	0.49		0.00		0.00	0.77	0.15		0.00		0.00

02/16/18	1440	0.963		0.00	2.15	0.41		0.00		0.00	0.49	0.08		0.00		0.00
02/19/18	1440	0.806	6.42	1.73	4.05	0.93		0.00		0.00	1.31	0.26		0.00	1.37	0.23
02/22/18	1440	0.963		0.00	1.46	0.28		0.00		0.00		0.00		0.00		0.00
02/25/18	1440	0.806	0.54	0.15		0.00		0.00		0.00		0.00		0.00		0.00
02/28/18	1440	0.963	12.66	2.86	8.96	1.72		0.00		0.00		0.00		0.00		0.00
03/03/18	1440	0.806		0.00		0.00		0.00		0.00		0.00		0.00		0.00
03/06/18	1440	0.963		0.00	0.86	0.16		0.00	0.54	0.09		0.00	0.55	0.09		0.00
03/09/18	1440	0.806		0.00		0.00		0.00		0.00		0.00		0.00		0.00
03/12/18	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
03/15/18	1440	0.806	1.68	0.45	0.9	0.21		0.00	0.44	0.09	0.49	0.10	0.49	0.10		0.00
03/18/18	1440	0.963	26.99	6.10	13.81	2.65	0.61	0.10		0.00	1.66	0.28		0.00		0.00
03/21/18	1440	0.806		0.00		0.00		0.00		0.00		0.00		0.00		0.00
03/24/18	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
03/27/18	1440	0.806	2.05	0.55	0.96	0.22		0.00		0.00		0.00	0.65	0.13		0.00
03/30/18	1440	0.963		0.00	0.67	0.13		0.00		0.00	0.9	0.15		0.00		0.00
04/02/18	1440	0.806		0.00		0.00		0.00		0.00		0.00		0.00		0.00
04/05/18	1440	0.963		0.00		0.00		0.00		0.00		0.00		0.00		0.00
04/08/18	1440	0.806		0.00	1.01	0.23		0.00		0.00		0.00		0.00		0.00
04/11/18	1440	0.936	6.48	1.51	5.01	0.99		0.00		0.00		0.00		0.00		0.00
04/14/18	1440	0.806	9.3	2.51	8.93	2.04		0.00		0.00	1.22	0.24	0.54	0.11		0.00
04/17/18	1440	0.936		0.00	0.59	0.12	0.5	0.09	0.45	0.08	0.86	0.15		0.00		0.00
04/20/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
04/23/18	1440	0.821		0.00	0.66	0.15		0.00		0.00		0.00		0.00		0.00
04/26/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
04/29/18	1440	0.871		0.00	0.53	0.11		0.00		0.00		0.00	0.49	0.09		0.00
05/02/18	1440	0.784	12.63	3.51	6.05	1.42	0.55	0.11		0.00	0.98	0.20	0.88	0.18		0.00
05/05/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
05/08/18	1440	0.784	0.81	0.22	0.98	0.23		0.00		0.00		0.00		0.00		0.00
05/11/18	1440	0.871		0.00	1.11	0.24		0.00		0.00		0.00		0.00		0.00
05/14/18	1440	0.784	1.53	0.42	1.46	0.34		0.00		0.00		0.00		0.00		0.00
05/17/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
05/20/18	1440	0.784		0.00	0.55	0.13		0.00		0.00	0.66	0.13	0.79	0.16		0.00
05/23/18	1440	0.871	1.85	0.46	2.47	0.52		0.00	0.52	0.10		0.00	0.49	0.09		0.00
05/26/18	1440	0.784	9.99	2.77	4.5	1.06	0.44	0.09		0.00	1.17	0.24		0.00		0.00
05/29/18	1440	0.871	2.89	0.72	2.18	0.46	0.5	0.09		0.00	0.81	0.15		0.00		0.00
06/01/18	1440	0.784	2.38	0.66	1.2	0.28		0.00		0.00	1.05	0.21	0.55	0.11		0.00
6/4/2018	1440	0.871	2.8	0.70	2.17	0.46		0.00		0.00		0.00		0.00		0.00
06/07/18	1440	0.784	19.27	5.35	5.95	1.40		0.00		0.00	1.53	0.31	0.71	0.15	1.67	0.28
6/10/2018	1440	0.871		0.00	0.48	0.10		0.00		0.00		0.00		0.00		0.00
06/13/18	1440	0.784	3.51	0.97	1.09	0.26		0.00		0.00	0.49	0.10		0.00		0.00
6/16/2018	1440	0.871	26.62	6.65	7.25	1.54		0.00	0.58	0.11	1.3	0.24	0.57	0.10	2.45	0.37
06/19/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
06/22/18	1440	0.871		0.00	0.51	0.11		0.00		0.00		0.00		0.00		0.00
6/25/2018	1440	0.784		0.00	0.57	0.13		0.00		0.00		0.00		0.00		0.00
06/28/18	1440	0.871	2.76	0.69	1.95	0.41		0.00		0.00		0.00		0.00		0.00
07/01/18	1440	0.784	11.21	3.11	3.6	0.85	0.49	0.10	0.58	0.12	1.28	0.26	0.69	0.14	1.58	0.27
7/4/2018	1440	0.871	4.36	1.09	1.12	0.24		0.00		0.00		0.00		0.00		0.00
07/07/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
07/10/18	1440	0.871	9.89	2.47	4.47	0.95		0.00		0.00	0.57	0.10		0.00	1.4	0.21
07/13/18	1440	0.784		0.00	0.46	0.11		0.00		0.00		0.00		0.00		0.00
07/16/18	1440	0.871	3.42	0.85	1.96	0.42		0.00		0.00		0.00		0.00		0.00
07/19/18	1440	0.784		0.00	0.97	0.23		0.00		0.00		0.00		0.00		0.00
07/22/18	1440	0.871	1.27	0.32	1.1	0.23		0.00		0.00		0.00		0.00		0.00
07/25/18	1440	0.784	0.53	0.15	1.12	0.26		0.00		0.00		0.00		0.00		0.00
07/28/18	1440	0.871	2.13	0.53	2.46	0.52	0.88	0.16		0.00	0.59	0.11		0.00		0.00
07/31/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
08/03/18	1440	0.871	2.85	0.71	2.76	0.58	0.94	0.17		0.00	0.91	0.17		0.00		0.00
08/06/18	1440	0.784	9.43	2.62	8.39	1.98		0.00		0.00		0.00		0.00		0.00
08/09/18	1440	0.871	2.61	0.65	2.89	0.61		0.00		0.00		0.00		0.00		0.00
08/12/18	1440	0.784	2.33	0.65	1.51	0.36		0.00	0.7	0.14		0.00		0.00		0.00
08/15/18	1440	0.871	14.29	3.57	9.91	2.10	0.52	0.10		0.00	1.4	0.26		0.00	1.36	0.21
08/18/18	1440	0.784	0.9	0.25	1.09	0.26		0.00		0.00		0.00		0.00		0.00
08/21/18	1440	0.871	2.44	0.61	1.88	0.40		0.00		0.00	0.57	0.10		0.00		0.00
08/24/18	1440	0.784	8.58	2.38	2.58	0.61		0.00		0.00		0.00		0.00		0.00
08/27/18	1440	0.871	7.24	1.81	5.27	1.12		0.00		0.00	0.91	0.17		0.00		0.00
08/30/18	1440	0.784		0.00	0.64	0.15		0.00		0.00		0.00		0.00		0.00
09/02/18	1440	0.871	9.97	2.49	6.3	1.33		0.00		0.00	0.6	0.11		0.00		0.00
09/05/18	1440	0.784	8.72	2.42	4.43	1.04		0.00		0.00	0.64	0.13		0.00		0.00
09/08/18	1440	0.871		0.00	0.73	0.15		0.00		0.00		0.00		0.00		0.00
09/11/18	1440	0.784	0.96	0.27	1.12	0.26		0.00		0.00	0.51	0.10	0.58	0.12		0.00
09/14/18	1440	0.871		0.00	0.79	0.17	0.69	0.13		0.00		0.00		0.00		0.00
09/17/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
09/20/18	1440	0.871	2.9	0.72	3.28	0.69		0.00		0.00	0.61	0.11		0.00		0.00
09/23/18	1440	0.784		0.00	0.58	0.14		0.00		0.00		0.00		0.00		0.00
09/26/18	1440	0.871	1.88	0.47	0.63	0.13		0.00		0.00		0.00		0.00		0.00
09/29/18	1440	0.784	7.15	1.99	7.29	1.72		0.00		0.00		0.00		0.00		0.00
10/02/18	1440	0.871	14.09	3.52	12.45	2.64		0.00		0.00	1.3	0.24		0.00		0.00
10/05/18	1440	0.784	2.97	0.82	1.68	0.40		0.00		0.00	0.81	0.17		0.00		0.00
10/08/18	1440	0.871	2.02	0.50	2.04	0.43		0.00		0.00		0.00	0.55	0.10		0.00
10/11/18	1440	0.784	1.35	0.37	0.9	0.21		0.00		0.00		0.00		0.00		0.00
10/14/18	1440	0.871		0.00	0.8	0.17		0.00		0.00		0.00		0.00		0.00
10/17/18	1440	0.784	1.27	0.35		0.00		0.00		0.00		0.00		0.00		0.00
10/20/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/23/18	1440	0.784	0.53	0.15		0.00		0.00		0.00		0.00	0.46	0.09		0.00
10/26/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/29/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/01/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/04/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/07/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/10/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/13/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/16/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/19/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/22/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/25/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/28/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/01/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/04/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/07/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/10/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/13/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/16/18	1440	0.784		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/19/18	1440	0.871		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/22/18	1440	0.784		0.00		0.00		0.00		0.00		0.00	0.75	0.15		0.00
12/28/18	1440	0.784	20.73	5.76	2.25	0.53		0.00	0.65	0.13		0.00		0.00		0.00
12/31/18	1440	0.871	2.68	0.67	1.34	0.28		0.00		0.00		0.00		0.00		0.00
01/03/19	1440	0.784	0.85	0.24	0.91	0.21		0.00		0.00		0.00		0.00		0.00
01/06/19	1440	0.871		0.00	0.44	0.09		0.00		0.00		0.00	0.59	0.11		0.00
01/09/19	1440	0.784		0.00	0.43	0.10		0.00		0.00		0.00	0.59	0.12		0.00
				#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!
				#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!
				#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!
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				#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!
				#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!
				#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!
				#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!
				#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!

PPB = (Total ug * 24.45) / (Volume m3 * MW)

Avalon Air Monitoring Site

Date	Time (min)	Flow (lpm)	Benzene	ppb	Toluene	ppb	Ethylbenzer	ppb	p-Xylene	ppb	m-Xylene	ppb	o-Xylene	ppb	Naphthalene	ppb
mdl	1440	1.04	0.44	0.10	0.43	0.08	0.43	0.07	0.43	0.07	0.43	0.07	0.44	0.07	1.29	0.17
04/05/14	1440	1.06		0.00	0.45	0.08		<0.07		0.00		0.00		0.00		0.00
04/11/14	1440	1.06	1.88	0.39	1.62	0.28		<0.07		0.00	0.75	0.11		0.00		0.00
04/17/14	1440	1.06		0.00	1.01	0.18		<0.07		0.00		0.00		0.00		0.00
04/23/14	1440	1.06		0.00		0.00		<0.07		0.00		0.00		0.00		0.00
04/29/14	1440	1.06		0.00	0.64	0.11		<0.07		0.00		0.00		0.00		0.00
05/05/14	1440	1.06		0.00	1.77	0.31		<0.07		0.00		0.00		0.00		0.00
05/11/14	1440	1.06	1.82	0.37	1.76	0.31		0.00		0.00		0.00		0.00	1.94	0.24
05/17/14	1440	1.06	3.31	0.68	0.79	0.14		0.00		0.00		0.00		0.00		0.00
05/23/14	1440	1.06		0.00	1.93	0.34		0.00		0.00		0.00		0.00		0.00
05/29/14	1440	1.06		0.00	2.79	0.48		0.00		0.00	1.27	0.19		0.00		0.00
06/04/14	1440	1.06		0.00	1.77	0.31		0.00		0.00		0.00		0.00		0.00
06/10/14	1440	1.06	2.09	0.43	3.71	0.64		0.00		0.00	1.23	0.19		0.00		0.00
06/16/14	1440	1.06		0.00	0.88	0.15		0.00		0.00		0.00		0.00		0.00
06/22/14	1440	1.06	6.21	1.27	2.59	0.45		0.00		0.00		0.00		0.00		0.00
06/28/14	1440	1.06	1.92	0.39	3.55	0.62		0.00		0.00		0.00		0.00		0.00
07/04/14	1440	1.05		0.00	0.73	0.13		0.00		0.00		0.00		0.00		0.00
07/10/14	1440	1.05		0.00	1.93	0.34		0.00		0.00		0.00		0.00		0.00
07/16/14	1440	1.05	2.28	0.47	1.73	0.30		0.00		0.00		0.00		0.00		0.00
07/22/14	1440	1.06	4.90	1.01	3.46	0.60		0.00		0.00	1.27	0.19		0.00		0.00
07/28/14	1440	1.06		0.00	0.95	0.17		0.00		0.00		0.00		0.00		0.00
08/03/14	1440	1.06		0.00	1.74	0.30		0.00		0.00		0.00		0.00		0.00
08/09/14	1440	1.06		0.00		0.00		0.00		0.00		0.00		0.00		0.00
08/15/14	1440	1.06		0.00	2.19	0.38		0.00		0.00		0.00		0.00	3.19	0.40
08/21/14	1440	1.06	5.01	1.03	2.56	0.45		0.00		0.00	1.57	0.24		0.00	1.46	0.18
08/27/14	1440	1.06	2.12	0.44	2.27	0.40		0.00		0.00		0.00		0.00		0.00
09/02/14	1440	1.06	4.83	0.99	1.26	0.22		0.00		0.00		0.00		0.00		0.00
09/08/14	1440	1.06		0.00	1.71	0.30		0.00		0.00		0.00		0.00		0.00
09/14/14	1440	1.07		0.00	1.27	0.22		0.00		0.00		0.00		0.00		0.00
09/20/14	1440	1.07		0.00	1.17	0.20		0.00		0.00		0.00		0.00		0.00
09/26/14	1440	1.07		0.00	1.96	0.34		0.00		0.00		0.00		0.00		0.00
10/02/14	1440	1.07	2.26	0.46	2.97	0.51		0.00		0.00		0.00		0.00		0.00
10/08/14	1440	1.07	2.71	0.55	1.41	0.24		0.00		0.00		0.00		0.00		0.00
10/14/14	1440	1.07		0.00	1.12	0.19		0.00		0.00		0.00		0.00		0.00
10/20/14	1440	1.07		0.00	1.23	0.21		0.00		0.00		0.00		0.00		0.00
10/26/14	1440	1.07		0.00	0.83	0.14		0.00		0.00		0.00		0.00		0.00
11/01/14	1440	1.07		0.00		0.00		0.00		0.00		0.00		0.00		0.00
11/07/14	1440	1.02		0.00	0.74	0.13		0.00		0.00		0.00		0.00		0.00
11/13/14	1440	0.79		0.00	1.06	0.25		0.00		0.00		0.00		0.00		0.00
11/25/14	1440	1.03	7.66	1.62	1.64	0.29		0.00		0.00		0.00		0.00		0.00
12/01/14	1440	1.03		0.00	1.08	0.19		0.00		0.00		0.00		0.00		0.00
12/07/14	1440	1.03		0.00	1.12	0.20		0.00		0.00		0.00		0.00		0.00
12/13/14	1440	1.03	3.18	0.67	1.72	0.31		0.00		0.00		0.00		0.00		0.00
12/19/14	1440	1.03		0.00	0.99	0.18		0.00		0.00		0.00		0.00		0.00
12/25/14	1440	1.03		0.00	0.83	0.15		0.00		0.00		0.00		0.00		0.00
12/31/14	1440	1.03		0.00	0.52	0.09		0.00		0.00		0.00		0.00		0.00
01/06/15	1440	1.03		0.00	1.25	0.22		0.00		0.00		0.00		0.00		0.00
01/12/15	1440	1.03		0.00	2.20	0.39		0.00		0.00		0.00		0.00		0.00
01/18/15	1440	1.03		0.00	1.03	0.18		0.00		0.00		0.00		0.00		0.00
01/24/15	1440	1.03		0.00	1.14	0.20		0.00		0.00		0.00		0.00		0.00
01/30/15	1440	1.03		0.00	0.70	0.13		0.00		0.00		0.00		0.00		0.00
02/05/15	1440	1.03		0.00	0.73	0.13		0.00		0.00		0.00		0.00		0.00
02/11/15	1440	1.06	4.36	0.90	2.06	0.36		0.00		0.00		0.00		0.00		0.00
02/17/15	1440	1.06		0.00	1.60	0.28		0.00		0.00		0.00		0.00		0.00
02/23/15	1440	1.06		0.00	0.57	0.10		0.00		0.00		0.00		0.00		0.00
03/01/15	1440	1.06		0.00	1.82	0.32		0.00		0.00		0.00	0.52	0.08		0.00
03/07/15	1440	1.06	3.47	0.71	1.02	0.18		0.00		0.00		0.00		0.00		0.00
3/13/2015	1440	1.05	6.79	1.41	4.73	0.83		0.00		0.00		0.00	1.77	0.27		0.00
3/19/2015	1440	1.05		0.00	0.97	0.17		0.00		0.00		0.00		0.00		0.00
3/25/2015	1440	1.05		0.00	1.93	0.34		0.00		0.00		0.00		0.00		0.00
3/31/2015	1440	1.05		0.00	0.88	0.16		0.00		0.00		0.00		0.00		0.00
4/6/2015	1440	1.05	5.72	1.19	5.21	0.92		0.00		0.00		0.00		0.00		0.00
4/12/2015	1440	1.05	6.9	1.43	3.17	0.56		0.00	1.39	0.21		0.00		0.00		0.00
4/18/2015	1440	1.05		0.00	2.45	0.43		0.00		0.00		0.00		0.00		0.00
4/24/2015	1440	1.05		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/30/2015	1440	1.04		0.00	1.24	0.22		0.00		0.00		0.00		0.00		0.00
5/6/2015	1440	1.04		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/12/2015	1440	1.04		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/18/2015	1440	1.04		0.00	1.81	0.32		0.00		0.00		0.00	0.54	0.08		0.00
5/24/2015	1440	1.04	6.24	1.31	4.18	0.74		0.00		0.00		0.00	1.09	0.17	1.78	0.23
5/30/2015	1440	1.04	4.46	0.93	2.15	0.38		0.00		0.00		0.00		0.00		0.00
6/5/2015	1440	1.04		0.00	1.71	0.30		0.00		0.00		0.00		0.00		0.00
6/11/2015	1440	1.04	6.71	1.40	2.14	0.38		0.00		0.00		0.00	0.62	0.10		0.00
6/17/2015	1440	1.04		0.00	2.52	0.45		0.00		0.00		0.00		0.00		0.00
6/23/2015	1440	1.05		0.00	1.43	0.25		0.00		0.00		0.00		0.00		0.00
6/29/2015	1440	1.05		0.00	2.17	0.38		0.00		0.00		0.00		0.00		0.00
7/5/2015	1440	1.05		0.00	1.53	0.27		0.00		0.00		0.00		0.00		0.00
7/11/2015	1440	1.05		0.00	2.44	0.43		0.00		0.00		0.00		0.00		0.00
7/17/2015	1440	1.05		0.00	3.07	0.54		0.00		0.00		0.00		0.00		0.00
7/23/2015	1440	1.05		0.00	1.8	0.32		0.00		0.00		0.00		0.00		0.00
7/29/2015	1440	1.05		0.00	1.78	0.31		0.00		0.00		0.00		0.00		0.00
8/4/2015	1440	1.05		0.00	1.23	0.22		0.00		0.00		0.00		0.00		0.00
8/10/2015	1440	1.05		0.00	2.28	0.40		0.00		0.00		0.00		0.00		0.00
8/16/2015	1440	1.05		0.00	2.59	0.46		0.00		0.00		0.00		0.00		0.00
8/22/2015	1440	1.05		0.00	1.61	0.28		0.00		0.00		0.00		0.00		0.00
8/28/2015	1440	1.036		0.00	2.14	0.38		0.00		0.00		0.00		0.00		0.00
9/3/2015	1440	1.036		0.00	2.63	0.47		0.00		0.00		0.00		0.00		0.00
9/9/2015	1440	1.036		0.00	1.88	0.33		0.00		0.00		0.00		0.00		0.00
9/15/2015	1440	1.036		0.00	2.78	0.50		0.00		0.00	1.04	0.16		0.00		0.00
9/21/2015	1440	1.036		0.00	1.67	0.30		0.00		0.00		0.00		0.00		0.00
9/27/2015	1440	1.036		0.00	1.33	0.24		0.00		0.00		0.00		0.00		0.00
10/3/2015	1440	1.036		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/9/2015	1440	1.036	0.9	0.19	1.60	0.29		0.00		0.00		0.00		0.00		0.00
10/15/2015	1440	1.036	1.21	0.25	2.51	0.45		0.00		0.00		0.00		0.00		0.00
10/21/2015	1440	1.036	1.28	0.27	4.40	0.78	0.6	0.09		0.00	0.58	0.09	1.98	0.31		0.00
10/27/2015	1440	1.036		0.00	2.01	0.36		0.00		0.00	1.31	0.20		0.00		0.00
11/2/2015	1440	1.036	3.25	0.68	4.25	0.76		0.00		0.00		0.00	1.4	0.22		0.00
11/8/2015	1440	1.036	3.45	0.72	1.81	0.32		0.00		0.00	1.06	0.16	0.75	0.12		0.00
11/14/2015	1440	1.036	1.47	0.31	0.53	0.09		0.00		0.00		0.00		0.00		0.00
11/20/2015	1440	1.036	2.7	0.57	0.58	0.10		0.00		0.00		0.00	0.68	0.11		0.00
11/26/2015	1440	1.036	2.66	0.56	1.74	0.31		0.00		0.00		0.00	0.64	0.10		0.00
12/2/2015	1440	1.036	4.54	0.95	1.16	0.21		0.00		0.00	1.01	0.16	0.63	0.10		0.00
12/8/2015	1440	1.036	3.32	0.70	5.35	0.95	0.59	0.09		0.00	3.02	0.47	2.44	0.38		0.00
12/14/2015	1440	1.036	3.4	0.71	6.06	1.08		0.00		0.00	1.82	0.28	1.99	0.31		0.00
12/20/2015	1440	1.036	1.39	0.29	2.84	0.51		0.00		0.00		0.00		0.00		0.00
12/26/2015	1440	1.036	2.04	0.43	1.10	0.20		0.00		0.00	0.66	0.10		0.00		0.00

1/1/2016	1440	1.024	0.65	0.14	0.64	0.12		0.00		0.00		0.00		0.00		0.00		0.00
1/7/2016	1440	1.024	2.29	0.49	6.22	1.12		0.00	0.91	0.14		0.00		0.00		0.00		0.00
1/13/2016	1440	1.024		0.00	1.48	0.27		0.00	0.43	0.07		0.00		0.00		0.00		0.00
1/19/2016	1440	1.024		0.00	0.59	0.11		0.00		0.00		0.00		0.00		0.00		0.00
1/25/2016	1440	1.024		0.00	0.31	0.06		0.00		0.00		0.00		0.00		0.00		0.00
1/31/2016	1440	1.024		0.00	1.08	0.19		0.00		0.00		0.00		0.00		0.00		0.00
2/6/2016	1440	1.024		0.00	1.57	0.28		0.00		0.00		0.00		0.00		0.00		0.00
2/12/2016	1440	1.024		0.00	1	0.18		0.00		0.00		0.00		0.00		0.00		0.00
2/18/2016	1440	1.024		0.00	0.63	0.11		0.00		0.00		0.00		0.00		0.00		0.00
2/24/2016	1440	1.024		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/1/2016	1440	0.724		0.00	2.98	0.76		0.00		0.00		0.00		0.00		0.00		0.00
3/7/2016	1440	0.765	1.46	0.42	1.46	0.35		0.00		0.00	0.53	0.11	0.57	0.12		0.00		0.00
3/13/2016	1440	1.038	5.91	1.24	1.9	0.34		0.00		0.00	1.32	0.20		0.00		0.00		0.00
3/19/2016	1440	1.038		0.00	0.7	0.12		0.00		0.00		0.00		0.00		0.00		0.00
3/25/2016	1440	1.038		0.00	0.57	0.10		0.00		0.00		0.00		0.00		0.00		0.00
3/31/2016	1440	1.038		0.00	1.64	0.29		0.00		0.00		0.00	0.7	0.11		0.00		0.00
4/6/2016	1440	1.038		0.00	0.7	0.12		0.00		0.00		0.00		0.00		0.00		0.00
4/12/2016	1440	1.038		0.00	1.45	0.26		0.00		0.00		0.00	0.54	0.08		0.00		0.00
4/18/2016	1440	1.038	1.06	0.22	2.12	0.38		0.00		0.00		0.00	0.97	0.15		0.00		0.00
4/24/2016	1440	1.038		0.00	1.17	0.21		0.00		0.00	0.57	0.09		0.00		0.00		0.00
4/30/2016	1440	1.038	3.09	0.65	1.01	0.18		0.00		0.00		0.00	0.61	0.09		0.00		0.00
5/6/2016	1440	1.038		0.00	0.62	0.11		0.00		0.00		0.00		0.00		0.00		0.00
5/12/2016	1440	1.038	5.34	1.12	2.17	0.39		0.00		0.00	0.56	0.09	0.5	0.08		0.00		0.00
5/18/2016	1440	1.038		0.00	0.88	0.16		0.00		0.00		0.00	0.59	0.09		0.00		0.00
5/24/2016	1440	1.038		0.00	1.97	0.35		0.00		0.00		0.00		0.00		0.00		0.00
5/30/2016	1440	1.038		0.00	1.56	0.28		0.00		0.00		0.00	0.64	0.10		0.00		0.00
6/5/2016	1440	1.038		0.00	0.6	0.11		0.00		0.00	0.48	0.07		0.00		0.00		0.00
6/11/2016	1440	1.038		0.00	1.42	0.25		0.00		0.00		0.00		0.00		0.00		0.00
6/17/2016	1440	0.975		0.00	2.24	0.42		0.00		0.00		0.00		0.00		0.00		0.00
6/23/2016	1440	0.975		0.00	1.2	0.23		0.00		0.00		0.00		0.00		0.00		0.00
6/29/2016	1440	0.975		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
7/5/2016	1440	0.975		0.00	1.26	0.24		0.00		0.00		0.00		0.00		0.00		0.00
7/11/2016	1440	0.975		0.00	2.16	0.41		0.00		0.00		0.00		0.00		0.00		0.00
7/17/2016	1440	0.975		0.00	1.25	0.24		0.00		0.00	0.56	0.09	0.59	0.10		0.00		0.00
7/23/2016	1440	0.975		0.00	1.53	0.29		0.00	0.45	0.07	0.58	0.10		0.00		0.00		0.00
7/29/2016	1440	0.975		0.00	2.09	0.40		0.00	0.44	0.07	0.95	0.16		0.00		0.00		0.00
8/4/2016	1440	0.975		0.00	1.69	0.32		0.00		0.00	1.04	0.17	0.74	0.12		0.00		0.00
8/10/2016	1440	0.975		0.00	1.29	0.24		0.00		0.00	0.73	0.12		0.00		0.00		0.00
8/16/2016	1440	0.975		0.00	0.91	0.17		0.00		0.00		0.00		0.00		0.00		0.00
8/22/2016	1440	0.975		0.00	0.57	0.11		0.00		0.00		0.00	0.68	0.11		0.00		0.00
8/28/2016	1440	0.975		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/3/2016	1440	0.975		0.00	0.64	0.12		0.00		0.00		0.00	0.56	0.09		0.00		0.00
9/9/2016	1440	0.975		0.00	0.74	0.14		0.00	0.45	0.07		0.00	0.47	0.08		0.00		0.00
9/15/2016	1440	0.975		0.00	0.86	0.16		0.00		0.00	0.84	0.14	0.56	0.09		0.00		0.00
9/21/2016	1440	0.975	0.55	0.12	1.09	0.21		0.00		0.00		0.00		0.00		0.00		0.00
9/27/2016	1440	0.553		0.00	0.89	0.30		0.00		0.00		0.00	0.54	0.16		0.00		0.00
10/3/2016	1440	0.553		0.00	2.24	0.75		0.00		0.00	1.1	0.32		0.00		0.00		0.00
10/9/2016	1440	0.89		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/15/2016	1440	0.89		0.00	1.57	0.33		0.00		0.00		0.00	0.46	0.08		0.00		0.00
10/21/2016	1440	0.89		0.00	0.47	0.10		0.00		0.00		0.00		0.00		0.00		0.00
10/27/2016	1440	0.89	0.88	0.22	1.24	0.26		0.00		0.00	0.9	0.16	0.51	0.09		0.00		0.00
11/2/2016	1440	0.89	0.57	0.14	4.56	0.95	1	0.18	1.18	0.21	2.41	0.43	0.8	0.14		0.00		0.00
11/8/2016	1440	0.89	1.75	0.43	6.18	1.28	1.07	0.19	1.43	0.26	3.71	0.67	2.07	0.37		0.00		0.00
11/14/2016	1440	0.89	1.1	0.27	3.49	0.72	1.25	0.22	0.97	0.17	2.14	0.39	0.56	0.10		0.00		0.00
11/20/2016	1440	0.89		0.00	0.77	0.16		0.00		0.00		0.00	0.66	0.12		0.00		0.00
11/26/2016	1440	0.89		0.00	0.75	0.16		0.00		0.00	0.55	0.10	0.57	0.10		0.00		0.00
12/2/2016	1440	0.89	0.69	0.17	0.54	0.11	0.47	0.08		0.00	0.73	0.13	0.49	0.09		0.00		0.00
12/8/2016	1440	0.89		0.00	0.66	0.14		0.00		0.00	0.69	0.12	0.47	0.08		0.00		0.00
12/14/2016	1440	0.89		0.00	0.54	0.11		0.00		0.00		0.00		0.00		0.00		0.00
12/20/2016	1440	0.89	1.34	0.33	3.4	0.71	1.11	0.20	1.01	0.18	2.37	0.43	1.03	0.19		0.00		0.00
12/26/2016	1440	0.89		0.00	1.3	0.27		0.00		0.00		0.00	0.49	0.09		0.00		0.00
1/1/2017	1440	0.89		0.00	1.15	0.24		0.00		0.00	0.74	0.13		0.00		0.00		0.00
1/7/2017	1440	0.89		0.00	1.08	0.22		0.00		0.00	0.74	0.13		0.00		0.00		0.00
1/13/2017	1440	0.89		0.00	0.92	0.19		0.00		0.00	0.61	0.11	0.49	0.09		0.00		0.00
1/19/2017	1440	0.89		0.00	1.99	0.41		0.00	0.47	0.08	0.72	0.13	0.5	0.09		0.00		0.00
1/25/2017	1440	1.004		0.00	1.46	0.27	0.44	0.07		0.00		0.00	0.5	0.08		0.00		0.00
1/31/2017	1440	1.004		0.00	0.63	0.12		0.00		0.00		0.00		0.00		0.00		0.00
2/6/2017	1440	1.004	1.66	0.36	3.12	0.57		0.00	0.72	0.11	2.08	0.33	1.74	0.28	2.36	0.31		0.00
2/12/2017	1440	1.004		0.00	2.19	0.40	0.62	0.10		0.00	0.97	0.15	0.96	0.15		0.00		0.00
2/18/2017	1440	1.004		0.00	3.04	0.56		0.00		0.00		0.00	0.62	0.10		0.00		0.00
2/24/2017	1440	1.004		0.00	0.55	0.10		0.00		0.00		0.00	0.53	0.08		0.00		0.00
3/2/2017	1440	1.004		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/8/2017	1440	1.004		0.00		0.00		0.00		0.00	0.54	0.09		0.00		0.00		0.00
3/14/2017	1440	1.004		0.00		0.00		0.00		0.00	0.5	0.08		0.00		0.00		0.00
3/20/2017	1440	1.004		0.00	1.73	0.32	0.56	0.09	0.55	0.09	1.12	0.18	0.54	0.09		0.00		0.00
3/26/2017	1440	1.004		0.00		0.00		0.00		0.00	0.44	0.07	0.46	0.07		0.00		0.00
4/1/2017	1440	1.004		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/7/2017	1440	1.004		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
4/13/2017	1440	1.004		0.00	1.06	0.19	0.66	0.11		0.00	0.91	0.15	0.66	0.11		0.00		0.00
4/19/2017	1440	1.048		0.00	0.7	0.12		0.00		0.00		0.00		0.00		0.00		0.00
4/25/2017	1440	1.048		0.00	0.84	0.15		0.00		0.00	1.07	0.16		0.00		0.00		0.00
5/1/2017	1440	1.048		0.00	1.4	0.25	0.45	0.07		0.00	1.08	0.17		0.00		0.00		0.00
5/7/2017	1440	1.048		0.00	0.63	0.11		0.00		0.00		0.00		0.00		0.00		0.00
5/13/2017	1440	1.048		0.00	0.84	0.15		0.00		0.00		0.00		0.00		0.00		0.00
5/19/2017	1440	1.048		0.00	1.64	0.29		0.00	0.45	0.07		0.00	0.75	0.11		0.00		0.00
5/25/2017	1440	1.048		0.00	0.51	0.09		0.00		0.00		0.00		0.00		0.00		0.00
5/31/2017	1440	1.012		0.00	1.29	0.24		0.00		0.00		0.00		0.00		0.00		0.00
6/6/2017	1440	1.012		0.00	2.29	0.42		0.00	0.51	0.08	0.65	0.10	0.55	0.09		0.00		0.00
6/12/2017	1440	1.012		0.00	2.03	0.37	0.65	0.10		0.00	1.34	0.21	0.98	0.16		0.00		0.00
6/18/2017	1440	1.012		0.00	1.16	0.21		0.00		0.00		0.00		0.00		0.00		0.00
6/24/2017	1440	1.012		0.00	1.66	0.30		0.00		0.00		0.00		0.00		0.00		0.00
6/30/2017	1440	1.012		0.00	2.51	0.46		0.00		0.00	0.57	0.09	0.64	0.10		0.00		0.00
7/6/2017	1440	1.012		0.00	1.84	0.34		0.00		0.00		0.00		0.00		0.00		0.00
7/12/2017	1440	1.012		0.00	2.74	0.50		0.00		0.00	0.72	0.11	1.08	0.17		0.00		0.00
7/18/2017	1440	1.012		0.00	0.56	0.10		0.00		0.00		0.00		0.00		0.00		0.00
7/24/2017	1440	1.012		0.00	0.72	0.13		0.00		0.00		0.00		0.00		0.00		0.00
7/30/2017	1440	1.012		0.00	0.84	0.15		0.00		0.00		0.00		0.00		0.00		0.00
8/5/2017	1440	1.012		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
8/11/2017	1440	1.012		0.00	1.7	0.31		0.00		0.00		0.00		0.00		0.00		0.00
8/17/2017	1440	1.012		0.00	2.24	0.41		0.00		0.00		0.00		0.00		0.00		0.00
8/23/2017	1440	1.012		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
8/29/2017	1440	1.012		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/4/2017	1440	1.012		0.00	1.61	0.29		0.00		0.00		0.00		0.00		0.00		0.00
9/10/2017	1440	1.012		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/16/2017	1440	1.012		0.00	2.38	0.43		0.00		0.00		0.00		0.00		0.00		0.00
9/22/2017	1440	0.984		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/28/2017	1440	0.984		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/16/2017	1440	0.984		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
10/22/2017	1440	0.984		0.00	2.49	0.47		0.00		0.00		0.00		0.00		0.00		0.00

10/28/2017	1440	0.984		0.00	0.72	0.14		0.00		0.00		0.00		0.00		0.00
11/3/2017	1440	0.984		0.00	0.86	0.16		0.00		0.00		0.00		0.00		0.00
11/9/2017	1440	0.984		0.00	1.08	0.20		0.00		0.00		0.00		0.00		0.00
11/15/2017	1440	0.984		0.00	2.04	0.38		0.00		0.00		0.00		0.00		0.00
11/21/2017	1440	0.984		0.00	1.58	0.30		0.00		0.00		0.00		0.00		0.00
11/27/2017	1440	1.017		0.00	1.8	0.33		0.00		0.00		0.00		0.00		0.00
12/3/2017	1440	1.017		0.00	4.11	0.75		0.00		0.00		0.00		0.00		0.00
12/9/2017	1440	1.017		0.00		0.00		0.00		0.00		0.00		0.00		0.00
12/15/2017	1440	1.017		0.00	2	0.36		0.00		0.00		0.00		0.00		0.00
12/21/2017	1440	1.017		0.00	0.53	0.10		0.00		0.00		0.00		0.00		0.00
12/27/2017	1440	1.017		0.00	0.6	0.11		0.00		0.00		0.00		0.00		0.00
1/2/2018	1440	1.017		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/8/2018	1440	1.017		0.00		0.00		0.00		0.00		0.00		0.00		0.00
1/14/2018	1440	1.017		0.00	1.59	0.29		0.00		0.00		0.00		0.00		0.00
1/20/2018	1440	1.017		0.00	1.3	0.24		0.00		0.00		0.00		0.00		0.00
1/26/2018	1440	1.017		0.00	3.25	0.59		0.00		0.00		0.00		0.00		0.00
2/1/2018	1440	1.017		0.00	1.17	0.21		0.00		0.00		0.00		0.00		0.00
2/7/2018	1440	1.007		0.00	1.8	0.33		0.00		0.00		0.00		0.00		0.00
2/13/2018	1440	1.007		0.00	0.79	0.14		0.00		0.00		0.00		0.00		0.00
2/19/2018	1440	1.007		0.00	5.87	1.08		0.00		0.00	0.94	0.15		0.00		0.00
2/25/2018	1440	1.007		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/3/2018	1440	1.007		0.00	0.43	0.08		0.00		0.00		0.00		0.00		0.00
3/9/2018	1440	1.007		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/15/2018	1440	1.007		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/21/2018	1440	1.007		0.00		0.00		0.00		0.00		0.00		0.00		0.00
3/27/2018	1440	1.007		0.00	1.67	0.31		0.00		0.00		0.00		0.00		0.00
4/2/2018	1440	1.007		0.00	1.17	0.21		0.00		0.00	0.55	0.09		0.00		0.00
4/8/2018	1440	1.007		0.00		0.00		0.00		0.00		0.00	0.79	0.13		0.00
4/14/2018	1440	1.007	0.64	0.14	2.12	0.39		0.00		0.00	1.4	0.22		0.00		0.00
4/20/2018	1440	1.007		0.00	2.15	0.39	0.86	0.14	0.73	0.12	1.45	0.23	0.89	0.14		0.00
4/26/2018	1440	1.007		0.00	0.49	0.09		0.00		0.00		0.00		0.00		0.00
5/2/2018	1440	1.014		0.00	4.26	0.78	1.14	0.18	0.86	0.14	2.12	0.33		0.00		0.00
5/8/2018	1440	1.014		0.00	1.44	0.26		0.00		0.00	1.26	0.20		0.00		0.00
5/14/2018	1440	1.014	0.5	0.11	2.41	0.44		0.00		0.00		0.00		0.00		0.00
5/20/2018	1440	1.014		0.00		0.00		0.00		0.00		0.00		0.00		0.00
5/26/2018	1440	1.014	1.28	0.27	1.77	0.32		0.00		0.00	1.35	0.21		0.00		0.00
6/1/2018	1440	1.014		0.00	0.73	0.13	0.44	0.07		0.00		0.00		0.00		0.00
6/7/2018	1440	1.014		0.00	1.6	0.29		0.00		0.00		0.00		0.00		0.00
6/13/2018	1440	1.014		0.00	0.88	0.16		0.00	0.47	0.07		0.00	0.49	0.08		0.00
6/19/2018	1440	1.014		0.00	0.94	0.17		0.00		0.00	0.99	0.16		0.00		0.00
6/25/2018	1440	1.014		0.00	0.7	0.13		0.00		0.00		0.00		0.00		0.00
7/1/2018	1440	1.014	0.66	0.14	2.07	0.38		0.00		0.00	1.14	0.18	0.71	0.11		0.00
7/7/2018	1440	1.014		0.00	1.3	0.24		0.00		0.00		0.00		0.00		0.00
7/13/2018	1440	1.014	0.6	0.13	2.2	0.40		0.00		0.00	1.21	0.19		0.00		0.00
7/19/2018	1440	1.014		0.00		0.00		0.00		0.00		0.00		0.00		0.00
7/25/2018	1440	1.014	0.6	0.13	1.15	0.21	0.73	0.12		0.00		0.00		0.00		0.00
7/31/2018	1440	1.014		0.00	1.59	0.29	0.9	0.14		0.00		0.00		0.00		0.00
8/6/2018	1440	1.014	0.64	0.14	3.84	0.70		0.00		0.00	1.06	0.17		0.00		0.00
8/12/2018	1440	1.014		0.00	1.06	0.19		0.00		0.00		0.00		0.00		0.00
8/18/2018	1440	1.014		0.00	0.84	0.15	0.95	0.15		0.00	0.89	0.14		0.00		0.00
8/24/2018	1440	1.014	3.08	0.66	5.08	0.92	0.59	0.09	1.31	0.21	1.78	0.28		0.00		0.00
8/30/2018	1440	1.014		0.00	1.05	0.19		0.00		0.00		0.00		0.00		0.00
9/5/2018	1440	1.014	0.7	0.15	3.58	0.65		0.00		0.00	1.11	0.18		0.00		0.00
9/11/2018	1440	1.014		0.00	1.44	0.26		0.00		0.00	1.1	0.17		0.00		0.00
9/17/2018	1440	1.014		0.00		0.00		0.00		0.00		0.00		0.00		0.00
9/23/2018	1440	1.014		0.00	0.61	0.11		0.00		0.00		0.00		0.00		0.00
9/29/2018	1440	1.014		0.00	1.18	0.21		0.00		0.00	0.69	0.11		0.00		0.00
10/5/2018	1440	1.014	1.4	0.30	2.11	0.38		0.00	0.9	0.14	1.08	0.17		0.00		0.00
10/11/2018	1440	1.014	1.46	0.31		0.00		0.00		0.00	0.61	0.10	0.57	0.09		0.00
10/17/2018	1440	1.014		0.00	0.71	0.13		0.00		0.00		0.00		0.00		0.00
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Exhibit C

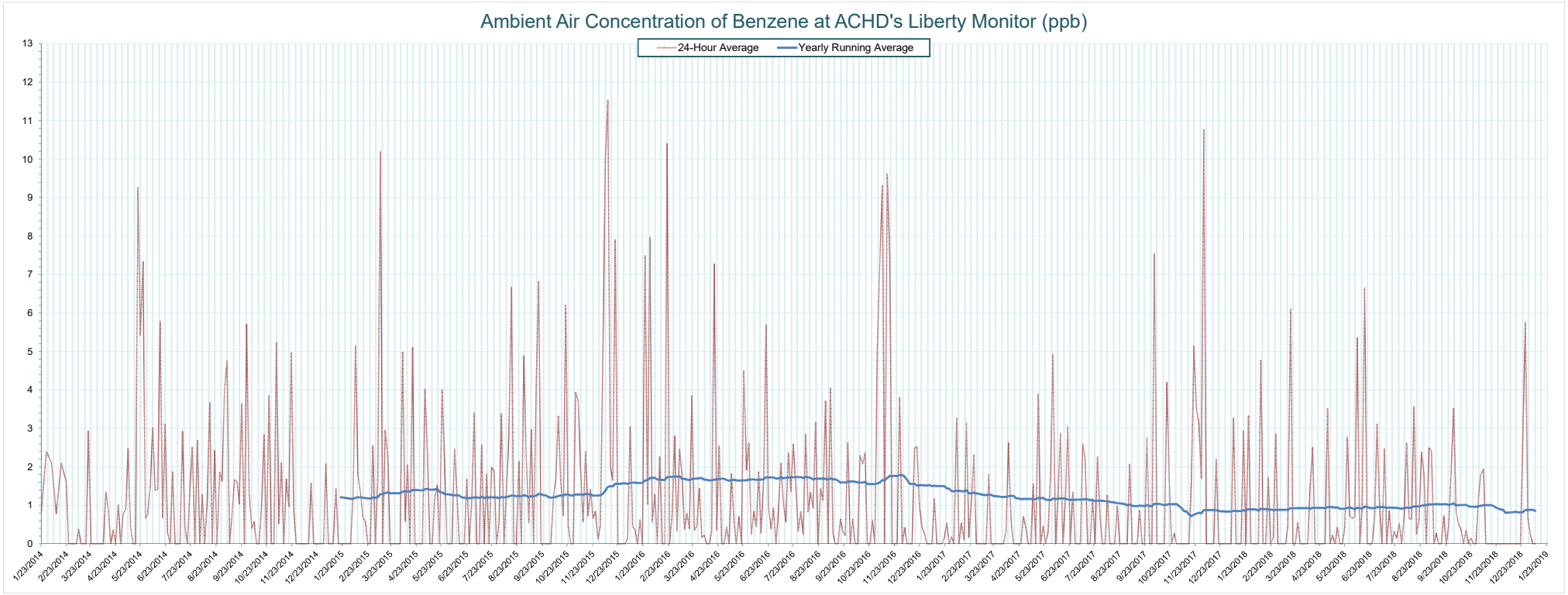
Ambient Air Concentration of Benzene at ACHD's Liberty Monitor (ppb)
24-Hour Average
Yearly Running Average
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1/23/2014
2/23/2014
3/23/2014
4/23/2014
5/23/2014
6/23/2014
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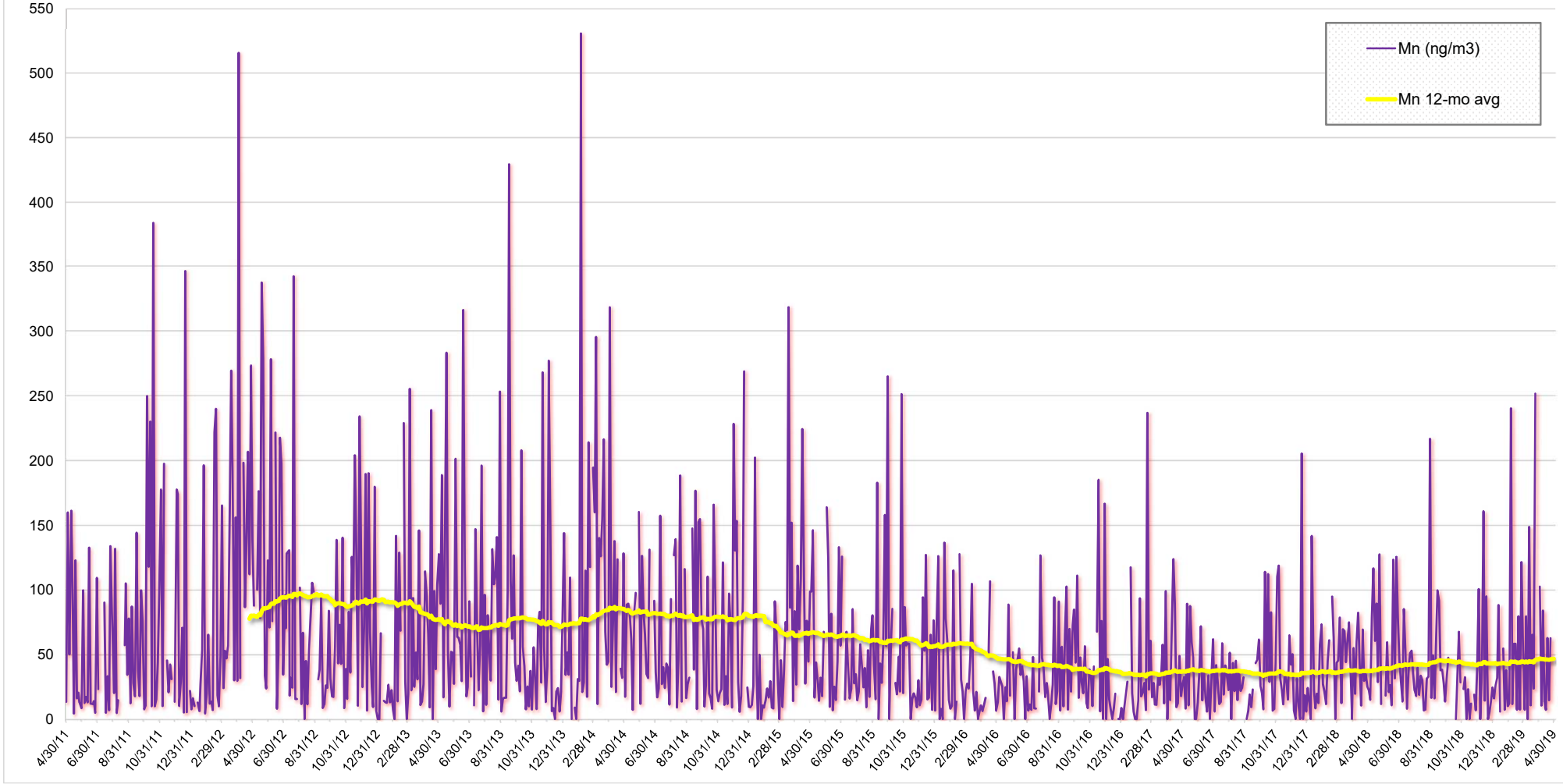
Exhibit D

Lawrenceville Toxic Metals Study: **MANGANESE**
Individual Sampling Results (ng/m^3) April 30, 2011 - April 30, 2019



Appendix C

Clean Air Council Document

CLEAN AIR COUNCIL

Allegheny County Health Department
2020 Air Monitoring Network Plan

June 10, 2018

Written Comments by Clean Air Council

Clean Air Council ("the Council") appreciates the opportunity to submit written comments regarding the proposed 2020 Air Monitoring Network plan dated July 1, 2019 ("Draft Plan").

The Council is a non-profit environmental organization headquartered at 135 South 19th Street, Suite 300, Philadelphia, Pennsylvania, 19103. The Council maintains an office in Pittsburgh. For 50 years, the Council has worked to improve air quality across Pennsylvania. The Council has members throughout the Commonwealth who support its mission to protect everyone's right to a healthy environment, including members in Allegheny County. The Council has approximately 35,000 activist members.

1. The Department Should State that the Liberty Monitor is Suitable for Comparison with the National Ambient Air Quality Standard for Fine Particulates.

The Department should make it clear that the Liberty monitor is suitable for comparison with the national ambient air quality standard. For years the Department has assumed that the Liberty monitor is suitable for comparison with the national ambient air quality standard for fine particulates. *See* Draft Plan, page 33, Section 10.2 (Liberty) ("Comments") ("Liberty is a core PM2.5 site that is used to determine compliance with national standards."); 2019 Annual Monitoring Network Plan, page 33, Section 10.2 (Liberty) ("Comments") (same) (July 1, 2018), https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Resources/Data_and_Reporting/Air_Quality_Reports/ANP2019-final.pdf; Air Monitoring Network Plan for 2018, page 33 (same) (June 30, 2017), Air Monitoring Network Plan for 2017, page 30 (same) (July 1, 2016). But in its recently proposed attainment demonstration for fine particulates, the Department appears to be saying the opposite. This is legally and factually incorrect.

In the proposed attainment demonstration, the Department calculated a future Design Value of 12.5 µg/m3 based on CAMx modeling. *See* Proposed Attainment Demonstration, page 29-32 (April 22, 2019), https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Programs/Air_Quality/SIPs/90-SIP-PM25-SIP-2012-NAAQS-04-22-2019-for-comment.pdf. But it failed to implement a Control Strategy to bring this number down to the level of the 12.0 µg/m3 standard. Instead, it substituted a separate Local Area Analysis that led to a conclusion that the future Design Value should be 12.0 µg/m3. *See id.* at 33-36.

This is not a proper use of a Local Area Analysis, which is supposed to be used for evaluating source contributions to a monitor, rather than for ignoring a future Design Value calculated through CAMx modeling. *See* EPA, Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM2.5 and Regional Haze (November 29, 2018), page 134 ("As part of the attainment demonstration modeling, it may be necessary to evaluate the local scale impacts of primary PM2.5 sources for contributions to the 24-hour and/or the annual NAAQS"), https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling_Guidance-2018.pdf.

While EPA's guidance document states that some monitors are not suitable for comparison with the standard, this statement is limited to micro-scale and middle-scale sites, which do not include the Liberty monitor:

> Note that the PM2.5 NAAQS ambient monitoring rule language72 indicates that some monitoring locations may not be comparable to the annual PM2.5 NAAQS. ***PM2.5 measurement data from monitors that are not representative of "area-wide" air quality, but rather of relatively unique micro-scale, or localized hot spot, or unique middle-scale impact sites, are not eligible for comparison to the annual PM2.5 NAAQS.*** The ambient air quality monitor siting rules define the appropriate scales of influence for the PM2.5 monitoring network.73
>
> 72 *See* 40 CFR 58.30.
> 73 *See* 40 CFR part 58, Appendix E.

Id. at 133 (bold italics added); *Accord*, 40 C.F.R. § 58.30 ("PM2.5 measurement data from monitors that are not representative of area-wide air quality but rather of relatively unique micro-scale, or localized hot spot, or unique middle-scale impact sites are not eligible for comparison to the annual PM 2.5 NAAQS."). The terms "micro-scale," "middle-scale," and "neighborhood scale" are separately defined and mean different things. 40 C.F.R. 58, Appendix D, Section 4.7.1(c).

That regulation does not make the Liberty monitor unsuitable for comparison with the standard because the Department has characterized the Liberty monitor as "neighborhood scale," rather than micro-scale or middle-scale. *See* Draft Plan, pages 33-34 (identifying "Neighborhood" as the "Appendix D Scale" for the primary PM2.5 FRM sensor, secondary

PM2.5 FRM sensor, and tertiary PM2.5 FEM sensor); *see also* 2019 Air Monitoring Network Plan, pages 33-34 (same).

In contrast, the Department has specifically characterized other monitoring sites as micro-scale or middle-scale sites, drawing a clear distinction between neighborhood scale sites and micro-scale or middle-scale sites. *See* Draft Plan, page 21 (identifying Parkway East Near Road as a micro-scale site), page 38 (identifying Lincoln as a middle-scale site).

This is important because the Department is required to identify monitors that are not suitable for comparison with the standard when it prepares its Air Monitoring Network Plans:

> (b) The annual monitoring network plan ***must contain the following information*** for each existing and proposed site:
>
> ….
>
> (7) ***The identification of any sites that are suitable and sites that are not suitable for comparison against the annual PM 2.5 NAAQS*** as described in § 58.30.

40 C.F.R. 58.10(b)(7) (bold italics added). If the response of the Department is that it has not identified monitors that are suitable either, that is not a defense. The Department cannot use one violation of the regulations (a failure to expressly state what is suitable and what is not suitable for comparison with the standard) as a justification for another violation (the mischaracterization of the Liberty monitor as a micro-scale or middle-scale site, as a basis for ignoring a future Design Value of 12.5 μg/m3 and the attendant obligation to reduce this number through a Control Strategy).

The Department's change of position is a violation of federal regulations and a misreading of EPA's guidance document. The Department should state that the Liberty monitor is suitable for comparison with the national ambient air quality standard.

2. <u>The Department Should Justify the Selection of the New Location of the Liberty Monitor at the South Allegheny School District's High School</u>.

In response to a request by the school district, the Department has proposed to relocate the Liberty monitor at the South Allegheny School District's High School. Draft Plan, page 9, Section 3.2.1 (Liberty Air Monitoring Station). Assuming the Department has no choice and must relocate the monitoring equipment, the question is whether the Department has chosen an appropriate new location. The Department should provide more information regarding its choice and its reasons for it.

Apparently, the proposal arises out of security concerns of the school district. *See id.* The Department proposes to install a small monitoring trailer next to the school, and run lines from gaseous monitor and particle sampler inlets and meteorological sensors from the roof to the trailer, so that the monitor may be operated without entry into the school building. *Id.* The

proposal would not change the height of the equipment, but it would move the gaseous monitor inlets a distance of 160 feet east-southeast and the particle samplers a distance of 570 feet northeast. *Id.*

The Liberty monitor is an important air monitor in the air monitoring network. As noted above, "Liberty is a core PM2.5 site that is used to determine compliance with national standards." *Id.* at 33, Section 10.2 ("Comments"). It is located in a suburban area approximately 3 km downwind of the Clairton facility. *Id.* The neighboring area has a long history of higher than average levels of fine particulates, coarse particulates, and sulfur dioxide. *Id.*

While it is an ambient air monitor, there are features to the network that address the fact that the U.S. Steel facilities contribute significant amounts of fine particulates, coarse particulates, and sulfur dioxide. (It also generates hydrogen sulfide and the BTEX chemicals, for which there are sensors at this monitor). There are telemetry devices that transmit readings from the monitor to the company, so that the company can minimize fugitive emissions and adjust production levels to maintain emissions within appropriate levels in downwind communities. *Id.*

Therefore, the choice of the new location of the Liberty monitor could have a material impact on monitoring data, which would have regulatory implications for the Department. This is particularly important because the particle samplers will be moved a distance of 570 feet northeast in the general direction opposite the Clairton facility, which is located a distance of about 3 km (approximately 9840 feet). In addition, the Irvin facility is even closer than the Clairton facility, at a distance of about 1 mile (approximately 5280 feet). The proposal would move the monitor away from both facilities.

The Department should explain how it made a decision to select this particular location, through the application of EPA's guidance document regarding the use of suitability modeling:

> Suitability modeling is a method for identifying suitable monitoring locations based on specific criteria. ***Geographic map layers representing important criteria, such as emissions source influence, proximity to populated places, urban or rural land use, and site accessibility can be compiled and merged to develop a composite map representing the combination of important criteria for a defined area***. Furthermore, each map layer input can be assigned a weighting factor based on the relative importance of each layer in the overall suitability model. The results provide the best locations to site monitors based on the input criteria.

See U.S. EPA, Ambient Air Monitoring Network Assessment Guidance: Analytical Techniques for Technical Assessments of Ambient Air Monitoring Networks (February 2007), page 3-31 (bold italics added), https://www.epa.gov/sites/production/files/2017-02/documents/network-assessment-guidance.pdf. In the Draft Plan, the Department does not explain how this was done.

In addition, the Department should explain any air modeling that it has performed for the purpose of evaluating this location or any other prospective location for the relocation of the Liberty monitor, and identify the reasons for ruling in or ruling out any alternative locations.

Finally, the Department should explain how it will meet the design requirements of the part 58 regulations, as applied to the Liberty monitor at the proposed site of relocation. *See* 40 C.F.R. part 58, Appendix D to Part 58 (Network Design Criteria for Ambient Air Quality Monitoring). In addition, it should explain how it will meet the siting requirements. *See* 40 C.F.R. part 58, Appendix E to Part 58 (Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring). In the Draft Plan, the Department does not explain how the new location will meet these requirements.

3. <u>The Department Should Provide an Explanation for Not Installing Additional Special Purpose Monitors Apart From the Clairton and West Mifflin Monitors During the Sulfur Dioxide Crisis at the U.S. Steel Facilities in 2019</u>.

The Council appreciates the Department's installation of special purpose monitors to measure air quality impacts resulting from U.S. Steel's combustion of coke oven gas without desulfurization plant controls at the Clairton facility earlier this year. Draft Plan, page 6, Section 2.2.2, Special Purpose Sulfur Dioxide Monitors, https://alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Resources/Data_and_Reporting/Air_Quality_Reports/ANP2020-draft.pdf. However, the Department should not have limited the installation of special purpose monitors to only these monitors at only these locations.

By design, the location of the Clairton monitor and the West Mifflin monitors was based on the identification of odor complaints in particular neighborhoods. *Id.* The Department states that these are "upwind locations," apparently meaning they are not in the line of the predominating plumes emanating from these two facilities. *See id.*

The Clairton monitor is located at the Clairton Education Center, within an environmental justice area that is west of the Clairton facility, whose predominating plumes moves in the other direction opposite this monitor. *See id.* at 52, 54 (Figure 10.8, Clairton Location Map); *see also* Attachment 1, Zhihao Li, Carnegie Mellon University, Simulations of Pollution Dispersion in Mon Valley: Updates on Modeling Work (December 11, 2018), pages 36-39 of slides, and pages 43-46 of pdf document (slide displays a map showing the dispersion of air emissions from the Clairton facility in the form of a yellow plume moving in an east-northeast direction, across the Monongahela River, and south of the Liberty monitor). Although the location of the Clairton monitor is generally upwind of the Clairton facility, during times of temperature inversions and atypical wind direction, this location is impacted by the Clairton facility and other sources. *See* Draft Plan at 52 ("Comments").

The West Mifflin monitor is located at the New Emerson Elementary School, which is located north-northeast of the Irvin facility and south-southeast of the Braddock facility. *See id.* at 68, 69 (Figure 10.14, West Mifflin Location Map). Again, this monitor is not located in the direction of the prevailing plume of either facility.

While the installation of these special purpose monitors was appropriate, the Department should not have limited its decision to only these monitors at these locations. The Department should have conducted a separate evaluation for other areas in the lines of the prevailing plumes emanating from the U.S. Steel facilities.

The Department should provide an explanation of other locations that it considered for special purposes monitors, its reasoning for siting the Clairton and West Mifflin monitors in these specific locations, and its reasoning for not siting additional monitors within the prevailing plumes emanating from the U.S. Steel facilities. The Department may have missed the full impact of the sulfur dioxide crisis, as a result of its limited monitoring.

Thank you for your consideration of the comments of the Council.

_____

Joseph Otis Minott, Esq.
Christopher D. Ahlers, Esq.
Clean Air Council
135 S. 19th St., Suite 300
Philadelphia, PA 19103
215-567-4004 x116
joe_minott@cleanair.org
cahlers@cleanair.org

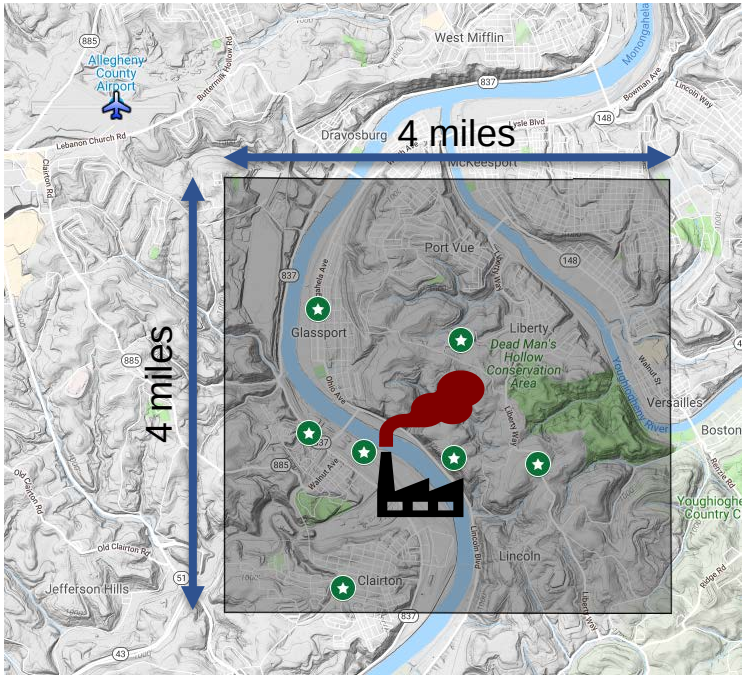
Attachment 1

Simulations of Pollution Dispersion in Mon Valley: Updates on Modeling Work

Date: Dec. 11, 2018

Speaker: Zhihao Li
Supervised by: Prof. Satbir Singh
Prof. Albert Presto
Prof. Peter Adams

Project Objective



: Monitor Site

: Interested Domain (The Mon Valley)

Under different meteorological conditions:

- How does the wind develop in the valley?
- What is the pollution dispersion pattern in the valley?

Accomplishments before Jul, 2018

Geometry Model and Mesh

- Extended study domain to include more RAMPs and wind sensors
- Built 10 stacks into the model

Analysis of Meteorology Data

- Analyzed data from measurement sites and developed methodology to select data for model validation

CFD Code Enhancement

- Implemented SO_2 transport equation

Model Validation

- Performed preliminary model validation of wind development in the valley

Accomplishments between Jul-Dec, 2018

Geometry Model and Mesh

- Further enhanced mesh quality
- Extended the height of the study domain from 500m to 1000m

Analysis of Meteorology Data

- Analyzed data from all available sources between Feb and Aug, 2018
- Devised curve-fitting algorithm to use data for setting up boundary profiles

CFD Code Enhancement

- Implemented new roughness model to account for high aerodynamic roughness length
- Explored better ways to visualize post-processed CFD results

Model Validation

- Simulated wind development under neutral condition to compare with measured data
- Simulated the dispersion of N_2O to compare with the tracer release experiments

Accomplishments between Jul-Dec, 2018

Geometry Model and Mesh

- Further enhanced mesh quality
- Extended the height of the study domain from 500m to 1000m

Analysis of Meteorology Data

- Analyzed data from all available sources between Feb and Aug, 2018
- Devised curve-fitting algorithm to use data for setting up boundary profiles

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Model Validation

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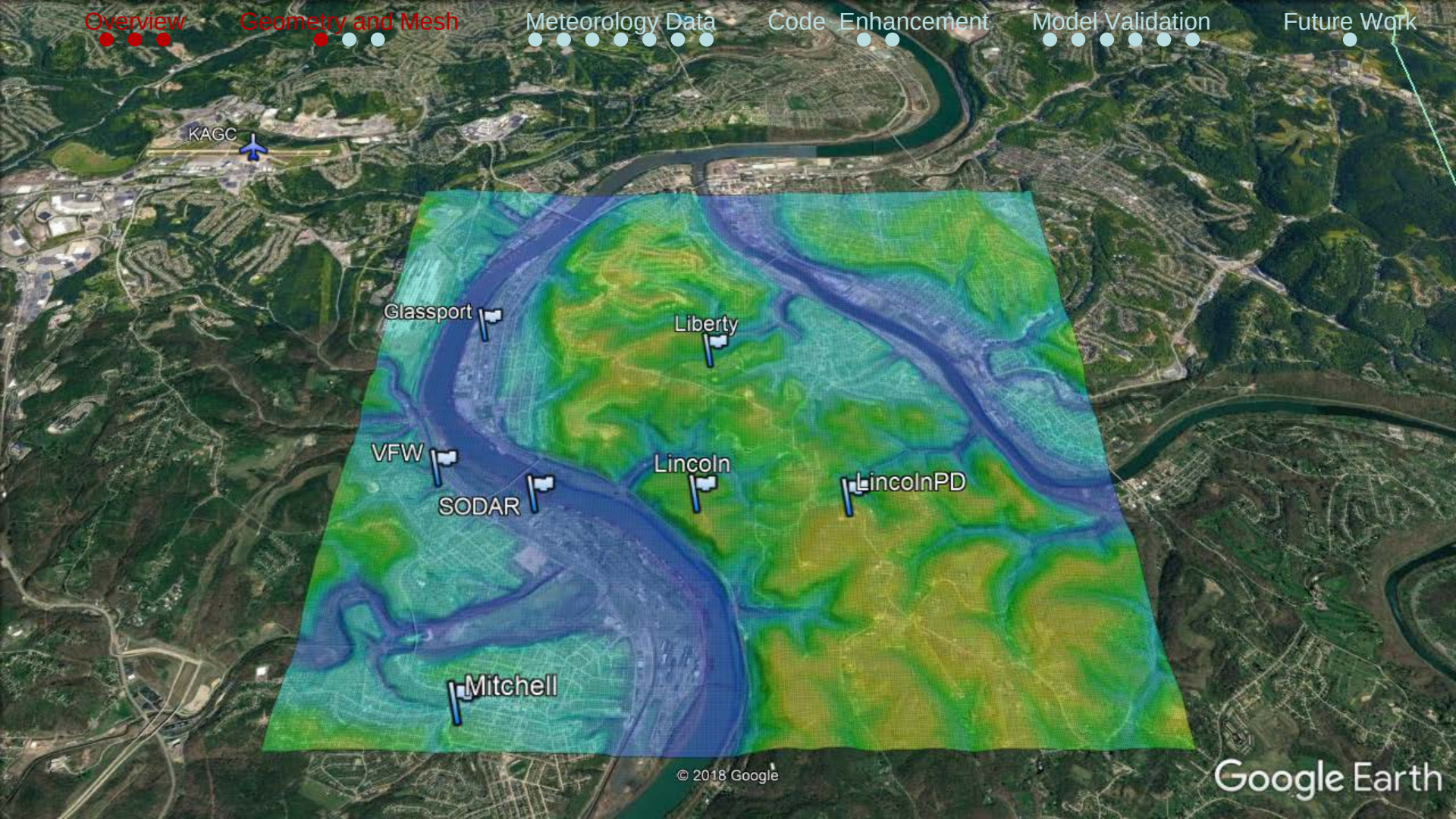
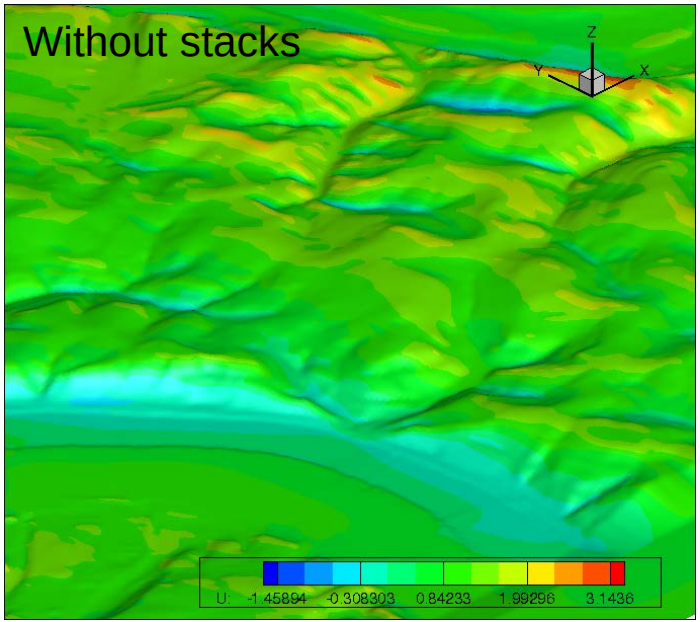
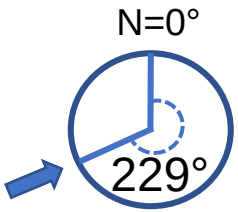
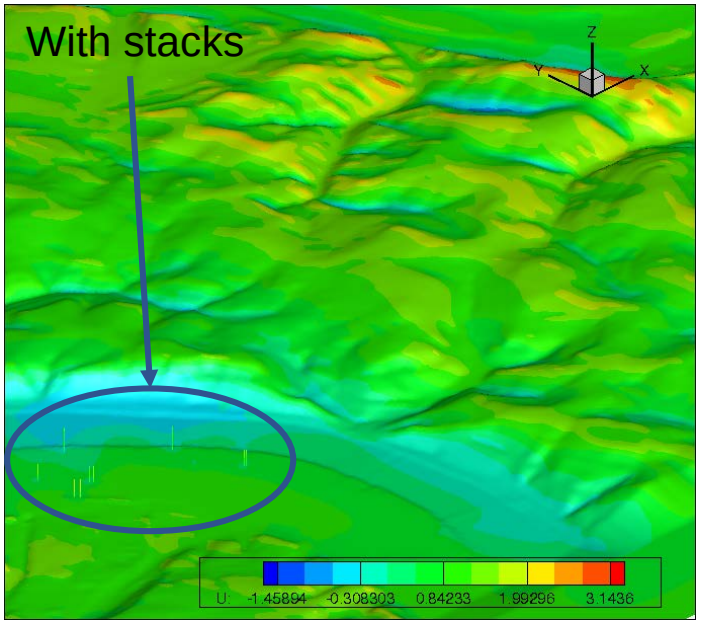

KAGC
Glassport
Liberty
VFW
SODAR
Lincoln
LincolnPD
Mitchell
© 2018 Google
Google Earth

Stacks only have slight influence on the wind velocity right behind them

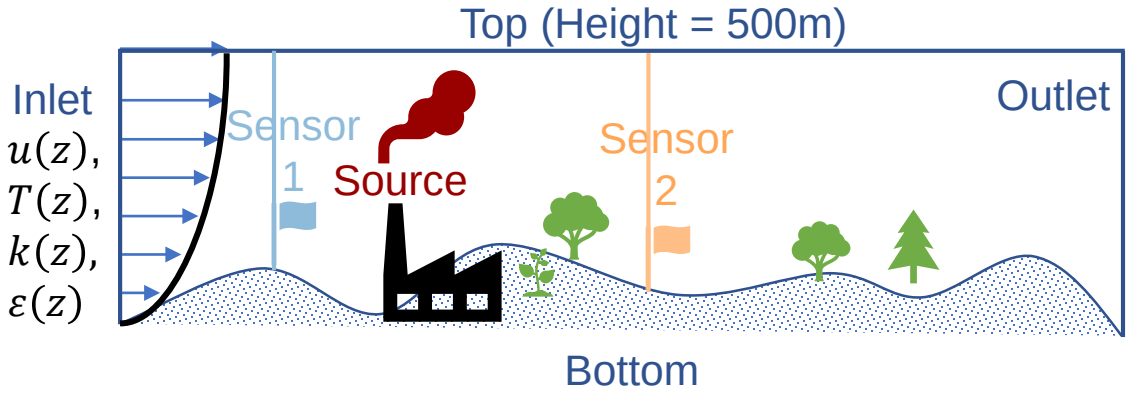


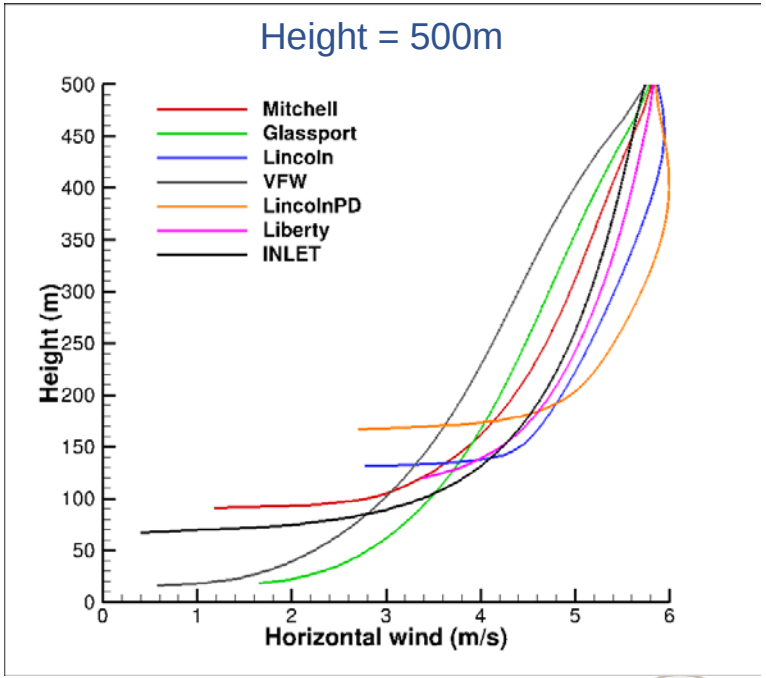


Inlet wind direction

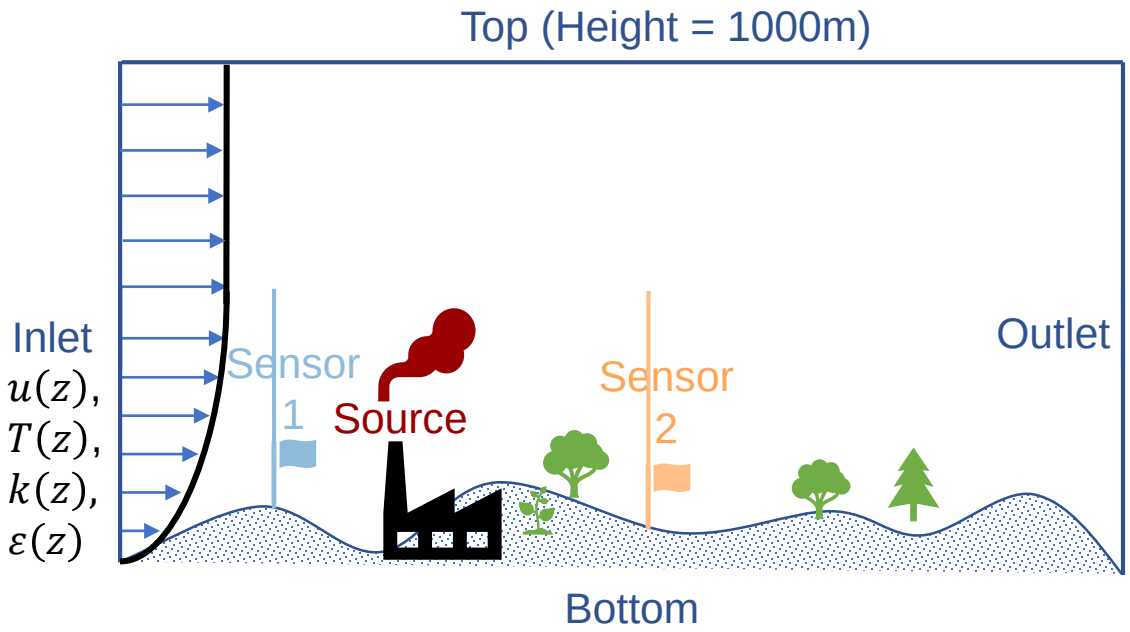


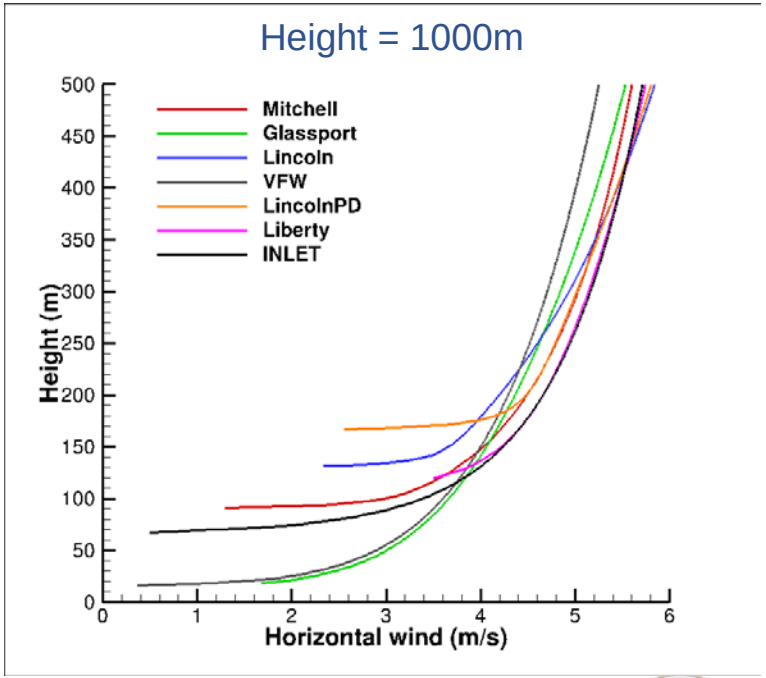
A domain height of 500m is not enough





A domain height of 500m is not enough





Predicted vertical wind profiles at different sites are now closer to the theoretical profiles.

Accomplishments between Jul-Dec, 2018

Geometry Model and Mesh

- Further enhanced mesh quality
- Extended the height of the study domain from 500m to 1000m

Analysis of Meteorology Data

- Analyzed data from all available sources between Feb and Aug, 2018
- Devised curve-fitting algorithm to use data for setting up boundary profiles

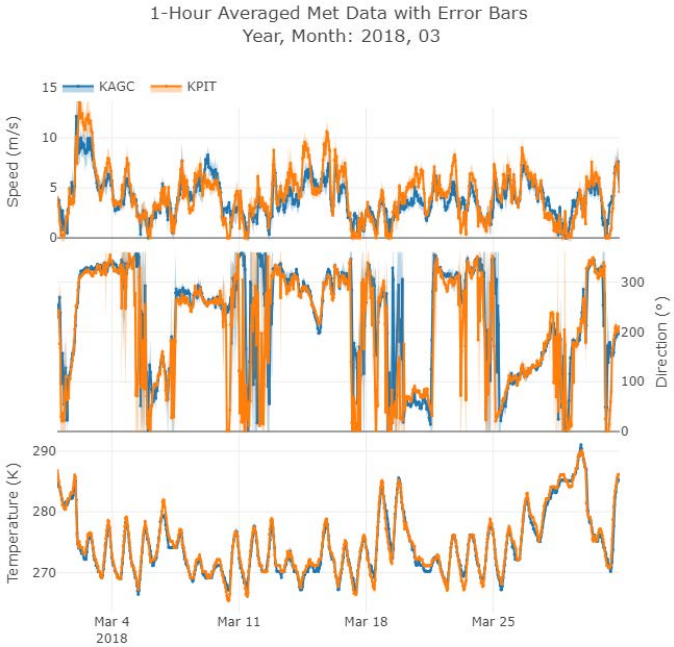
CFD Code Enhancement

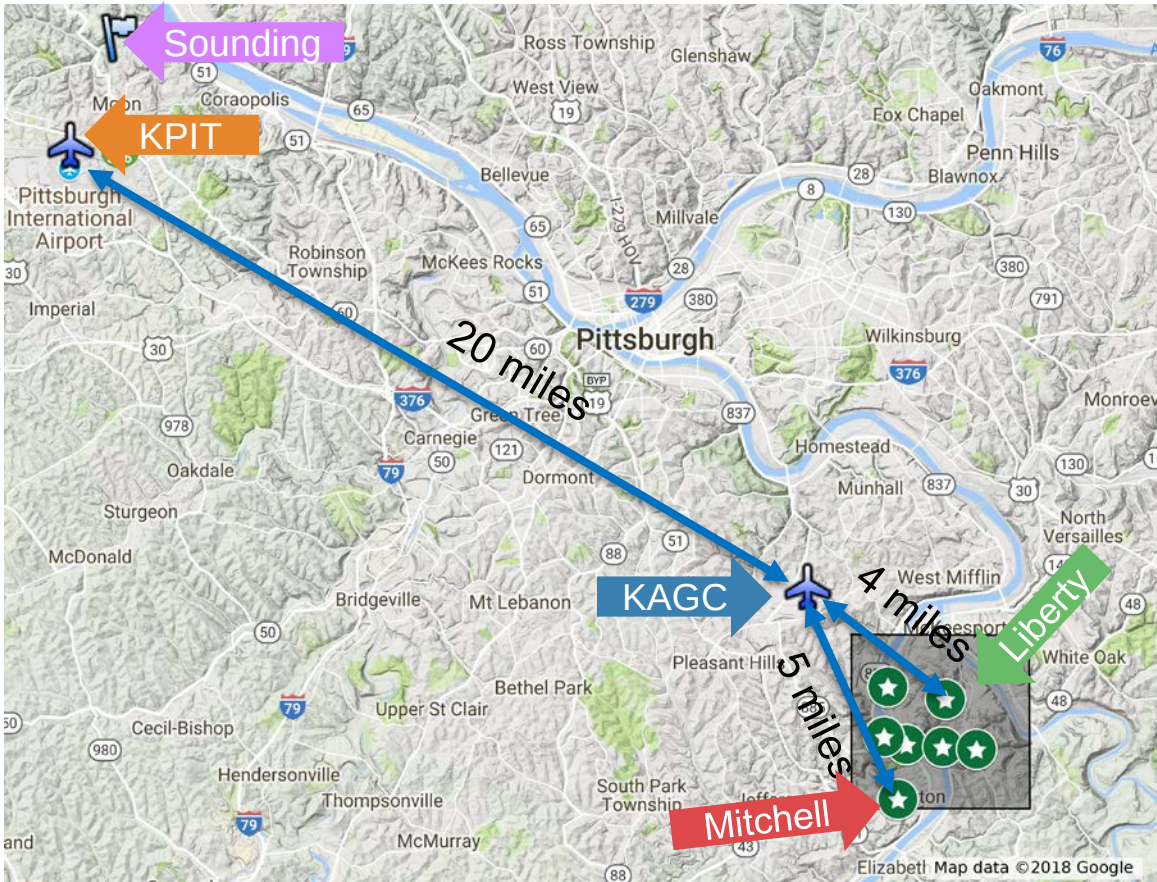
- Implemented new roughness model to account for high aerodynamic roughness length
- Explored better ways to visualize post-processed CFD results

Model Validation

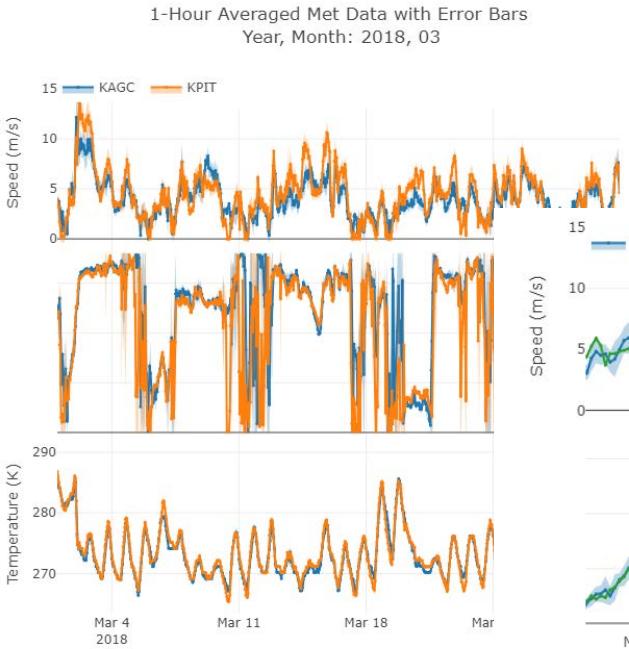
- Simulated wind development under neutral condition to compare with measured data
- Simulated the dispersion of N_2O to compare with the tracer release experiments

Met data at different stationary sites show good agreement

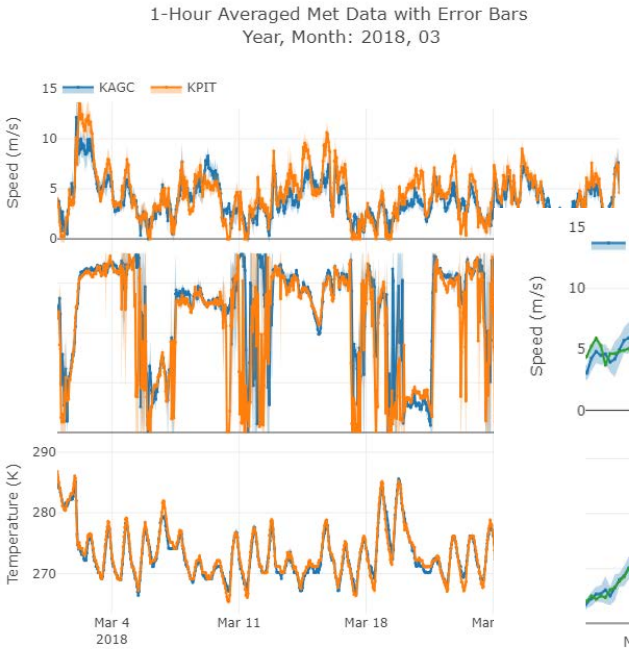


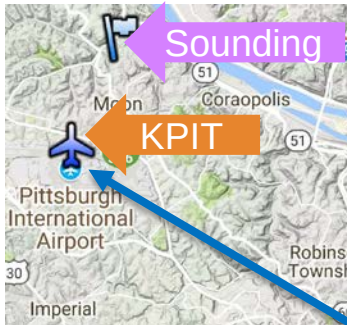


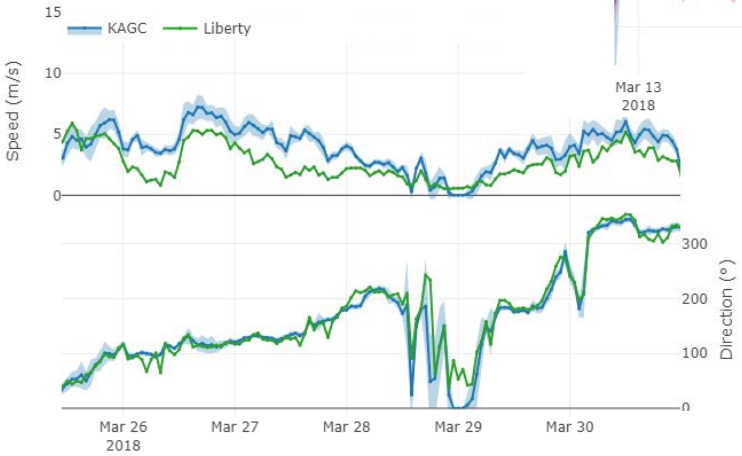
Met data at different stationary sites show good agreement

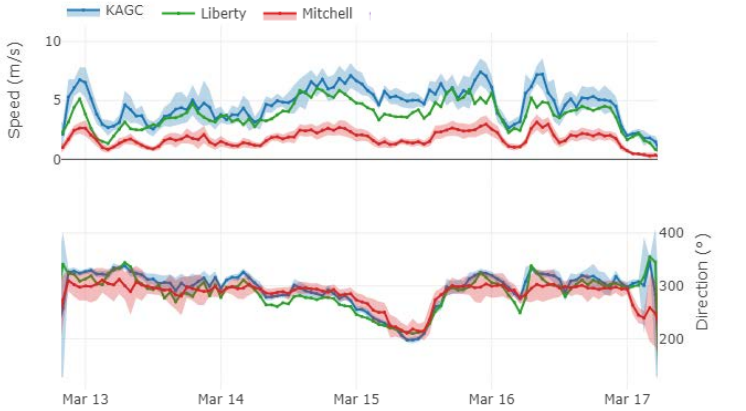


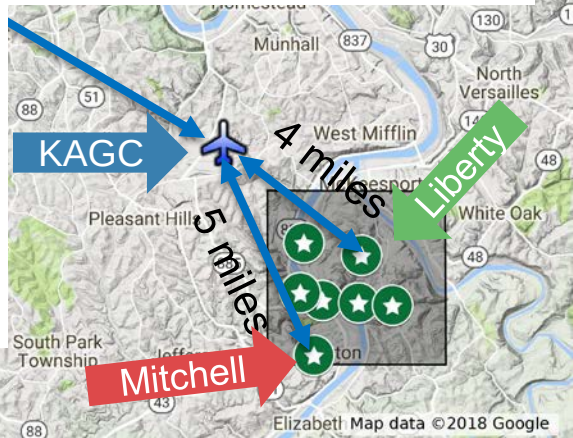
Met data at different stationary sites show good agreement



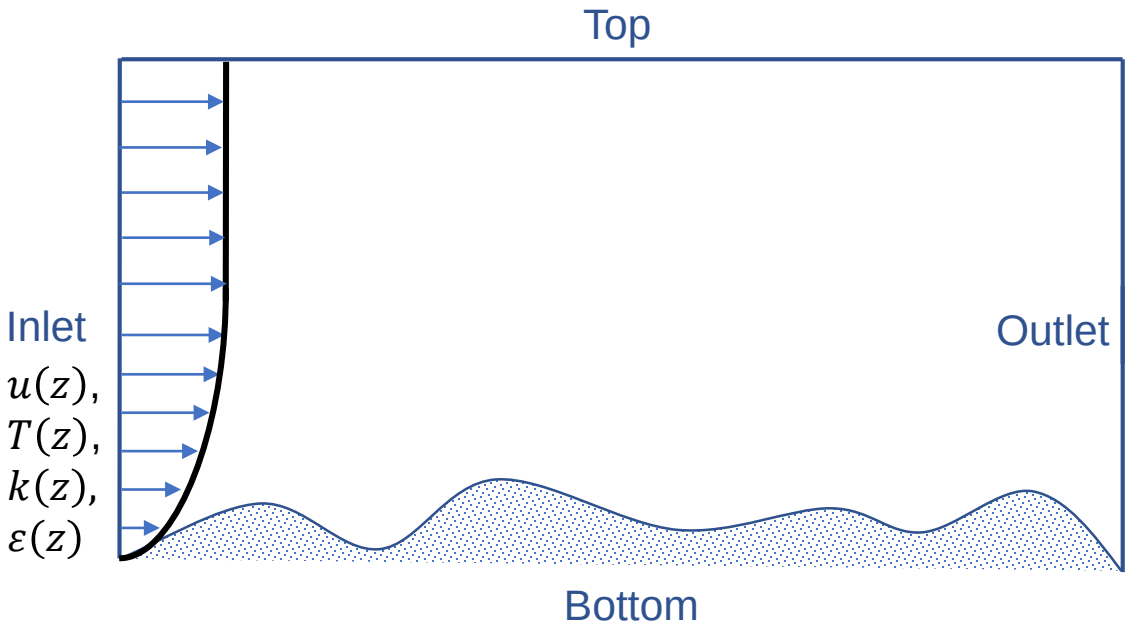






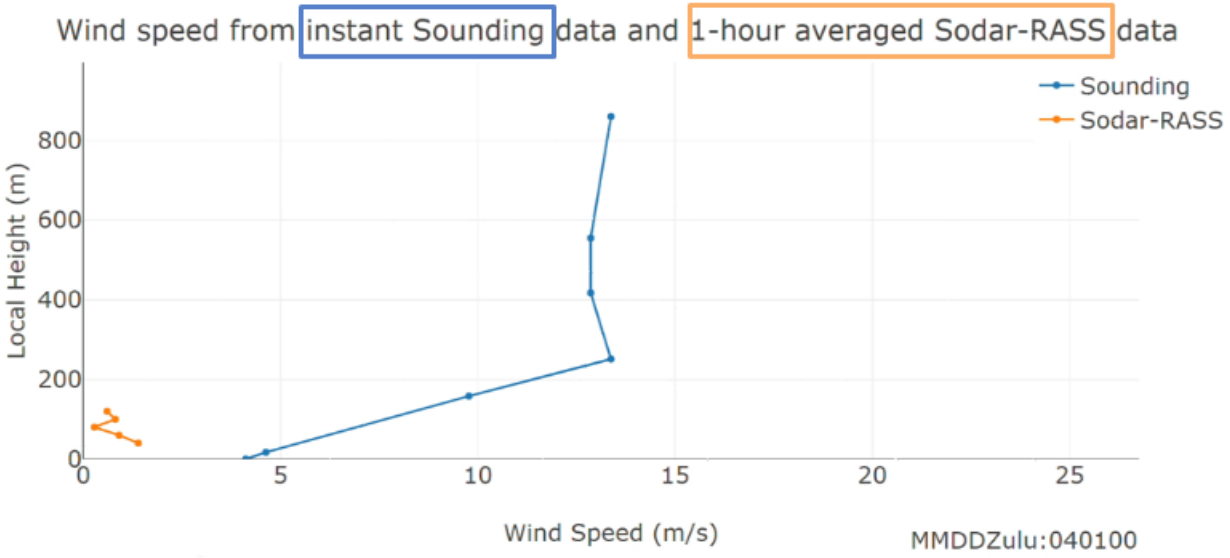


However, CFD model needs vertical wind profiles, not wind at fixed height

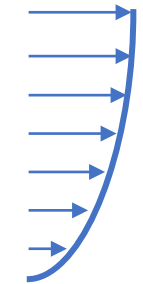


- Currently we have measured data at different height from Sounding and Sodar-RASS.

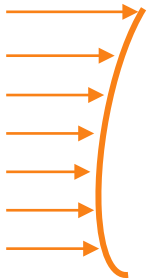
Data from Sounding and Sodar-RASS show different vertical profiles at times



Theoretical logarithmic wind profile



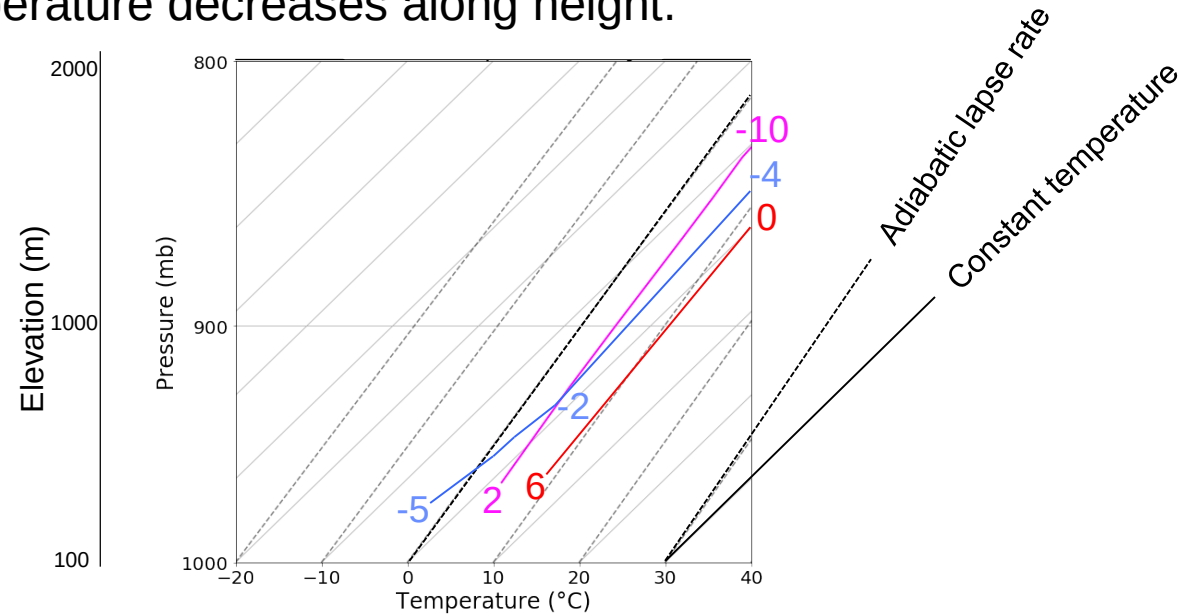
Common “C” shaped wind profile from Sodar-RASS



- At this point, Sounding data is preferred for the purpose of setting up boundary profiles.

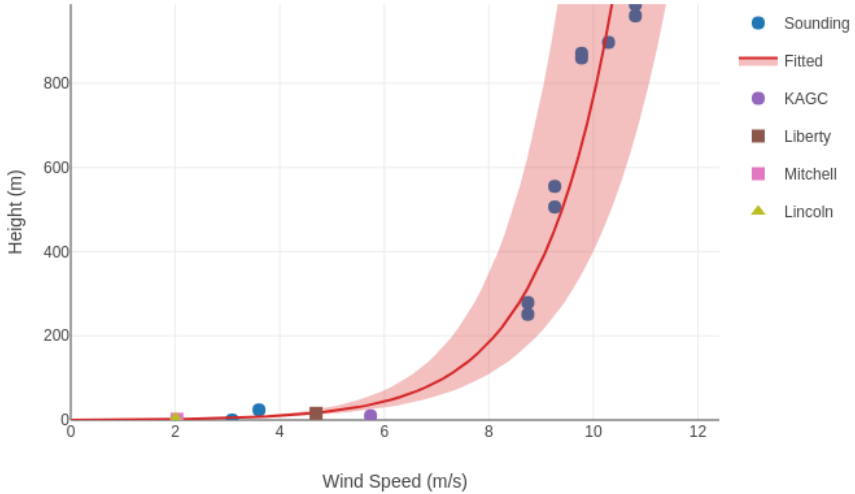
The Sounding data is used to first determine the stability class

- Neutral: temperature decreases at dry adiabatic lapse rate.
- Stable: temperature increases along height.
- Unstable: temperature decreases along height.



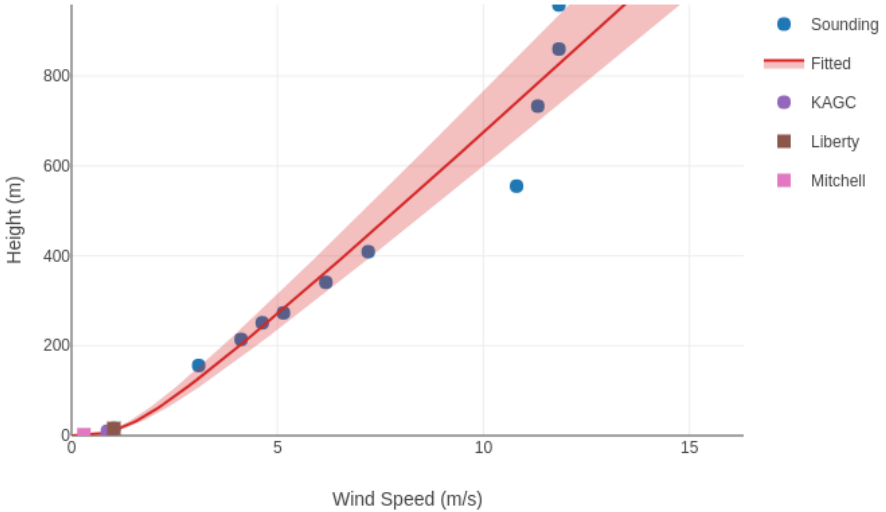
Vertical profiles can then be generated for different stability classes

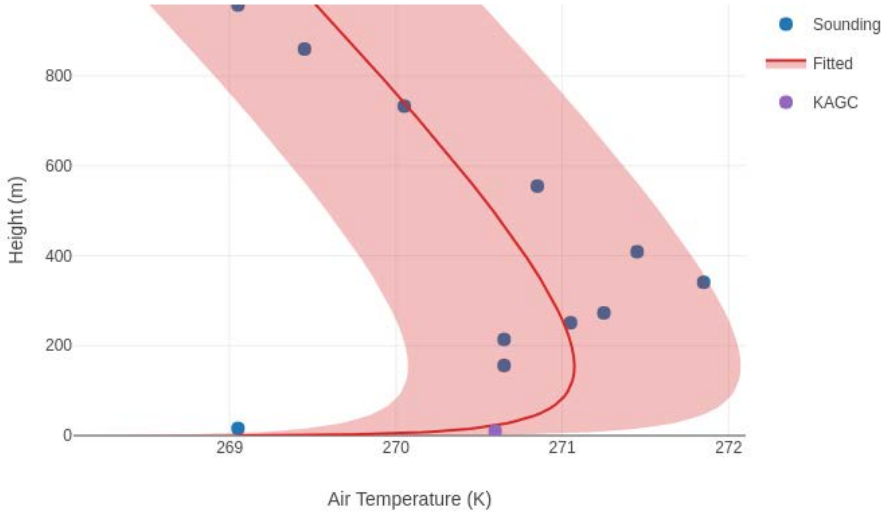
- Under neutral condition: $U(z) = \frac{u_*}{\kappa} \ln\left(\frac{z}{z_0}\right)$, logarithmic profile.
- u_* and z_0 are optimized by fitting wind data into the theoretical equation.



More parameters need to be optimized under non-neutral conditions

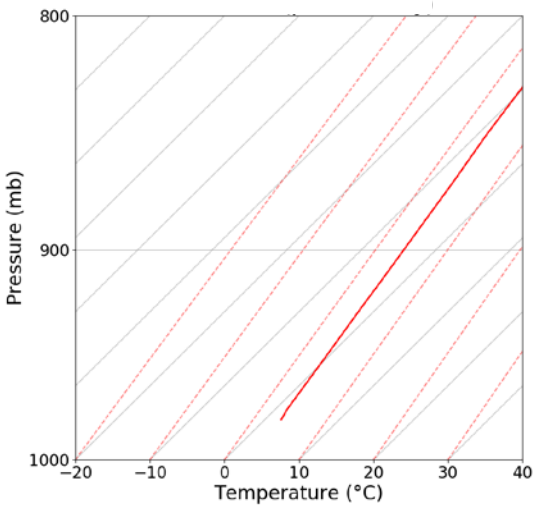
- For stable and unstable condition, velocity and temperature profiles are fitted.
- Surface heat flux from the Reanalysis data is also used.



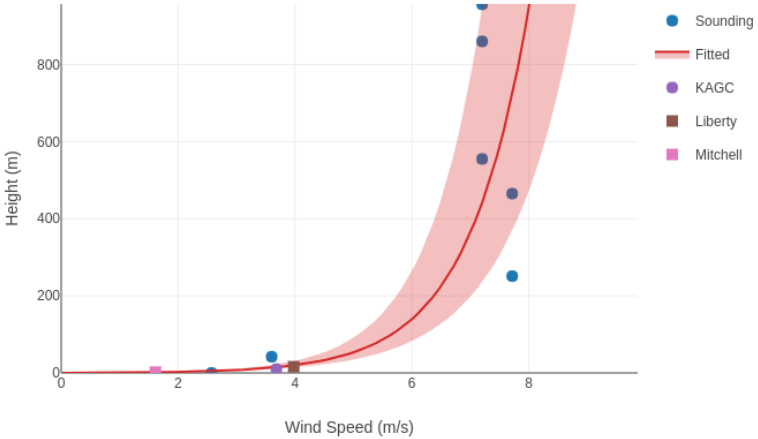


Cases that are selected to simulate need to meet 3 criteria

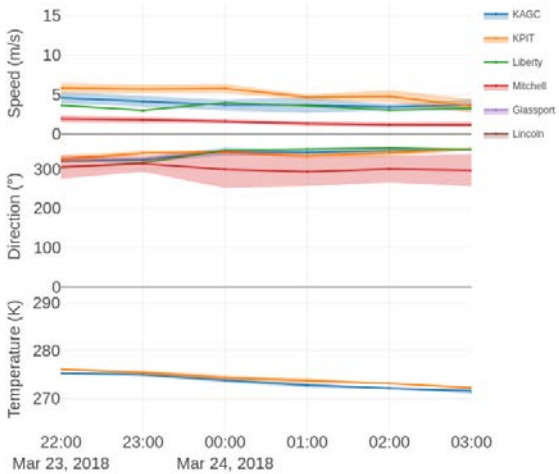
Clear stability condition



Good curve-fitting result



Steady wind for about 2 hours



Accomplishments between Jul-Dec, 2018

Geometry Model and Mesh

- Further enhanced mesh quality
- Extended the height of the study domain from 500m to 1000m

Analysis of Meteorology Data

- Analyzed data from all available sources between Feb and Aug, 2018
- Devised curve-fitting algorithm to use data for setting up boundary profiles

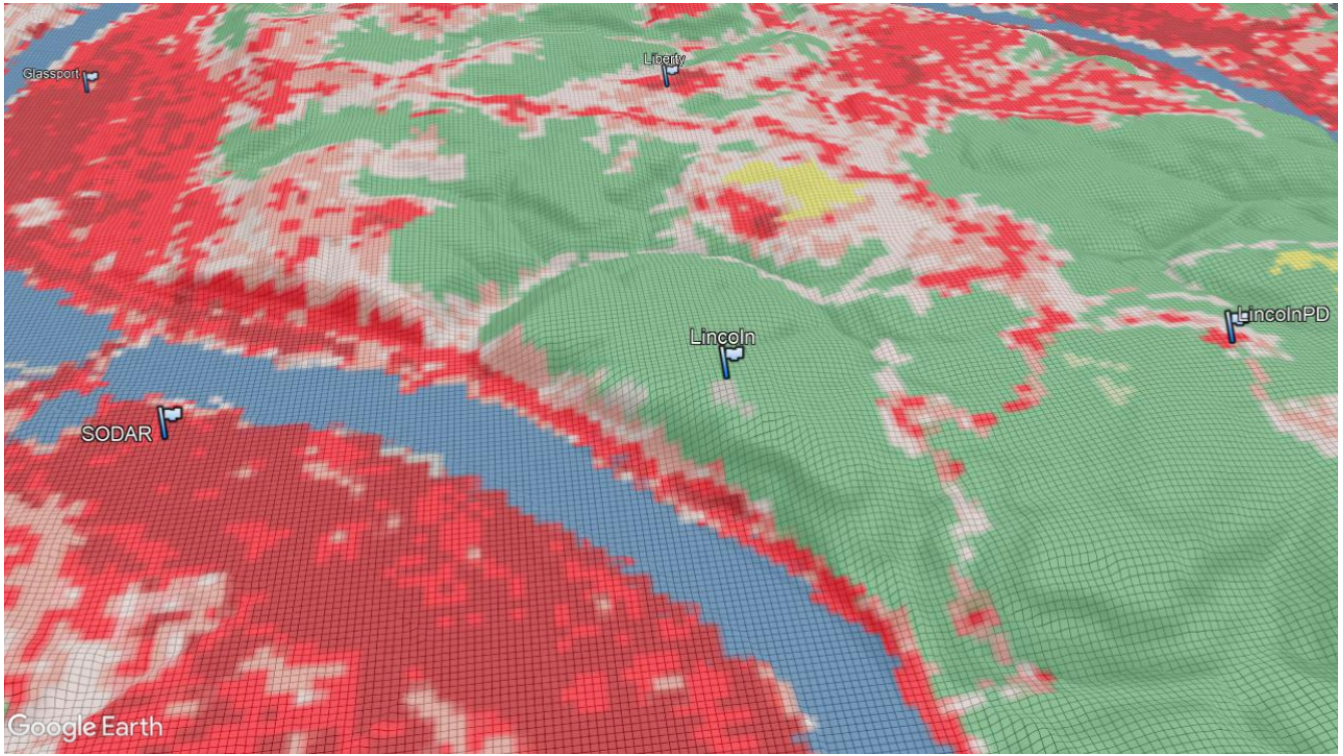
CFD Code Enhancement

- Implemented new roughness model to account for high aerodynamic roughness length
- Explored better ways to visualize post-processed CFD results

Model Validation

- Simulated wind development under neutral condition to compare with measured data
- Simulated the dispersion of N_2O to compare with the tracer release experiments

CFD model can now take in much larger roughness length than before

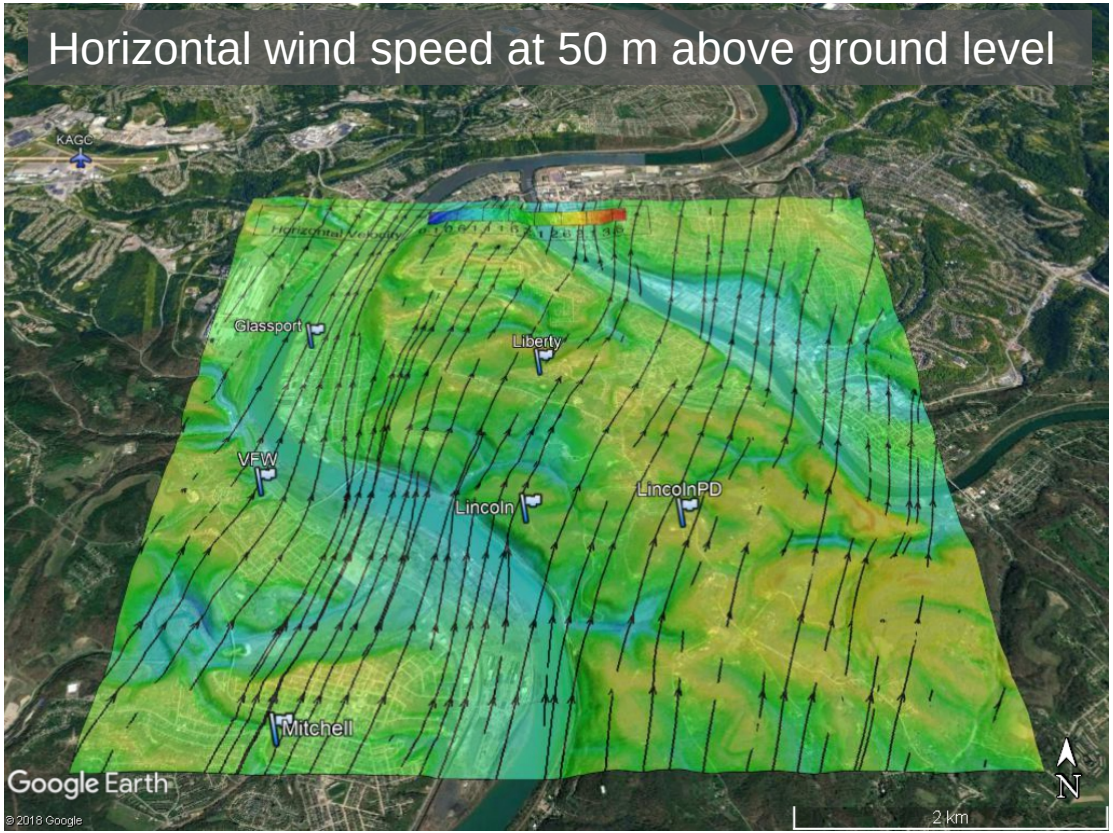


Land Cover:

- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Deciduous Forest
- Evergreen Forest
- Mixed Forest

Roughness length ranges from 0.01m to 0.7m in the domain.

Post-processing of CFD result gives complete insight into the simulation



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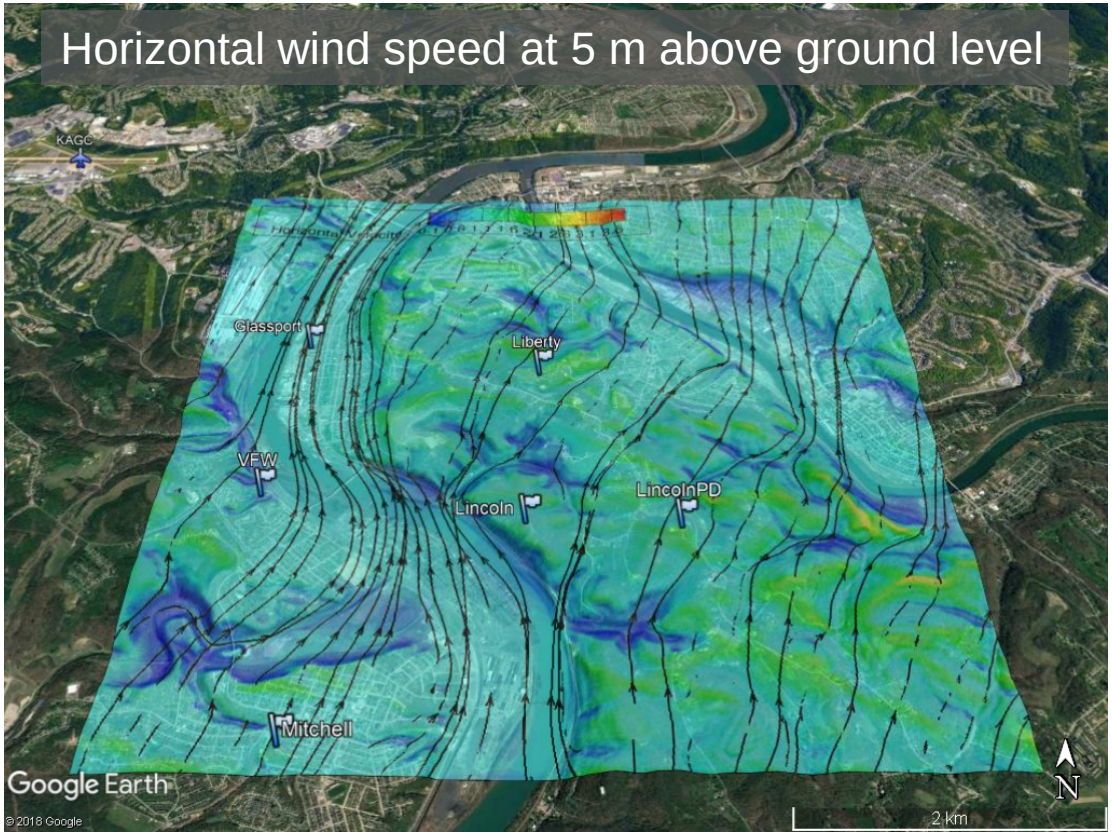

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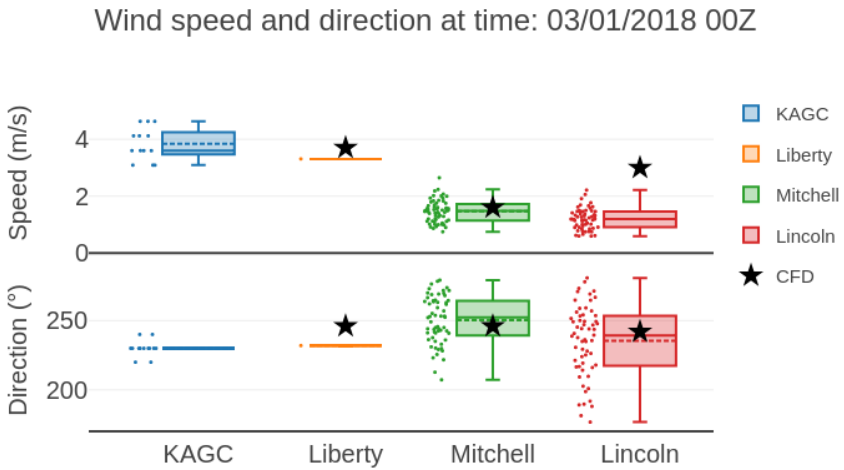
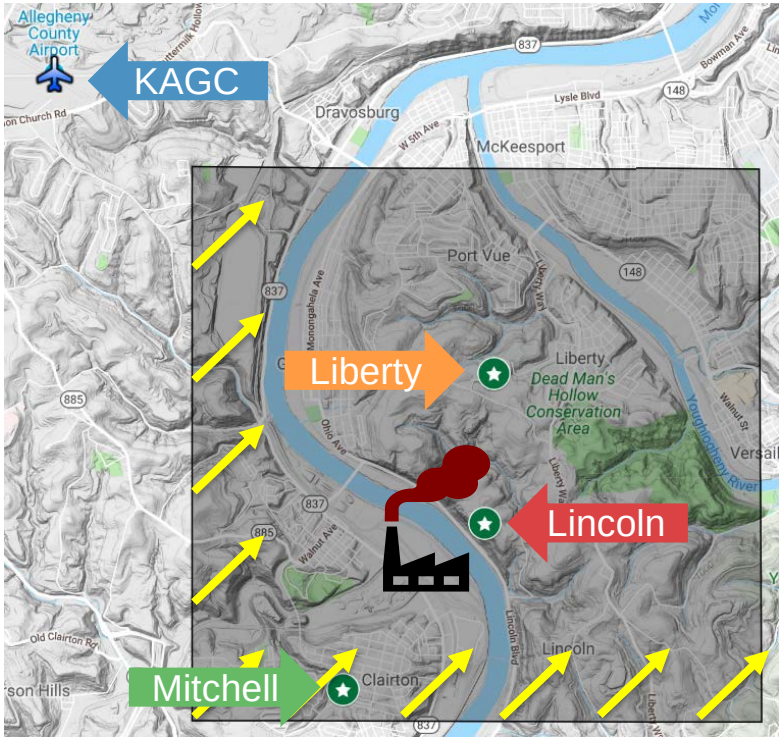
CFD makes consistent predictions at Liberty and Mitchell site





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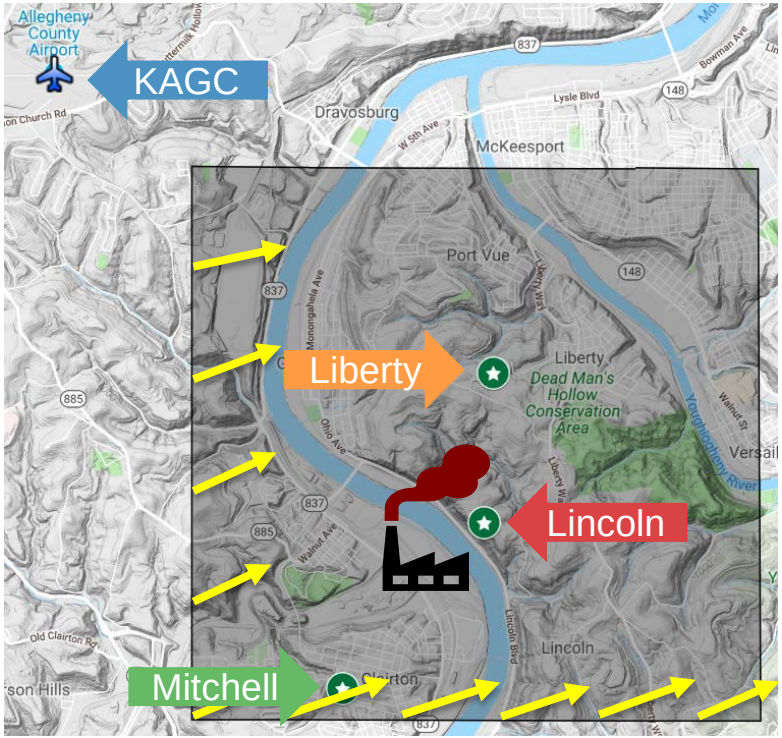

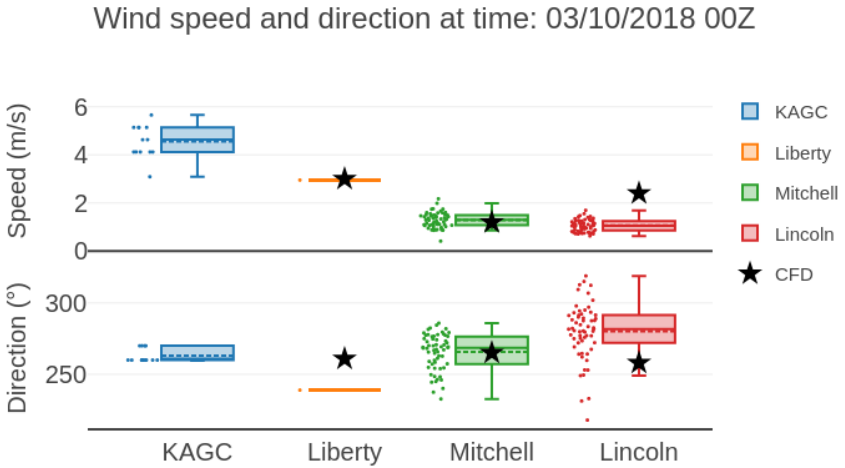

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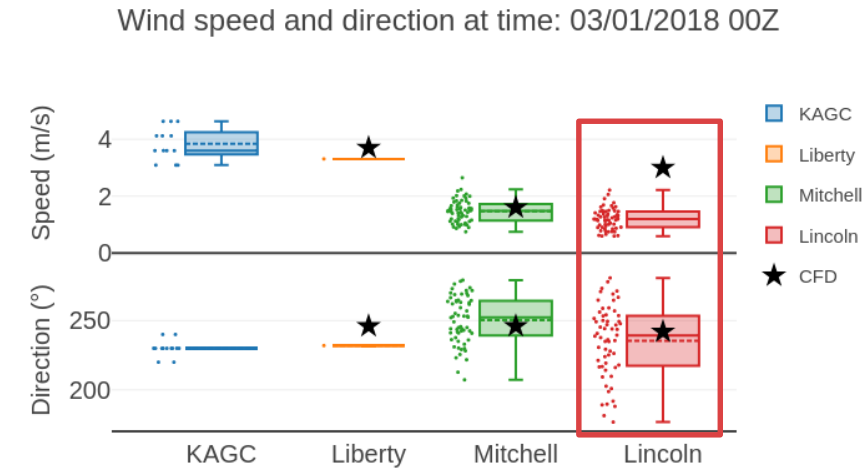
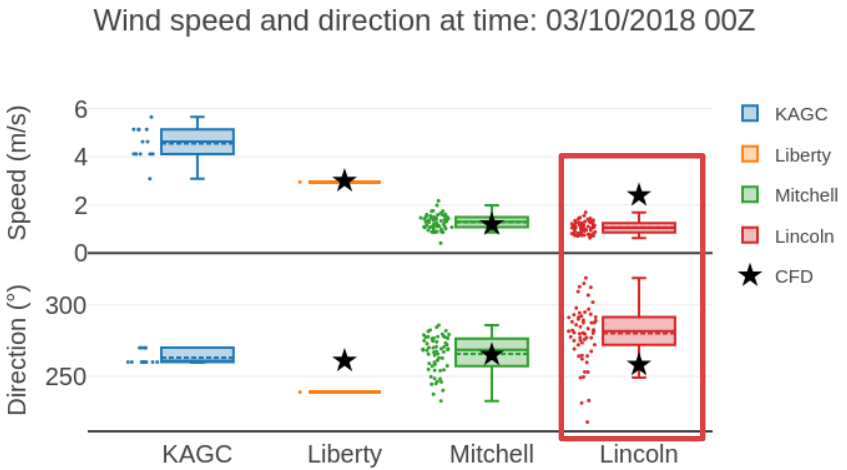
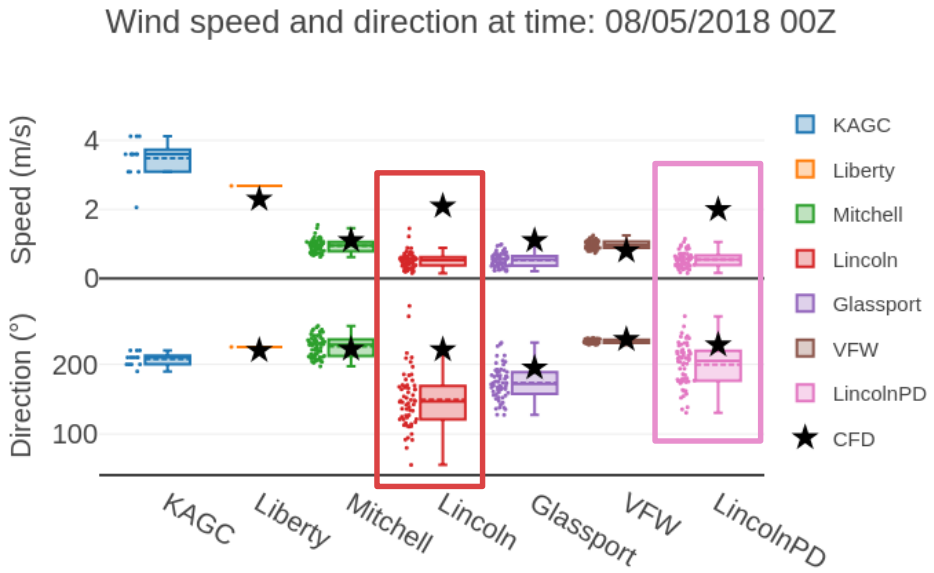
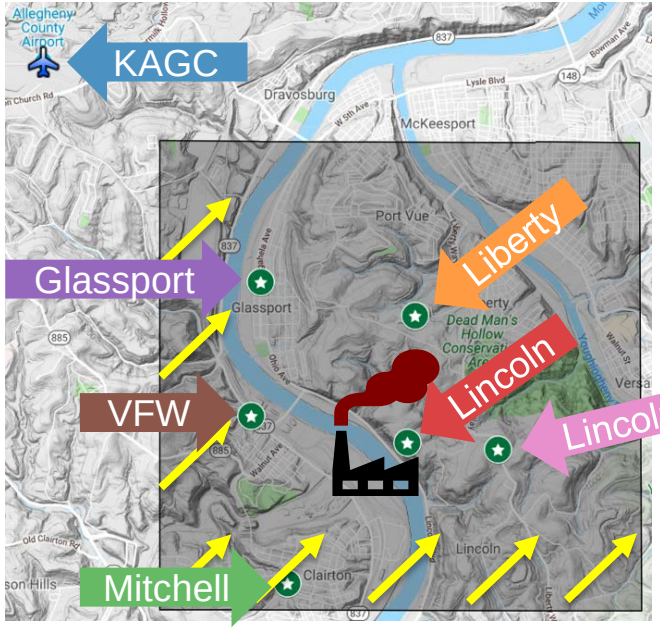


Elevation (m)	377	325	310	348
Sensor Height (m)	10	16	2	4



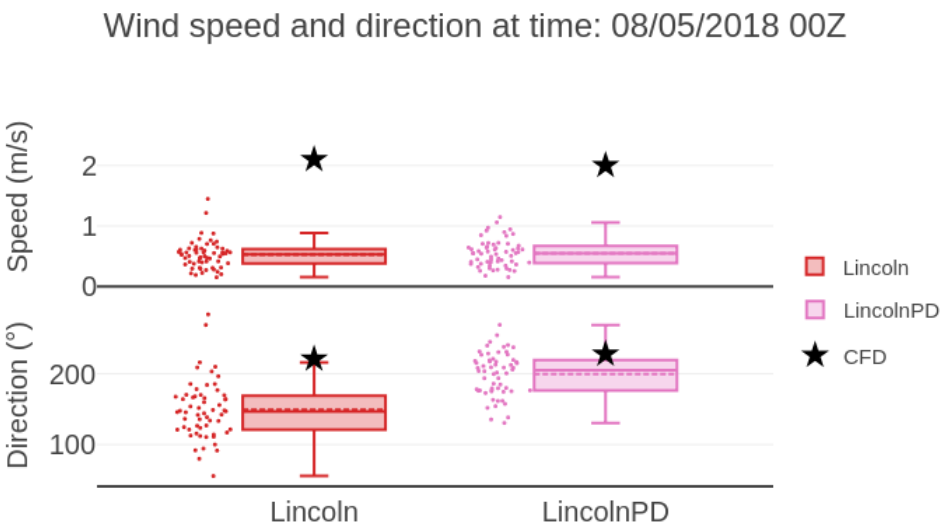
Wind speed comparison at more locations gives same conclusion

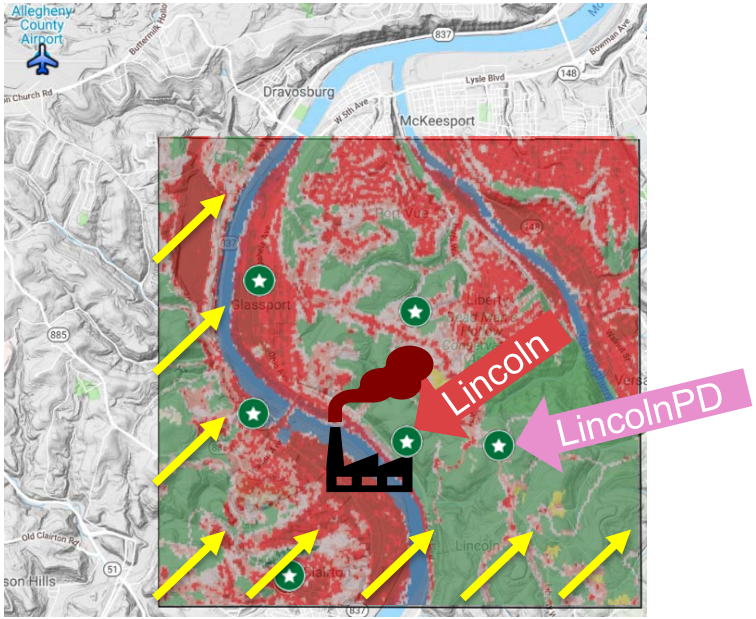




Elevation (m)	377	325	310	348	232	235	385
Sensor Height (m)	10	16	2	5.4	7.7	3.7	3.7

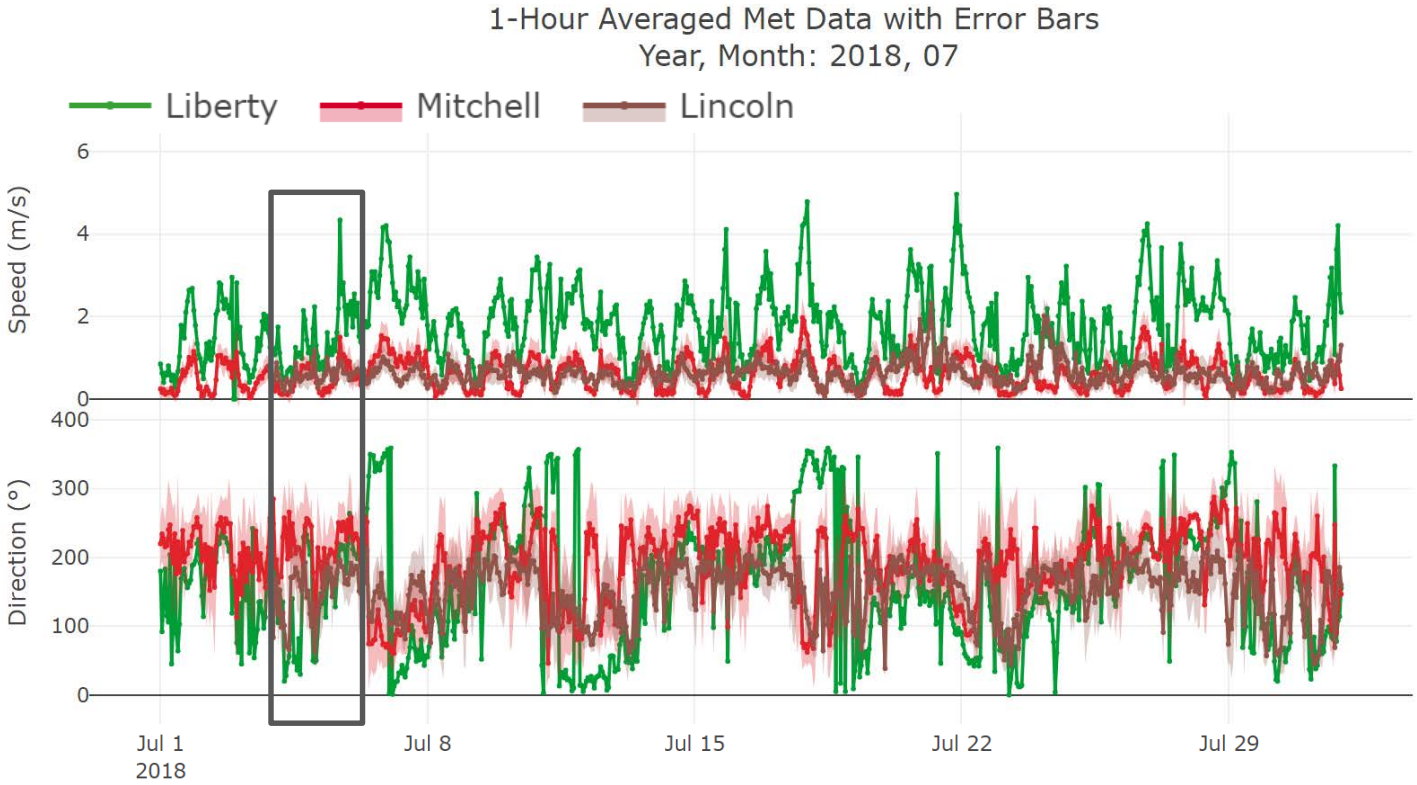
Disagreement between CFD and measurements may be due to roughness length



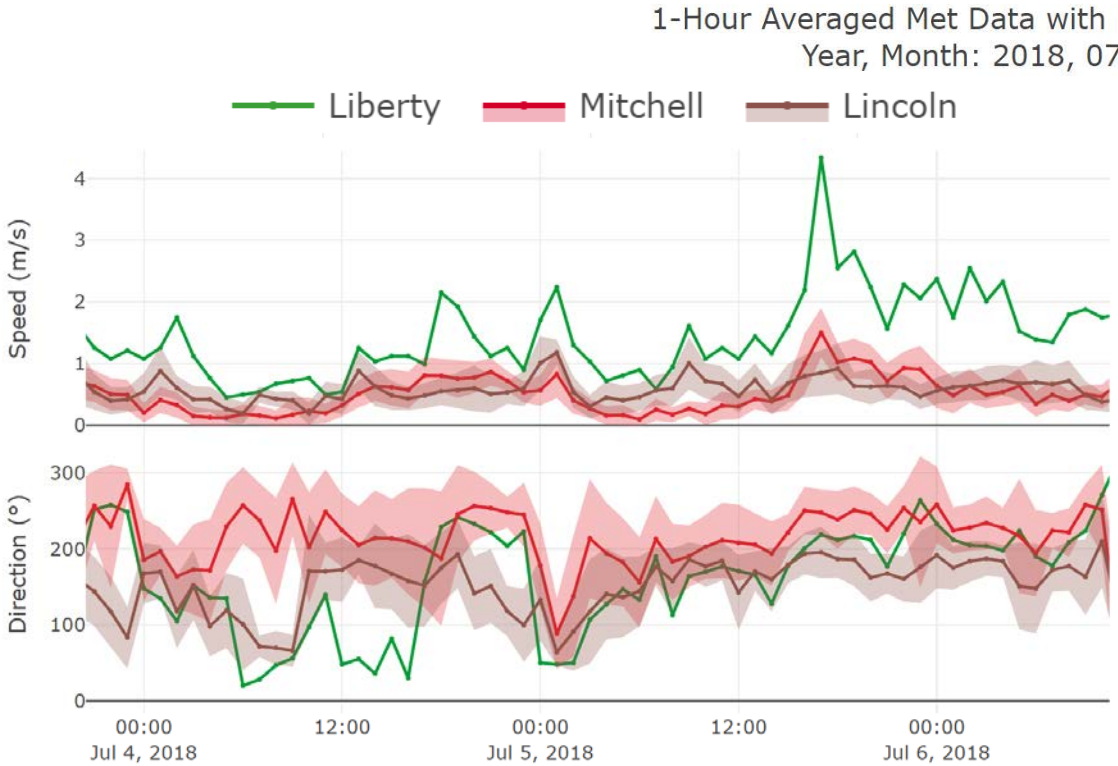


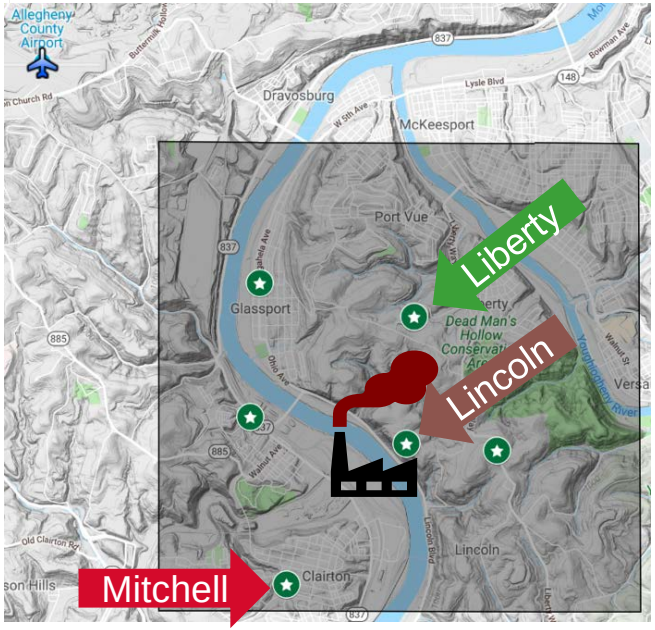
- Lincoln site and LincolnPD site lie within the forest region, while all other sites lie within the developed region.

Time series confirm that wind pattern at Lincoln site is not local

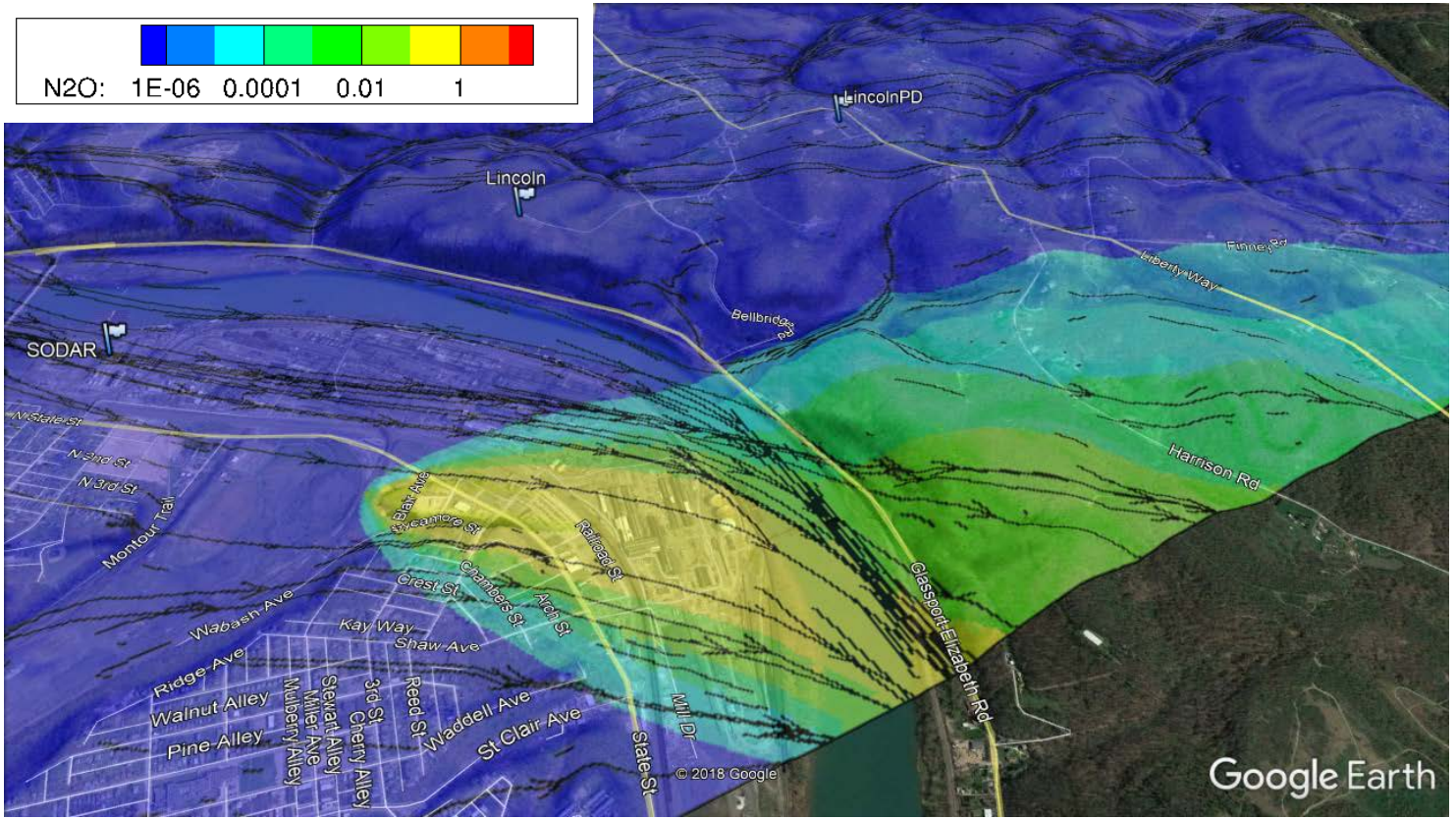


Time series confirm that wind pattern at Lincoln site is not local





Preliminary simulations to compare with tracer release experiments are available



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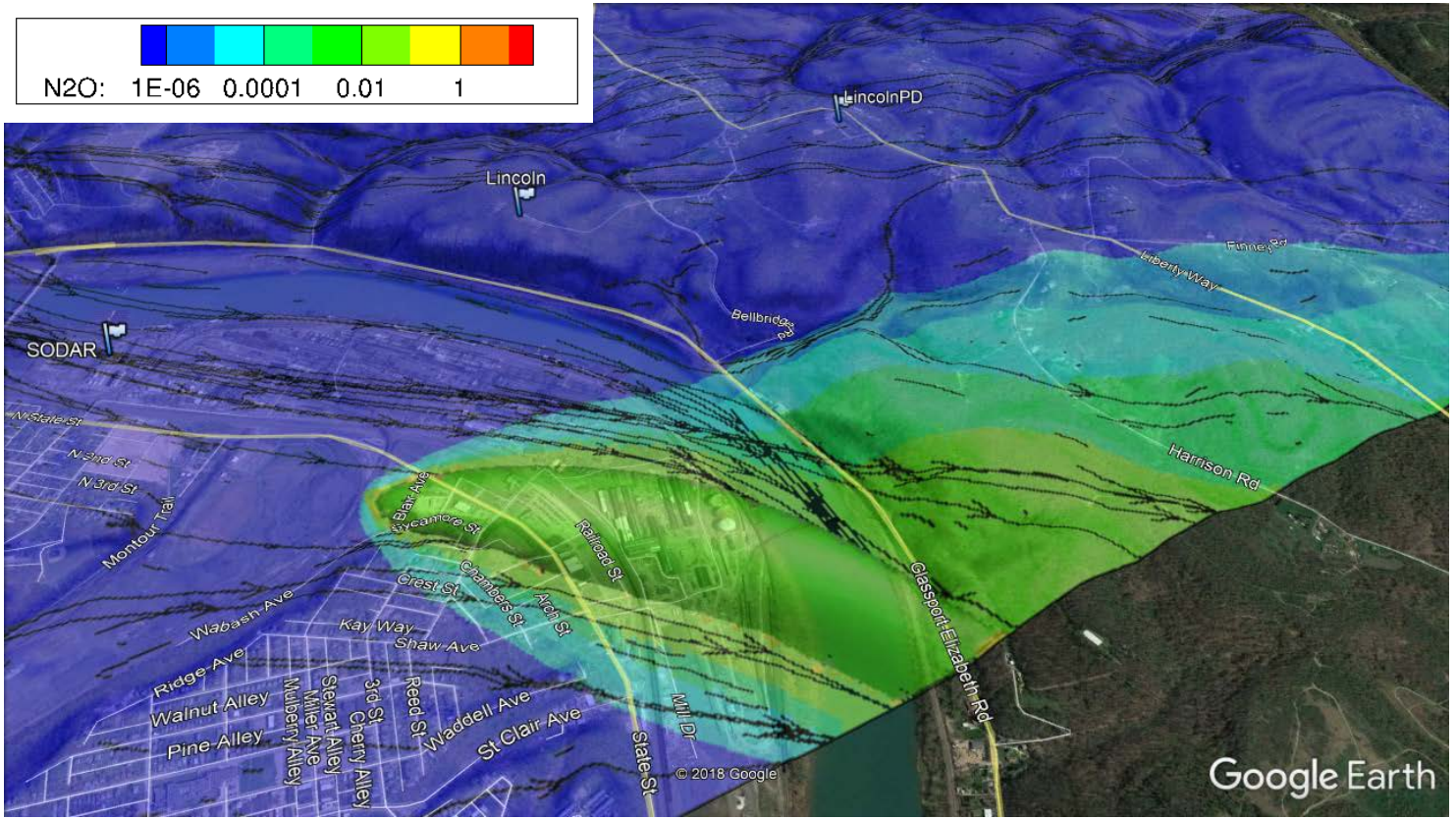

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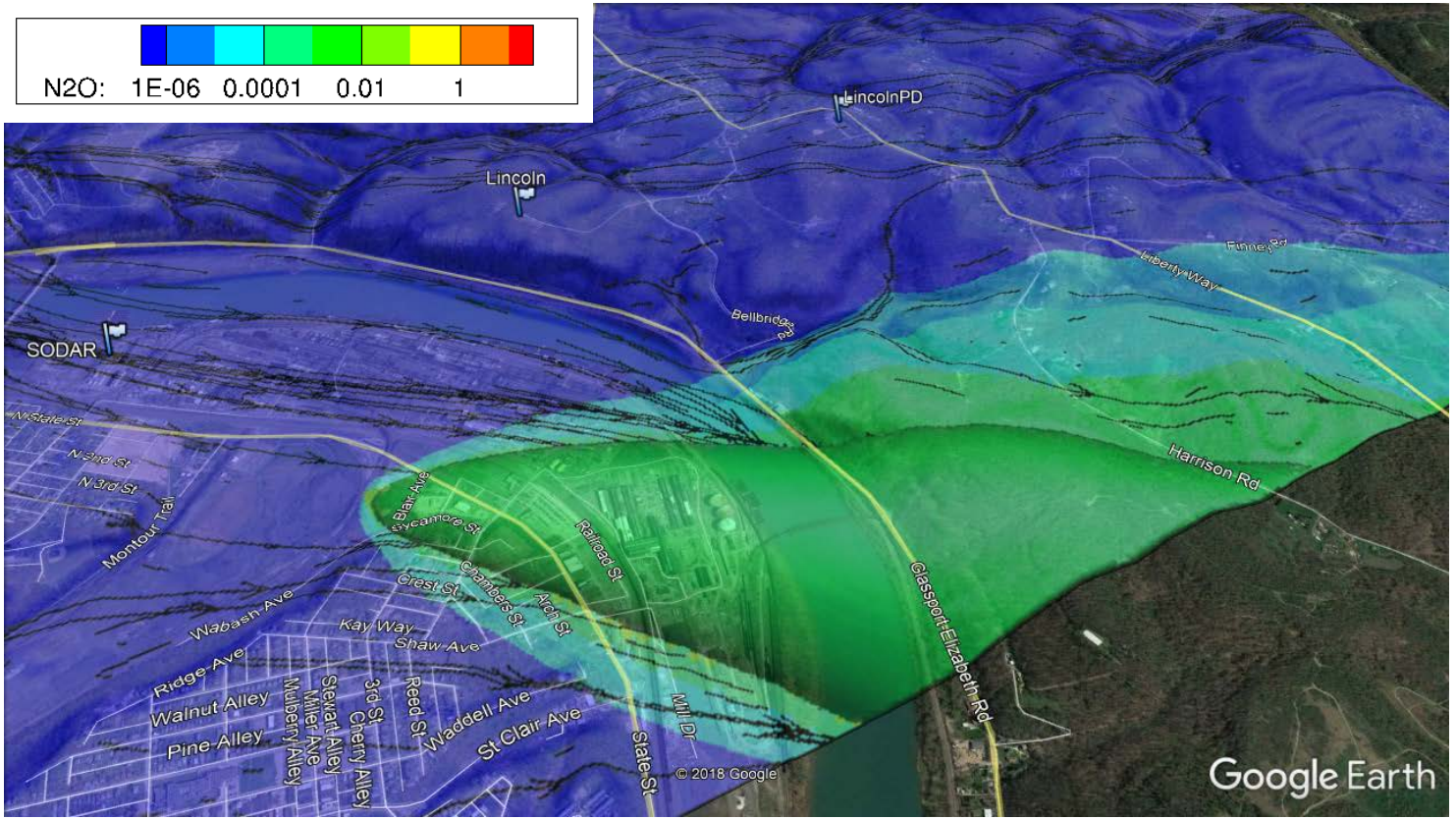

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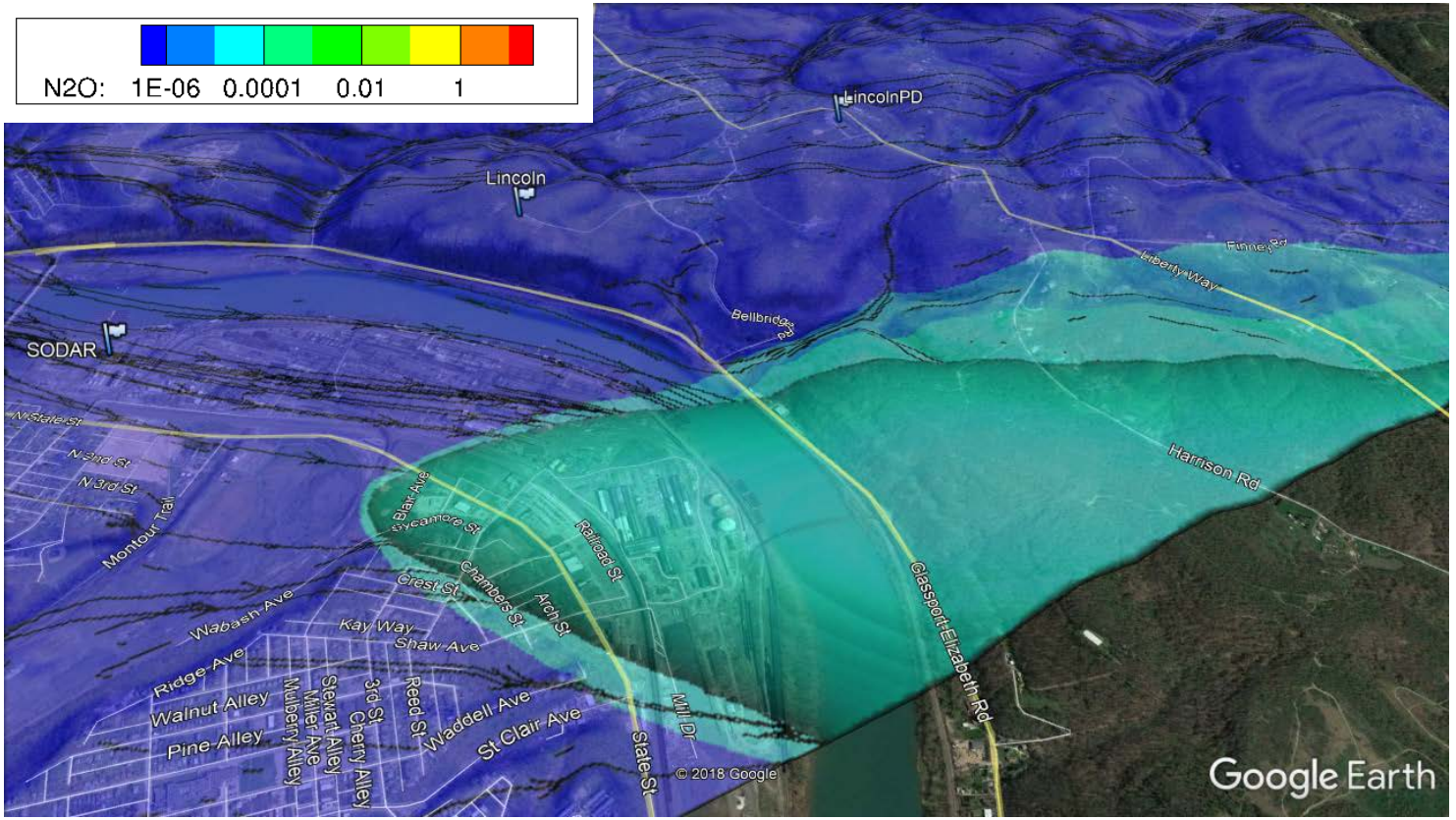
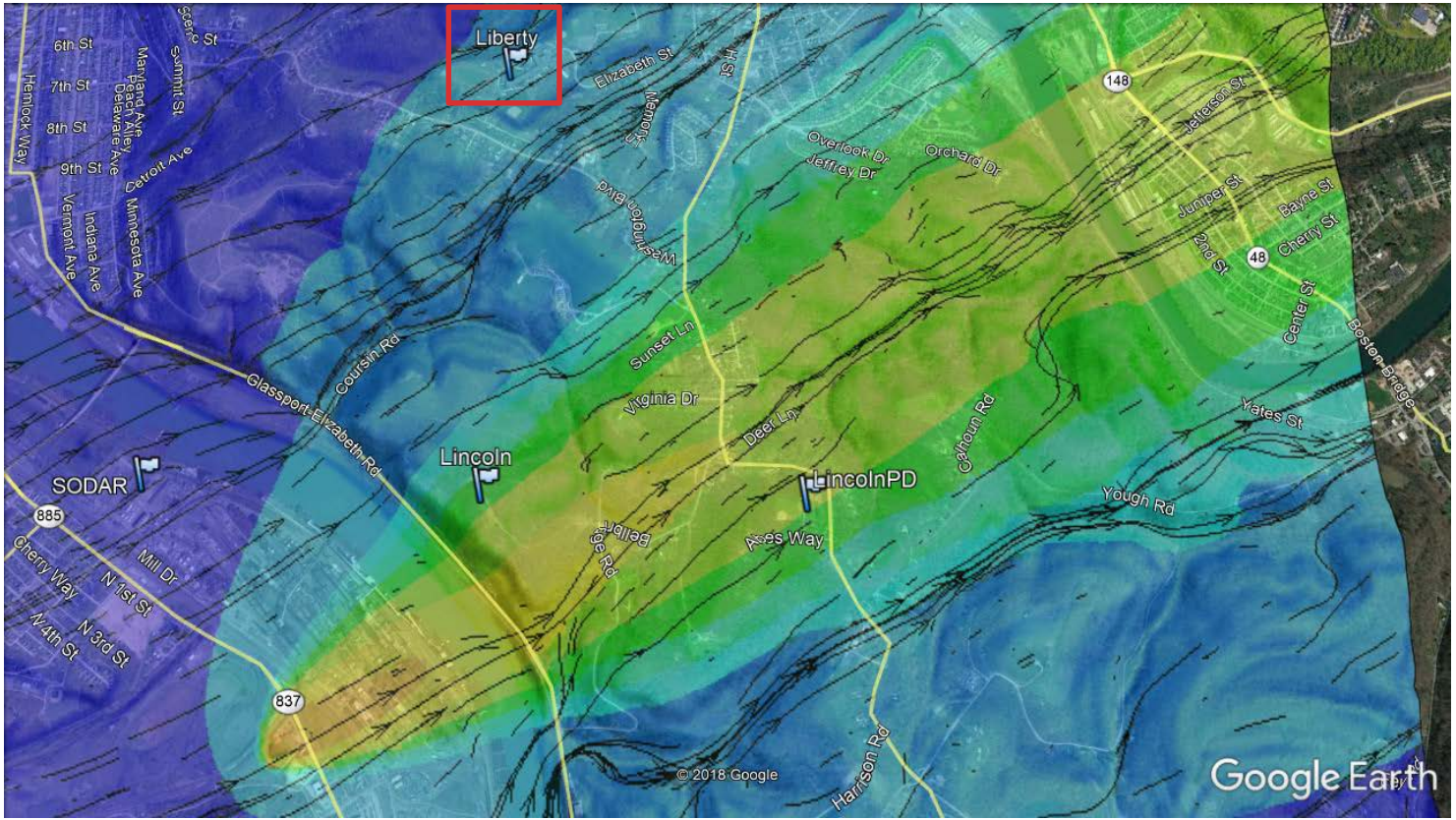


Plumes emitted from the coke plant will be simulated in a similar way



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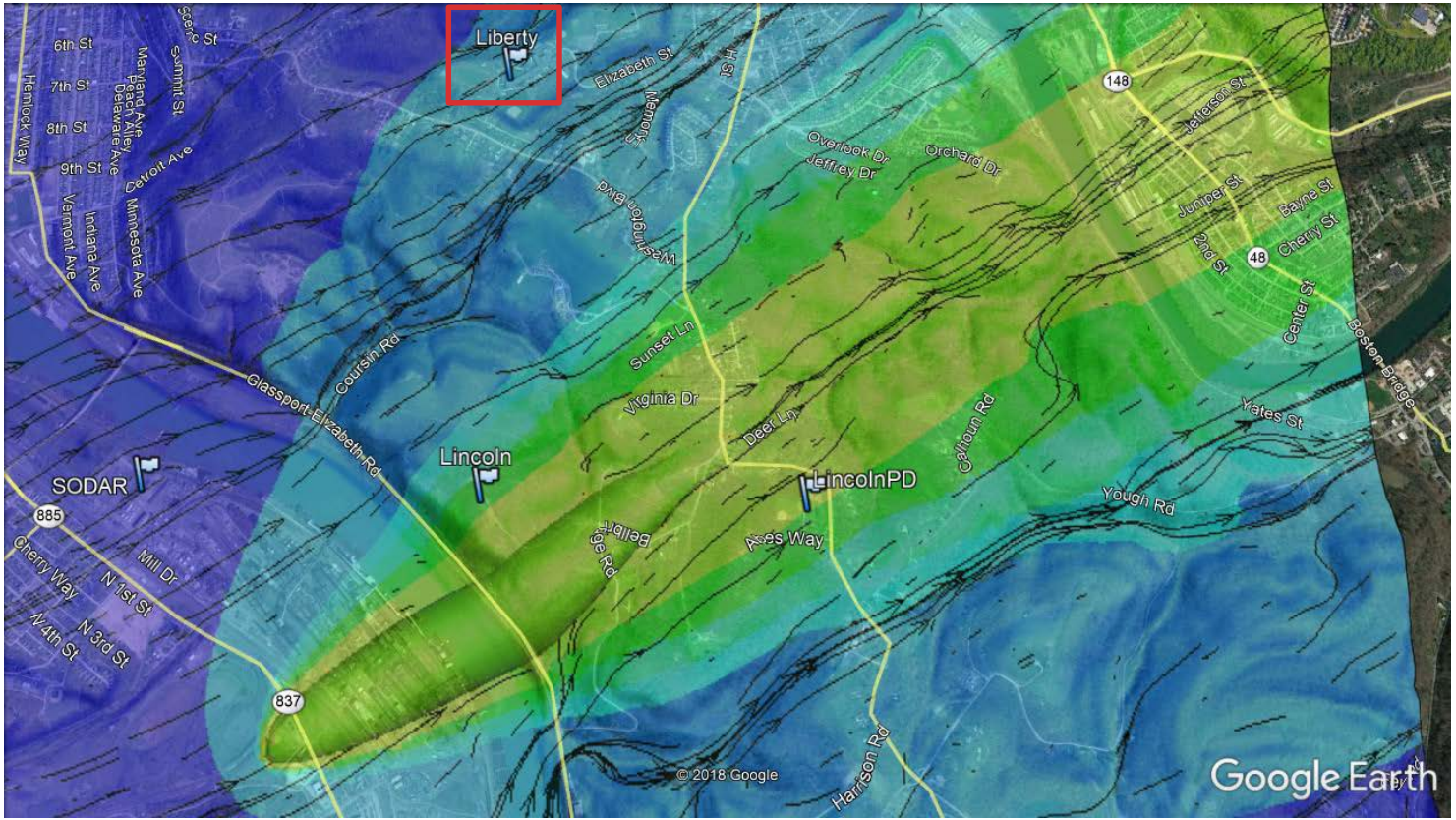

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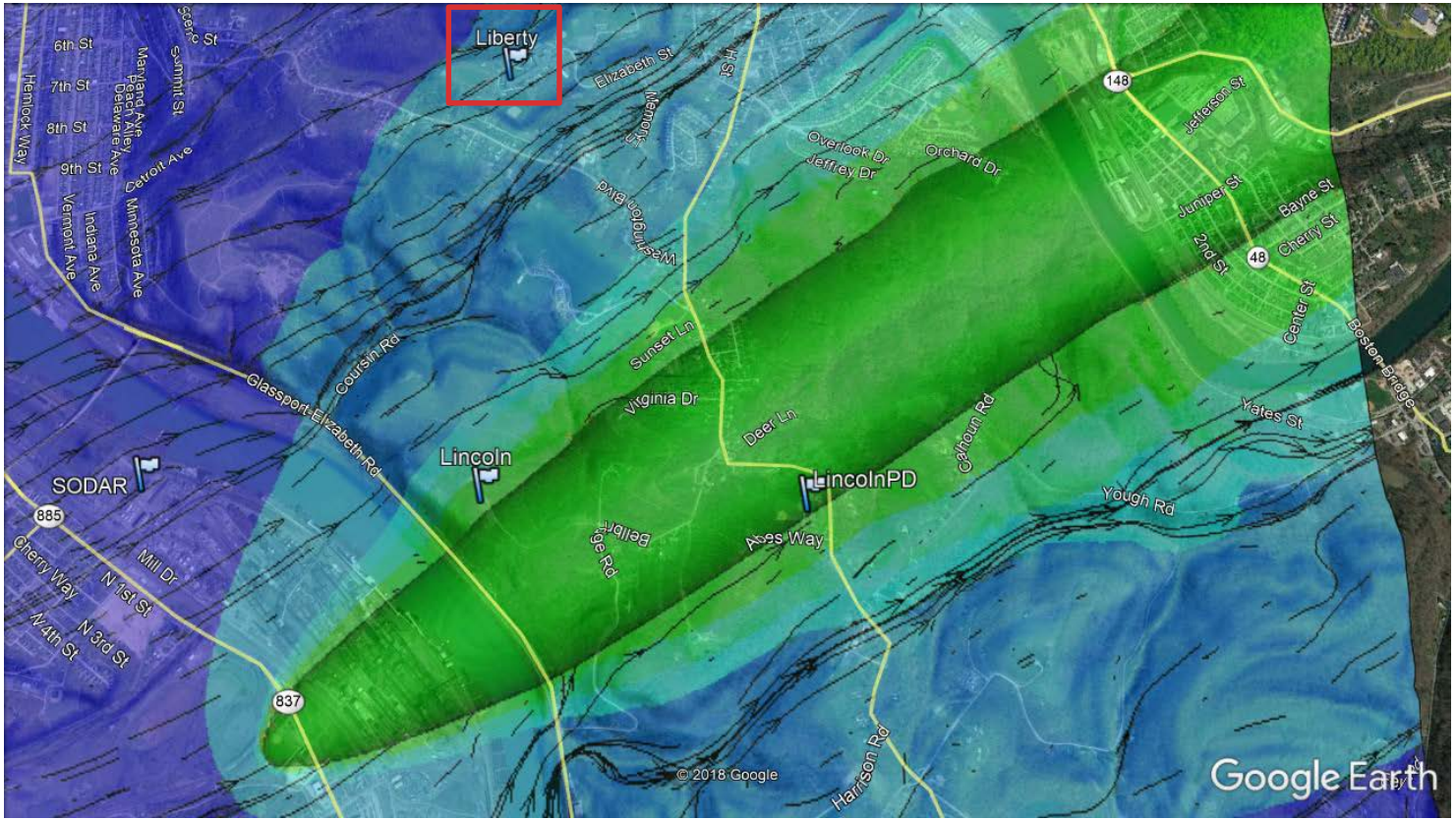

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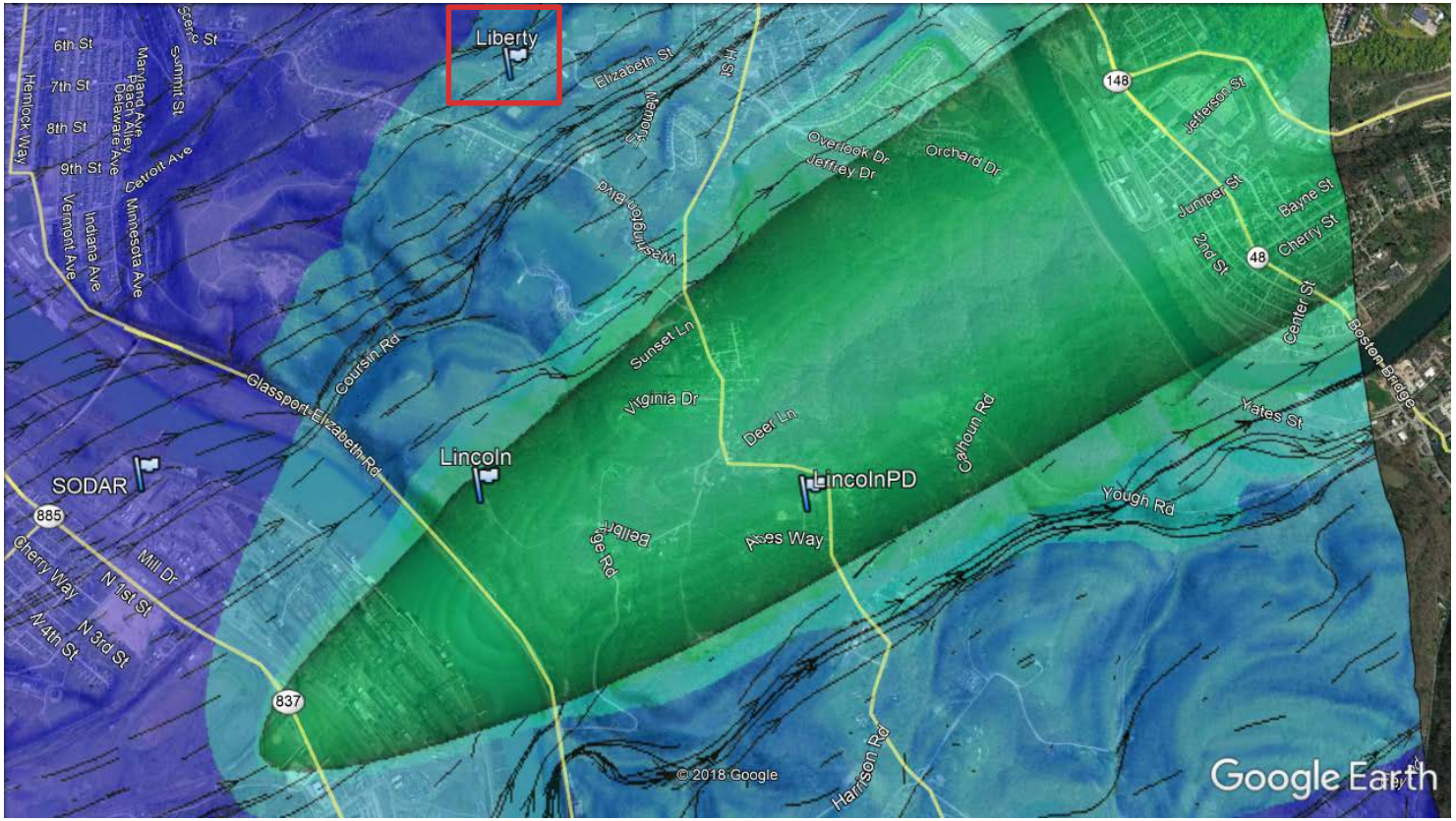

Future work

- Updating current computational domain (based on 2006 contour data) with the latest 2017 high-resolution contour data.
- Investigating the drainage wind pattern reported by the Sodar-RASS in the valley.
- Combining data form the Sounding, Reanalysis, Sodar-RASS and wind sensors deployed in the valley to generate more realistic boundary profiles.
- Using measured vertical profiles to further validate simulation results under various meteorological conditions.
- Validating the predicted pollution dispersion pattern by comparing with data from tracer release and Liberty monitor.