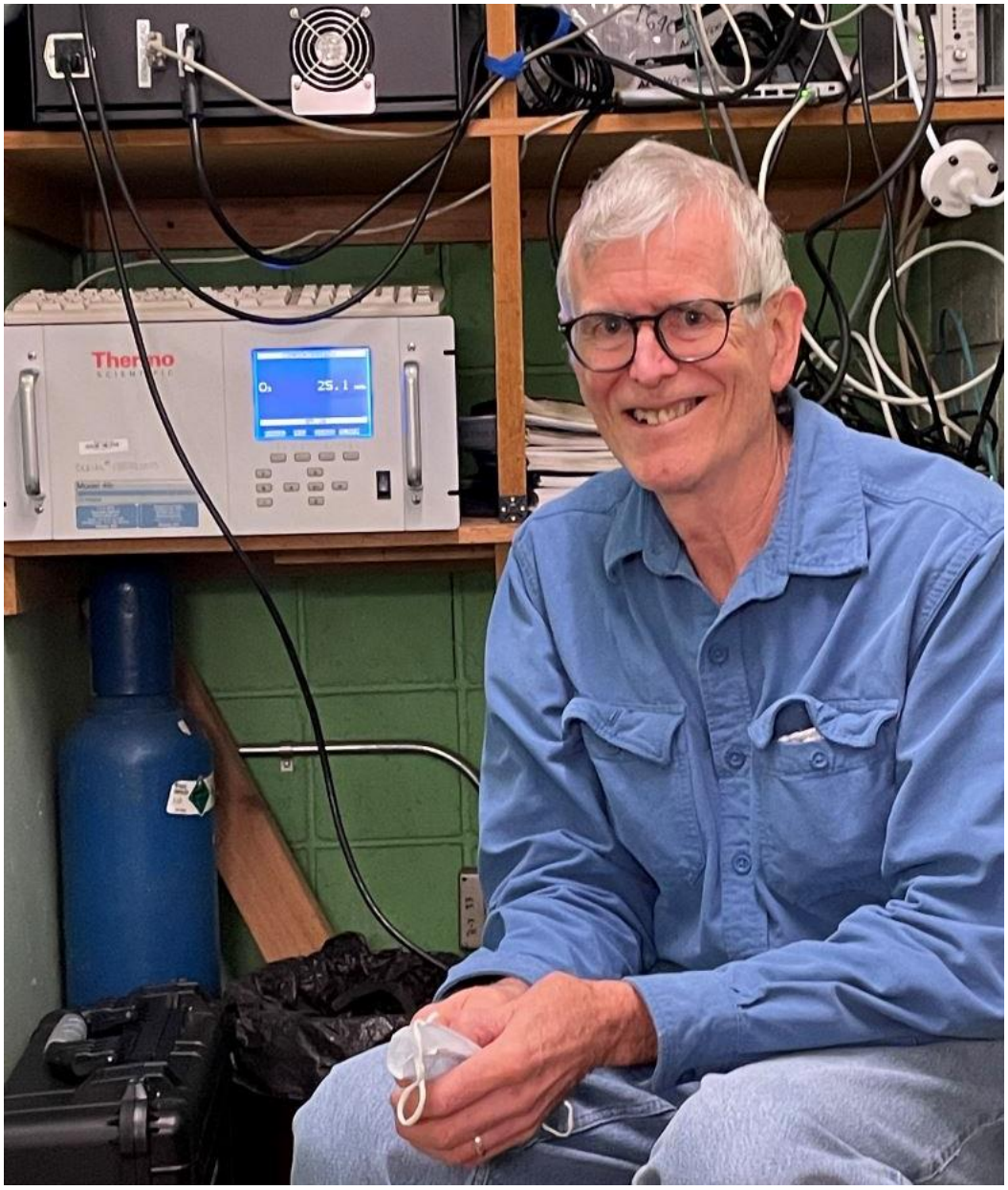
2020 Air Quality Annual Report



ALLEGHENY COUNTY HEALTH DEPARTMENT

Allegheny County Health Department
Air Quality Program
301 39th St., Bldg. #7
Pittsburgh, PA 15201

Annual Report
for
2020
with
2000-2020 Trends

ALLEGHENY COUNTY
PENNSYLVANIA
A GREAT PLACE TO LIVE, WORK & PLAY
& HOME OF AMERICA'S MOST LIVABLE CITY

Pictured on the front cover…

A picture of Keith Nelson in front of Lawrenceville's Ozone monitor. Keith has been performing quality assurance work on a variety of monitors in ACHD's Air Quality Network. After over 21 years of service with the Health Department, Keith retired from ACHD on the first of November 2021.

Below is a map of all monitoring locations in 2020. Downtown Pittsburgh comprises the Flag Plaza site.

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Preface

This report reflects air quality as sampled and validated by the Allegheny County Health Department (ACHD) through the calendar year of 2020.

For comparison to previous years, this report also provides 2019 data and twenty-year trends. For pollutant standards that require averages over consecutive years, multi-year averages are also given. Note that multi-year values were be calculated as specified by the U.S. Environmental Protection Agency (EPA); if the standard requires calculations on a quarterly basis, such as with $PM_{2.5}$, the multi-year average were calculated as such.

Exceedances are given for pollutants. An *exceedance* is a concentration that goes above a standard but does not necessarily constitute a *violation* of a standard. For some standards, a violation is a collection of several exceedances over a multi-year period. The standards for each pollutant are described in detail in the pollutant sections.

Official validated pollutant concentrations are submitted to EPA's Air Quality System (AQS) on a quarterly basis, and selected parameters are available at the AirData website: www.epa.gov/airdata/. Allegheny County 2020 air quality data were submitted for certification in mid-2021.

Unofficial data for ozone and $PM_{2.5}$ are reported to EPA's AIRNow on an hourly basis and are available at the AIRNow website: www.airnow.gov/.

Unofficial Air Quality Index (AQI) levels are also available each hour for all continuously monitored pollutants via ACHD phone recording at 412-578-8179 and at the Allegheny County website: https://alleghenycounty.us/hd/AQIReport.XLS.

1. Executive Summary

All exceedances of the short-term standards in 2020 are shown in the table on the next page. All other criteria pollutants were below the annual and short-term federal standards in 2020.

Ozone: The County recorded five exceedance days for 8-hour ozone in 2020, with one day above the previous standard of 0.075 parts per million (ppm). The ACHD monitors showed attainment of the 8-hour standard of 0.070 ppm for the fourth time in five years (2015-2020). The 2016-2018 value at South Fayette was above the federal standard at 0.071 ppm. The highest 3-year average of the 4th maximum concentration for 2018-2020 was 0.068 ppm at the Harrison monitor.

$PM_{2.5}$: For particulate matter 2.5 microns or less in diameter ($PM_{2.5}$), none of the eight monitoring sites was above the annual standard of 12.0 µg/m³ (micrograms/cubic meter): Liberty was 11.1 µg/m³ for the years 2018-2020.

In 2020, the Liberty FRM (Federal Reference Method) $PM_{2.5}$ monitor exceeded the 24-hour standard of 35 µg/m³ three times, leading to a 98th-percentile value of 27.2 µg/m³. Data from the Liberty $PM_{2.5}$ monitor in Allegheny County met attainment of this standard for the past three 3-year periods.

SO_2: A new 1-hour federal standard of 75 ppb was promulgated in 2010 for SO_2. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor must not exceed 75 ppb. Data from ACHD's Liberty monitor show nonattainment of the federal standard.

NO_2: A new 1-hour federal standard of 100 ppb was promulgated in 2010 for NO_2. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor must not exceed 100 ppb. Data from all ACHD monitors show attainment if the federal standard.

In the following table, ozone can have a short-term exceedance of either the 1-hour or 8-hour standard and will be labeled as such. The $PM_{2.5}$ short-term exceedances are for the 24-hour standard and the SO_2 short-term exceedances are for the 1-hour standard.

2020 Exceedances of the Short-Term Federal Standards

Pollutant	Site	Date	Concentration	Standard
Ozone	Harrison	7/6/2020	0.074 ppm (8-hr)	0.070 ppm
Ozone	South Fayette	7/6/2020	0.071 ppm (8-hr)	0.070 ppm
Ozone	Lawrenceville*	7/6/2020	0.071 ppm (8-hr)	0.070 ppm
Ozone	Harrison	7/7/2020	0.077 ppm (8-hr)	0.070 ppm
Ozone	Harrison	7/8/2020	0.071 ppm (8-hr)	0.070 ppm
Ozone	Lawrenceville	7/8/2020	0.071 ppm (8-hr)	0.070 ppm
Ozone	South Fayette	8/9/2020	0.071 ppm (8-hr)	0.070 ppm
Ozone	Harrison	8/10/2020	0.074 ppm (8-hr)	0.070 ppm
$PM_{2.5}$	Liberty	3 Days	Max = 41.0 µg/m³	35 µg/m³
$PM_{2.5}$	Avalon	1 Days	Max = 41.0 µg/m³	35 µg/m³
SO_2	North Braddock	2 Hours	Max = 105 ppb	75 ppb

* Note: Lawrenceville would have been an exceedance of the short-term federal standard, if not for a three-hour long power failure on 7/6/20.

2. Attainment of the Federal Standards

8-Hour Ozone

Allegheny County and the surrounding six counties of the Pittsburgh-Beaver Valley Area were designated nonattainment of the previous 1997 and 2008 standards (0.08 ppm and 0.075 ppm, respectively) for 8-hour ozone. The Pittsburgh-Beaver Valley Area has since been in attainment of these standards. For the 1997 standard the EPA used the 2009-2011 values to determine attainment on May 6, 2013, and for the 2008 standard the EPA used the 2013-2015 values to determine attainment on January 5, 2017. Allegheny County and surrounding counties have not been designated under the 2015 standard (0.070 ppm). The monitor at South Fayette tied with Lawrenceville as the highest 3-year average of 0.068 ppm for 2017-2019 in the area. The monitor at Harrison had the highest ozone levels in Allegheny County for 2018-2020 at 0.068 ppm. Allegheny County is in attainment of the current 8-hour ozone standard of 0.070 ppm at all sites based on 2018-2020 data.

$PM_{2.5}$

For the 1997 and 2006 standards, Allegheny County had been designated nonattainment for $PM_{2.5}$ as part of a multi-county Pittsburgh-Beaver Valley Area. Additionally, a five-municipality Liberty-Clairton Area was designated nonattainment as a separate area within Allegheny County. These areas have since been in attainment of these standards. In 2015, Allegheny County was designated a nonattainment area for the 2012 standards, and a State Implementation Plan (SIP) was developed for the attainment of this standard to demonstrate attainment by the end of 2021. Monitored results for 2018-2020 show levels of attainment county-wide for the annual standard of 12.0 $\mu g/m^3$.

SO_2

The County has monitored attainment for the annual and 24-hour SO_2 standards for several consecutive years. In 2013, EPA designated a 22-municipality nonattainment area in the Monongahela Valley region of Allegheny County for the 2010 1-hour standard of 75 ppb, and a SIP was developed for this area. The Liberty monitor is not yet in attainment of the standard, with 2018-2020 results showing a 3-year average of 85 ppb.

Other Criteria

For *PM_{10}*, the County has monitored for attainment for 26 consecutive years. EPA redesignated Allegheny County to be in attainment for PM_{10} in 2003.

For *1-hour ozone*, the County has monitored for attainment for 23 consecutive years. EPA redesignated Allegheny County to attainment for the 1-hour ozone standard in 2001. EPA revoked this standard for Southwestern PA in 2005.

For *CO*, the County has monitored for attainment for 33 consecutive years. EPA redesignated Allegheny County to attainment for CO in 2003.

For *NO_2*, the County has monitored for attainment for over 35 consecutive years and has been in attainment since the announcement of the standard.

For *Lead (Pb)*, in 2014 the County monitored for nonattainment for the first time in over 25 years for the 0.15 µg/m³ rolling 3-month average. The County has monitored attainment in 2015, 2016 and 2017.

3. Air Monitoring Results

A. Ozone (O_3)

The federal standard for ozone is based on maximum 8-hour averages within each 8-hour block period within a calendar day. The 8-hour standard of 0.070 parts per million (ppm) must not be exceeded by the 3-year average of the 4th highest 8-hour concentrations. Since 2016, the ozone season for Allegheny County extends from March 1 through October 31.

There were five exceedance days overall for 8-hour ozone in 2020. Two of the days included an exceedance at more than one monitor.

Based on predominant wind flow for Allegheny County, South Fayette is considered to represent incoming ozone levels, Lawrenceville represents ambient urban ozone levels, and Harrison represents outgoing ozone levels.

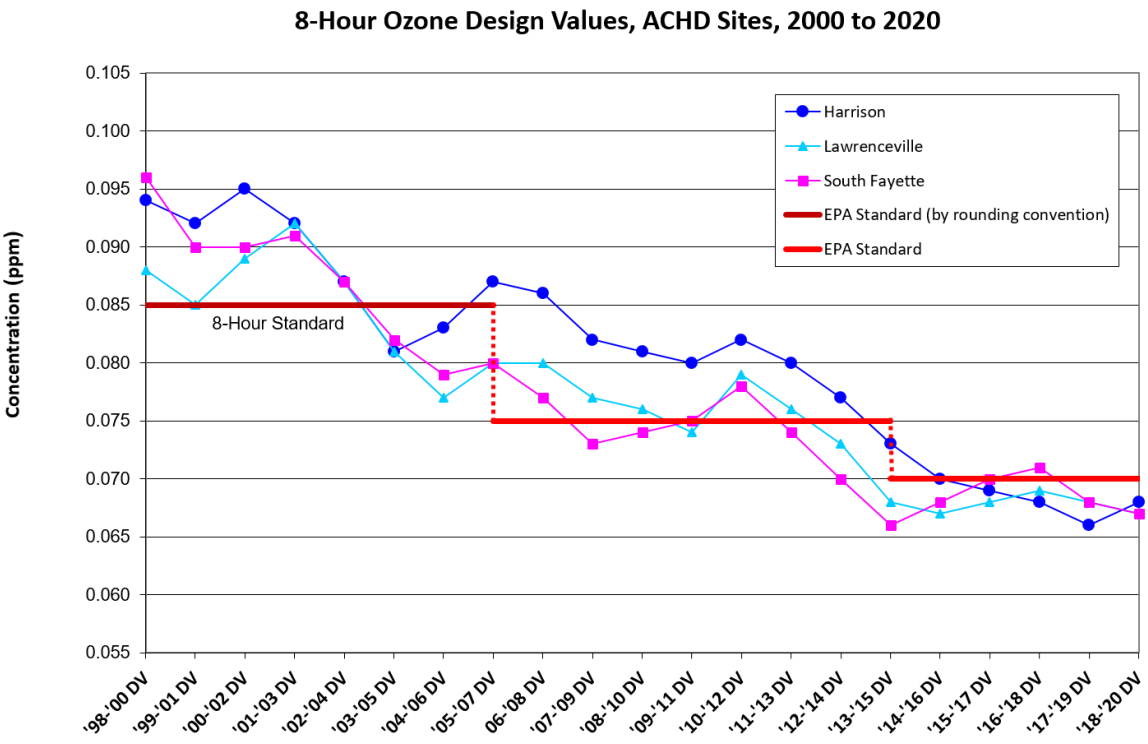
8-Hour Ozone Concentrations

Maximum 8-hour ozone concentrations and exceedance days are given below for 2020, with exceedance concentrations and days shown in red. 2019 values are shown in gray for comparison.

8-Hour Std. = 0.070 ppm*						
Site	2019 8-Hour Maximum (ppm)	**2020 8-Hour Maximum (ppm)**	2019 Exceedance Days	**2020 Exceedance Days**	2017-2019 8-Hour 3-Yr. Avg. of 4th Max. (ppm)	**2018-2020 8-Hour 3-Yr. Avg. of 4th Max. (ppm)**
Harrison	0.067	0.077	0	4	0.066	0.068
South Fayette	0.066	0.071	0	2	0.068	0.067
Lawrenceville	0.066	0.071	0	2	0.068	0.067

* For comparison to the standards, values are truncated at 1/1000th ppm (e.g., 0.0706 truncates to 0.070 ppm). An exceedance day is one in which any 8-hour period has an average of greater than 0.070 ppm.

Below is a chart showing the 8-hour design values for the three Allegheny County Health Department monitoring sites since 2000.



1-Hour Ozone Concentrations

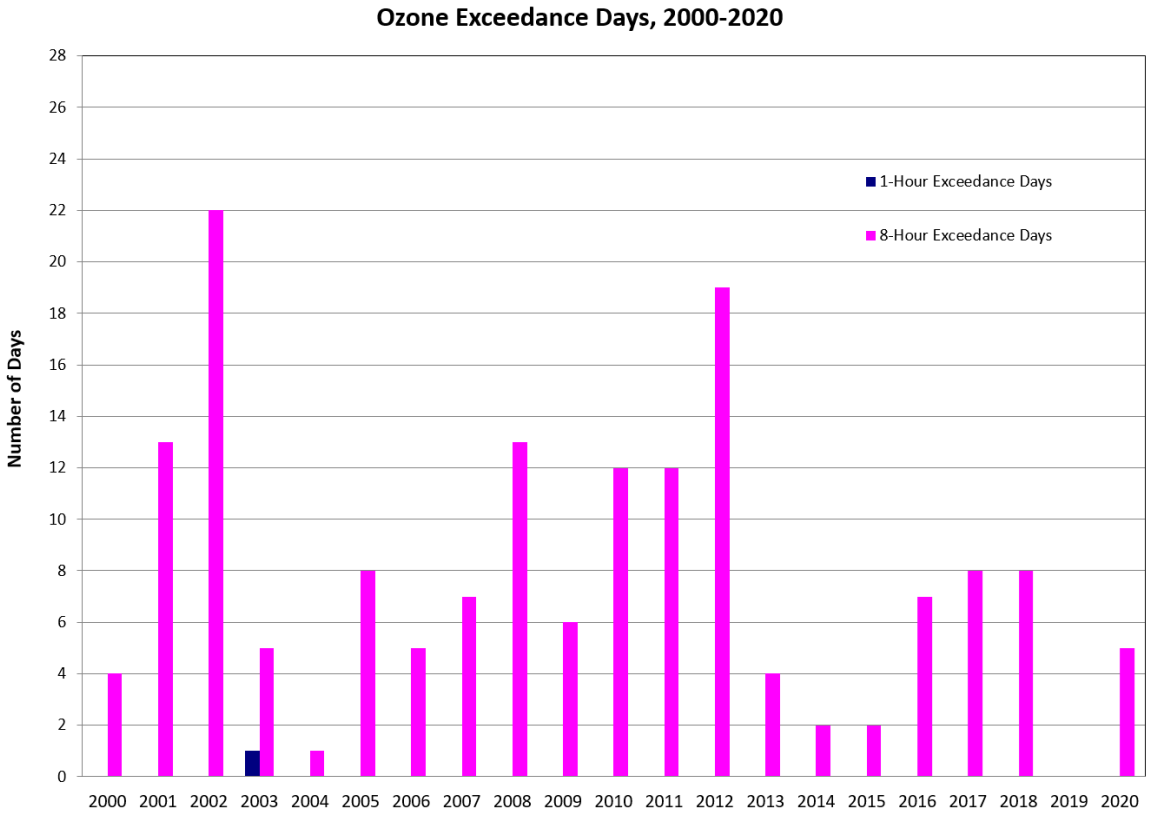
The 1-hour standard was revoked for the Pittsburgh-Beaver Valley Area in mid-2005. The former 1-hour standard of 0.12 ppm was not to be exceeded more than once a year, averaged over a 3-year period. 1-hour ozone maximums and exceedances are given in this report for comparative purposes.

Maximum 1-hour concentrations for ozone are given in the table that follows for 2020, with 2019 values shown in gray. "Expected" exceedance days are based on the 3-year average of the actual exceedance days per year, adjusted for missing data.

Former 1-Hour Std. = 0.12 ppm*						
Site	2019 1-Hour Maximum (ppm)	**2020 1-Hour Maximum (ppm)**	2019 Exceedance Days	**2020 Exceedance Days**	2017-2019 Expected Exceedance Days	**2018-2020 Expected Exceedance Days**
Harrison	0.077	0.087	0	0	0.0	0.0
Lawrenceville	0.079	0.080	0	0	0.0	0.0
South Fayette	0.076	0.077	0	0	0.0	0.0

* For comparison to the standards, values are rounded to the nearest 1/100th ppm (e.g., 0.126 rounds up to 0.13 ppm). An exceedance day is one in which any hour has a concentration of 0.125 ppm or greater. Concentrations are shown here in thousandths of ppm for detail.

Below is a chart showing ozone exceedance days, both 1-hour and 8-hour, for all Allegheny County sites over the period 2000-2020. Exceedance days represent days when at least one site exceeded the standard.



B. Particulate Matter - 2.5 microns or less ($PM_{2.5}$)

$PM_{2.5}$ is sampled using both intermittent filter-based and continuous monitors throughout the county. Both types of $PM_{2.5}$ monitors can be used for comparison to the federal standard of 12.0 on an annual basis and 35 µg/m³ on a 24-hour basis.

$PM_{2.5}$ Filter-Based Monitors, Annual

Federal Reference Method (FRM) filter-based $PM_{2.5}$ monitors are used to determine attainment for an area. The annual federal standard for $PM_{2.5}$ is 12.0 µg/m³ on an annual basis (3-year average). The ACHD had seven $PM_{2.5}$ monitors across the county and additional monitors at several sites for quality assurance. The North Park monitor was discontinued in the fourth quarter of 2020.

Annual averages for 2020 are given in the table below, with 2019 averages shown in gray. The annual standard was met in 2020.

Annual Std. = 12.0 µg/m³				
Site	**2019 Average**	**2020 Average**	**2017-2019 3-Year Average**	**2018-2020 3-Year Average**
Liberty	12.2	9.8	12.4	11.1
North Braddock	9.9	9.0	10.4	9.7
Lawrenceville	9.0	7.7	9.1	8.5
Harrison	8.6	7.3	9.3	8.4
Clairton	7.9	7.3	8.8	8.0
South Fayette	7.7	6.6	8.1	7.4
North Park	6.8	5.7	7.4	6.6

Note: Starting 2017, the Avalon filter-based monitor is now a quality assurance monitor.

$PM_{2.5}$ Continuous Monitors, Annual

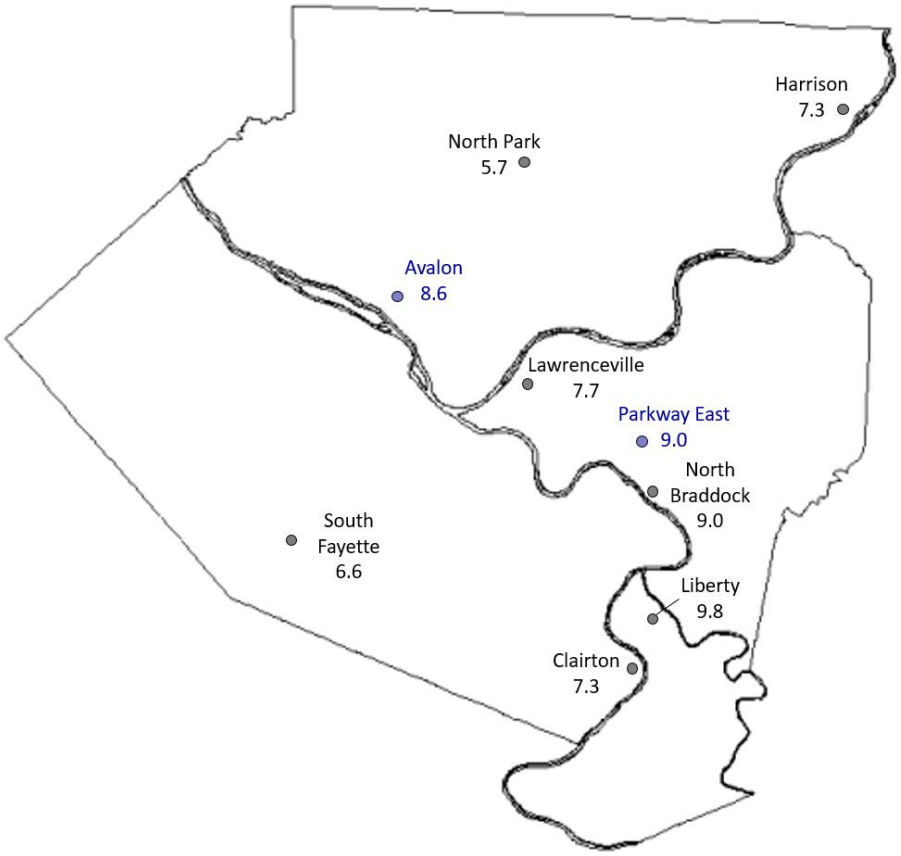
ACHD's four continuous $PM_{2.5}$ monitors are used mainly for AQI reporting. The Parkway East monitor started operation in 2016 and the Avalon monitor started operation in 2017; both monitors are used to determine attainment of the federal standards.

Annual averages for 2020 are given in the table on the following page, with 2019 averages shown in gray. The annual and 3-year average standards were met in 2020.

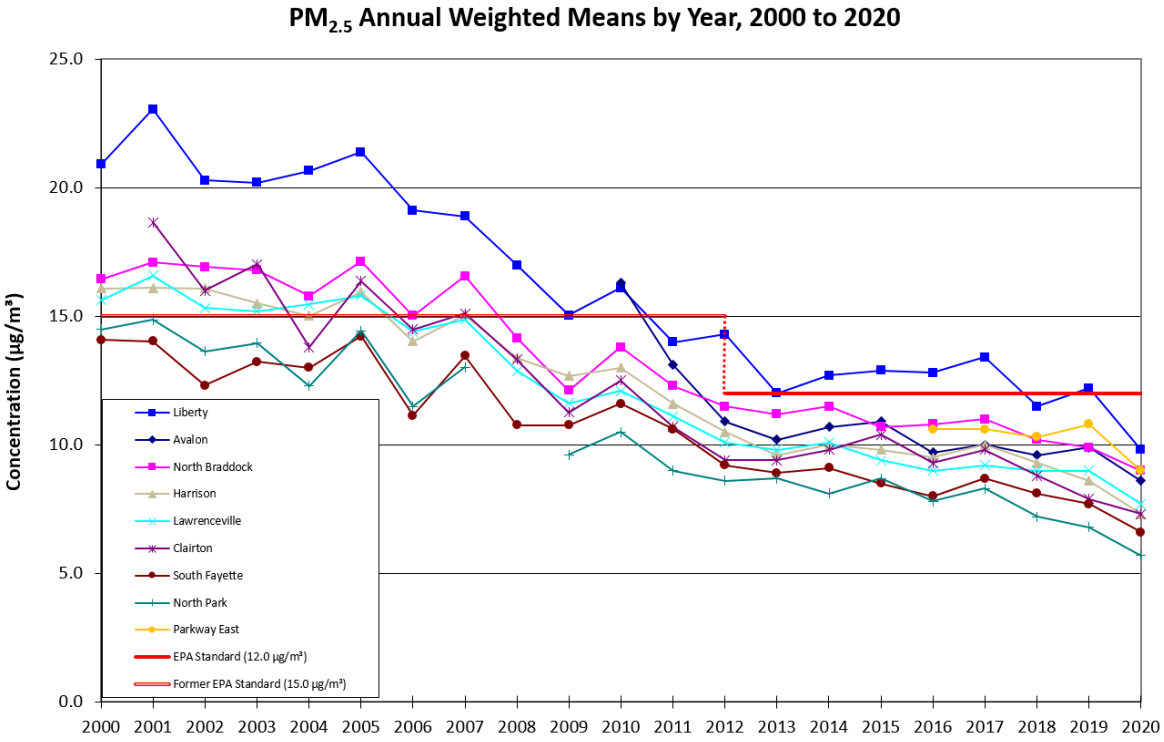
Annual Std. = 12.0 µg/m³				
Site	**2019 Average**	**2020 Average**	**2017-2019 3-Year Average**	**2018-2020 3-Year Average**
Parkway East	10.8	9.0	10.6	10.0
Avalon	9.9	8.6	9.8	9.4

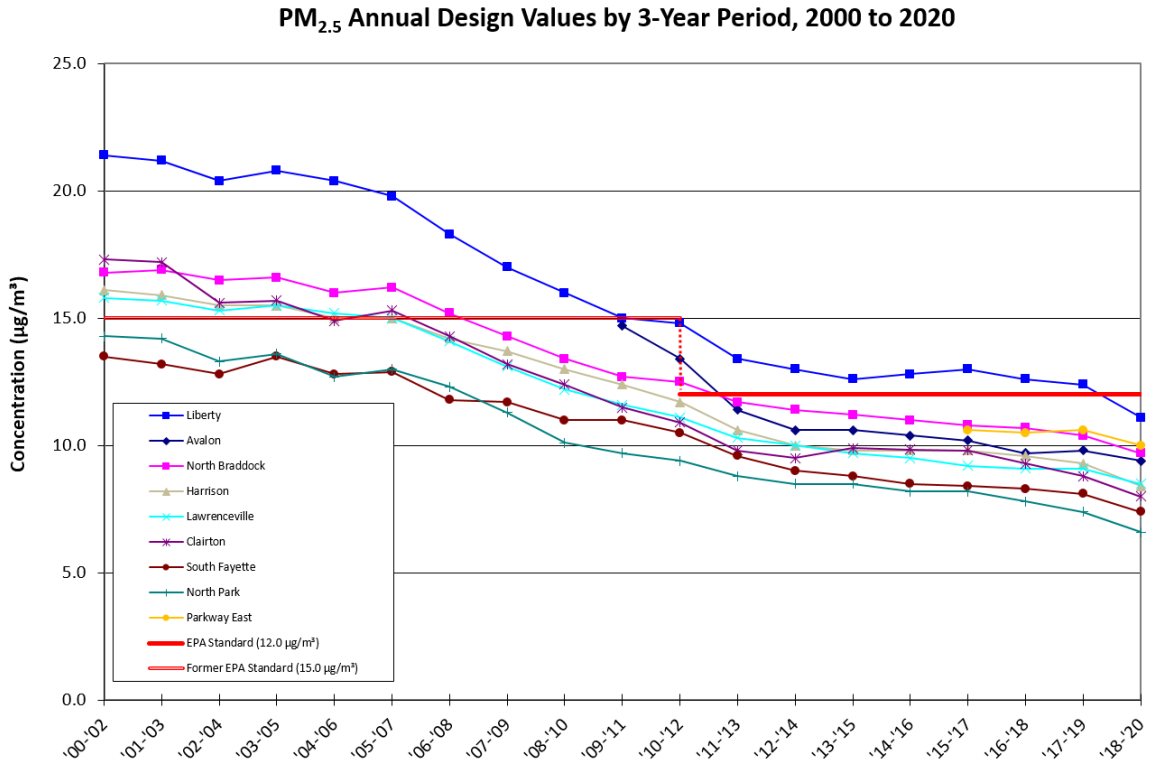
2020 FRM annual averages are shown on the map below. 2020 FEM annual averages are also shown on the map below in blue.

2020 $PM_{2.5}$ FRM/FEM Annual Averages by Site, in µg/m³



Long-term trends for the $PM_{2.5}$ annual averages and the $PM_{2.5}$ annual design values are shown in the charts below.





$PM_{2.5}$ Filter-Based Monitors, 24-Hour

The 24-hour standard for $PM_{2.5}$ of 65 µg/m³ on a 24-hour basis (3-year average of the 98th-percentile value) was revised in December 2006 to 35 µg/m³.

The maximum 2020 24-hour concentrations and number of exceedance days are shown in the following table, with 2019 values shown in gray. 98th-percentile values by year and by 3-year average are also shown. Exceedances in 2020 are shown in red.

24-Hour Std. = 35 µg/m³								
Site	2019 24-Hour Max.	**2020 24-Hour Max.**	2019 24-Hour Exceed.	**2020 24-Hour Exceed.**	2019 98th-Percentile Value	**2020 98th-Percentile Value**	2017-2019 3-Year Avg. of 98th-Percentile	**2018-2020 3-Year Avg. of 98th-Percentile**
Liberty	66.4	41.0	9	3	39.4	27.2	34.6	31.5
North Braddock	31.9	30.3	0	0	21.8	20.5	23.1	22.3
Lawrenceville	27.1	30.9	0	0	21.7	18.1	19.5	19.7
Clairton	20.4	24.7	0	0	20.1	18.9	18.9	18.8
Harrison	24.4	22.5	0	0	20.6	16.4	20.3	18.8
South Fayette	18.1	25.2	0	0	16.5	15.7	17.9	16.7
North Park	18.6	16.9	0	0	14.1	16.9	14.9	15.1

Note: Starting 2017, the Avalon filter-based monitor is now a quality assurance monitor.

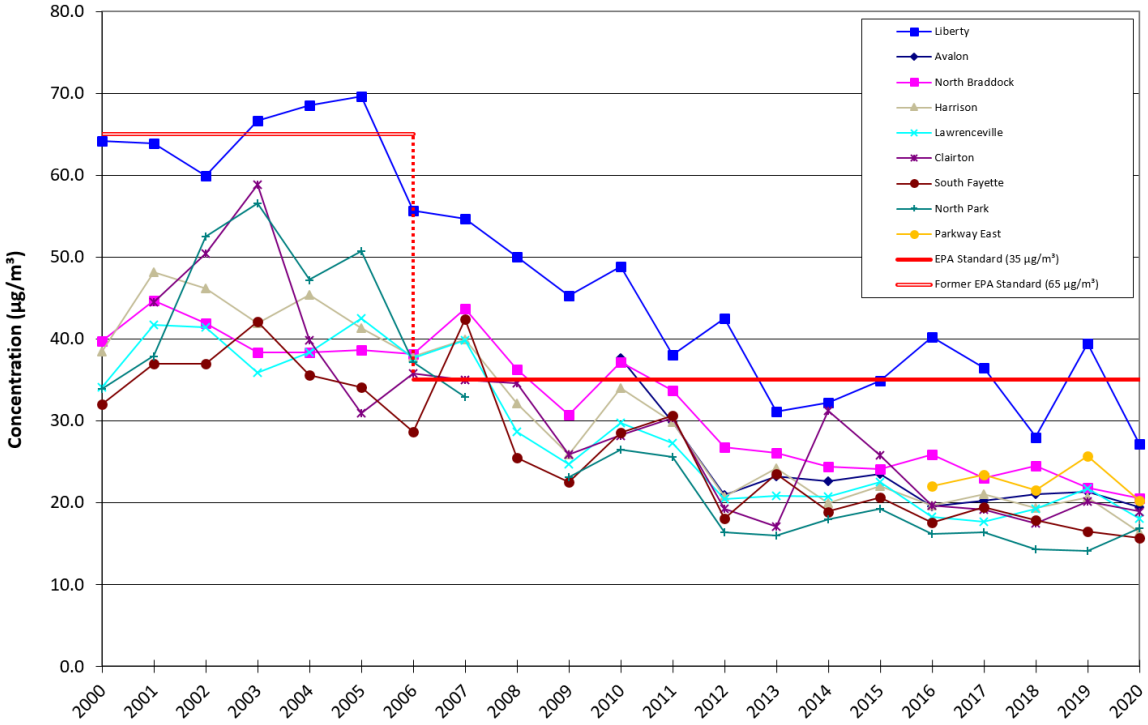
$PM_{2.5}$ Continuous Monitors, 24-Hour

The maximum 2020 24-hour concentrations and number of exceedance days are shown in the following table, with 2019 values shown in gray. 98th-percentile values by year and by 3-year average are also shown. Exceedances in 2020 are shown in red.

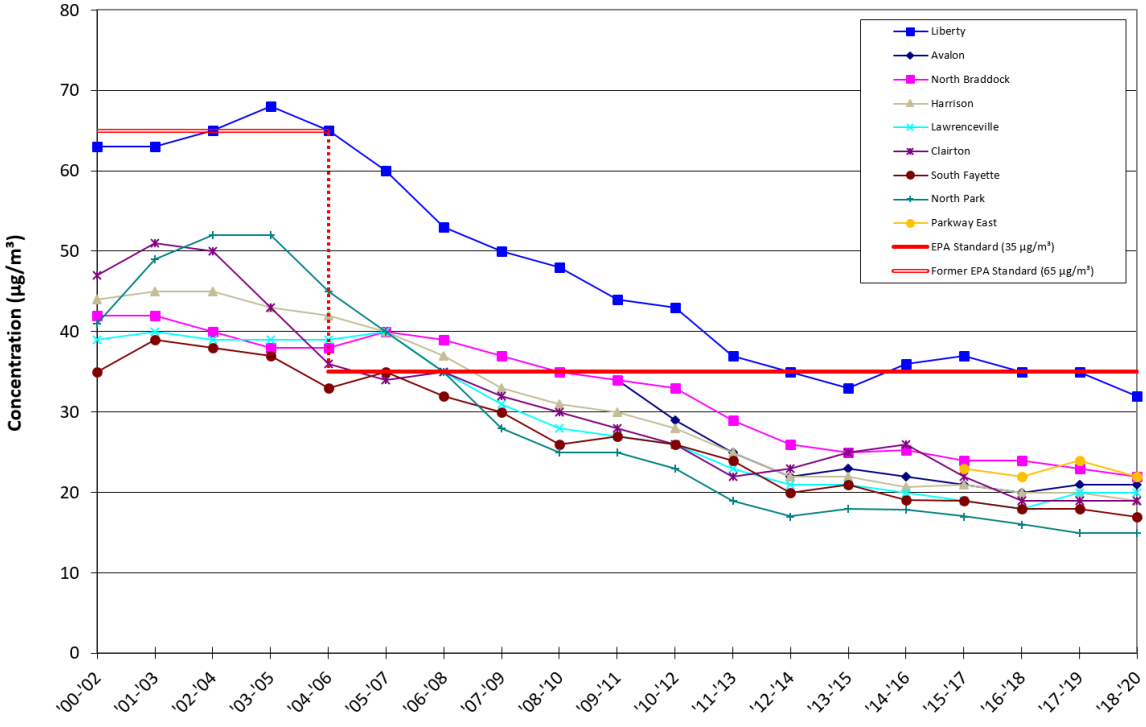
24-Hour Std. = 35 µg/m³								
Site	2019 24-Hour Max.	**2020 24-Hour Max.**	2019 24-Hour Exceed.	**2020 24-Hour Exceed.**	2019 98th-Percentile Value	**2020 98th-Percentile Value**	2017-2019 3-Year Avg. of 98th-Percentile	**2018-2020 3-Year Avg. of 98th-Percentile**
Parkway East	32.5	26.5	0	0	25.7	20.2	23.5	22.5
Avalon	30.4	41.0	0	1	21.3	19.4	20.8	20.6

Long-term trends for the $PM_{2.5}$ 24-hour 98th-percentile by year and the design values by 3-year period are shown in the charts that follow.

$PM_{2.5}$ 24-Hour 98th Percentile Values by Year, 2000 to 2020



$PM_{2.5}$ 24-Hour Design Values by 3-Year Period, 2000 to 2020



$PM_{2.5}$ Continuous Monitors

ACHD's four continuous $PM_{2.5}$ monitors are used mainly for AQI reporting. The Parkway East monitor started operation in 2016 and the Avalon monitor started operation in 2017; both monitors are used to determine attainment of the federal standards. Liberty and Lawrenceville 24-Hour values are only used in determining the federal standards, if the FRM sample(s) from that day is(are) voided. The Liberty continuous monitor was not used formally in determining attainment of the federal standards until 2019.

	Annual Std. = 12.0 µg/m³ [FRM]			24-Hour Std. = 35 µg/m³ [FRM]		
Site	**2019 Average**	**2020 Average**	**2018-2020 3-Year Average**	**2019 24-Hour Maximum**	**2020 24-Hour Maximum**	**2018-2020 3-Year Avg. of 98th-Percentile**
Parkway East	10.8	9.0	10.0	32.5	26.5	22.5
Avalon	9.9	8.6	9.4	30.4	41.0	20.6
Lawrenceville	12.0	9.4	N/A	31.9	33.5	N/A
Liberty	14.2	11.1	N/A	75.7	46.5	N/A

$PM_{2.5}$ Speciation Monitors

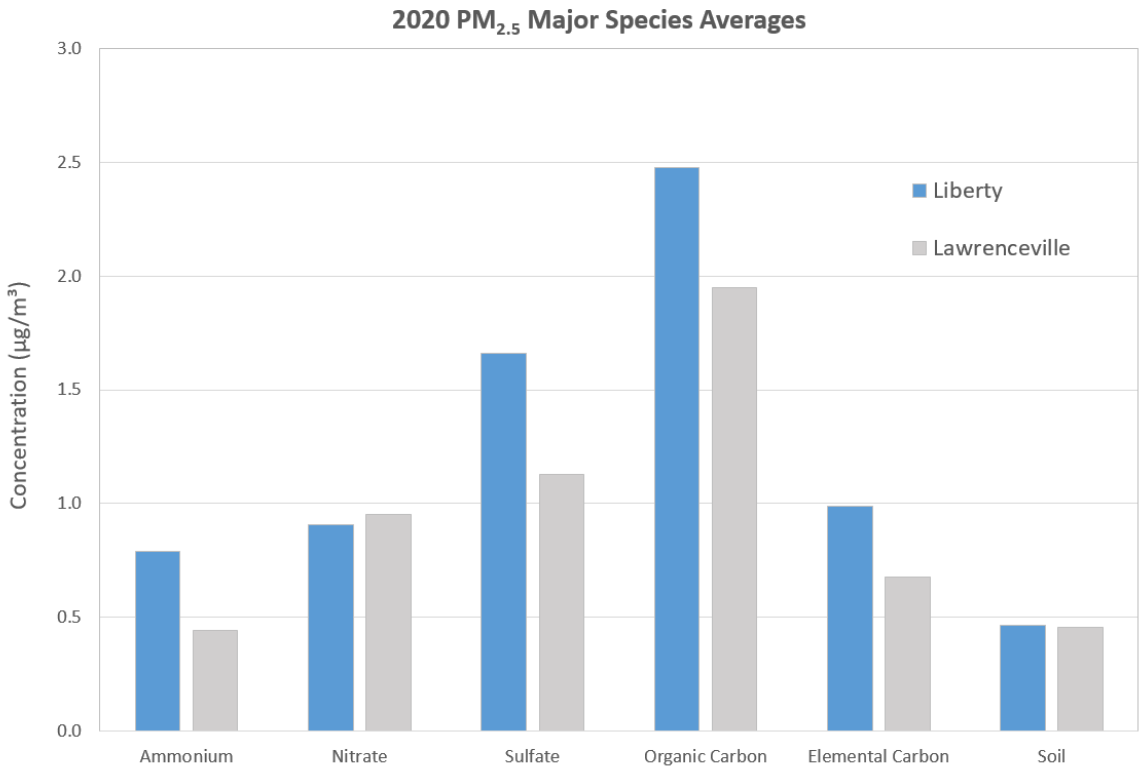
Physically, $PM_{2.5}$ is any particle that is 2.5 microns or less in diameter. Chemically, $PM_{2.5}$ is composed of many different chemical compounds. In addition to the FRM and continuous $PM_{2.5}$ monitors, the County operates two $PM_{2.5}$ speciation monitors that are used to measure specific components, or species, of the total collected sample. In the Pittsburgh metro area, the most dominant $PM_{2.5}$ species are sulfates and organic carbon compounds.

The averages of the major species concentrations are given below. Crustal component is made up of fine soil or minute dust particles. Additional material collected by the monitors but not shown below include particle-bound water, trace amounts of metals and non-metals, and unspeciated material.

Annual averages for major species at Lawrenceville and Liberty for 2020 are given below in µg/m³.

Site	Ammonium	Nitrate	Sulfate	Organic Carbon	Elemental Carbon	Soil
Liberty	0.788	0.907	1.659	2.479	0.988	0.463
Lawrenceville	0.441	0.950	1.127	1.951	0.676	0.455

2020 major species averages are also shown in the column chart below.



C. Particulate Matter - 10 microns or less (PM_{10})

PM_{10} is sampled using both intermittent filter-based and continuous monitors throughout the county. Both types of PM_{10} monitors can be used for comparison to the federal standard of 150 µg/m³ (24-hour). The 24-hour standard can be exceeded an average of once per year over a 3-year period. The PM_{10} annual standard of 50 µg/m³ was revoked by EPA in December 2006; annual averages have been given below for comparative purposes. The North Braddock filter-based monitor and the Monroeville continuous monitor were discontinued yearend 2015. The Avalon filter-based monitor was discontinued after the first quarter of 2017. The Manchester, South Fayette, and Liberty filter-based monitors and the Lincoln continuous monitor were discontinued in 2020.

2020 maximums and averages are shown in the table below, with 2019 values shown in gray. There were no exceedances in 2020.

PM_{10} Filter-Based Monitors

	24-Hour Std. = 150 µg/m³		Former Annual Std. = 50 µg/m³	
Site	2019 24-Hour Maximum	**2020 24-Hour Maximum**	2019 Average	**2020 Average**
Liberty	72	39	17.2	13.8
Manchester	42	38	13.2	12.3
Clairton	26	31	11.3	10.9
South Fayette	31	20	9.7	9.3

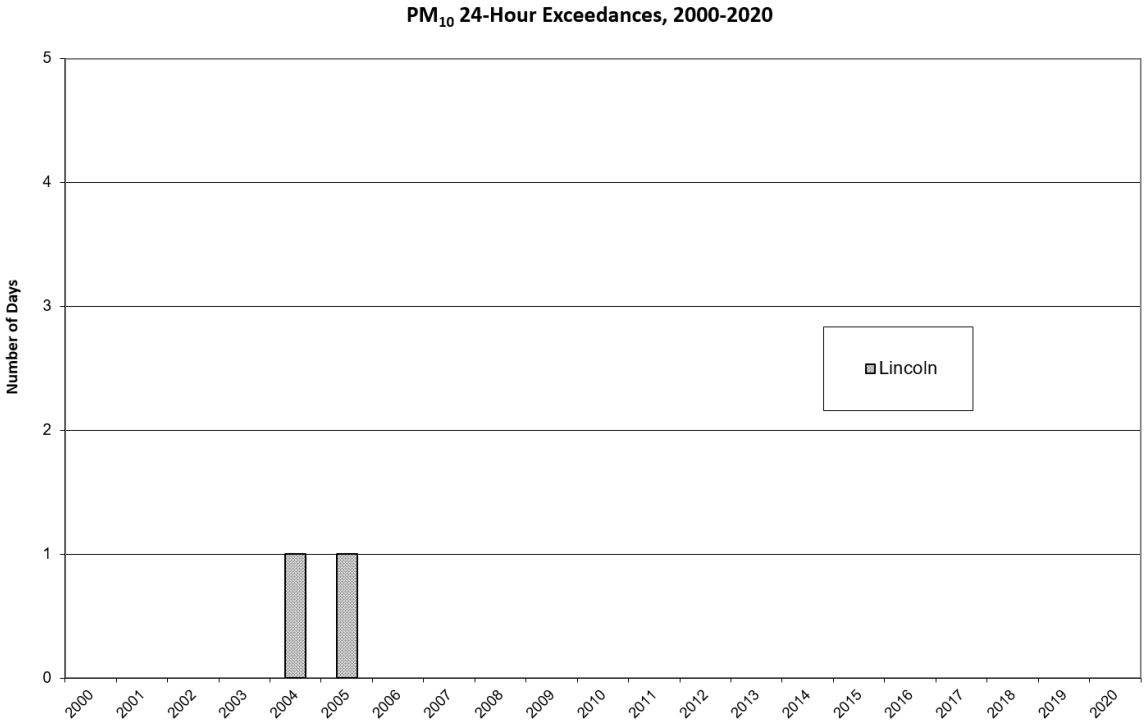
Note: Liberty was discontinued in November 2020; Manchester was discontinued in October 2020; and South Fayette was discontinued in July 2020

PM_{10} Continuous Monitors

	24-Hour Std. = 150 µg/m³		Former Annual Std. = 50 µg/m³	
Site	2019 24-Hour Maximum	**2020 24-Hour Maximum**	2019 Average	**2020 Average**
North Braddock	64	81	23.8	24.7
Lincoln	75	73	21.0	17.3
Flag Plaza	47	64	14.7	13.2
Liberty	74	49	16.7	14.6
Glassport	105	46	16.2	13.0

Note: Lincoln was discontinued yearend 2020

The following chart shows PM_{10} 24-hour exceedances for the period 2000-2020. For sites with both filter-based and continuous monitors, data for only the filter-based monitors are shown.



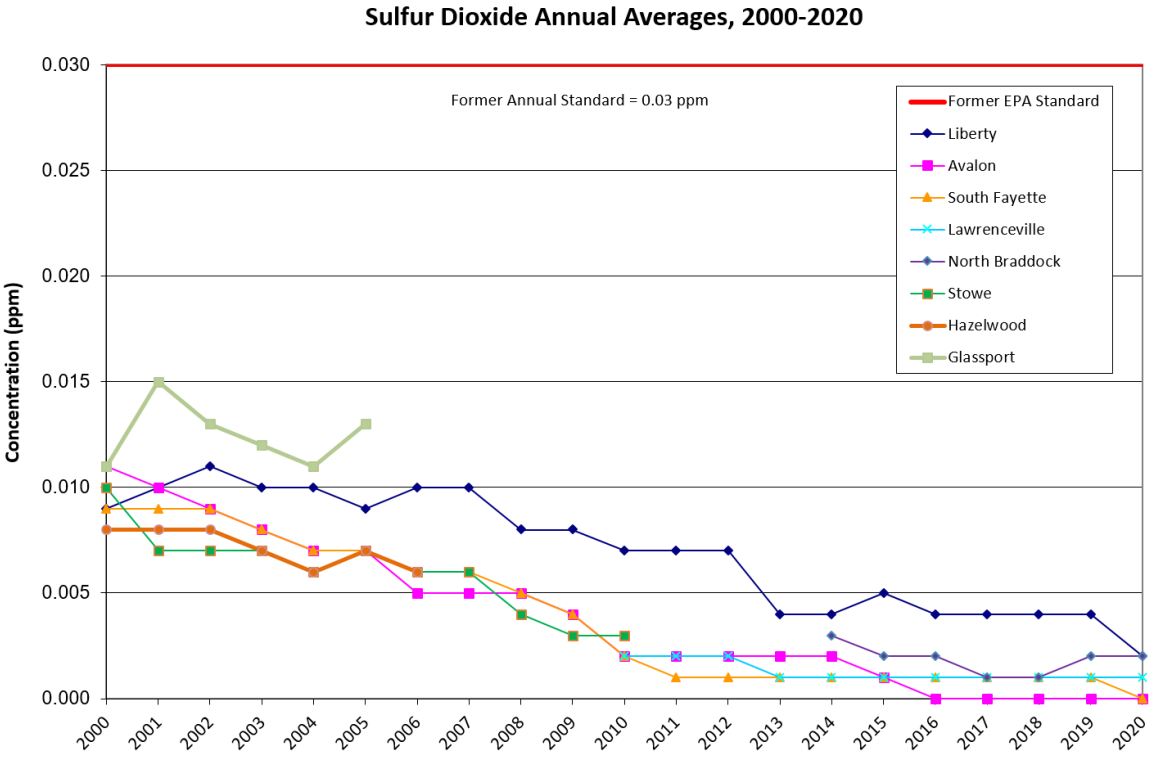
D. Sulfur Dioxide (SO_2)

Sulfur dioxide is monitored at five sites in the County, mostly in industrial areas. The South Fayette monitor is used as a background monitor, providing a measurement of SO_2 entering Allegheny County from the southwest. The former primary federal standards were 0.14 ppm (24-hour average) and 0.03 ppm (annually); the new 1-hour primary federal standard of 75 ppb was promulgated in 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor must not exceed 75 ppb. Maximums and averages for 2020 are shown in the table below, with 2019 values shown in gray. Exceedances in 2020 are shown in red. The Avalon SO_2 gas analyzer was discontinued in November 2020.

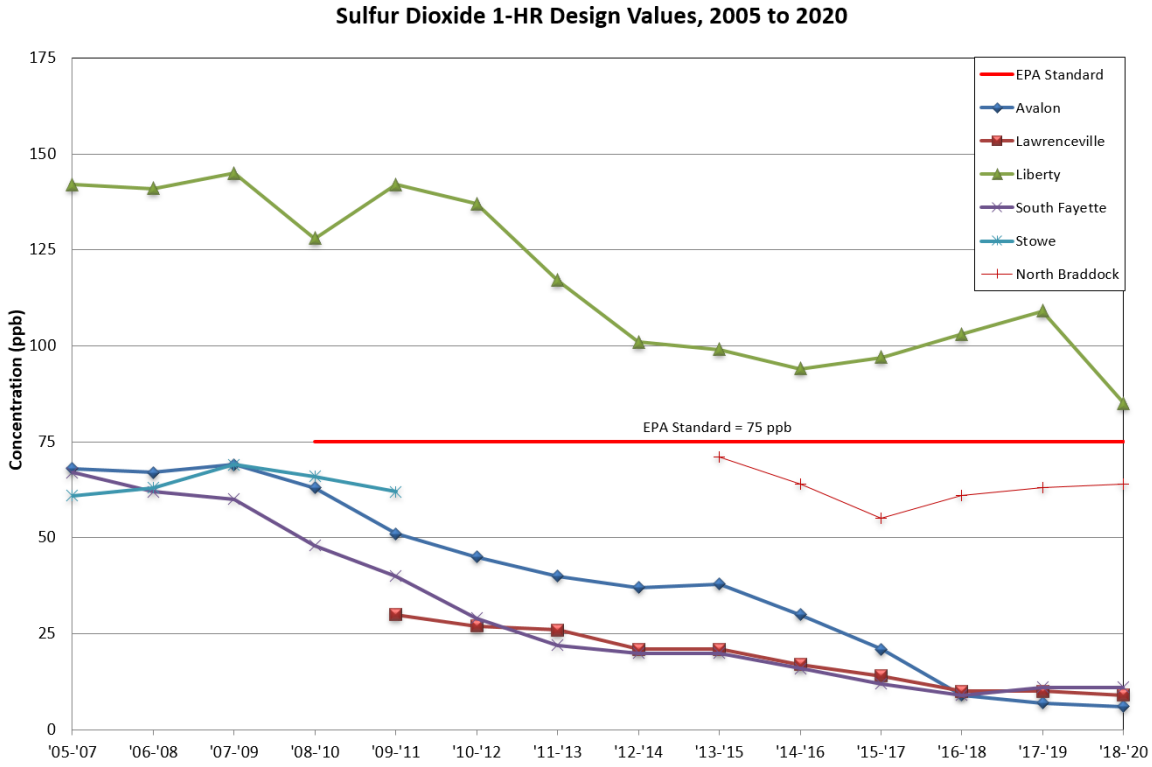
	Former 24-Hour Std. = 0.14 ppm		Former Annual Std. = 0.03 ppm	
Site	2019 24-Hour Maximum	**2020 24-Hour Maximum**	2019 Average	**2020 Average**
North Braddock	0.018	0.019	0.002	0.002
Liberty	0.030	0.018	0.004	0.002
Lawrenceville	0.003	0.003	0.001	0.001
South Fayette	0.003	0.003	0.001	0.000
Avalon	0.003	0.002	0.000	0.000

	1-Hour Std. = 75 ppb				
Site	2019 1-Hour Maximum	**2020 1-Hour Maximum**	2017-2019 99th percentile	**2018-2020 99th percentile**	**2020 Exceedances**
North Braddock	83	105	63	64	2
Liberty	85	57	109	85	0
South Fayette	18	16	11	11	0
Lawrenceville	21	7	10	9	0
Avalon	12	5	7	6	0

The former 24-hour standard can be exceeded once per year. Glassport was the last site to exceed the 24-hour standard in 1999. SO_2 annual average trends are shown on the following page for 2000-2020.



SO_2 one-hour design value trends are shown below for 2005-2020.

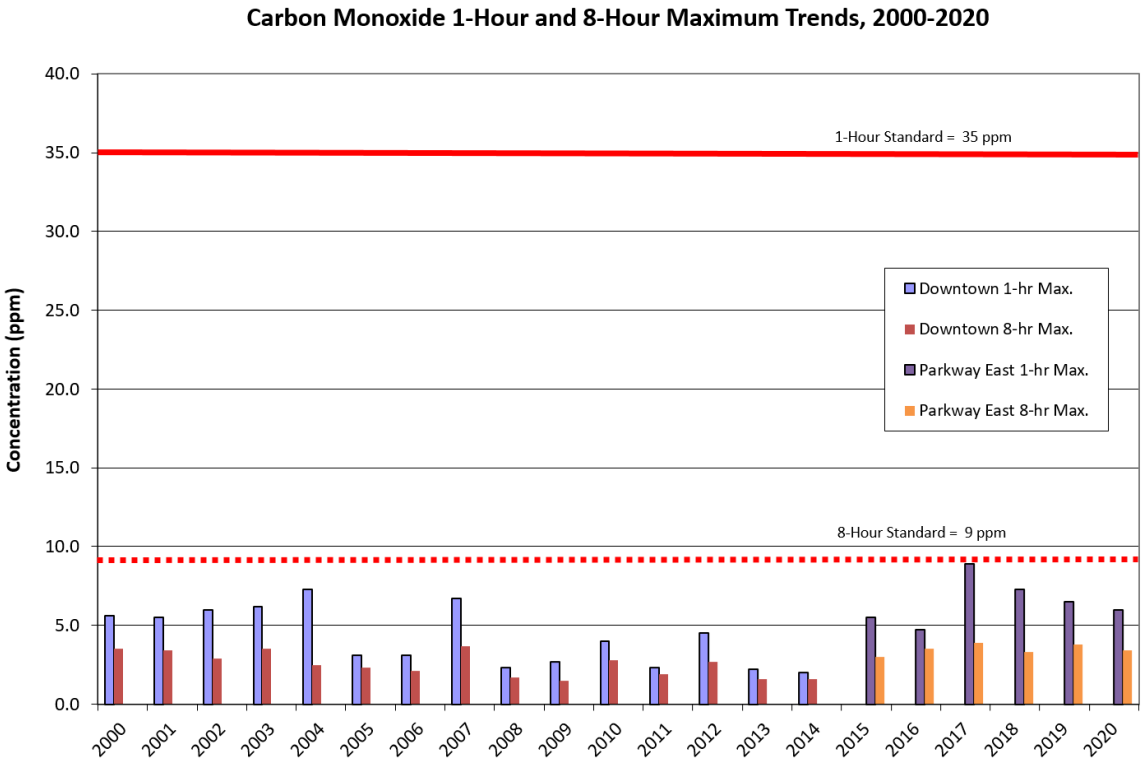


E. Carbon Monoxide (CO)

The county operates three carbon monoxide (CO) monitors; one in the Downtown Pittsburgh area. The Lawrenceville trace gas analyzer for CO started operation in 2010. The Parkway East, Near Road, trace gas analyzer for CO started operation on 9/1/2014 and the Downtown CO monitor was discontinued on 8/27/2014. The federal standards for CO are 35 ppm on an hourly basis and 9 ppm on an 8-hour average basis. Maximums for 2020 are shown in the table below, with 2019 values shown in gray. The Flag Plaza CO gas analyzer was discontinued in 2020.

	1-Hour Std. = 35 ppm		8-Hour Std. = 9 ppm	
Site	2019 1-Hour Maximum	**2020 1-Hour Maximum**	2019 8-Hour Maximum	**2020 8-Hour Maximum**
Parkway East	6.5	6.0	3.8	3.4
Lawrenceville	2.2	1.9	1.4	1.4
Flag Plaza	2.2	1.8	1.7	1.3

Carbon monoxide maximum trends are shown below for 2000-2020. The County has not exceeded the 8-hour standard since 1987.

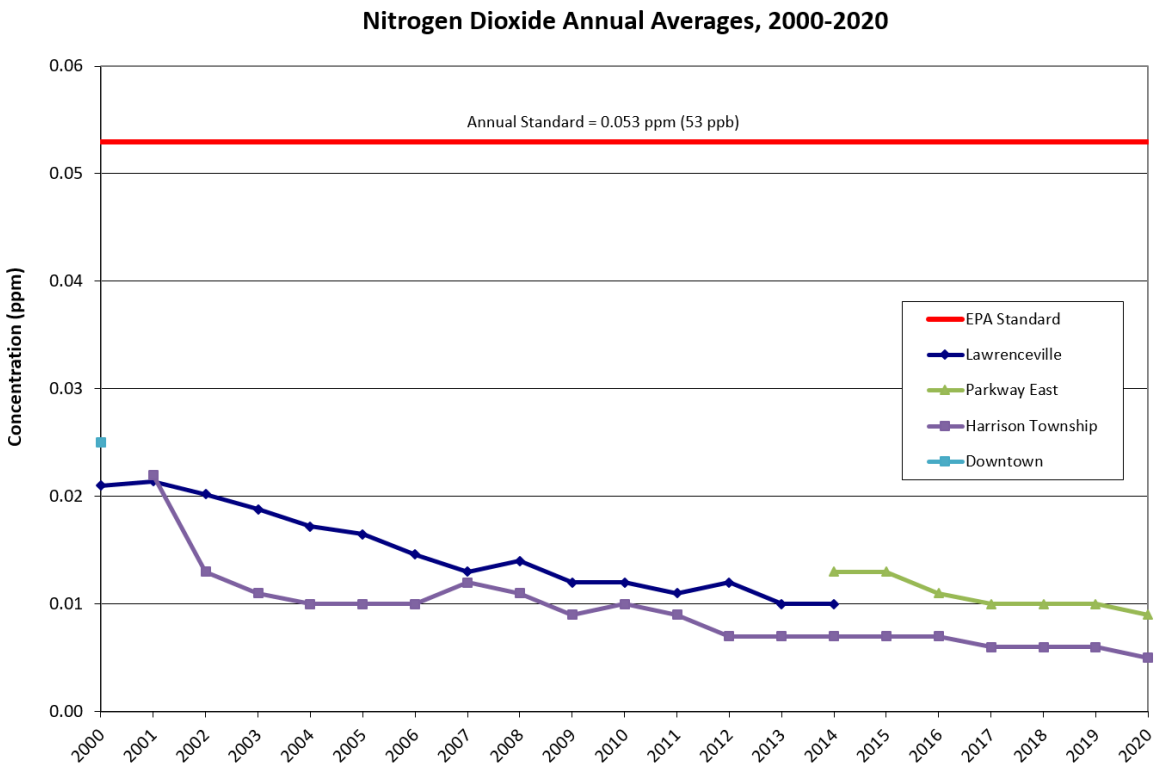


F. Nitrogen Dioxide (NO_2)

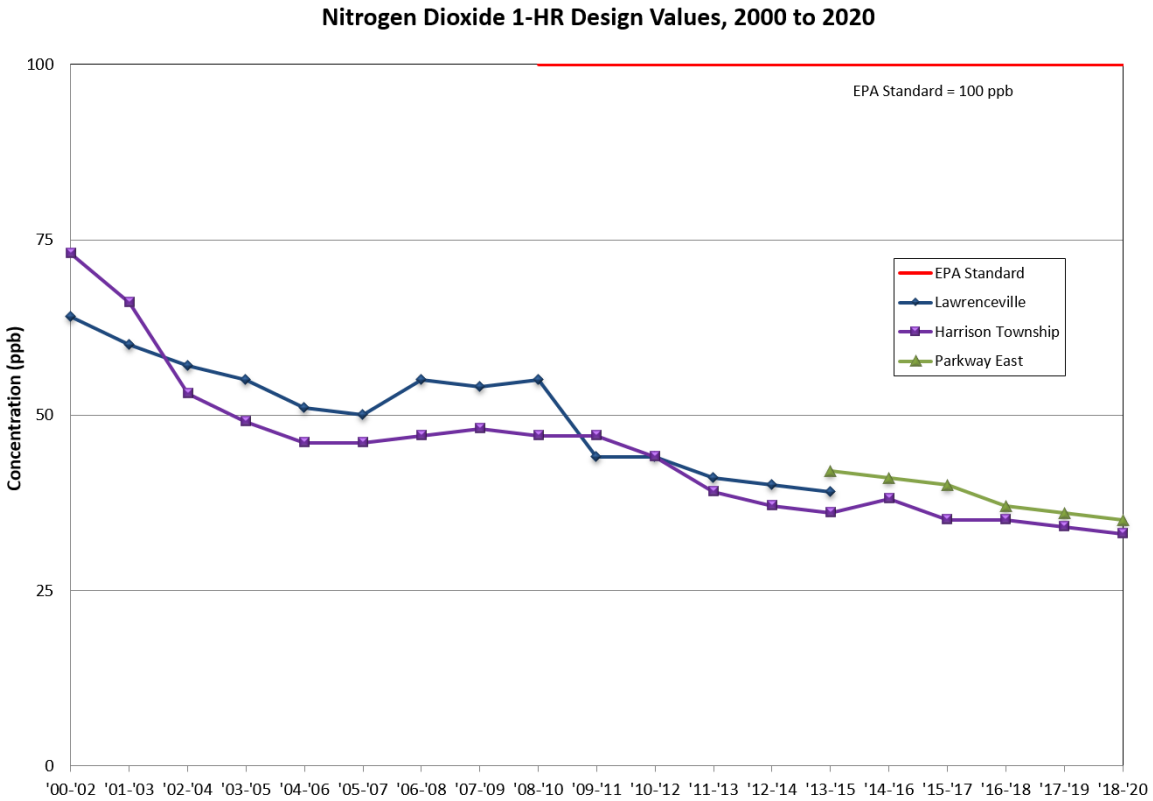
Nitrogen oxides are monitored at two sites in the County. Nitrogen dioxide (NO_2) is calculated each hour by subtracting nitrogen oxide (NO) from the total nitrogen oxides (NO_x) concentration. Since 2010, the standard for NO_2 is 0.053 ppm (53 ppb) on an annual average basis. A new 1-hour federal standard 100 ppb was promulgated in 2010. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor must not exceed 100 ppb. 2020 averages are shown in the table below, with 2019 values shown in gray. The Parkway East, Near Road, trace gas analyzer for NO_2 started operation on 9/1/2014 and the Lawrenceville NO_2 monitor was discontinued on 8/25/2014.

	Annual Std. = 53 ppb		1-Hour Std. = 100 ppb			
Site	2019 Average	**2020 Average**	2019 1-Hour Maximum	**2020 1-Hour Maximum**	2017-2019 98th percentile	**2018-2020 98th percentile**
Parkway East	10	9	40	51	36	35
Harrison	6	5	45	44	34	33

Long-term trends for NO_2 annual averages are shown on the following page for 2000-2020.



NO_2 one-hour design value trends are shown below for 2000-2020.

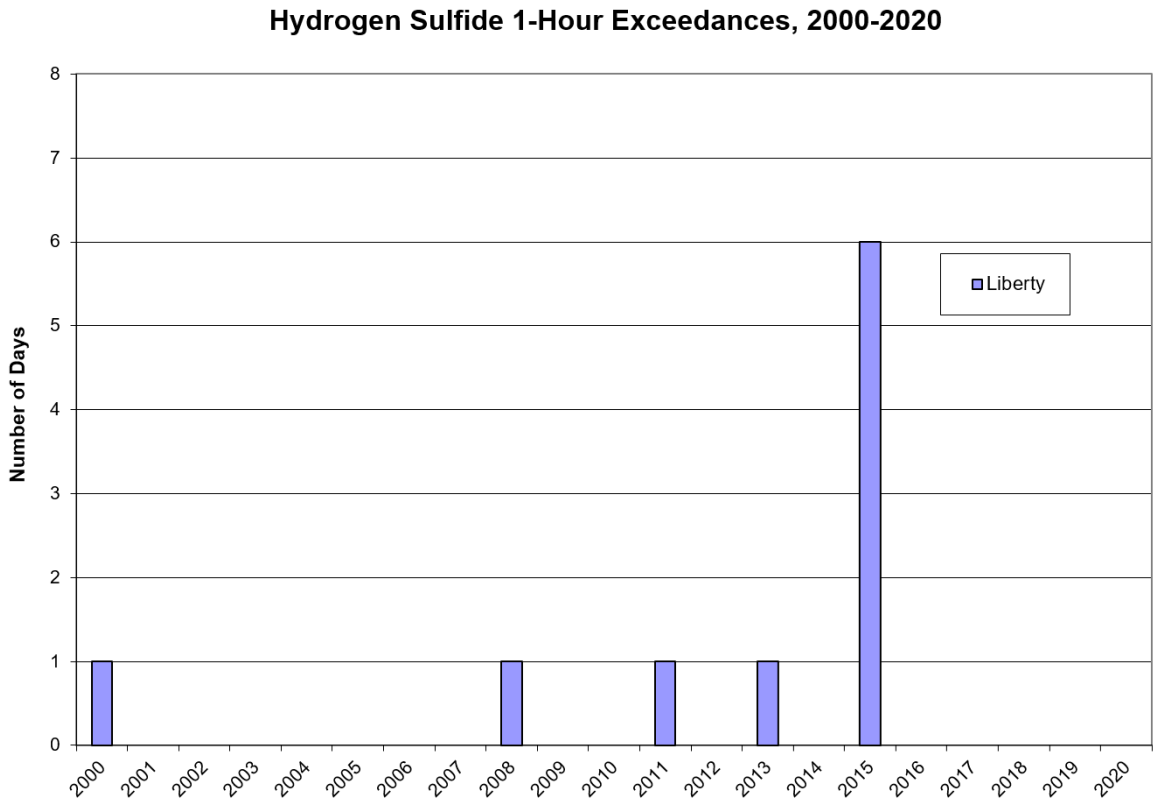


G. Hydrogen Sulfide (H_2S)

Although there are no federal standards for hydrogen sulfide, PA state standards for protection against odor nuisances are 0.1 ppm on a 1-hour basis and 0.005 ppm on a 24-hour average basis.

Hydrogen sulfide 1-hour concentrations for 2020 are given in the table below, with 2019 values shown in gray. Long-term exceedances for 2000-2020 are also given in the chart below. Liberty last exceeded the 1-hour PA standard six times in 2015. The West Allegheny monitor started operation in May 2009 and was discontinued on 8/29/2014. The Avalon monitor was discontinued on 9/15/20 and was installed in North Braddock on 12/9/20.

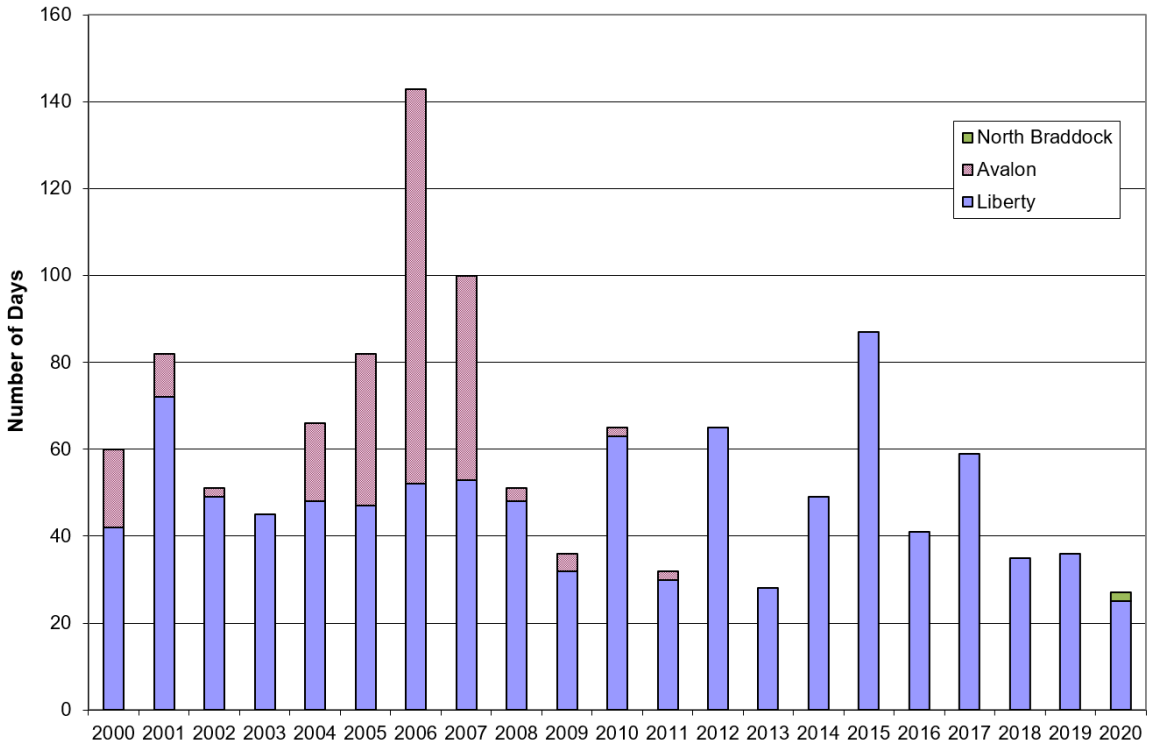
	1-Hour PA Standard = 0.1 ppm			
Site	2019 1-Hour Maximum	**2020 1-Hour Maximum**	2019 Exceedances	**2020 Exceedances**
Liberty	0.074	0.056	0	0
North Braddock	--	0.060	--	0
Avalon	0.006	0.002	0	0



Hydrogen sulfide 24-hour concentrations and exceedances for 2020 are given in the following table, with 2019 values shown in gray. Long-term exceedances for 2000-2020 are also given in the chart below. Exceedances for 2020 are shown in red. Each exceedance constitutes a violation of the state 24-hour H_2S standard.

	24-Hour PA Standard = 0.005 ppm			
Site	2019 24-Hour Maximum	**2020 24-Hour Maximum**	2019 Exceedances	**2020 Exceedances**
Liberty	0.023	0.014	36	25
North Braddock	--	0.008	--	2
Avalon	0.002	0.001	0	0

Hydrogen Sulfide 24-Hour Exceedances, 2000-2020



H. Dustfall

Dustfall (or total settled particulates) is a nuisance rather than a health hazard, in that the particles are too large to be inhaled into the respiratory system.

PA state standards for protection against dust nuisances are 0.8 mg/cm^2/month (formerly 23 tons/mile^2/month) on an annual average basis and 1.5 mg/cm^2/month (formerly 43 tons/mile^2/month) on a monthly basis.

Annual averages, monthly maximums, and exceedances for 2020 are shown in the table below, with 2019 values shown in gray. Exceedances for 2020 are shown in red. Each exceedance constitutes a violation of the state dustfall standards.

Collier, Natrona 8, and Natrona 9 dustfall collectors were in operation for 2009 and future years. North Braddock, Neville, Neville 2 and Forward dustfall collectors were discontinued year end 2008. West Deer and Russellton began operation in April 2018 and were discontinued in November 2020.

	Annual PA Standard = 0.8 mg/cm^2/month		**Monthly PA Standard = 1.5 mg/cm^2/month**		**Monthly Exceedances**	
Site	**2019 Average**	**2020 Average**	**2019 Monthly Maximum**	**2020 Monthly Maximum**	**2019 Exceedances**	**2020 Exceedances**
Natrona 9	0.96	0.76	1.50	1.26	0	0
Natrona 8	0.56	0.50	1.15	0.91	0	0
Collier	0.42	0.47	1.22	1.69	0	1
West Deer	0.63	0.45	1.42	0.71	0	0
Russellton	0.41	0.28	0.69	0.57	0	0

I. Benzo(a)pyrene (B(a)P)

Benzo(a)pyrene, or B(a)P, is a known carcinogen. There are no federal or state ambient standards for B(a)P.

B(a)P sampling and analysis ended yearend 2019 due to catastrophic instrument failure at the county lab. 24-hour maximums and annual averages for B(a)P in 2019 are shown below in gray. Liberty typically shows the highest concentrations of B(a)P in Allegheny County. B(a)P measurements at Avalon discontinued yearend 2016.

No Ambient Standard ***Concentrations given in ng/m³****				
Site	2019 24-Hour Maximum	**2020 24-Hour Maximum**	2019 Average	**2020 Average**
Liberty	37	--	2	--
South Fayette	0	--	0	--

Note: Nanograms/cubic meter (ng/m³) represents a smaller quantity than micrograms/cubic meter (µg/m³). There are 1000 nanograms in a microgram. Concentrations for B(a)P may therefore appear much greater than those for other compounds.

J. Hazardous Air Pollutants (HAPs)

Hazardous Air Pollutants (HAPs), or air toxics, are a group of 187 EPA-classified pollutants that can cause cancer or other serious health effects or adverse environmental and ecological effects. HAPs are sampled by various methods at several locations in the county. HAPs are not criteria pollutants, and there are no federal ambient standards for these compounds.

HAPs monitoring methods and locations are summarized below:

Canister Toxics

SUMMA canisters were in operation at Flag Plaza, Avalon, Stowe, and South Fayette. Canister concentrations represent 24-hour samples, collected every six days, which are analyzed at an out-of-County lab (Maryland). Canister toxics monitoring at Flag Plaza has been in operation for several years, while monitoring at Avalon, Stowe, and South Fayette was part of an ACHD in-house air toxics study started in 2006 and discontinued year end 2007.

Cartridge Toxics

Cartridge (carbonyl) monitoring is conducted at all the canister sites at every-six-day intervals, and samples are analyzed at an out-of-county lab (Philadelphia). Cartridge toxics monitoring at Flag Plaza has been in operation for several years, while monitoring at Avalon, Stowe, and South Fayette was part of an ACHD in-house air toxics study started in 2006 and discontinued year end 2007.

Benzene

The HAP compound benzene was measured continuously at Liberty through 2013. ACHD started monitoring benzene at Liberty in January and Avalon in April of 2014 using charcoal tubes on a 24-hour basis. However, the benzene monitor was inoperative in most of 2006 and 2007.

Results from the various techniques and sites are given below and on the following pages. Several additional compounds that are analyzed simultaneously with the canister and cartridge samples, but are not classified as HAPs, are also provided.

Flag Plaza - Canister and Cartridge

Annual averages and 24-hour maximums for Flag Plaza canister and cartridge HAPs in 2020 are shown below, with 2019 values shown in gray. Several years of toxics data are available for Flag Plaza, and multi-year trends for selected compounds may be included in future reports. Flag Plaza canister and cartridge HAP analysis was discontinued on August 13, 2020.

Notes: Concentrations are given below in units of parts-per-billion (ppb) by volume; one ppb is equal to 1/1000th parts-per-million (ppm) by volume.

Flag Plaza				
HAP	**2019 Average (ppb)**	**2019 24-Hour Maximum (ppb)**	**2020 Average (ppb)**	**2020 24-Hour Maximum (ppb)**
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) †	0.10	0.20	0.09	0.12
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon 114) †	0.02	0.04	0.02	0.04
1,3-Butadiene	0.01	0.12	0.00	0.03
Hexane	0.05	0.34	0.03	0.20
Heptane†	0.04	0.33	0.03	0.12
Cyclohexane†	0.01	0.09	0.03	0.32
Methyl tert-butyl ether (MTBE, 2-methoxy-2-methyl-Propane)	0.00	0.00	0.00	0.00
Formaldehyde*	1.76	6.38	1.88	4.48
Acetaldehyde*	0.61	1.51	0.58	1.29
Propionaldehyde*	0.13	0.26	0.13	0.30
Acrolein	0.23	1.15	0.12	1.71
Acetone*†	1.30	3.39	1.37	3.51
Methyl ethyl ketone (MEK, 2-Butanone)*	0.17	0.47	0.18	0.31
Methyl isobutyl ketone (MIK, 4-Methyl-2-pentanone)*	0.10	0.38	0.10	0.33
Chloromethane	0.64	0.87	0.66	1.16
Methylene chloride (Dichloromethane)	0.10	0.39	0.09	0.17
Chloroform	0.05	0.37	0.03	0.26
Carbon tetrachloride	0.09	0.12	0.09	0.11
Trichlorofluoromethane (Freon 11) †	0.27	0.36	0.25	0.38
1,1,1-Trichloroethane (Methyl chloroform)	0.02	0.31	0.01	0.02
1,2-Dichloroethane (Ethylene dichloride)	0.01	0.04	0.01	0.05
Tetrachloroethylene	0.01	0.07	0.02	0.10
1,1,2,2-Tetrachloroethane	0.00	0.02	0.00	0.04
Dichlorodifluoromethane (Freon 12) †	0.56	0.78	0.54	0.99
Trichloroethene (-ethylene, TCE)	0.00	0.01	0.00	0.04
1,2-Dichloropropane	0.00	0.00	0.00	0.01
trans-1,3-Dichloro-1-propene (-propylene)	0.00	0.00	0.00	0.04
cis-1,3-Dichloro-1-propene (-propylene)	0.00	0.00	0.00	0.01
1,2-Dibromoethane (Ethylene dibromide)	0.00	0.01	0.01	0.20

Flag Plaza				
HAP	2019 Average (ppb)	2019 24-Hour Maximum (ppb)	2020 Average (ppb)	2020 24-Hour Maximum (ppb)
Chloroethene (Vinyl chloride)	0.00	0.01	0.00	0.00
m & p- Xylene	0.12	0.49	0.11	0.29
Benzene	0.30	1.39	0.27	1.07
Toluene	0.31	1.30	0.22	0.70
Ethylbenzene	0.04	0.15	0.04	0.09
o-Xylene	0.04	0.19	0.04	0.11
1,3,5-Trimethylbenzene†	0.01	0.06	0.01	0.07
1,2,4-Trimethylbenzene†	0.04	0.25	0.05	0.27
1-Ethyl-4-methylbenzene (4-Ethyltoluene) †	0.02	0.27	0.03	0.21
Styrene	0.20	5.99	0.05	0.36
Benzaldehyde*†	0.13	0.31	0.18	0.68
Chlorobenzene	0.00	0.02	0.01	0.22
1,4-Dichlorobenzene	0.01	0.07	0.08	1.71
Tetrahydrofuran†	0.00	0.04	0.01	0.36

*Value measured by cartridge (carbonyl) method. All other values are as measured by SUMMA canister.
†Compound is not an official EPA-classified HAP.

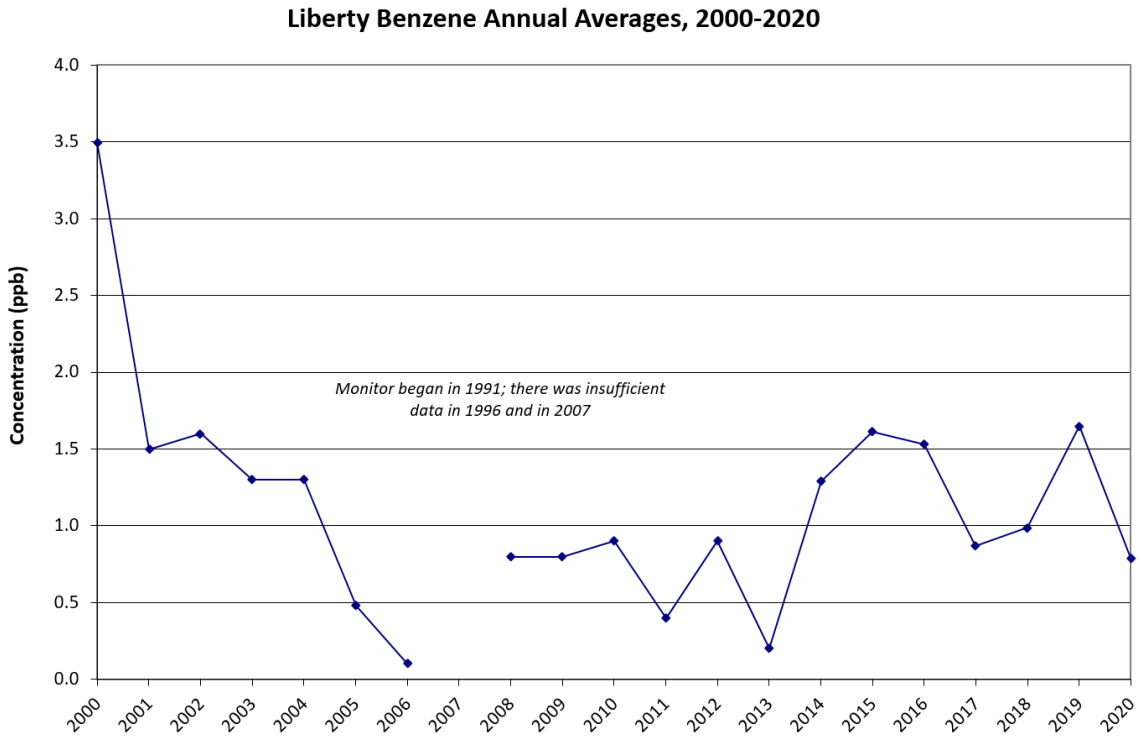
Benzene

Additionally, benzene was measured continuously at Liberty through 2013. ACHD started monitoring benzene at Liberty in January and Avalon in April of 2014 using charcoal tubes on a 24-hour basis. Monitoring of benzene at Avalon was discontinued in 2018. The annual average and 24-hour maximum for benzene in 2020 are shown below, with 2019 values shown in gray.

Site	2019 Average (ppb)	2019 24-Hour Maximum (ppb)	2020 Average (ppb)	2020 24-Hour Maximum (ppb)
Liberty	1.65	9.51	0.89	8.66

Note: Also, data below the Method Detection Limit (MDL) is reported as the (MDL/2); formerly zero for years 2014-2019.

A chart showing Liberty benzene annual averages for 2000-2020 is shown below. The continuous monitor began operation in 1991 and was not operational in 1996, most of 2006, 2007, and portions of 2011, 2012 and 2013.



4. Short-Term Exceedances

Exceedances of the federal short-term primary standards are listed below for the years 2008 through 2020 for each standard. Exceedances are given by year, site, number of exceedances, and maximum concentration.

Standard	Year	Site	Number of Exceedances	Maximum Concentration
24-Hour $PM_{2.5}$	2008	Liberty	31	70.8 µg/m³
35 µg/m³	2008	N. Braddock	4	38.4 µg/m³
	2008	Harrison	2	41.3 µg/m³
	2008	Clairton	1	40.6 µg/m³
	2008	Lawrenceville	1	39.7 µg/m³
	2009	Liberty	12	92.1 µg/m³
	2009	Harrison	1	43.5 µg/m³
	2010	Liberty	25	69.9 µg/m³
	2010	N. Braddock	3	40.6 µg/m³
	2010	Lawrenceville	2	41.5 µg/m³
	2010	Harrison	2	39.7 µg/m³
	2010	Clairton	1	37.0 µg/m³
	2011	Liberty	10	59.0 µg/m³
	2011	Avalon	1	35.6 µg/m³
	2011	N. Braddock	1	35.5 µg/m³
	2012	Liberty	9	54.7 µg/m³
	2013	Liberty	6	43.6 µg/m³
	2014	Liberty	4	63.8 µg/m³
	2015	Liberty	7	58.1 µg/m³
	2016	Liberty	13	56.0 µg/m³
	2017	Liberty	10	77.7 µg/m³
	2017	Parkway East	1	44.9 µg/m³
	2017	N. Braddock	1	41.6 µg/m³
	2018	Liberty	2	43.8 µg/m³
	2019	Liberty	9	66.4 µg/m³
	2020	Liberty	3	41.0 µg/m³
	2020	Avalon	1	41.0 µg/m³

Standard	Year	Site	Number of Exceedances	Maximum Concentration
8-Hour Ozone	2008	Harrison	10	0.091 ppm
0.075 ppm	2008	Lawrenceville	7	0.084 ppm
	2008	South Fayette	3	0.079 ppm
	2009	Harrison	6	0.084 ppm
	2009	Lawrenceville	1	0.077 ppm
	2010	Harrison	6	0.105 ppm
	2010	Lawrenceville	7	0.087 ppm
	2010	South Fayette	5	0.089 ppm
	2011	Harrison	10	0.085 ppm
	2011	Lawrenceville	3	0.095 ppm
	2011	South Fayette	6	0.086 ppm
	2012	Harrison	16	0.094 ppm
	2012	Lawrenceville	7	0.089 ppm
	2012	South Fayette	6	0.085 ppm
	2013	Harrison	4	0.085 ppm
	2013	Lawrenceville	1	0.095 ppm
	2013	South Fayette	2	0.089 ppm
	2014	Harrison	2	0.076 ppm
	2015	Harrison	2	0.084 ppm
0.070 ppm	2016	Harrison	1	0.076 ppm
	2016	Lawrenceville	3	0.077 ppm
	2016	South Fayette	4	0.081 ppm
	2017	Harrison	1	0.071 ppm
	2017	South Fayette	8	0.082 ppm
	2018	Harrison	5	0.087 ppm
	2018	Lawrenceville	6	0.079 ppm
	2018	South Fayette	3	0.078 ppm
	2020	Harrison	4	0.077 ppm
	2020	Lawrenceville	2	0.071 ppm
	2020	South Fayette	2	0.071 ppm

Standard	Year	Site	Number of Exceedances	Maximum Concentration
1-Hour SO_2	2010	Liberty	34	215 ppb
75 ppb	2010	South Fayette	1	108 ppb
	2010	Avalon	2	97 ppb
	2010	Stowe Township	3	93 ppb
	2011	Liberty	45	450 ppb
	2012	Liberty	43	199 ppb
	2013	Liberty	9	99 ppb
	2013	Lawrenceville	2	100 ppb
	2014	Liberty	14	122 ppb
	2014	North Braddock	5	126 ppb
	2015	Liberty	17	244 ppb
	2015	North Braddock	1	80 ppb
	2016	Liberty	4	171 ppb
	2017	Liberty	18	163 ppb
	2017	North Braddock	3	127 ppb
	2018	Liberty	11	155 ppb
	2018	North Braddock	3	113 ppb
	2019	Liberty	5	85 ppb
	2019	North Braddock	2	83 ppb
	2020	North Braddock	2	105 ppb

5. Air Quality Index

The Air Quality Index (AQI) is a method of quantifying air quality on any given day according to the highest measurements. EPA's AQI scale is shown below:

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	*...air quality conditions are:*	*...as symbolized by this color:*
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

The Pennsylvania Department of Environmental Protection (PA DEP) forecasts daily AQI levels for $PM_{2.5}$ (year-round) and for ozone (March through Oct.) for Southwestern Pennsylvania.

Allegheny County AQI levels based upon actual monitored results for 2008-2020 are shown in the table below, by number of days.

Year	*Good Days*	*Moderate Days*	*Unhealthy for Sensitive Groups Days*	*Unhealthy Days*
2008	187	157	20	2
2009	214	136	14	1
2010	146	163	48	8
2011	176	156	30	3
2012	136	183	46	1
2013	175	175	15	0
2014	169	179	16	1
2015	166	181	16	2
2016	177	168	20	1
2017	161	173	30	1

Year	*Good Days*	*Moderate Days*	*Unhealthy for Sensitive Groups Days*	*Unhealthy Days*
2018	159	183	22	1
2019	138	212	11	4
2020	213	141	12	0

The Unhealthy for Sensitive Groups range represents an exceedance level for criteria pollutants. In Allegheny County, unhealthy days can occur during different air quality scenarios. Elevated $PM_{2.5}$ days can be either widespread or localized and can also coexist with elevated ozone concentrations in summer months. Days in the unhealthy ranges are shown below for 2020, broken down by air quality scenario.

2020 Unhealthy Scenarios	*Unhealthy for Sensitive Groups Days*	*Unhealthy Days*
Elevated $PM_{2.5}$ - Liberty Only	4	0
Elevated $PM_{2.5}$ - Widespread	1	0
Elevated Sulfur Dioxide Only	2	0
Elevated Ozone Only	5	0
Elevated $PM_{2.5}$ with Elevated Sulfur Dioxide	0	0
Elevated $PM_{2.5}$ with Elevated Ozone	0	0
Elevated Ozone with Elevated Sulfur Dioxide	0	0
Elevated $PM_{2.5}$, Elevated Ozone and Elevated Sulfur Dioxide	0	0

6. Pollutants, Sources, and Health Effects

EPA promulgated the National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. In addition, the State of Pennsylvania has adopted standards for hydrogen sulfide (H_2S) and dustfall (total settled particulate matter). The Clean Air Act also defines Hazardous Air Pollutants (HAPs) but does not address specific ambient limits for these compounds. The primary sources and known health effects of the EPA and the State of Pennsylvania pollutants are in the following table.

Pollutant	*Primary Sources*	*Health Effects*
	Criteria Pollutants	
Ozone – O_3 (colorless gas)	Formed in hot, sunny conditions from vehicle, commercial, and industrial emissions	Respiratory problems; eye, nose, and throat irritation
Particulate Matter – PM (solid or liquid particles)	Coke plants, steel mills, power plants, road dust, vehicles	Respiratory problems; small particles may also aggravate heart conditions
Sulfur Dioxide – SO_2 (colorless gas)	Power plants, coke plants	Respiratory problems
Carbon Monoxide – CO (colorless, odorless gas)	Motor vehicles, especially congested areas	Heart or lung disease; headache; fatigue; impaired reflexes and alertness
Nitrogen Dioxide – NO_2 (colorless, odorless gas)	Power and industrial plants, motor vehicles	Respiratory problems; eye irritation
Lead – Pb (in particulates)	Incinerators, glass making, metallurgical facilities	Headache; fatigue; sleep and digestive disorders

Pollutant	*Primary Sources*	*Health Effects*
	Other	
Hydrogen Sulfide – H_2S (colorless, pungent gas)	Coke plants, waste treatment plants	Respiratory problems; eye irritation; malodorous
HAPs (often carcinogens)	Various, including motor vehicles, chemical and power plants, steel mills, dry cleaners, print shops	Can be carcinogenic; can cause birth defects
Benzo(a)pyrene – B(a)P	Coke plants	Carcinogen

7. Air Monitoring Network

Below is a table of monitor sites corresponding to pollutant types, current through 2020. Meteorological monitors (wind and temperature) are also included.

	SO_2	CO	NO_x	O_3	PM_{10}	$PM_{2.5}$	H_2S	HAPs	Dustfall	Met
Flag Plaza		**C**(T)			**C**			**I**(6), **I**(6)		
Manchester					**I**(6)					
Lawrenceville	**C**(T)	**C**(T)		**C**		**C**, **I**(1) **I**(6) **SPC**(3)		**I**(6) **NATTS**(6)		**C**
North Park						**I**(6)				
Avalon	**C**					**C, I**(3)	**C**			
West Deer									**I**	
Harrison			**C**	**C**		**I**(3)				
Natrona									**I**, **I**	
N. Braddock	**C**				**C**	**I**(3)	**C**			**C**
Liberty	**C**				**C**, **I**(3) **I**(6)	**C**, **I**(1) **I**(6) **SPC**(6)	**C**			**C**
Glassport					**C**					
Lincoln					**C**					
Clairton					**I**(6)	**I**(6)				
South Fayette	**C**			**C**	**I**(6)	**I**(3)				
Collier									**I**	
Parkway East		**C**(T)	**C**(T)			**C**		**BC**		**C**
Russellton									**I**	
Total	C = 5	C = 3	C = 2	C =3	C = 5 I = 5	C = 4 I = 10 SPC = 2	C = 3	C = 1 I = 4	I = 5	C = 4

KEY C = Continuous; I = Intermittent or Filter-Based; BC = Black Carbon (Aethalometer, Continuous data)
(1), (3), or (6) = Sampling Frequency [for example, (3) means every third day]
SPC = Speciation; (S) = Seasonal Continuous Monitor; (T) = Trace Level Monitor
NATTS = National Air Toxics Station: PM10 metals, volatile organic compounds, carbonyls, polycyclic aromatic hydrocarbons

Additional Information

For more information concerning Allegheny County air quality data, contact the ACHD Air Quality Program, Planning and Data Analysis Section, at 412-578-8120, or at Shaun.Vozar@AlleghenyCounty.US.

For information concerning Pennsylvania Air Quality, visit: www.dep.state.pa.us/dep/deputate/airwaste/aq/default.htm.

For information about national air quality, visit EPA's website: www.epa.gov.

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