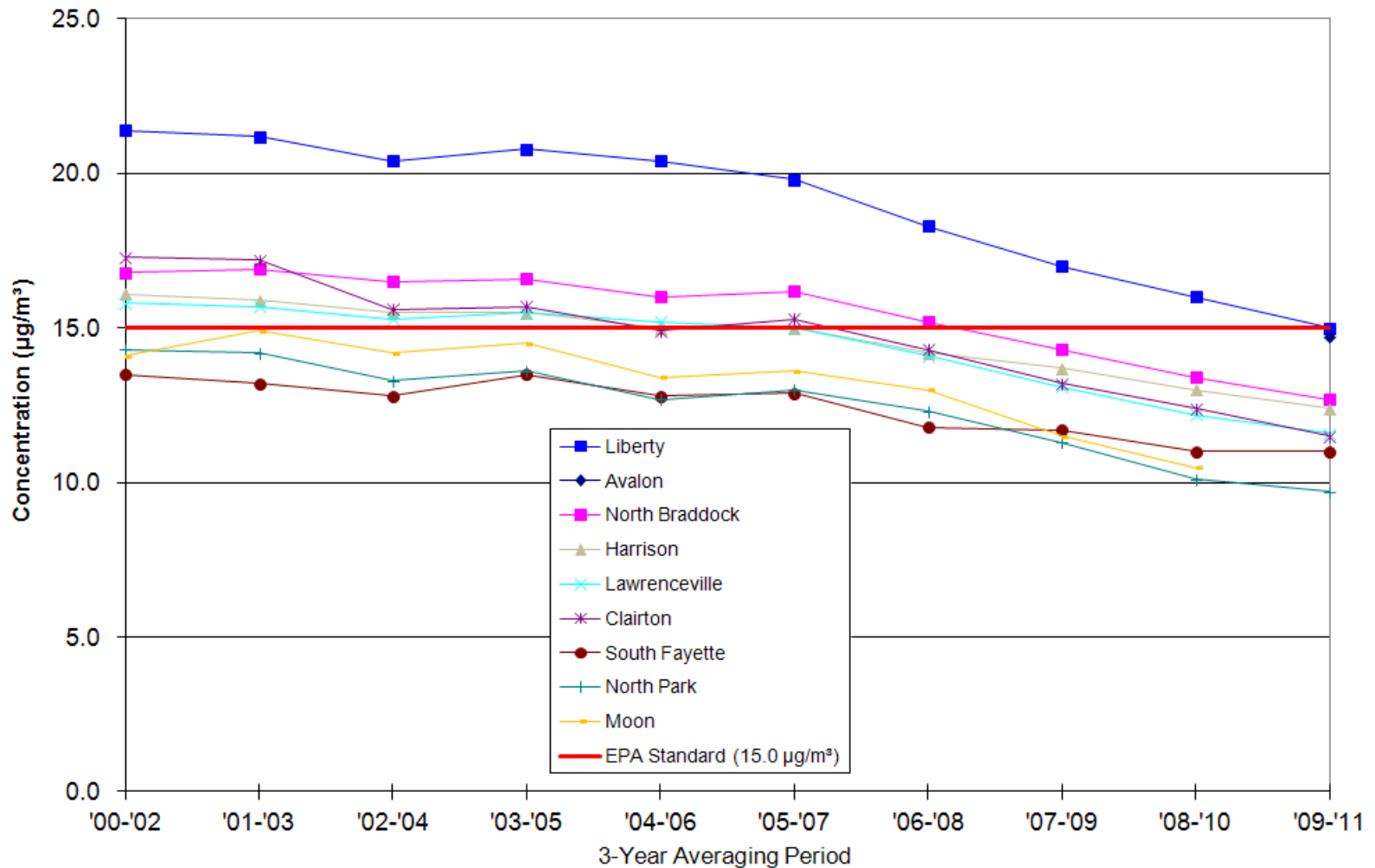


2011

Air Quality

Annual Report

PM2.5 Annual Design Values by 3-Year Period, 2000 to 2011





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

**Air Quality
Annual Report
for
2011**

**with
1991-2011 Trends**



Pictured on the front cover...

A graph of the 3-year average design values for annual PM-2.5. The '09-'11 values at all ACHD sites are below the annual standard of $15.0 \mu\text{g}/\text{m}^3$. This is the first time since the promulgation of the PM-2.5 annual standard that all sites are at or below $15.0 \mu\text{g}/\text{m}^3$.

Below is a map of all monitoring locations. Downtown Pittsburgh comprises the Downtown and Flag Plaza sites.

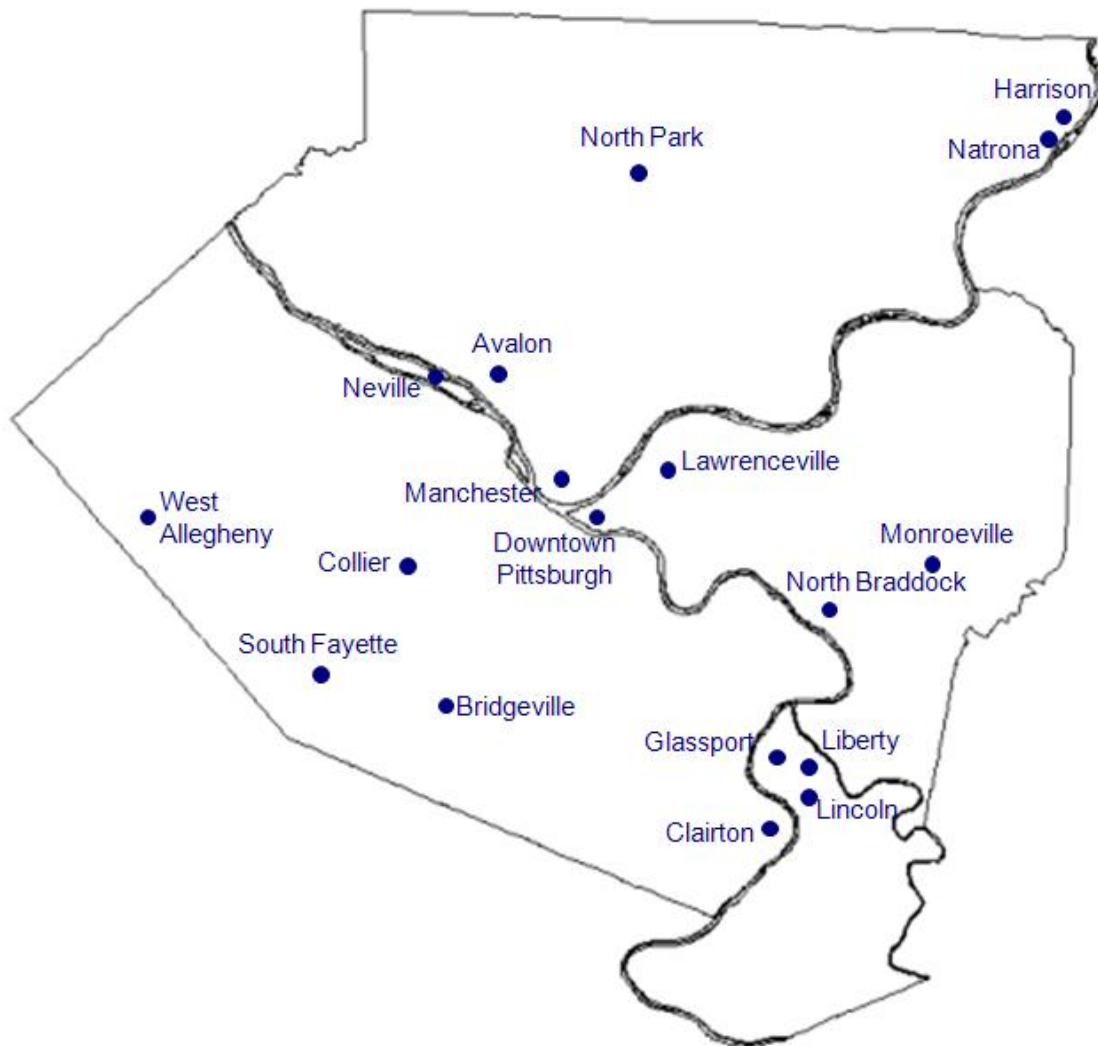


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Preface

This report reflects air quality as sampled and validated by the Allegheny County Health Department (ACHD) through the calendar year of 2011.

For comparison to previous data, this report also provides 2010 data and twenty-year trends. For standards that require consecutive years' averages, multi-year averages are also given. Note that multi-year design values will 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 will be calculated as such.

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

Official validated concentrations are submitted to EPA's Air Quality System (AQS) on a quarterly basis, and selected parameters are available at the AirData web site: www.epa.gov/airdata/. Allegheny County air quality data for 2011 was certified in AQS in mid-2012.

Unofficial data for ozone and PM_{2.5} is reported to EPA's AIRNow on an hourly basis and is available at the AIRNow web site: 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.

1. Executive Summary

The County recorded twelve exceedance days for 8-hour ozone in 2011, with one day above 0.085 parts per million (ppm). This ozone season was elevated due to several stretches of temperatures over 90°F, the ACHD monitors showed nonattainment of the 8-hour standard for the fifth consecutive 3-year period. The highest 3-year average of the 4th maximum concentration for 2009-2011 was 0.080 ppm at Harrison.

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 15.0 µg/m³ (micrograms/cubic meter); Liberty was 15.0 µg/m³ which meets the standard.

On a short-term basis, the Liberty FRM (Federal Reference Method) PM_{2.5} monitor exceeded the 24-hour standard of 35 µg/m³ ten times, leading to a 98th-percentile value of 38.0 µg/m³. On December 17, 2006, the new EPA 24-hour PM_{2.5} standard of 35 µg/m³ became effective. Data from only the Liberty PM_{2.5} monitor in Allegheny County shows nonattainment of this standard.

Concurrent with the revised 24-hour PM_{2.5} standard, the annual standard of 50 µg/m³ for PM₁₀ was revoked. Annual averages are included in this report and may be included in future reports for comparative purposes.

A new 1-hour federal standard of 75 ppb was started in 2010 for SO₂. 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.

A new 1-hour federal standard 100 ppb was started in 2010 for NO₂. 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.

All exceedances of the short-term standards in 2011 are shown in the table on the next page. All other criteria pollutants were below the annual and short-term federal standards in 2011. 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 SO₂ short-term exceedances are for the 1-hour standard.

2011 Exceedances of the Short-Term Federal Standards

Pollutant	Site	Date	Concentration	Standard
Ozone	Lawrenceville	6/6/2011	0.079 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	6/6/2011	0.078 ppm (8-hr.)	0.075 ppm
Ozone	South Fayette	6/6/2011	0.078 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	6/8/2011	0.084 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	6/9/2011	0.080 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	6/18/2011	0.078 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	6/30/2011	0.076 ppm (8-hr.)	0.075 ppm
Ozone	South Fayette	7/1/2011	0.082 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	7/6/2011	0.082 ppm (8-hr.)	0.075 ppm
Ozone	South Fayette	7/7/2011	0.084 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	7/22/2011	0.080 ppm (8-hr.)	0.075 ppm
Ozone	South Fayette	7/22/2011	0.077 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	8/18/2011	0.076 ppm (8-hr.)	0.075 ppm
Ozone	Lawrenceville	9/2/2011	0.095 ppm (8-hr.)	0.075 ppm
Ozone	South Fayette	9/2/2011	0.086 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	9/2/2011	0.078 ppm (8-hr.)	0.075 ppm
Ozone	Harrison	9/3/2011	0.085 ppm (8-hr.)	0.075 ppm
Ozone	Lawrenceville	9/3/2011	0.077 ppm (8-hr.)	0.075 ppm
Ozone	South Fayette	9/3/2011	0.077 ppm (8-hr.)	0.075 ppm
PM _{2.5}	Liberty	10 Days	Max = 59.0 µg/m ³	35 µg/m ³
PM _{2.5}	Avalon	1 Day	Max = 35.6 µg/m ³	35 µg/m ³
PM _{2.5}	North Braddock	1 Day	Max = 35.5 µg/m ³	35 µg/m ³
SO ₂	Liberty	53 Days	Max = 450 ppb	75 ppb

2. Attainment of the Federal Standards

8-Hour Ozone

Allegheny County and the surrounding six counties of the Pittsburgh-Beaver Valley Area have been designated nonattainment for 8-hour ozone, based on 2001-2003 monitored data. In February, 2011 the EPA had issued in 40 CFR part 52, Approval and Promulgation of Air Quality Implementation Plans; Pennsylvania; Determination of Attainment for the Pittsburgh-Beaver Valley 8-Hour Ozone Nonattainment area (This is for the old standard of 0.08 ppm). The monitor at Harrison had the highest 3-year average of 0.081 ppm for 2008-2010 in the area. It remained the highest in Allegheny County for 2009-2011 at 0.080 ppm. Allegheny County is in violation of the new 8-hour ozone standard of 0.075 ppm for the past five 3-year periods.



PM_{2.5}

Allegheny County has been designated nonattainment for PM_{2.5} as part of a multi-county Pittsburgh-Beaver Valley Area, based on 2001-2003 monitored data. Additionally, a five-municipality Liberty-Clairton Area was designated nonattainment as a separate area within Allegheny County. Monitored results for 2009-2011 show levels of attainment (county-wide excluding the Liberty monitor) for both the annual standard and the 24-hour standard of 35 µg/m³. The Liberty-Clairton Area is still in violation of the 24-hour standard.



The County is developing a State Implementation Plan (SIP) for the control of PM_{2.5} in the Liberty-Clairton Area. Funding from the County's Clean Air Fund has been approved for use in this SIP development. The County will also assist the PA DEP in the development of the Pittsburgh-Beaver Valley PM_{2.5} SIP.

SO₂

The County had monitored attainment for SO₂ for 10 consecutive years. EPA redesignated Allegheny County to attainment for SO₂ in 2004. However, the Liberty monitor is in nonattainment of the new 1-Hour NAAQS of 75 ppb. ACHD will continue developing a SIP for SO₂.

Other Criteria

The County has monitored attainment for PM₁₀ for 17 consecutive years. EPA redesignated Allegheny County to attainment for PM₁₀ in 2003.

For 1-hour ozone, the County has monitored attainment for 14 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 attainment for 24 consecutive years. EPA redesignated Allegheny County to attainment for CO in 2003.

For NO₂, the County has monitored attainment for over 26 consecutive years and has been in attainment since promulgation of the standard.

For Lead (Pb), the County has monitored attainment for over 21 consecutive years and has been in attainment since promulgation of the standard.

3. Air Monitoring Results

A. Ozone (O₃)

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 0.075 parts per million (ppm) must not be exceeded by the 3-year average of the 4th highest 8-hour concentrations. The ozone season for Allegheny County extends from March 1 through October 31. The South Fayette monitor runs during the ozone season only.

There were twelve exceedance days overall for 8-hour ozone in 2011. Four 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.

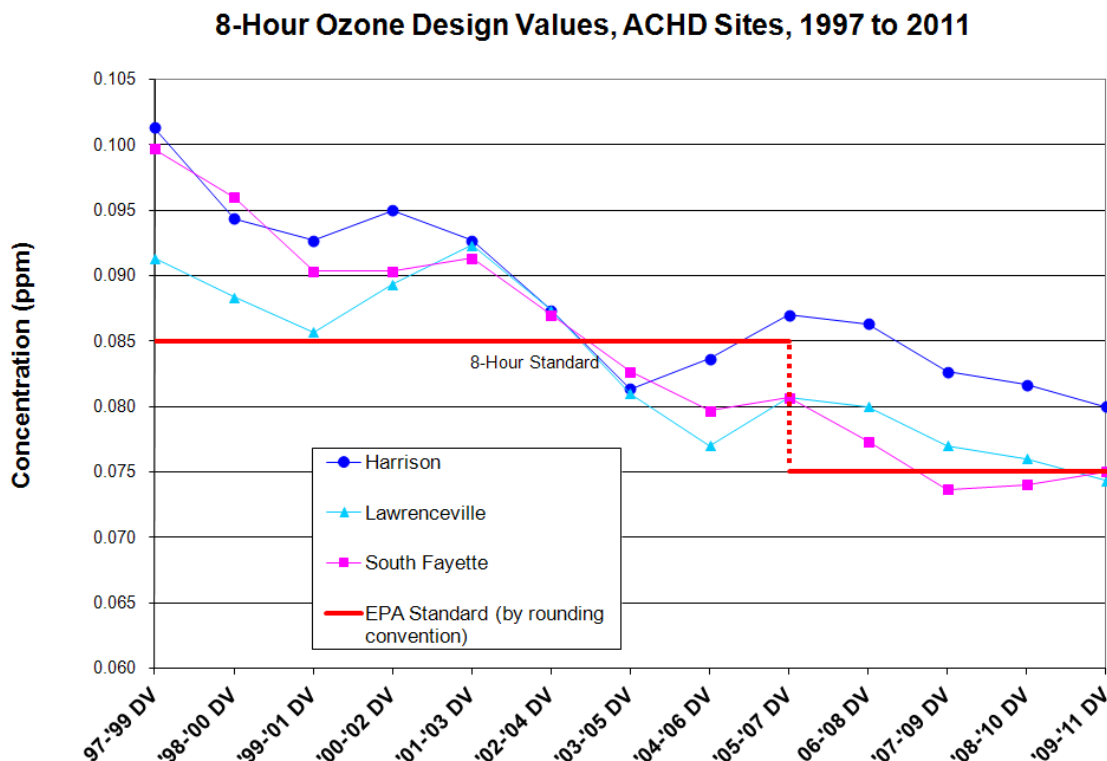
8-Hour Ozone Concentrations

Maximum 8-hour ozone concentrations and exceedance days are given below for 2011, with exceedance concentrations and days shown in red. 2010 values are shown in gray for comparison.

8-Hour Std. = 0.075 ppm*						
Site	2010 8-Hour Maximum (ppm)	2011 8-Hour Maximum (ppm)	2010 Exceedance Days	2011 Exceedance Days	2008-2010 8-Hour 3-Yr. Avg. of 4 th Max. (ppm)	2009-2011 8-Hour 3-Yr. Avg. of 4 th Max. (ppm)
Harrison	0.105	0.085	6	10	0.081	0.080
South Fayette	0.089	0.086	5	6	0.074	0.075
Lawrenceville	0.087	0.095	8	3	0.076	0.074

* For comparison to the standards, values are truncated at 1/1000th ppm (e.g., 0.0816 truncates to 0.081 ppm). An exceedance day is one in which any 8-hour period has an average of greater than 0.075 ppm.

Below is a chart showing the 8-hour design values for the three Allegheny County Health Department sites since 1997.



1-Hour Ozone Concentrations

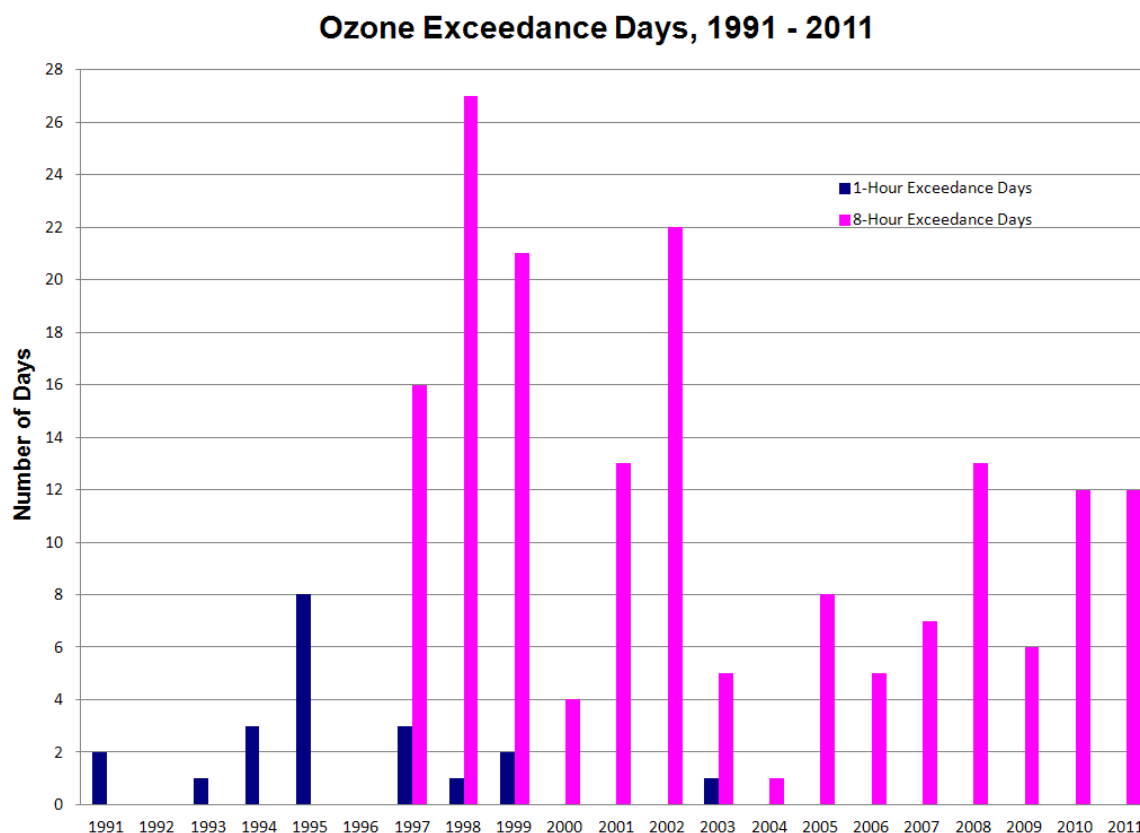
The 1-hour standard was revoked for the Pittsburgh-Beaver Valley Area in mid-2005. The former 1-hour standard of 0.12 ppm was not to be exceeded more than once a year, averaged over a 3-year period. 1-hour ozone maximums and exceedances are given in this report for comparative purposes.

Maximum 1-hour concentrations for ozone are given in the table that follows for 2011, with 2010 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	2010 1-Hour Maximum (ppm)	2011 1-Hour Maximum (ppm)	2010 Exceedance Days	2011 Exceedance Days	2008-2010 Expected Exceedance Days	2009-2011 Expected Exceedance Days
Lawrenceville	0.095	0.112	0	0	0.0	0.0
Harrison	0.121	0.099	0	0	0.0	0.0
South Fayette	0.095	0.091	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 1991-2011. Exceedance days represent days when at least one site exceeded the standard. 8-hour exceedance days are shown starting in 1997, when the 8-hour standard was promulgated.



B. Particulate Matter - 2.5 microns or less (PM_{2.5})**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 15.0 µg/m³ on an annual basis (3-year average).

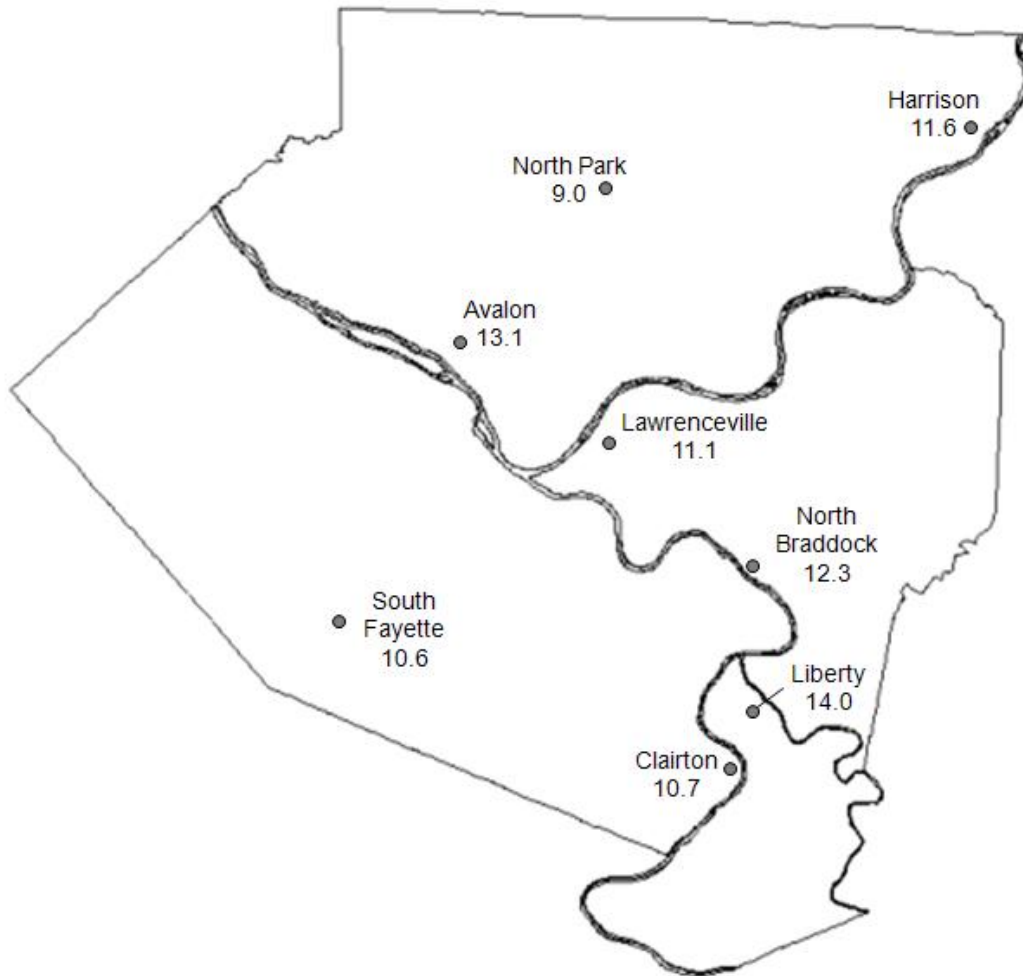
Annual averages for 2011 are given in the table below, with 2010 averages shown in gray. There were no exceedances in 2011.

Annual Std. = 15.0 µg/m ³				
Site	2010 Average	2011 Average	2008-2010 3-Year Average	2009-2011 3-Year Average
Liberty	16.0	14.0	16.0	15.0
Avalon	--	13.1	--	14.7
North Braddock	13.7	12.3	13.4	12.7
Harrison	13.0	11.6	13.0	12.4
Lawrenceville	12.2	11.1	12.2	11.6
Clairton	12.5	10.7	12.4	11.5
South Fayette	11.7	10.6	11.0	11.0
North Park	10.5	9.0	10.1	9.7
Moon	11.5	--	10.5	10.5

Note: The Moon and North Park PM_{2.5} monitors were not in operation in 2008 due to low staffing. Their 3-year average for 2008-2010 is actually a two year average using 2010 and 2009 PM_{2.5} data. The Moon monitor was shutdown year end 2010. The Moon monitor's 3-year average for 2009-2011 is actually a two year average using 2010 and 2009 PM_{2.5} data. The Avalon Filter-Based monitor started the third quarter of 2011. Avalon's 3-year average for 2009-2011 is actually a two year average of the PM_{2.5} BAM data for 2010 and BAM data for the first two quarters of 2011 in addition to the Filter-Based monitor data for the last two quarters of 2011.

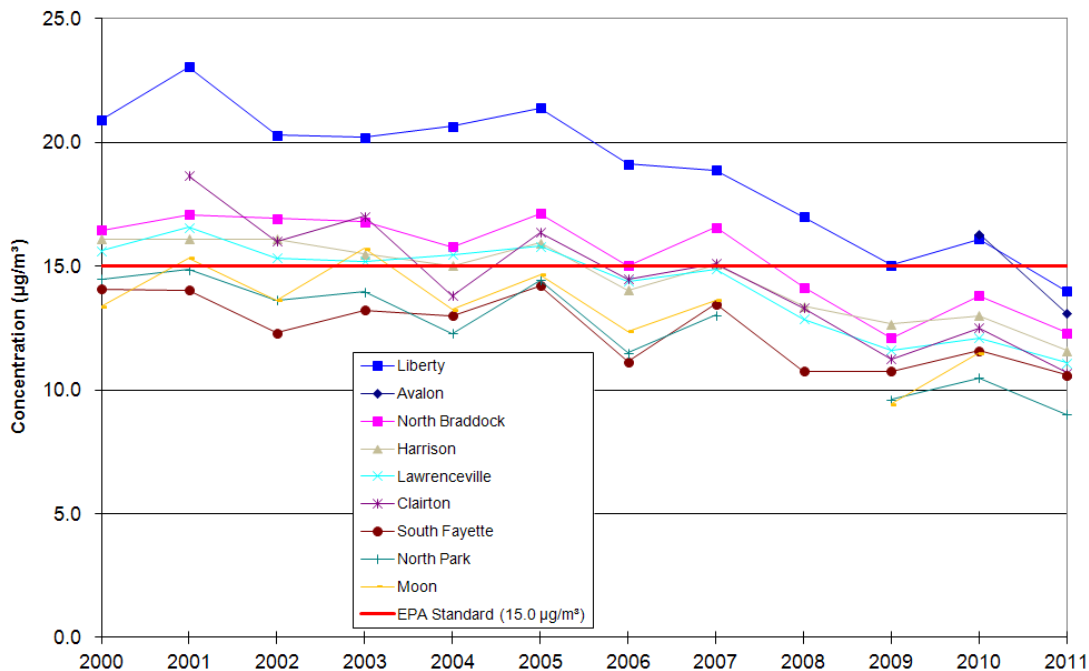
2011 FRM annual averages are also shown on the map below.

2011 PM_{2.5} FRM Annual Averages by Site, in $\mu\text{g}/\text{m}^3$

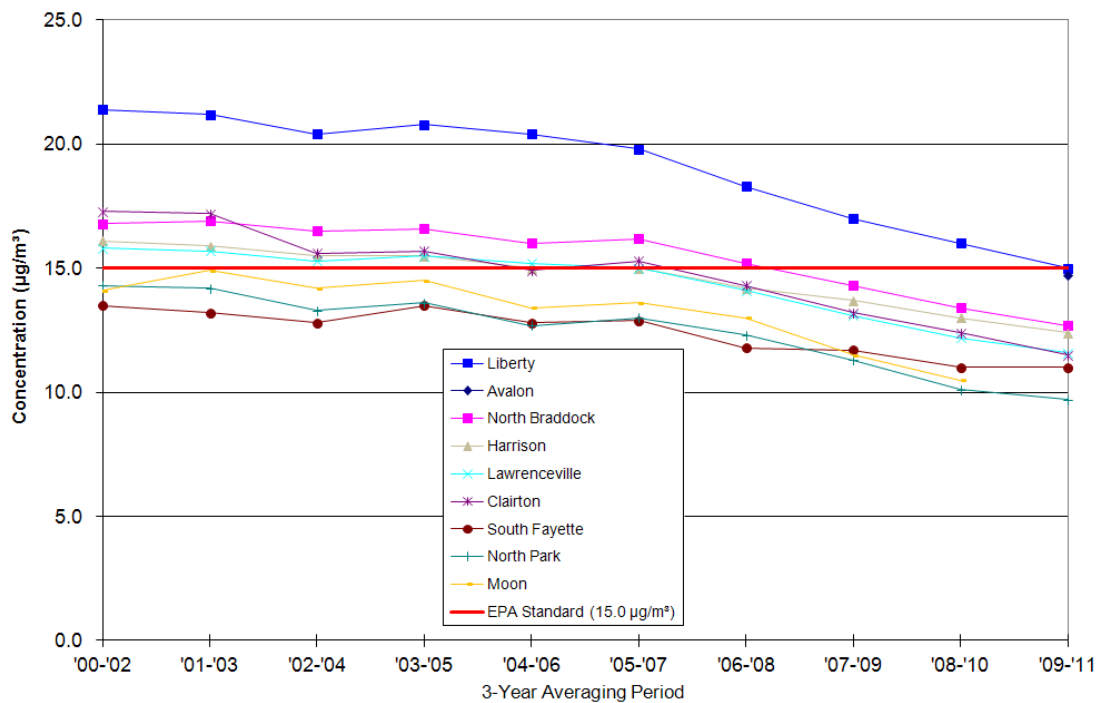


Long-term trends for the PM_{2.5} annual averages and the PM_{2.5} annual design values are shown in the charts below.

PM_{2.5} Annual Averages by Year, 2000 to 2011



PM_{2.5} Annual Design Values by 3-Year Period, 2000 to 2011



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.

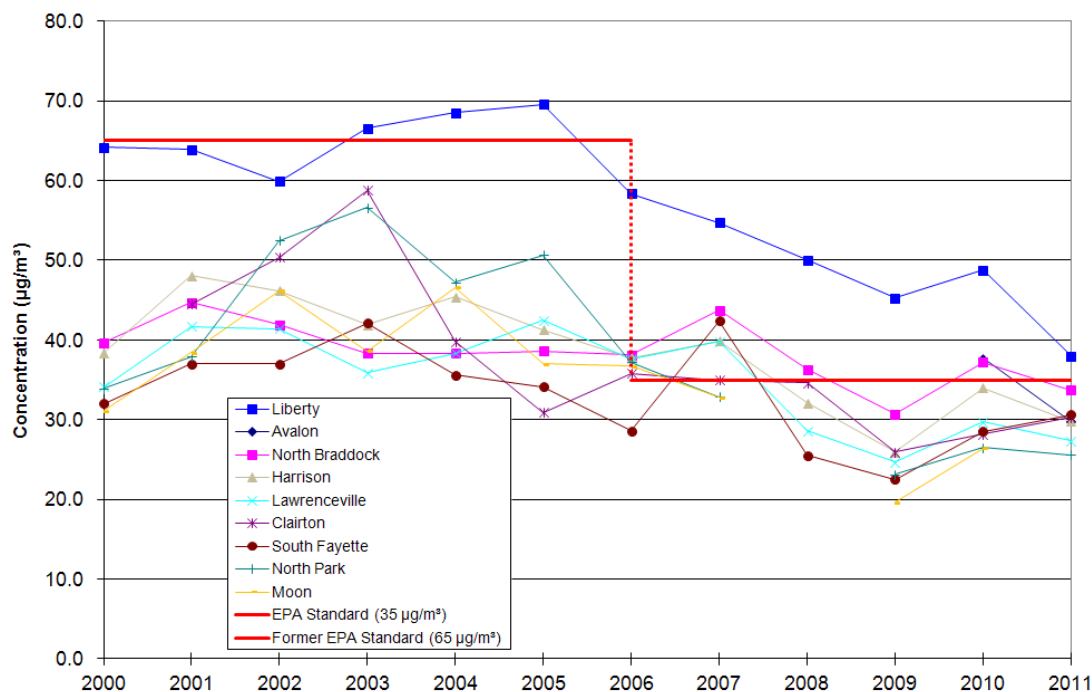
The maximum 2011 24-hour concentrations and number of exceedance days are shown in the following table, with 2010 values shown in gray. Values for 98th-percentile values by year and by 3-year average are also shown. Exceedances in 2011 are shown in red.

24-Hour Std. = 35 µg/m ³								
Site	2010 24-Hour Max.	2011 24-Hour Max.	2010 24-Hour Exceed.	2011 24-Hour Exceed.	2010 98 th - Percentile Value	2011 98 th - Percentile Value	2008-2010 3-Year Avg. of 98 th - Percentile	2009-2011 3-Year Avg. of 98 th - Percentile
Liberty	69.9	59.0	25	10	48.8	38.0	48.0	44.0
Avalon	--	35.6	--	1	--	29.8	--	33.8
North Braddock	40.6	35.5	3	1	37.2	33.7	34.7	33.9
Harrison	39.7	32.5	2	0	34.0	29.8	30.7	29.9
South Fayette	32.6	32.4	0	0	28.5	30.6	25.5	27.2
Lawrenceville	41.5	32.1	2	0	29.7	27.3	27.7	27.2
Clairton	37.0	30.3	1	0	28.2	30.3	29.6	28.1
North Park	28.4	25.6	0	0	26.5	25.6	24.8	25.1
Moon	27.0	--	0	--	26.4	--	23.0	23.0

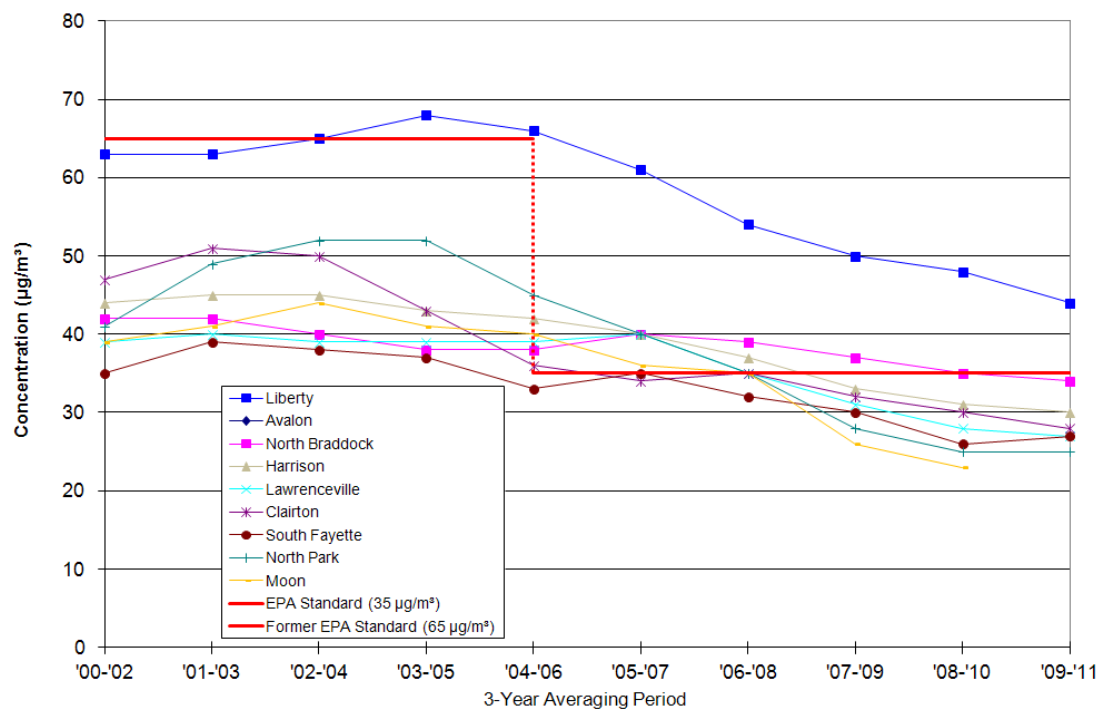
Note: The Moon and North Park PM_{2.5} monitors were not in operation in 2008 due to low staffing. Their 3-year average for 2008-2010 is actually a two year average using 2010 and 2009 PM_{2.5} data. The Moon monitor was shutdown year end 2010. The Moon monitor's 3-year average for 2009-2011 is actually a two year average using 2010 and 2009 PM_{2.5} data. The Avalon Filter-Based monitor started the third quarter of 2011. Avalon's 3-year average for 2009-2011 is actually a two year average of the PM_{2.5} BAM data for 2010 and BAM data for the first two quarters of 2011 in addition to the Filter-Based monitor data for the last two quarters of 2011.

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

PM2.5 24-Hour 98th-Percentile Values by Year, 2000 to 2011



PM2.5 24-Hour Design Values by 3-Year Period, 2000 to 2011



PM_{2.5} Continuous Monitors

ACHD's two continuous PM_{2.5} monitors are used mainly for AQI reporting. These monitors are not used formally in determining attainment of the federal standards, but they do provide estimates of the FRM filter-based values. Since 2007, ACHD reports both the raw (as measured from the monitor) and corrected (correlated to the FRM at the same site) continuous values. All data reported prior to 2007 is considered raw.

	Annual Std. = 15.0 µg/m ³ [FRM]			24-Hour Std. = 35 µg/m ³ [FRM]		
Site	2010 RAW Average	2011 RAW Average	2011 CORRECTED Average	2010 RAW 24-Hour Maximum	2011 RAW 24-Hour Maximum	2011 CORRECTED 24-Hour Maximum
Lawrenceville	10.3	10.1	12.1	35.8	29.7	29.5
Liberty	16.1	13.2	14.6	70.9	45.2	45.2

PM_{2.5} Speciation Monitors

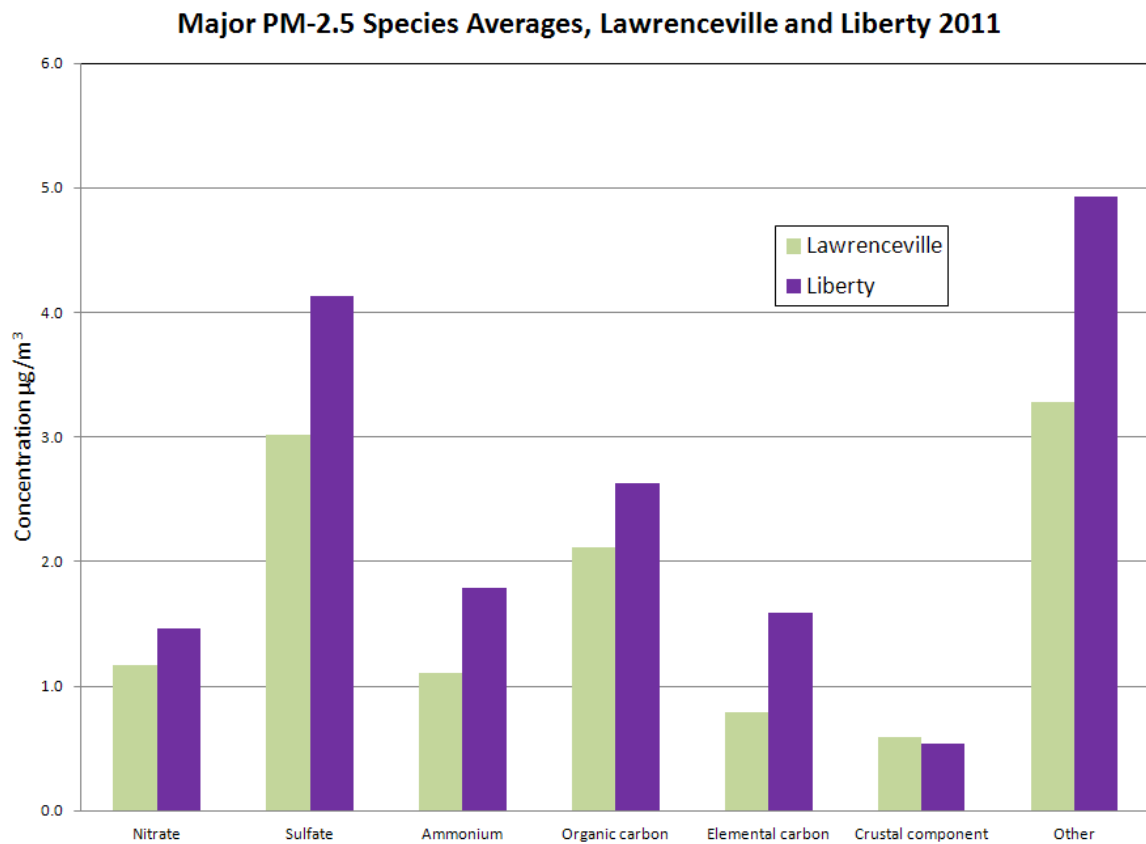
Physically, PM_{2.5} is any particle that is 2.5 microns or less in diameter. Chemically, PM_{2.5} is composed of many different chemical compounds. In addition to the FRM and continuous PM_{2.5} monitors, the County operates two PM_{2.5} speciation monitors that are used to measure specific components, 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 crustal component is made up of fine soil or minute dust particles. "Other species" represents the difference in total weighed mass concentration and the sum of the major species. "Other species" can include trace amounts of metals, non-metals such as halogens, and water.

Annual averages for major species at Lawrenceville and Liberty for 2011 are given below in µg/m³.

Site	Nitrate	Sulfate	Ammonium	Organic Carbon	Elemental Carbon	Crustal Component	Other Species
Lawrenceville	1.172	3.014	1.102	2.117	0.790	0.595	3.277
Liberty	1.468	4.132	1.792	2.631	1.591	0.543	4.934

2011 speciation results are shown in the column chart below.



C. Particulate Matter - 10 microns or less (PM₁₀)

PM₁₀ is sampled using both intermittent filter-based and continuous monitors throughout the County. Both types of PM₁₀ monitors can be used for comparison to the federal standards 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 PM₁₀ annual standard of 50 µg/m³ was revoked by EPA in December 2006; 2011 annual averages have been given below for comparative purposes.

2011 maximums and averages are shown in the table below, with 2010 values shown in gray. There were no exceedences in 2011.

PM₁₀ Filter-Based Monitors

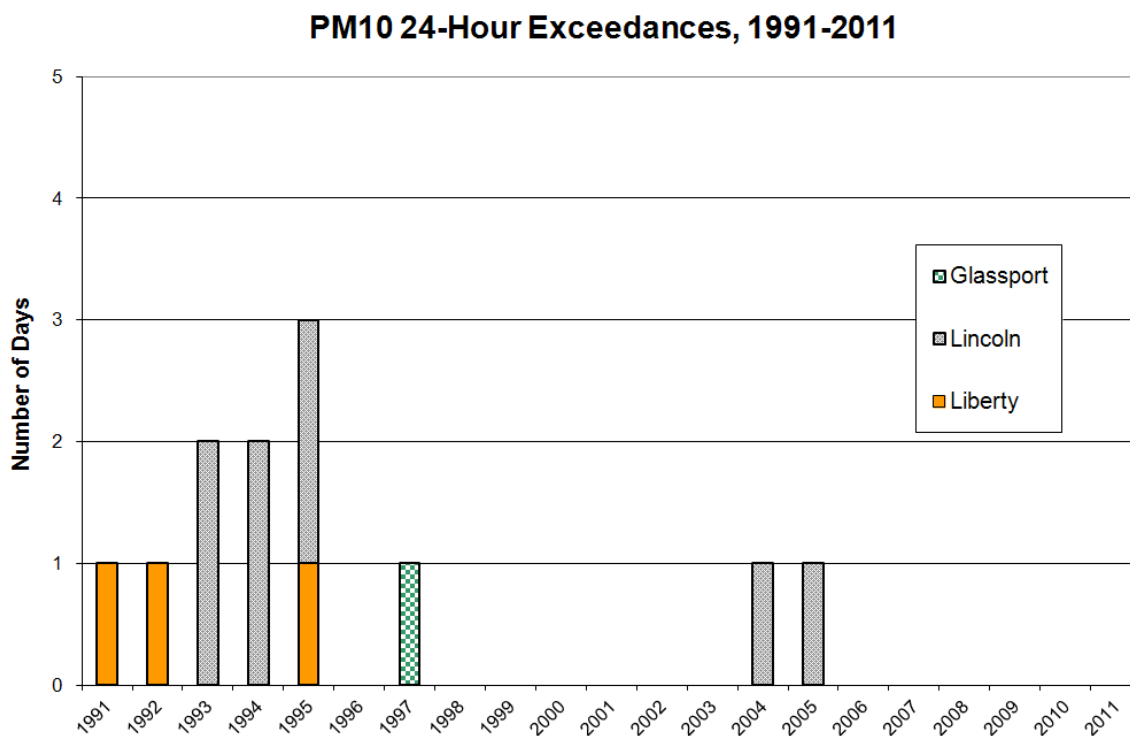
	24-Hour Std. = 150 µg/m³		Former Annual Std. = 50 µg/m³	
Site	2010 24-Hour Maximum	2011 24-Hour Maximum	2010 Average	2011 Average
Liberty	73	93	25.6	23.6
Avalon	70	71	22.6	19.0
North Braddock	88	55	28.2	20.8
Manchester	79	44	22.4	19.1
South Fayette	36	42	15.7	14.9
Clairton	46	37	18.3	16.8

PM₁₀ Continuous Monitors

	24-Hour Std. = 150 µg/m³		Former Annual Std. = 50 µg/m³	
Site	2010 24-Hour Maximum	2011 24-Hour Maximum	2010 Average	2011 Average
Lincoln	100	115	27.9	25.7
Glassport	83	83	20.6	18.4
Liberty	70	70	23.2	19.6
North Braddock	--	65	--	23.2
Flag Plaza	98	47	20.2	16.6
Monroeville	--	44	--	17.3
Stowe	77	--	17.8	--

Note: The Stowe PM₁₀ Continuous Monitor was discontinued in 2011. North Braddock and Monroeville PM₁₀ Continuous Monitors became official the start of 2011.

Below is a chart showing PM₁₀ 24-hour exceedances for the period 1991-2011. Continuous monitors began operation after 1992. For sites with both filter-based and continuous monitors, data for only the filter-based monitors are shown.



D. Sulfur Dioxide (SO₂)

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 SO₂ entering Allegheny County from the southwest. The primary federal standards are 0.14 ppm (24-hour average) and 0.03 ppm (annually); a new 1-hour federal standard of 75 ppb was started 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 2011 are shown in the table below, with 2010 values shown in gray. Exceedances in 2011 are shown in red. The NCore trace gas analyzer for SO₂ at Lawrenceville started operation in 2010 and Stowe was discontinued in 2011.

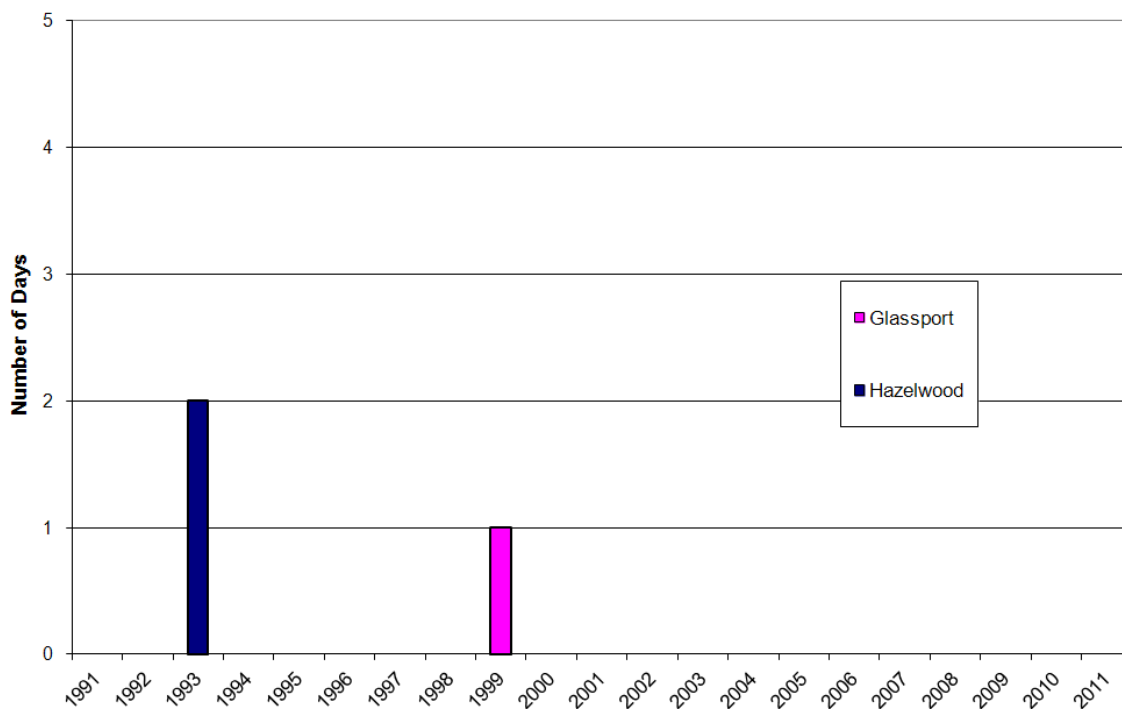
	24-Hour Std. = 0.14 ppm		Annual Std. = 0.03 ppm	
Site	2010 24-Hour Maximum	2011 24-Hour Maximum	2010 Average	2011 Average
Liberty	0.026	0.134	0.007	0.007
South Fayette	0.018	0.016	0.002	0.001
Lawrenceville	0.015	0.015	0.002	0.002
Avalon	0.019	0.013	0.002	0.002
Stowe	0.021	--	0.003	--

	1-Hour Std. = 75 ppb			
Site	2010 1-Hour Maximum	2009-2011 99 th percentile	2011 1-Hour Maximum	2011 Exceedances
Liberty	215	146	450	53
Stowe	93	62*	--	--
Avalon	97	51	54	0
South Fayette	108	40	48	0
Lawrenceville	56	30*	41	0

* Note: The 2009-2011 99th percentile for Lawrenceville is only for 2010 and 2011 and the 2009-2011 99th percentile for Stowe is only for 2009 and 2010.

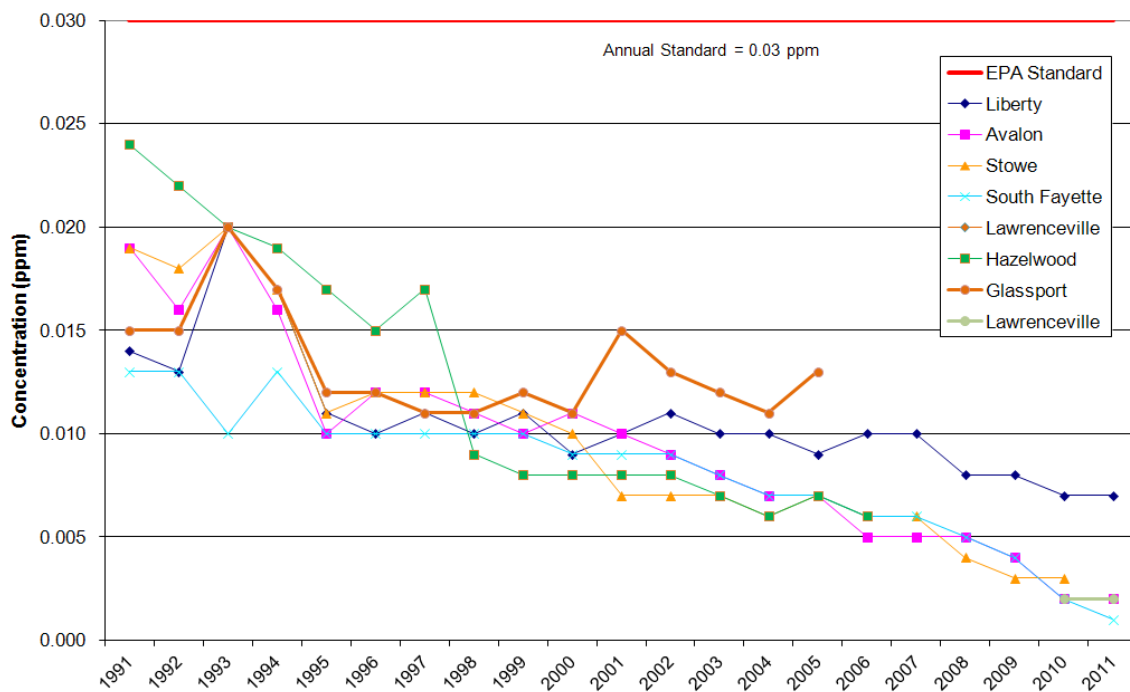
SO₂ 24-hour exceedances are shown on the following page for 1991-2011. The 24-hour standard can be exceeded once per year. Glassport was the last site to exceed the 24-hour standard in 1999.

Sulfur Dioxide 24-Hour Exceedances, 1991-2011



SO₂ annual average trends are shown below for 1991-2011.

Sulfur Dioxide Annual Averages, 1991-2011



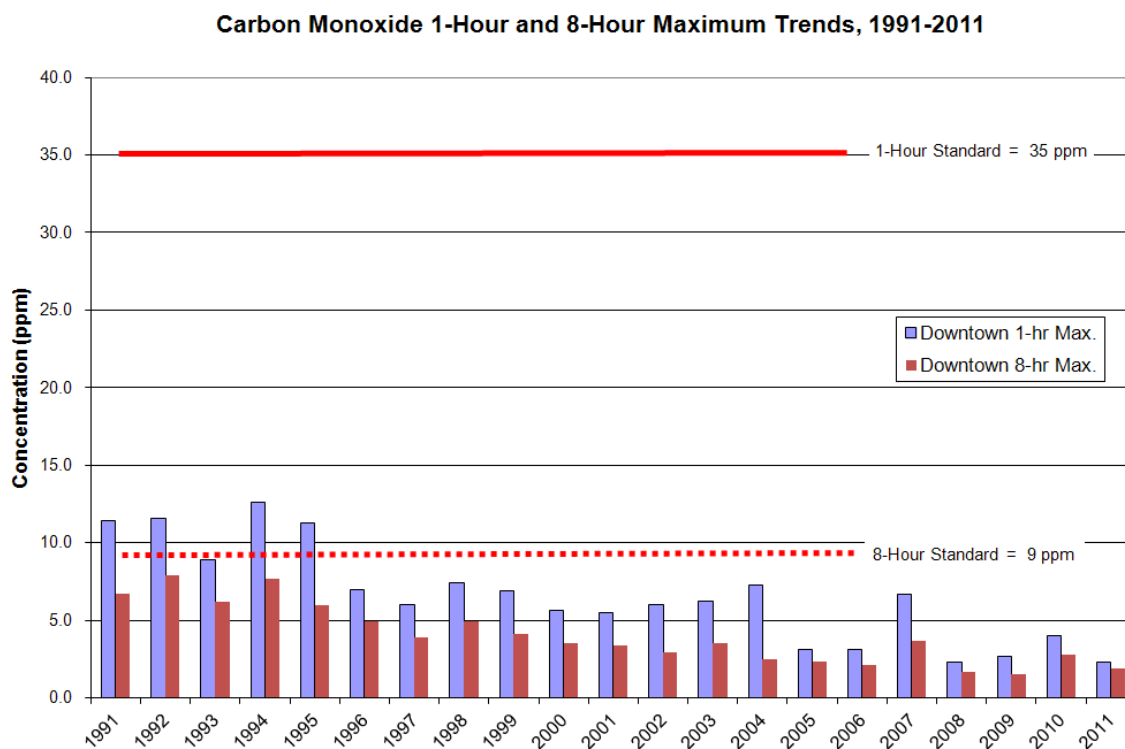
E. Carbon Monoxide (CO)

The County operates three carbon monoxide (CO) monitors; two in the Downtown Pittsburgh area. The NCore trace gas analyzer for CO at Lawrenceville started operation in 2010. The federal standards for CO are 35 ppm on an hourly basis and 9 ppm on an 8-hour average basis. Maximums for 2011 are shown in the table below, with 2010 values shown in gray.

	1-Hour Std. = 35 ppm		8-Hour Std. = 9 ppm	
Site	2010 1-Hour Maximum	2011 1-Hour Maximum	2010 8-Hour Maximum	2011 8-Hour Maximum
Downtown*	4.0	2.3	2.8	1.9
Lawrenceville	1.6	2.2	1.2	1.6
Flag Plaza	1.8	1.9	1.4	1.5

* Note: The Downtown site was formerly referred to as the "Courthouse."

Carbon monoxide maximum trends are shown below for 1991-2011. The County has not exceeded the 8-hour standard since 1987.



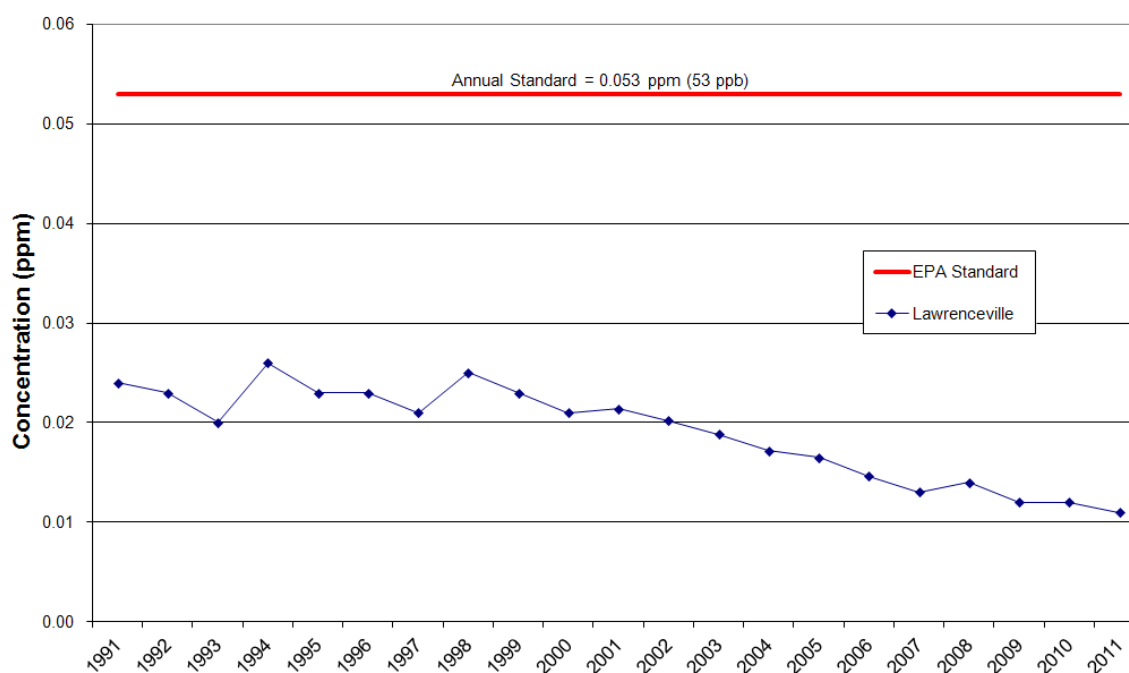
F. Nitrogen Dioxide (NO₂)

Nitrogen oxides are monitored at two sites in the County. Nitrogen dioxide (NO₂) is calculated each hour by subtracting nitrogen oxide (NO) from the total nitrogen oxides (NO_x) concentration. Starting in 2010, the standard for NO₂ is now 0.053 ppm (53 ppb) on an annual average basis. A new 1-hour federal standard 100 ppb was started 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. 2011 averages are shown in the table below, with 2010 values shown in gray.

	Annual Std. = 53 ppb		1-Hour Std. = 100 ppb			
Site	2010 Average	2011 Average	2010 1-Hour Maximum	2011 1-Hour Maximum	2008-2010 98 th percentile	2009-2011 98 th percentile
Lawrenceville	12	11	57	51	55	44
Harrison	10	9	61	81	47	47

Long-term trends for Lawrenceville NO₂ annual averages are shown below for 1991-2011.

Lawrenceville NO₂ Annual Averages, 1991-2011



G. Total Suspended Particulates (TSP)

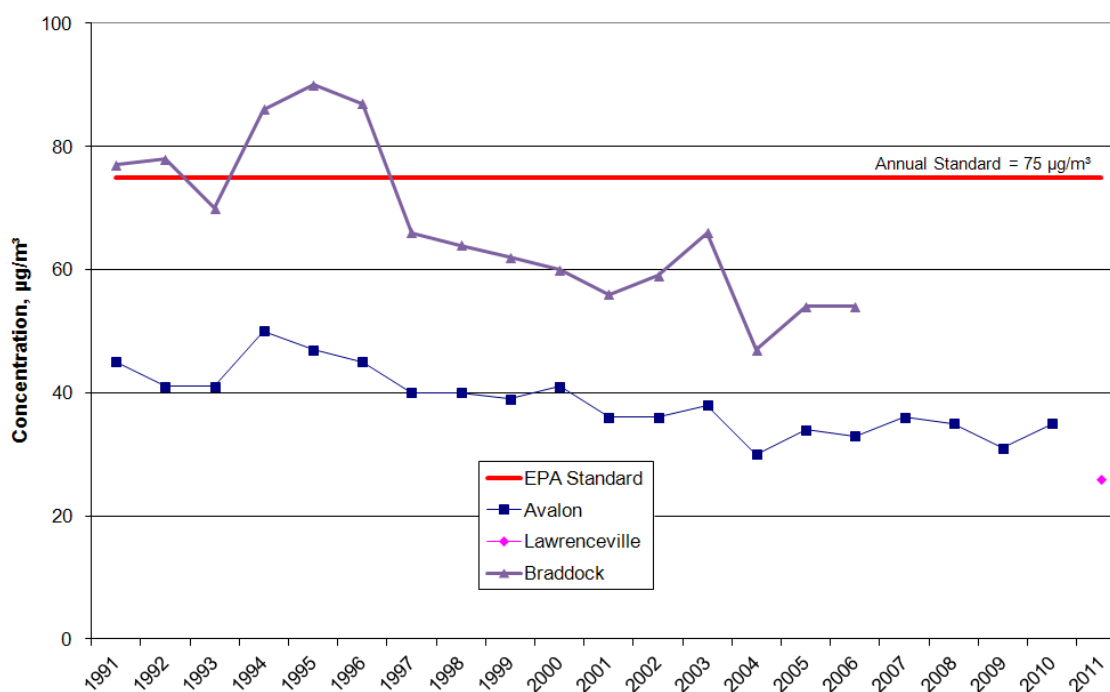
Federal standards for total suspended particulates (TSP) were replaced by those for PM₁₀ in 1987. TSP is measured at one site in the County for the analysis of lead and to examine long-term trends. The former federal standards for TSP are 260 µg/m³ on a 24-hour basis (maximum) and 75 µg/m³ annually (geometric mean).

For 2009 and previous years, the TSP values are calculated at standard conditions, however 2010 and future values will be calculated at local conditions. 2011 maximums and geometric means are shown in the table below, with 2010 values shown in gray. The Avalon monitor was moved to Lawrenceville the second quarter of 2011.

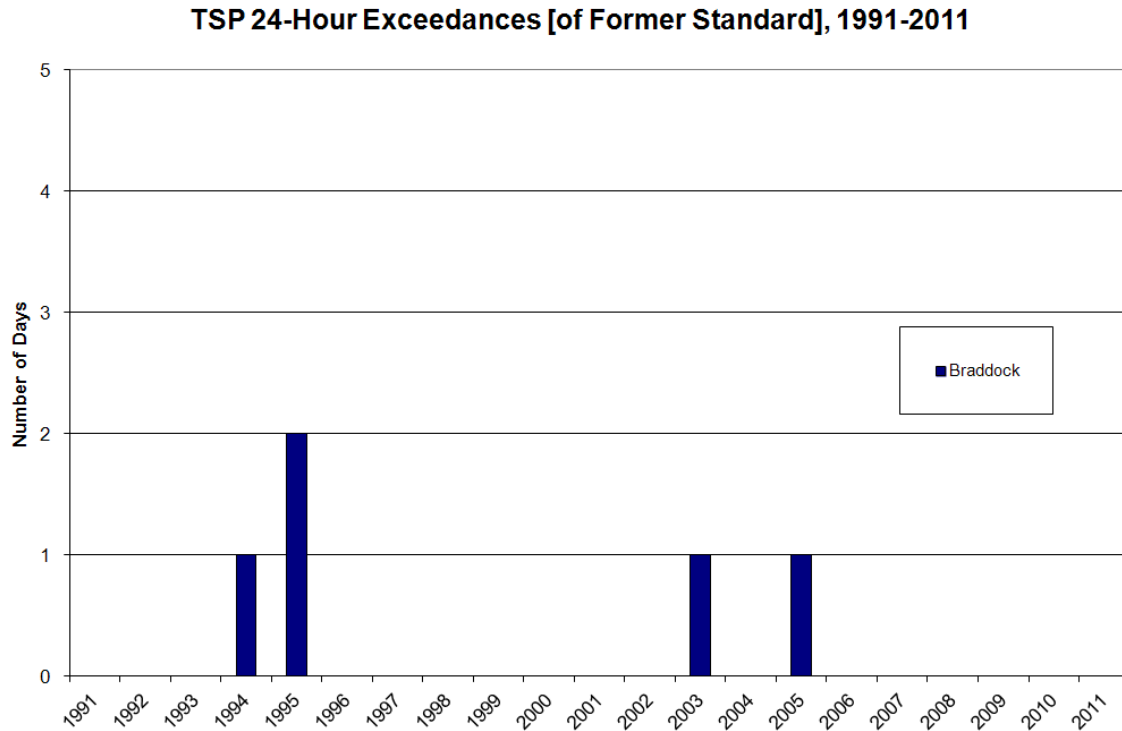
	Former 24-Hour Std. = 260 µg/m ³		Former Annual Std. = 75 µg/m ³	
Site	2010 24-Hour Maximum	2011 24-Hour Maximum	2010 Geometric Mean	2011 Geometric Mean
Avalon	125	--	34.9	--
Lawrenceville	--	64	--	26.1

Below is a chart showing 1991-2011 trends for annual geometric mean TSP. Braddock last exceeded the former annual standard in 1996.

TSP Annual Geometric Mean Trends, 1991-2011



Below is a chart showing exceedances the former 24-hour TSP standard for the period 1991-2011.



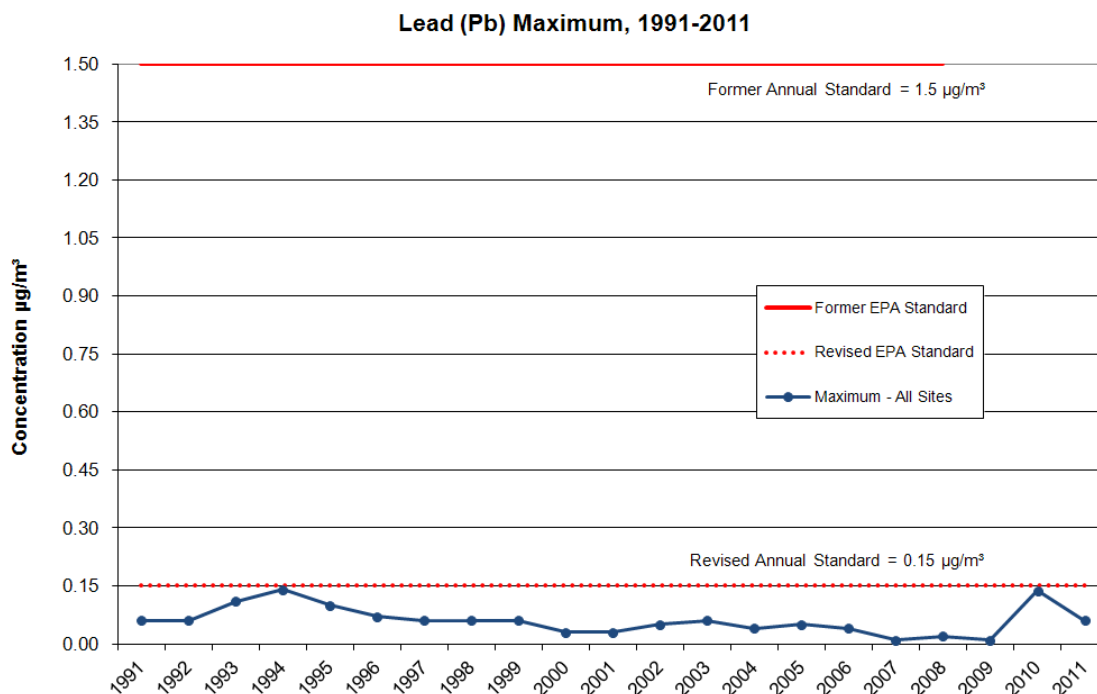
Because the former TSP standards were replaced by the PM₁₀ standards, exceedances of the former standard do not constitute violations.

H. Lead (Pb)

Lead is analyzed at the laboratory from the three TSP filter sites in the network. The federal standard was 1.5 $\mu\text{g}/\text{m}^3$ on a quarterly average basis; however in 2009 the federal standard has changed to 0.15 $\mu\text{g}/\text{m}^3$ on a 3-month rolling average basis at local conditions. 2011 3-month rolling average maximums are shown in the table below, with 2010 3-month rolling average maximums shown in gray. Both Bridgeville and Natrona started operation in 2010. The Avalon monitor was moved to Lawrenceville the second quarter of 2011.

	3-Month Average Std. = 0.15 $\mu\text{g}/\text{m}^3$	
Site	2010 3-Month Average Maximum	2011 3-Month Average Maximum
Natrona	0.138	0.061
Bridgeville	0.052	0.056
Lawrenceville	--	0.014
Avalon	0.016	--

Below is a chart showing 1991-2011 trends of the quarterly maximum lead concentration per year. Several sites have monitored lead since 1986; the maximum concentration from all sites is shown for each given year. 2008 and prior years are quarterly maximums, while 2009 and future years are maximum 3-month averages.



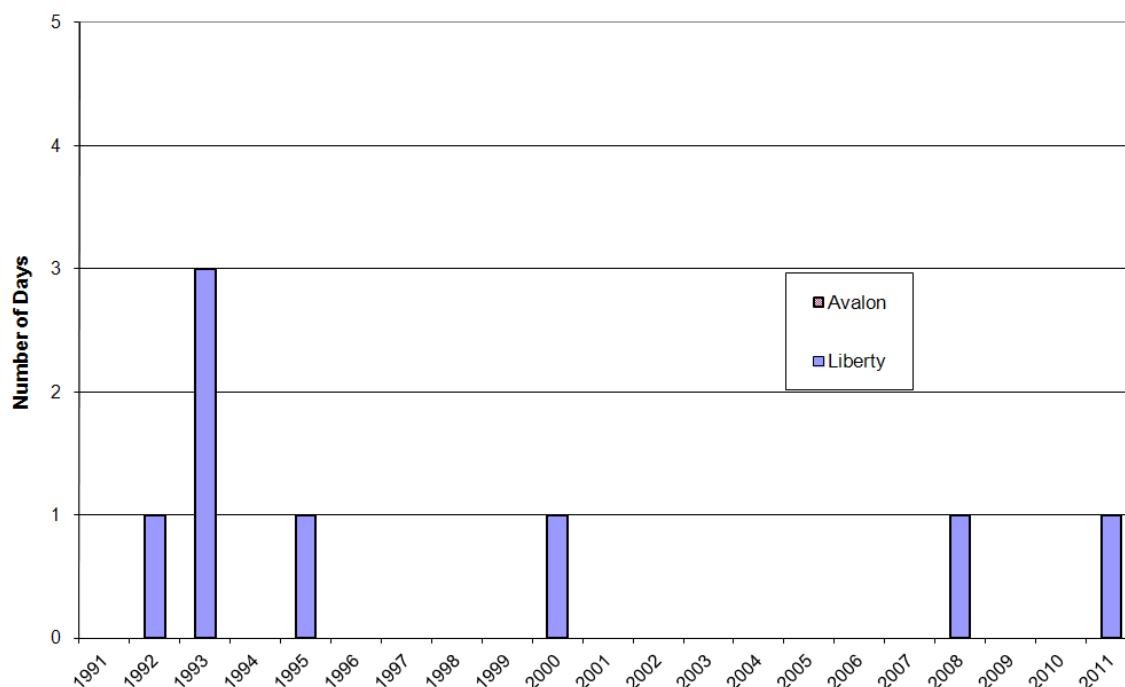
I. Hydrogen Sulfide (H₂S)

There are no federal standards for hydrogen sulfide. However, 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 2011 are given in the table below, with 2010 values shown in gray. 2011 1-hour concentrations that exceeded the standard are shown in red. Long-term exceedances for 1991-2011 are also given in the chart below. Liberty exceeded the 1-hour PA standard in 2011. The West Allegheny monitor started operation in May 2009.

	1-Hour PA Standard = 0.1 ppm			
Site	2010 1-Hour Maximum	2011 1-Hour Maximum	2010 Exceedances	2011 Exceedances
Liberty	0.062	0.352	0	1
Avalon	0.039	0.035	0	0
West Allegheny	0.025	0.004	0	0

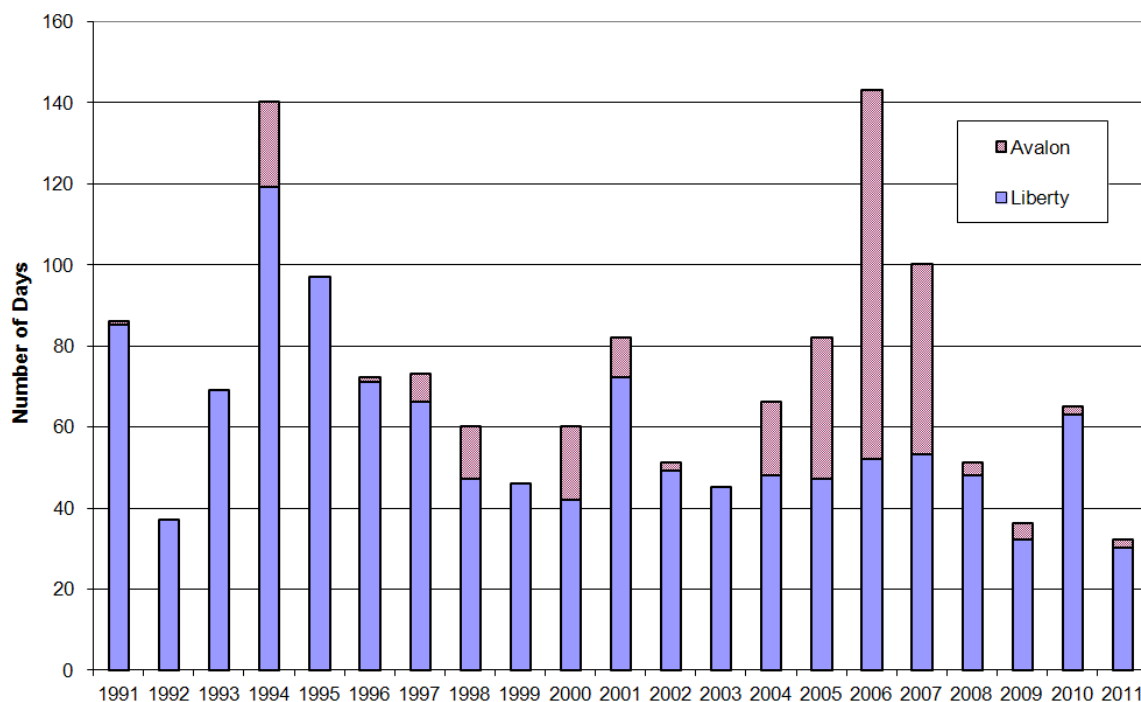
Hydrogen Sulfide 1-Hour Exceedances, 1991-2011



Hydrogen sulfide 24-hour concentrations and exceedances for 2011 are next given in the following table, with 2010 values shown in gray. Long-term exceedances for 1991-2011 are also given in the chart below. Exceedances for 2011 are shown in red. Each exceedance constitutes a violation of the state H₂S standards.

	24-Hour PA Standard = 0.005 ppm			
Site	2010 24-Hour Maximum	2011 24-Hour Maximum	2010 Exceedances	2011 Exceedances
Liberty	0.013	0.082	63	30
Avalon	0.006	0.006	2	2
West Allegheny	0.004	0.001	0	0

Hydrogen Sulfide 24-Hour Exceedances, 1991-2011



J. Dustfall

Dustfall (or total settled particulates) is more of a nuisance 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 23 tons/mile²/month on an annual average basis and 43 tons/mile²/month on a monthly basis.

Annual averages, monthly maximums, and exceedances for 2011 are shown in the table below, with 2010 values shown in gray. Exceedances for 2011 are shown in red. Each exceedance constitutes a violation of the state dustfall standards.

Only Collier, Natrona 8, and Natrona 9 dustfall collectors are in operation for 2009 and future years. North Braddock, Neville, Neville 2 and Forward dustfall collectors were discontinued year end 2008.

Site	Annual PA Standard = 23 tons/mile ² /month		Monthly PA Standard = 43 tons/mile ² /month		Monthly Exceedances	
	2010 Average	2011 Average	2010 Monthly Maximum	2011 Monthly Maximum	2010 Exceedances	2011 Exceedances
Natrona 9	29	24	65	41	1	0
Natrona 8	20	11	81	16	1	0
Collier	11	10	27	16	0	0

K. 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.

24-hour maximums and annual averages for B(a)P in 2011 are shown below, with 2010 values shown in gray. Liberty typically shows the highest concentrations of B(a)P in Allegheny County.

No Ambient Standard				
<i>Concentrations given in ng/m³*</i>				
Site	2010 24-Hour Maximum	2011 24-Hour Maximum	2010 Average	2011 Average
Liberty	105	56	21	7
Avalon	3	5	1	0
South Fayette	2	1	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.

L. 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

SUMA canisters are 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 is 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 of 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 is part of an ACHD in-house air toxics study started in 2006 and discontinued year end 2007.

Open Path Toxics

Open path UV-DOAS toxics monitoring began Downtown (at Flag Plaza) and at Neville Island (at West View Water) in 2006. This method continuously measures several HAP compounds over a long distance. Measurements discontinued year end 2008. Refer to the 2008 Air Quality Annual Report for Open path UV-DOAS toxics data.

Continuous Benzene

The HAP compound benzene is measured continuously at Liberty. 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 2011 are shown below, with 2010 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.

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	2010 Average (ppb)	2010 24-Hour Maximum (ppb)	2011 Average (ppb)	2011 24-Hour Maximum (ppb)
Carbon disulfide	0.02	0.09	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) [†]	0.10	0.14	0.08	0.11
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon 114) [†]	0.02	0.03	0.02	0.03
Ethyl acetate [†]	0.03	0.15	--	--
1,3-Butadiene	0.06	0.20	0.03	0.10
Hexane	0.21	1.46	0.10	0.37
Heptane [†]	0.09	1.02	0.05	0.17
Cyclohexane [†]	0.04	0.14	0.05	0.13
Isopropyl alcohol [†]	0.32	0.99	--	--
Methyl tert-butyl ether (MTBE, 2-methoxy-2-methyl-Propane)	0.00	0.01	0.00	0.01
Acetone* [†]	1.86	4.68	1.58	3.19
Methyl ethyl ketone (MEK)*	0.34	1.47	0.30	0.70
Methyl butyl ketone (2-Hexanone) [†]	0.01	0.05	--	--
Methyl isobutyl ketone (MIK)*	0.02	0.06	0.02	0.27
Chloromethane	0.67	0.86	0.60	0.78
Methylene chloride (Dichloromethane)	0.24	1.87	0.12	0.69
Chloroform	0.03	0.06	0.02	0.04
Carbon tetrachloride	0.10	0.12	0.08	0.13
Bromoform (Tribromomethane)	0.00	0.01	--	--
Trichlorofluoromethane (Freon 11) [†]	0.30	0.35	0.29	0.40
Chloroethane	0.07	0.12	--	--
1,1-Dichloroethane	0.00	0.01	--	--
1,1,1-Trichloroethane (Methyl chloroform)	0.02	0.03	0.01	0.02
1,2-Dichloroethane (Ethylene dichloride)	0.02	0.04	0.01	0.03
Tetrachloroethylene	0.03	0.17	0.02	0.09
1,1,2,2-Tetrachloroethane	0.00	0.01	0.00	0.01
Bromomethane	0.01	0.02	--	--
1,1,2-Trichloroethane	0.00	0.01	--	--
Dichlorodifluoromethane (Freon 12) [†]	0.61	0.72	0.54	0.76
Trichloroethene (-ethylene, TCE)	0.01	0.05	0.00	0.02
1,1-Dichloroethylene (-ethene, DCE, Vinylidene chloride)	0.00	0.01	--	--

Flag Plaza				
HAP	2010 Average (ppb)	2010 24-Hour Maximum (ppb)	2011 Average (ppb)	2011 24-Hour Maximum (ppb)
Bromodichloromethane [†]	0.01	0.03	--	--
1,2-Dichloropropane	0.01	0.02	0.00	0.02
trans-1,3-Dichloro-1-propene (-propylene)	0.00	0.01	0.00	0.01
cis-1,3-Dichloro-1-propene (-propylene)	0.00	0.01	0.00	0.01
Dibromochloromethane [†]	0.00	0.01	--	--
trans-1,2-Dichloroethene [†]	0.00	0.01	--	--
cis-1,2-Dichloroethene [†]	0.00	0.01	--	--
1,2-Dibromoethane (Ethylene dibromide)	0.00	0.01	0.00	0.01
Hexachloro-1,3-butadiene (Hexachlorobutadiene)	0.00	0.01	--	--
Chloroethene (Vinyl chloride)	0.00	0.01	0.00	0.01
m & p- Xylene	0.16	0.67	0.12	0.42
Benzene	0.36	1.72	0.29	1.49
Toluene	0.46	2.22	0.30	1.06
Ethylbenzene	0.06	0.19	0.04	0.12
o-Xylene	0.06	0.23	0.04	0.15
1,3,5-Trimethylbenzene [†]	0.02	0.06	0.01	0.04
1,2,4-Trimethylbenzene [†]	0.06	0.28	0.04	0.11
1-Ethyl-4-methylbenzene (4-Ethyltoluene) [†]	0.02	0.18	0.02	0.07
Styrene	0.03	0.13	0.01	0.07
Chlorobenzene	0.00	0.02	0.00	0.02
1,2-Dichlorobenzene [†]	0.00	0.01	--	--
1,3-Dichlorobenzene [†]	0.00	0.01	--	--
1,4-Dichlorobenzene	0.07	0.20	0.02	0.17
Benzyl chloride	0.00	0.04	--	--
1,2,4-Trichlorobenzene	0.00	0.01	--	--
Tetrahydrofuran [†]	0.01	0.07	0.01	0.28
Acetaldehyde*	0.90	1.84	0.84	1.56
Acrolein*	0.04	0.14	0.04	0.12
Formaldehyde*	1.85	5.33	1.84	5.11
Propionaldehyde*	0.19	0.36	0.17	0.41
Acrylonitrile	0.01	0.09	--	--
Acetonitrile	0.30	0.75	--	--

*Value measured by cartridge (carbonyl) method. All other values are as measured by SUMA canister.

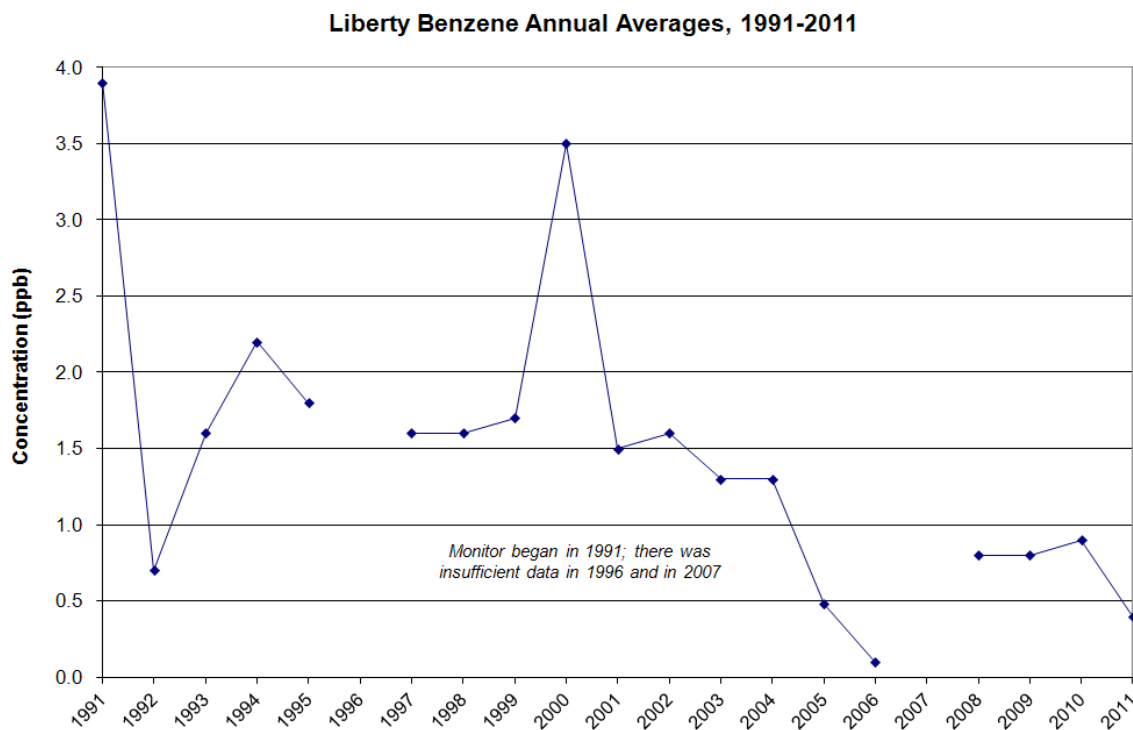
[†]Compound is not an official EPA-classified HAP.

Liberty Borough Benzene

Additionally, benzene is measured continuously at Liberty. The annual average and 24-hour maximum for Liberty benzene in 2011 are shown below, with 2010 values shown in gray.

HAP	2010 Average (ppb)	2010 24-Hour Maximum (ppb)	2011 Average (ppb)	2011 24-Hour Maximum (ppb)
Benzene	0.9	10.5	0.4	6.6

A chart showing Liberty benzene annual averages for 1991-2011 is shown below. The monitor began operation in 1991 and was not operational in 1996, most of 2006, 2007, and a portion of 2011.



4. Short-Term Exceedances

Exceedances of the federal short-term primary standards are listed below for the years 2001 through 2011 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} 65 µg/m ³	2001	Liberty	5	99 µg/m ³
	2002	Liberty	1	70 µg/m ³
	2003	Liberty	9	102 µg/m ³
	2004	Liberty	7	94 µg/m ³
	2005	Liberty	10	100 µg/m ³
	2006	Liberty	3	101 µg/m ³
35 µg/m ³				
	2007	Liberty	46	61.7 µg/m ³
	2007	Lawrenceville	12	50.7 µg/m ³
	2007	N. Braddock	6	50.0 µg/m ³
	2007	Harrison	5	51.8 µg/m ³
	2007	South Fayette	4	43.6 µg/m ³
	2007	Moon	1	40.7 µg/m ³
	2007	Clairton	1	40.4 µg/m ³
	2007	North Park	1	39.6 µg/m ³
	2008	Liberty	31	70.8 µg/m ³
	2008	N. Braddock	4	38.4 µg/m ³
	2008	Harrison	2	41.3 µg/m ³
	2008	Clairton	1	40.6 µg/m ³
	2008	Lawrenceville	1	39.7 µg/m ³
	2009	Liberty	12	92.1 µg/m ³
	2009	Harrison	1	43.5 µg/m ³
	2010	Liberty	25	69.9 µg/m ³
	2010	N. Braddock	3	40.6 µg/m ³
	2010	Lawrenceville	2	41.5 µg/m ³
	2010	Harrison	2	39.7 µg/m ³
	2010	Clairton	1	37.0 µg/m ³
	2011	Liberty	10	59.0 µg/m ³
	2011	Avalon	1	35.6 µg/m ³
	2011	N. Braddock	1	35.5 µg/m ³

8-Hour Ozone 0.08 ppm	2001	Harrison	8	0.101 ppm
	2001	Lawrenceville	4	0.095 ppm
	2001	South Fayette	7	0.098 ppm
	2002	Harrison	14	0.105 ppm
	2002	Lawrenceville	16	0.107 ppm
	2002	South Fayette	17	0.110 ppm
	2003	Harrison	2	0.121 ppm
	2003	Lawrenceville	5	0.122 ppm
	2003	South Fayette	4	0.111 ppm
	2004	South Fayette	1	0.089 ppm
	2005	Harrison	6	0.107 ppm
	2005	Lawrenceville	1	0.085 ppm
	2005	South Fayette	4	0.103 ppm
	2006	Harrison	4	0.093 ppm
	2006	Lawrenceville	2	0.086 ppm
	2006	South Fayette	1	0.087 ppm
	2007	Harrison	4	0.099 ppm
	2007	Lawrenceville	3	0.092 ppm
	2007	South Fayette	1	0.087 ppm
0.075 ppm	2008	Harrison	10	0.091 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
1-Hour Ozone 0.12 ppm	2003	Lawrenceville	1	0.130 ppm
	2003	South Fayette	1	0.132 ppm

24-Hour PM ₁₀	2004	Lincoln	1	162 µg/m ³
150 µg/m ³	2005	Lincoln	1	157 µg/m ³
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	53	450 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
<i>When the AQI is in this range:</i>	<i>...air quality conditions are:</i>	<i>...as symbolized by this color:</i>
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 according to actual monitored results for 2001-2011 are shown in the table below, by number of days.

Year	Good Days	Moderate Days	Unhealthy for Sensitive Groups Days	Unhealthy Days
2001	123	192	45	5
2002	144	172	44	5
2003	156	172	28	9
2004	141	182	36	7
2005	136	182	36	11
2006	156	173	32	4
2007	136	174	47	8
2008	187	157	20	2
2009	214	136	14	1

Year	<i>Good Days</i>	<i>Moderate Days</i>	<i>Unhealthy for Sensitive Groups Days</i>	<i>Unhealthy Days</i>
2010	146	163	48	8
2011	176	156	30	3

The Unhealthy for Sensitive Groups range represents an exceedance level for most pollutants. For PM_{2.5}, an exceedance level corresponds to the Unhealthy range, while the Unhealthy for Sensitive Groups range corresponds to levels of 35.5 to 55.4 µg/m³.

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 2011, broken down by air quality scenario.

2011 Unhealthy Scenarios	<i>Unhealthy for Sensitive Groups Days</i>	<i>Unhealthy Days</i>
Elevated PM _{2.5} - Liberty Only	3	0
Elevated PM _{2.5} - Widespread	5	1
Elevated Sulfur Dioxide Only	8	2
Elevated Ozone Only	12	0
Elevated PM _{2.5} with Elevated Sulfur Dioxide	2	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 also adopted standards for hydrogen sulfide (H₂S) 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.

<i>Pollutant</i>	<i>Primary Sources</i>	<i>Health Effects</i>
	<u><i>Criteria Pollutants</i></u>	
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

<i>Pollutant</i>	<i>Primary Sources</i>	<i>Health Effects</i>
	<u><i>Other</i></u>	
Hydrogen Sulfide – H ₂ S (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 according to pollutant types, current through 2011. Meteorological monitors (wind and temperature) are also included.

	SO ₂	CO	NO _x	O ₃	PM ₁₀	PM _{2.5}	TSP/Pb	H ₂ S	HAPs	Dustfall	Met
Downtown		C									
Flag Plaza		C			C				I(6), I(6)		
Manchester					I(6)						
Lawrenceville	C(T)	C(T)	C	C	C	C, I(1) C, I(6) SPC(3)	I(6) I(6)		I		C
North Park						I(6)					
Monroeville					C						
Avalon	C				I(6)	C, I(3)		C			C
Bridgeville							I(6)				
Harrison			C	C		I(3)					
Natrona							I(6)			I, I	
N. Braddock					C, I(6) I(6)	I(3)					
Liberty	C				C, I(3) I(6)	C, I(1) I(6) SPC(6)		C	C		C
Glassport					C						
Lincoln					C						
Clairton					I(6)	I(6)					
South Fayette	C			C(S)	I(6)	I(3)					C
Collier										I	
West Allegheny								C			
<u>Total</u>	C = 4	C = 3	C = 2	C = 3	C = 7 I = 8	C = 4 I = 10 SPC = 2	I = 4	C = 3	C = 1 I = 3	I = 3	C = 4

KEY C = Continuous; I = Intermittent or Filter-Based

(1), (3), or (6) = Sampling Frequency [for example, (3) means every third day]

SPC = Speciation; (S) = Seasonal Continuous Monitor; (T) = Trace Level Monitor

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 svozar@achd.net.

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 web site: www.epa.gov.

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