

Louisville Metro Air Pollution Control District
PM_{2.5} Monitoring Report
July 2018

This report summarizes PM_{2.5} data collected by Federal Reference Method (FRM) samplers. Measurements are reported as 24-hour averages in micro-grams per cubic meter (µg/m³). The data are subject to further quality assurance checks and are not final.

PM_{2.5} Monthly Data Summary for June 2018

Site Name	Maximum		Minimum		Sample	Monthly
	Conc.	Date	Conc.	Date	Recovery	Average
Firearms Training *	17.6	6/19/18	4.2	6/4/18	NA	9.7
Durrett Lane	18.0	6/19/18	5.5	6/4/18	NA	10.2
Cannons Lane	17.4	6/19/18	4.7	6/4/18	NA	9.1
Watson Lane **	19.1	6/19/18	6.1	6/25/18	NA	12.5
Overall	19.1	6/19/18	4.2	6/4/18	NA	10.4

* Firearms Training replaced Southwick on 1/5/2018

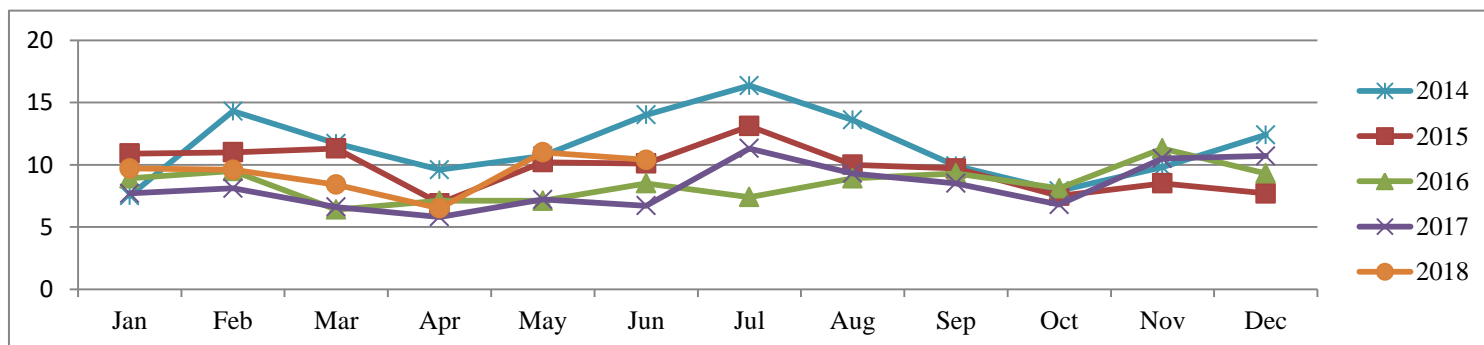
** 2018 Data from FEM BAM Instrument

PM_{2.5} Monthly Averages Tracking Table for 2008-2018

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months >Annual Standard
2008	11.8	12.0	11.9	11.6	12.1	11.8	18.1	17.1	17.6	10.6	14.3	9.4	3
2009	14.6	11.1	11.3	9.3	10.3	13.9	13.1	12.6	12.1	8.9	13.8	12.9	0
2010	13.3	16.3	12.2	12.2	11.0	14.1	16.0	16.4	11.0	17.0	12.6	13.7	4
2011	15.2	10.6	9.7	8.6	12.1	14.1	19.7	16.2	11.5	9.0	7.6	9.9	3
2012	8.9	9.5	9.2	7.2	11.7	10.9	12.5	11.9	8.6	7.3	13.1	9.6	0
2013*	10.5	10.0	8.5	7.6	8.8	11.6	10.1	12.7	11.9	9.3	7.2	10.7	1
2014	7.5	14.3	11.7	9.6	10.7	14.0	16.4	13.6	9.9	7.9	9.8	12.4	5
2015	10.9	11.0	11.3	6.9	10.2	10.1	13.1	10.0	9.7	7.5	8.5	7.7	1
2016	8.9	9.5	6.4	7.1	7.1	8.5	7.4	8.9	9.3	8.1	11.3	9.3	0
2017	7.7	8.1	6.6	5.8	7.2	6.7	11.3	9.3	8.5	6.8	10.5	10.7	0
2018	9.7	9.6	8.4	6.5	11.0	10.4							0
Average	11.3	11.7	11.2	9.4	11.7	13.4	15.5	15.4	12.1	9.8	11.0	11.2	

*The new PM_{2.5} standard of 12 µg/m³ became effective on March 18, 2013

PM_{2.5} Monthly Averages 5-Year Trend



National Ambient Air Quality Standards (NAAQS):

National Ambient Air Quality Standards consist of primary and secondary standards. The primary standards define levels of air quality which EPA judges are necessary, with an adequate margin of safety, to protect the public health. The secondary standards define levels of air quality which EPA judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. For PM_{2.5} the levels of the primary and secondary standards are the same.

National Ambient Air Quality Standard for PM_{2.5} - Annual Standard:

The annual standard is designed to provide an appropriate level of protection from long-term exposure to PM_{2.5}. The standard is met when the annual design value is less than or equal to 12 µg/m³. The standard changed from 15 µg/m³ to 12 µg/m³ on March 18, 2013. The annual design value is calculated by averaging the annual means of 3 consecutive complete years of air quality data. The table below compares data collected from 2012 through year-to-date 2018 to the PM_{2.5} annual standard.

PM_{2.5} Annual Means and Annual Design Values

Site Name	Annual Means µg/m ³							Annual Design Values				
	2012	2013	2014	2015	2016	2017	2018	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Firearms Tr*	12.3	12.3	11.2	10.4	8.3	8.3	9.1	11.9	11.3	10.0	9.0	8.6
Durrett Lane	10.3	10.2	12.0	10.0	9.2	8.9	10.0	10.8	10.7	10.4	9.4	9.4
Cannons Lane	12.3	11.1	11.0	9.5	7.9	7.9	9.0	11.5	10.5	9.5	8.4	8.3
Watson Lane	13.3	12.5	12.2	10.4	8.4	8.1	8.6	12.7	11.7	10.3	9.0	8.4

Bold: Design value for Louisville

* Firearms Training replaced Southwick in 2018

National Ambient Air Quality Standard for PM_{2.5} - 24-Hour (Daily) Standard:

The 24-hour standard is designed to provide an appropriate level of protection from short-term exposure to PM_{2.5}. The standard is met when the 24-hour design value is less than or equal to 35 µg/m³. The design value is based on 3 consecutive complete years of air quality data and is calculated by taking the average of the 98th percentile value for each of the 3 years. The 98th percentile value is the 24-hour average out of a year of PM_{2.5} monitoring data below which 98 percent of all 24-hour averages fall. The table below compares data collected from 2012 through year-to-date 2018 to the 24-hour standard for PM_{2.5}.

PM_{2.5} Annual 98th Percentiles and 24-Hour Design Values

Site Name	Annual 98 th Percentile Value µg/m ³							24-Hour Design Values				
	2012	2013	2014	2015	2016	2017	2018	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Firearms Tr*	24.1	24.0	24.3	22.3	17.0	17.8	17.6	24.1	23.5	21.2	19.0	17.5
Durrett Lane	22.1	20.6	26.0	22.1	18.7	20.7	20.1	22.9	22.9	22.3	20.5	19.8
Cannons Lane	23.2	22.5	23.9	21.7	18.7	17.2	21.6	23.2	22.7	21.4	19.2	19.2
Watson Lane	26.3	23.8	26.2	22.8	16.2	17.7	19.1	25.4	24.3	21.7	18.9	17.7

Bold: Design value for Louisville

* Firearms Training replaced Southwick in 2018

Louisville Metro Air Pollution Control District

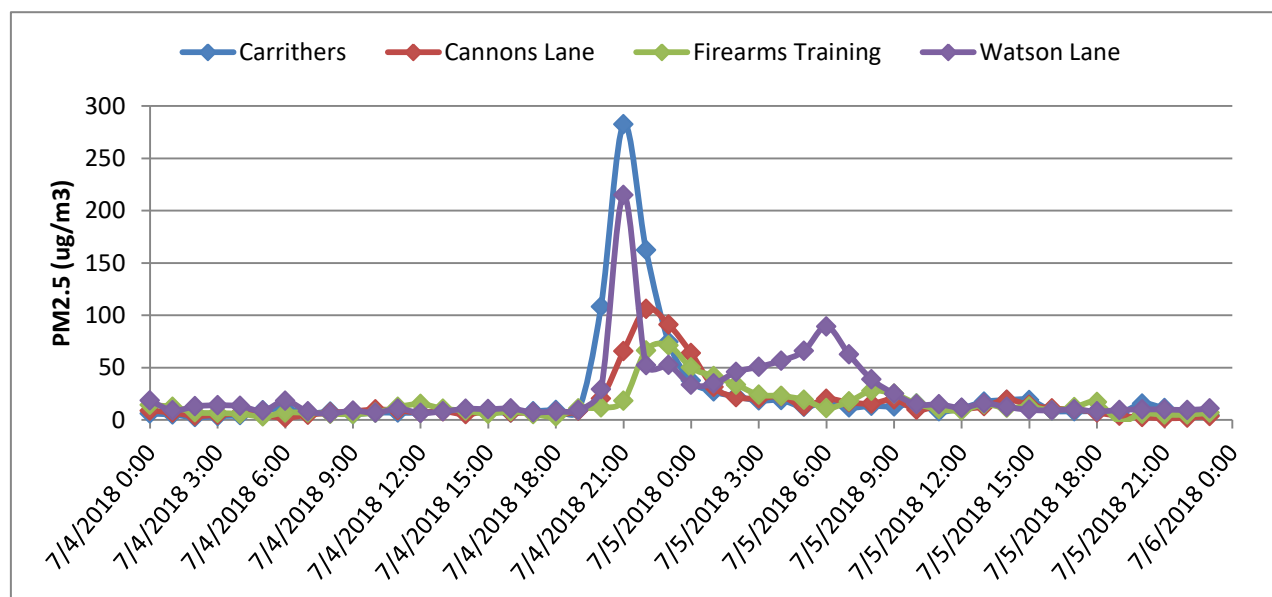
Special Report for PM_{2.5} July 4-5, 2018

This Special Report shows the 24-hour PM_{2.5} averages for July 4th and July 5th. A 24-hour average above 35 µg/m³ exceeds the NAAQS.

Date	Cannons Lane	Firearms Training	Carrithers	Watson Lane
	24 hr avg (ug/m3)	24 hr avg (ug/m3)	24 hr avg (ug/m3)	24 hr avg (ug/m3)
07/04/15	17.3	13.7	32.0	23.1
07/05/15	15.3	16.9	14.6	27.4

*see below for an explanation of filter based FRM versus continuous FEM monitors

The NAAQS is a health based standard. The negative health effects of PM_{2.5} are regulated based on 24-hour averages (35 µg/m³) and annual averages (12 µg/m³). The hourly spikes during July 4th are shown below. Carrithers Middle School had the highest one-hour average of 282.6 µg/m³. PM_{2.5} concentrations slowly declined during the early morning hours of July 5th except at Watson Lane which remained elevated during that time.



*A **filter based FRM (Federal Reference Method) monitor** pulls ambient air through a filter for 24 hours at a constant flow rate. The filter is weighed before and after the sampling and the concentration is calculated using the mass accumulated on the filter and the volume of air sampled. LMAPCD is using a contract lab to weigh the filters. There is typically a three week lag time between data collection and results. LMAPCD currently operates four filter-based PM_{2.5} FRM monitors. Page one of this report show filter based FRM monitor data. The data presented in this Special Report show data collected from **continuous FEM (Federal Equivalent Method) monitors**. These units collect hourly data using beta attenuation technology. The hourly FEM data are used to update the Air Quality Index (alerts) and allows LMAPCD to evaluate spikes on a higher resolution than the traditional FRM 24-hour average filter method. LMAPCD currently operates four PM_{2.5} continuous FEM monitors and three PM₁₀ FEM continuous monitors.

8-Hour Ozone Exceedances:

The National Ambient Air Quality Standard for ozone is measured as an 8-hour average. An ozone exceedance occurs when the highest 8-hour average for each day is greater than the NAAQS. The NAAQS was lowered from 80 ppb to 75 ppb in 2007 and from 75 ppb to 70 ppb in 2016. The data below lists the number of exceedances based on the NAAQS at the time the data was collected.

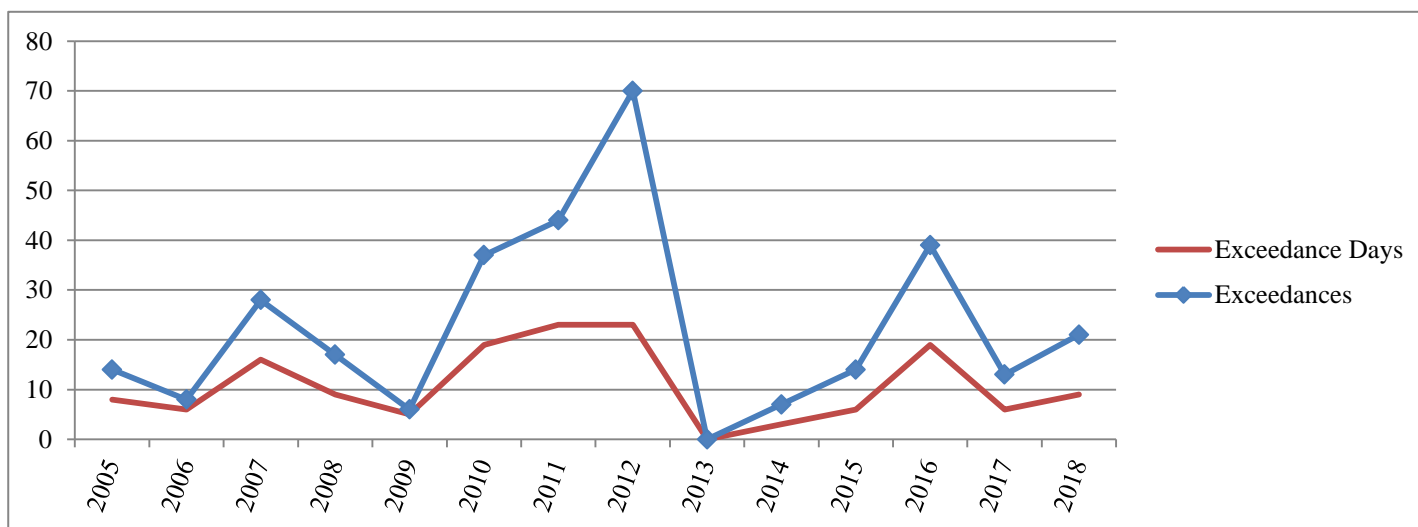
2005-2018 8-Hour Ozone Exceedance Summary through July 15th

Year	Charles-town	New Albany	Bates & Carrithers	Watson	WLKY & Cannons Lane	Buckner	Shepherds-ville	Louisville MSA Total		Jefferson County Total	
								Exceedances	Days	Exceedances	Days
2005	3	2	0	4	1	4	0	14	8	5	4
2006	3	1	0	1	0	3	0	8	6	1	1
2007	8	3	8	4	2	3	0	28	16	14	11
2008	3	3	2	2	1	4	2	17	9	5	5
2009	0	0	2	4	0	0	0	6	5	6	5
2010	4	2	3	3	15	8	2	37	19	21	15
2011	6	5	6	5	8	13	1	44	23	19	14
2012	8	13	7	11	13	14	4	70	23	31	17
2013	0	0	0	0	0	0	0	0	0	0	0
2014	1	2	0	2	2	0	0	7	3	4	3
2015	3	0	4	1	4	2	0	14	6	9	5
2016	7	6	5	3	14	3	1	39	19	22	16
2017	1	5	1	1	4	1	0	13	6	6	4
2018	4	5	2	2	5	1	2	21	9	9	6

* Cannons Lane replaced WLKY in 2010. Data through 2009 are from WLKY.

* Carrithers replaced Bates in 2018. Data through 2017 are from Bates.

Historical Graph of 8-Hour Ozone Exceedances



National Ambient Air Quality Standard for Ozone - 8-Hour Standard:

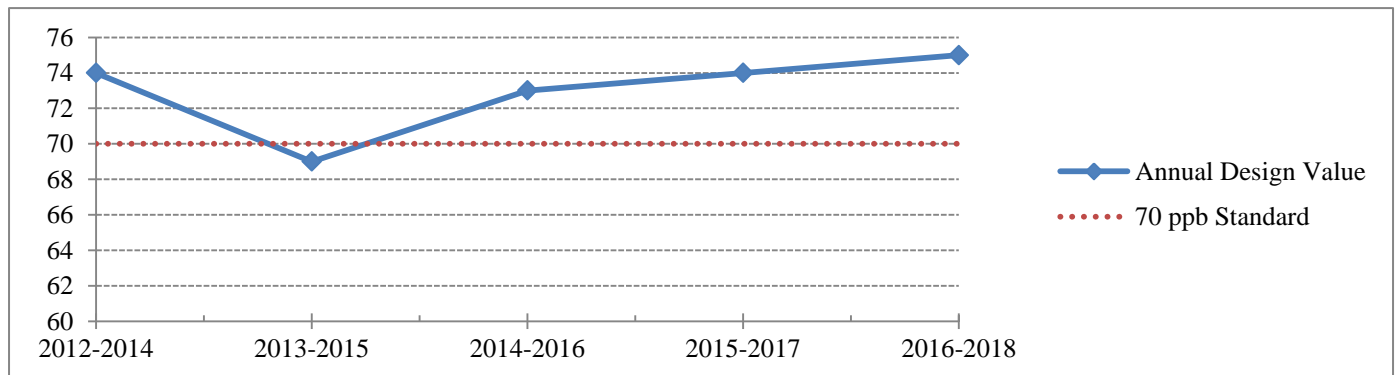
Attainment of the 8-hour standard for ozone at an individual monitor is achieved when the three-year average of the annual fourth-highest daily maximum (4th maximum) 8-hour average ozone concentration is less than 71 ppb. This three-year average is the design value for that monitor. The Louisville MSA row represents the largest 4th maximum and design value* for all monitors within the MSA.

8-Hour Ozone 4th Maximums and Design Values through July 12th

Site Name	4 th Maximums							8-Hour Design Values				
	2012	2013	2014	2015	2016	2017	2018	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Charlestown	85	67	66	74	73	68	71	72	69	71	71	71
New Albany	87	68	66	67	73	74	73	73	67	68	71	73
Bates/Carrithers	86	64	65	71	73	65	68	71	66	69	69	69
Watson Lane	81	65	69	69	70	66	69	71	67	69	68	68
Cannons Lane	90	64	68	76	76	72	77	74	69	73	74	75
Buckner	92	64	68	73	69	64	65	74	68	70	68	66
Shepherdsville	80	64	65	67	67	63	67	69	65	66	65	66
Louisville MSA	92	68	69	76	76	74	77	74	69	73	74	75

* Design Value calculations are approximations based on preliminary summary data and may differ from official design value calculations

8-Hour Ozone Design Value Trend Chart



**Louisville Metro Air Pollution Control District
Air Monitoring Report for Sulfur Dioxide (SO₂)
July 2018**

On June 2, 2010, EPA strengthened the primary National Ambient Air Quality Standard for SO₂. Specifically, EPA replaced the existing annual (30 ppb) and 24-hour (140 ppb) primary standards with a new 1-hour standard set at 75 ppb. The 1-hour standard was set to better protect public health by reducing exposure to high short-term concentrations of SO₂. The new standard took effect August 23, 2010.

Exceedances of the 1-Hour SO₂ Standard:

An exceedance occurs when a measured 1-hour average is greater than 75 ppb. Since up to twenty-four 1-hour averages are recorded each day, multiple exceedances may occur in one day. However, only the maximum 1-hour average (Daily Max) for each day is used in determining if the area is in compliance with the standard. The table below indicates the number of exceedances and the daily maximums reported thus far this year. The data are subject to further quality assurance checks and are not final.

SO₂ Daily Maximums and Exceedances through June 30th

Date	Fire Arms Training		Watson Lane Elementary		Cannons Lane NCore		New Albany Indiana	
	Exceeds	Daily Max	Exceeds	Daily Max	Exceeds	Daily Max	Exceeds	Daily Max
01/02/18		3.0		2.9		2.0		5.7
01/03/18		4.3		16.0		8.0		2.8
01/06/18		9.0		1.7		0.9		2.1
01/16/18		2.4		2.2		12.8		0.9
02/08/18		1.5		2.5		2.8		NA
02/15/18		1.3		4.8		1.6		0.1
02/19/18		1.7		3.0		0.1		4.3
02/27/18		5.1		2.3		0.5		1.0
03/06/18		2.8		4.5		1.0		1.0
03/09/18		2.5		3.6		6.3		2.3
03/23/18		1.7		10.3		1.4		2.5
04/11/18		2.6		4.0		1.3		3.0
04/17/18		2.3		3.0		4.4		NA
04/22/18		3.2		2.4		3.2		1.6
04/26/18		1.3		12.1		1.3		0.3
05/22/18		0.9		1.9		5.2		0.5
05/23/18		6.5		2.2		3.5		2.3
05/25/18		2.6		5.1		2.3		6.3
05/26/18		1.0		21.9		4.6		0.7
06/14/18		9.7		1.9		2.0		1.6
Totals/Max	0	9.7	0	24.3	0	12.8	0	34.8
99 th Percentile		9.0		21.9		9.1		6.3

Attainment of the SO₂ Standard:

Attainment of the new standard is achieved when the 3-year average of the 99th percentile annual distribution of the daily maxima is less than or equal to 75 ppb. Since this value can be calculated from historical data, the chart below indicates those values based on 2012-2018 data.

SO₂ Annual 99th Percentiles and Annual Design Values

Site Name	Annual 99 th Percentiles (ppb)							Annual Design Values				
	2012	2013	2014	2015	2016	2017	2018	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Watson Lane	147	93	149	54	26	13	22	130	99	76	31	20
Fire Arms	35	37	42	25	16	8	9	38	35	28	16	11
Cannons Lane	31	27	29	19	8	7	9	29	25	19	11	8
New Albany	32	21	44	26	11	5	6	32	30	27	14	7