

Louisville Metro Air Pollution Control District
PM_{2.5} Monitoring Report
August 2021

This report summarizes PM_{2.5} data collected by Federal Reference Method (FRM) and Federal Equivalent Method (FEM) instruments. 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 July 2021

Site Name	Maximum		Minimum		Sample Recovery	Monthly Average
	Conc.	Date	Conc.	Date		
Algonquin Parkway	32.9	7/21/21	4.9	7/11/21	NA	14.9
Durrett Lane	34.3	7/21/21	4.8	7/11/21	NA	15.7
Cannons Lane ^T	28.0	7/5/21	4.5	7/11/21	NA	14.2
Watson Lane	36.9	7/21/21	7.1	7/10/21	NA	16.1
Overall	36.9	7/21/21	4.5	7/11/21	NA	15.2

^T Cannons Lane data summary impacted by instrument malfunction during period of higher PM_{2.5} in mid/late July

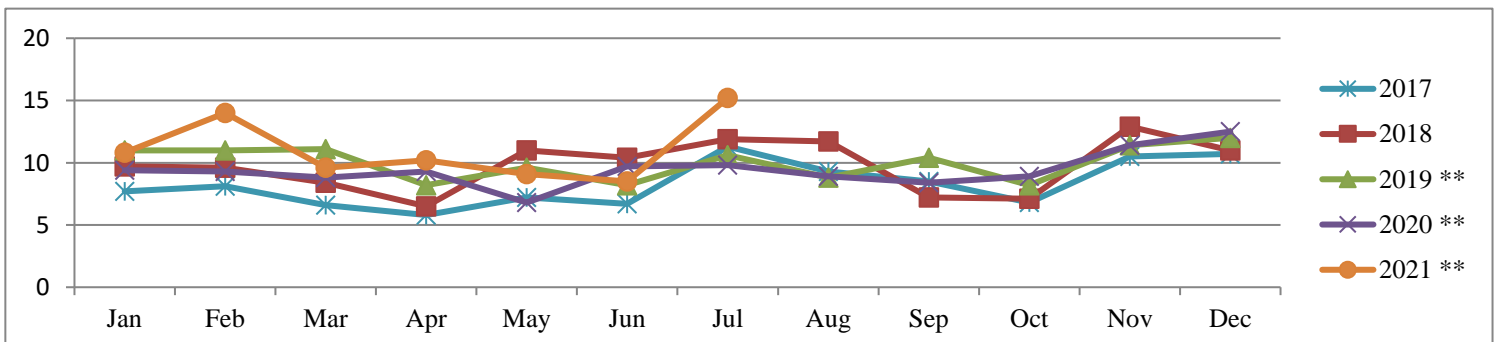
PM_{2.5} Monthly Averages Tracking Table for 2011-2021

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months >Annual Standard
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	0
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	1
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	11.9	11.7	7.2	7.1	12.9	11.0	1
2019 **	11	11.0	11.1	8.2	9.6	8.2	10.6	8.8	10.4	8.2	11.4	12.0	0
2020 **	9.4	9.3	8.8	9.3	6.8	9.7	9.8	8.9	8.4	8.9	11.4	12.5	1
2021 **	10.8	14.0	9.6	10.2	9.1	8.5	15.2						2
Average	10.0	10.6	9.2	7.9	10.3	10.2	12.5	11.2	9.5	8.0	10.4	10.6	

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

** Data from continuous FEM Instruments

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 2015 through year-to-date 2021 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				
	2015	2016	2017	2018	2019	2020	2021	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Algonquin*	10.4	8.3	8.3	9.5	10.2	9.3	10.7	9.0	8.7	9.3	9.6	10.0
Durrett Lane	10.0	9.2	8.9	10.2	10.4	9.7	11.7	9.4	9.4	9.8	10.1	10.6
Cannons Lane	9.5	7.9	7.9	9.1	9.6	9.2	10.7	8.4	8.3	8.8	9.3	9.8
Watson Lane	10.4	8.4	8.1	10.5	10.0	9.6	11.1	9.0	9.0	9.6	10.1	10.2

Bold: Design value for Louisville

* Site name changed from Firearms Training to Algonquin Parkway

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 2015 through year-to-date 2021 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				
	2015	2016	2017	2018	2019	2020	2021	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Algonquin*	22.3	17.0	17.8	23.0	20.2	18.9	27.8	19.0	19.3	20.3	20.7	22.3
Durrett Lane	22.1	18.7	20.7	24.7	22.9	22.4	28.8	20.5	21.4	22.8	23.3	24.7
Cannons Lane	21.7	18.7	17.2	22.2	20.5	20.6	27.2	19.2	19.4	20.0	21.1	22.8
Watson Lane	22.8	16.2	17.7	24.3	21.4	21.3	27.9	18.9	19.4	21.1	22.3	23.5

Bold: Design value for Louisville

* Site name changed from Firearms Training to Algonquin Parkway

Louisville Metro Air Pollution Control District

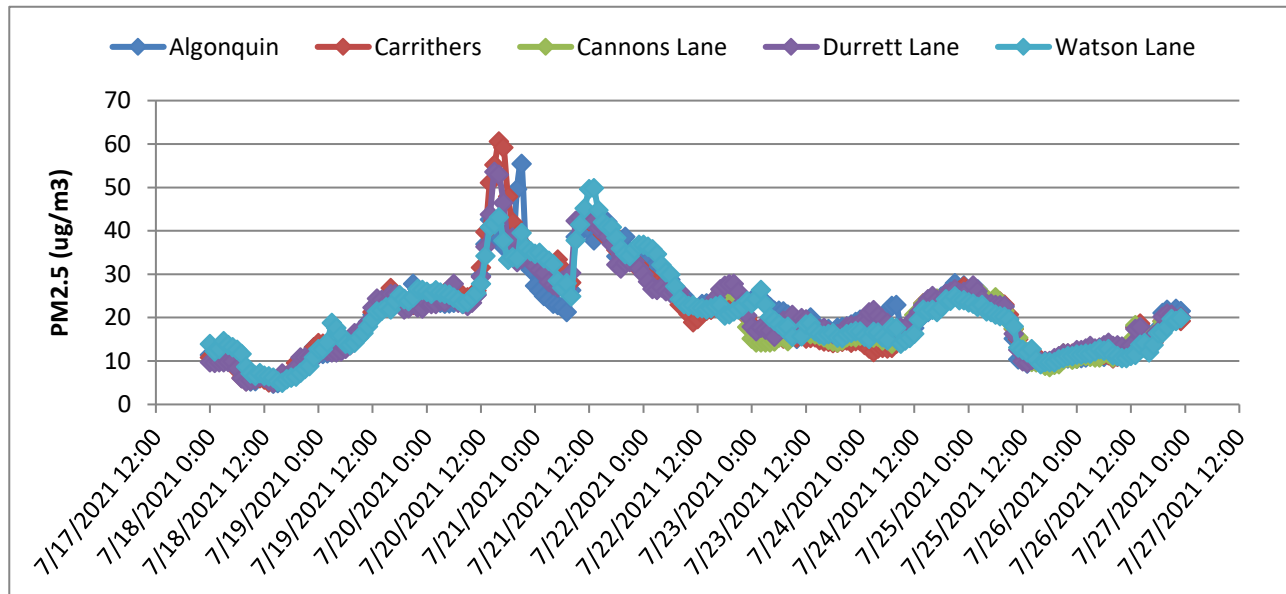
Special Report for July, 2021 Elevated PM Event from Wildfire Smoke

This Special Report shows PM_{2.5} data for a period of time when the Louisville Metropolitan area was impacted by elevated PM concentrations due to long range transport of wildfire smoke.

Date	Cannons Lane	Algonquin Parkway	Carrithers	Watson Lane	Durrett Lane
	24 hr avg (ug/m3)	24 hr avg (ug/m3)	24 hr avg (ug/m3)	24 hr avg (ug/m3)	24 hr avg (ug/m3)
07/20/21	NA	31.5	35.0	30.7	31.7
07/21/21	NA	32.9	34.5	36.9	34.3
07/22/21	23.8	25.5	23.9	25.8	25.9

*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 24-hour average summaries are presented above. The peak hourly concentrations (shown below) occurred during the afternoon hours of 7/20 and 7/21, but moderate smoke impacts continued to occur for a prolonged period, resulting in an unusually high monthly average for July. The data presented here represent a time when the smoke impacts were the most significant.



*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. There is typically a three week lag time between data collection and results. LMAPCD currently operates two filter-based PM_{2.5} FRM monitors. The data presented in this report show data collected from **continuous FEM (Federal Equivalent Method) monitors**. 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 five PM_{2.5} continuous FEM monitors and two PM₁₀ FEM continuous monitors.

Louisville Metro Air Pollution Control District
8-Hour Ozone Monitoring Report
August 2021

This report summarizes ozone data collected by Automated Equivalent Method (AEM) ozone analyzers located within the Louisville Metropolitan Statistical Area. Measurements are reported as 8-hour averages in parts-per-billion (ppb). The data are subject to further quality assurance checks and are not final.

2021 8-Hour Ozone Maximum Values and Exceedances through August 11th

Date	# of 8-Hour Exceeds	# of Days Exceeds	Charlestown Clark County IN	New Albany Floyd County IN	Carrithers Jefferson County KY	Watson Lane Jefferson County KY	Cannons Lane Jefferson County KY	Buckner Oldham County KY	Shepherdsville Bullitt County KY
04/27/21	0	0	56.8	56.5	62.5	56.5	60.3	60.8	62.0
05/22/21	0	0	56.5	59.6	65.6	56.5	63.8	58.1	60.3
05/23/21	0	0	59.1	58.5	66.2	58.5	63.8	58.2	65.3
05/24/21	1	1	60.6	63.3	73.0	57.2	69.0	66.2	65.1
05/25/21	0	0	57.7	56.0	61.3	56.3	60.5	61.2	58.7
06/04/21	2	1	68.5	65.8	75.2	68.6	78.1	65.3	69.1
06/12/21	0	0	53.2	55.5	61.3	64.3	59.3	54.6	63.7
06/13/21	0	0	58.5	56.8	59.0	54.2	63.5	56.0	54.2
06/14/21	0	0	63.3	67.1	68.5	67.2	69.3	63.6	67.2
06/17/21	0	0	67.7	63.5	64.5	57.1	68.1	59.6	57.1
07/23/21	0	0	56.5	64.8	57.6	68.3	61.8	56.2	57.0
07/24/21	0	0	60.1	54.7	68.7	56.0	70.0	67.2	53.6
07/27/21	1	1	59.6	64.8	68.8	72.6	68.6	65.0	62.2
07/28/21	2	1	57.7	57.5	74.2	64.3	70.5	55.0	83.6
Total Exceeds	6	4	0	0	3	1	1	0	1
Truncated 4th Maximum			60	64	68	67	69	65	65

Values in **BOLD/RED** exceed the level of the 2015 ozone standard of 70 ppb (parts-per-billion).

This standard applies to air monitoring data beginning with the 2016 ozone season.

NA - Indicates data were not available.

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.

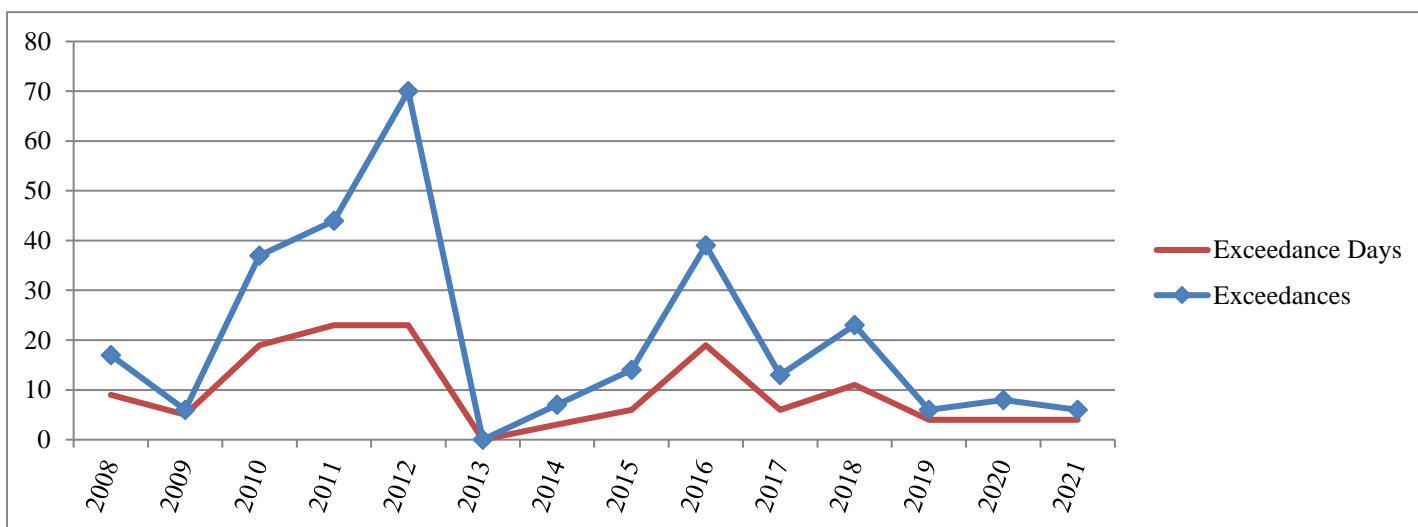
2008-2021 8-Hour Ozone Exceedance Summary through August 11th

Year	Charles-town	New Albany	Bates & Carri-thers	Watson	WLKY& Cannons Lane	Buckner	Shepherds-ville	Louisville MSA Total		Jefferson County Total	
								Exceedances	Days	Exceedances	Days
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	3	2	6	1	2	23	11	11	8
2019	1	0	2	0	2	1	0	6	4	4	2
2020	0	1	1	1	4	0	1	8	4	6	4
2021	0	0	3	1	1	0	1	6	4	5	4

* 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:

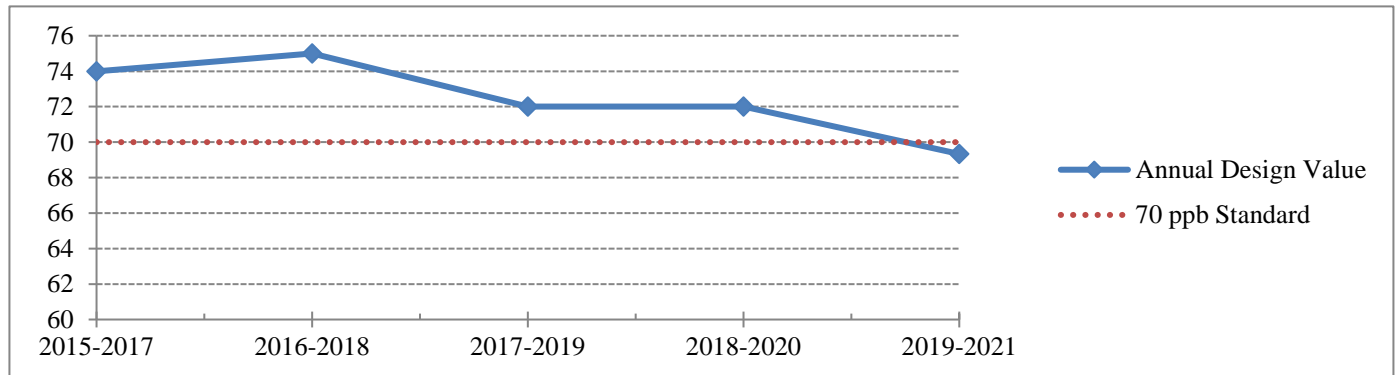
Attainment of the 8-hour standard for ozone at an individual monitor is achieved when the three-year average of the annual fourth-highest daily maximum (4th maximum) 8-hour average ozone concentration is less than 71 ppb. This three-year average is the design value for that monitor. The Louisville MSA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

8-Hour Ozone 4th Maximums and Design Values through August 11th

Site Name	4 th Maximums							8-Hour Design Values				
	2015	2016	2017	2018	2019	2020	2021	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Charlestown	74	73	68	71	64	63	60	71	70	67	66	62
New Albany	67	73	74	73	63	66	64	71	73	70	67	64
Bates/Carrithers	71	73	65	70	64	68	68	69	69	66	67	67
Watson Lane	69	70	66	69	65	63	67	68	68	66	65	65
Cannons Lane	76	76	72	77	68	71	69	74	75	72	72	69
Buckner	73	69	64	69	65	61	65	68	67	66	65	64
Shepherdsville	67	67	63	68	60	65	65	65	66	63	64	63
Louisville MSA	76	76	74	77	68	71	69	74	75	72	72	69

* 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)
August 2021

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 July 31st

Date	Algonquin Parkway		Watson Lane Elementary		Cannons Lane NCore		New Albany Indiana	
	Exceeds	Daily Max	Exceeds	Daily Max	Exceeds	Daily Max	Exceeds	Daily Max
01/04/21		2.3		2.5		1.6		1.0
01/12/21		2.0		NA		5.4		1.0
01/29/21		3.0		0.9		3.6		2.0
02/03/21		0.8		0.0		5.5		0.5
02/08/21		2.4		1.5		1.2		10.4
02/12/21		3.8		4.7		2.6		1.6
02/18/21		8.5		4.2		2.7		2.9
03/05/21		2.2		2.5		4.8		2.9
03/13/21		2.7		1.9		3.3		2.2
03/29/21		0.8		5.3		0.7		1.3
03/30/21		2.3		2.3		1.7		3.1
04/05/21		1.9		12.7		3.3		2.2
04/06/21		2.4		7.1		6.0		2.2
04/07/21		4.6		1.0		1.3		3.4
05/06/21		2.3		8.0		1.9		1.6
05/21/21		3.7		1.8		0.7		1.3
05/26/21		1.0		2.0		10.3		0.5
06/05/21		0.9		9.3		12.1		0.7
06/18/21		1.0		12.2		3.4		0.3
Totals/Max	0	8.5	0	15.7	0	12.1	0	10.4
99 th Percentile		3.8		12.2		7.2		3.1

NA - Indicates data were not available

Louisville Metro Air Pollution Control District Air Monitoring Report for Sulfur Dioxide (SO₂) August 2021

Continuation of SO₂ Daily Maximums and Exceedances through July 31st

Date	Algonquin Parkway		Watson Lane Elementary		Cannons Lane NCore		New Albany Indiana	
	Exceeds	Daily Max	Exceeds	Daily Max	Exceeds	Daily Max	Exceeds	Daily Max
06/20/21		1.4		15.7		4.4		0.2
06/24/21		0.9		1.5		1.0		2.3
06/28/21		2.8		1.2		2.0		1.2
07/15/21		1.2		4.8		7.2		0.4
07/16/21		3.1		2.0		5.9		1.3
07/28/21		1.7		1.7		2.2		2.9
07/29/21		2.2		9.0		3.0		1.0
Totals/Max	0	8.5	0	15.7	0	12.1	0	10.4
99 th Percentile		3.8		12.2		7.2		3.1

NA - Indicates data were not available

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 table below indicates those values based on 2015-2021 data.

SO₂ Annual 99th Percentiles and Annual Design Values

Site Name	Annual 99 th Percentiles (ppb)							Annual Design Values				
	2015	2016	2017	2018	2019	2020	2021	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Watson Lane	54	26	14	16	15	15	12	31	19	15	15	14
Algonquin	25	16	11	12	6	5	4	17	13	10	8	5
Cannons Lane	19	8	7	8	9	8	7	11	8	8	8	8
New Albany	26	11	8	9	7	4	3	15	9	8	7	5

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