

**Louisville Metro Air Pollution Control District**  
**PM<sub>2.5</sub> Monitoring Report**  
**November 2018**

This report summarizes PM<sub>2.5</sub> data collected by Federal Reference Method (FRM) samplers. Measurements are reported as 24-hour averages in micro-grams per cubic meter (µg/m<sup>3</sup>). The data are subject to further quality assurance checks and are not final.

**PM<sub>2.5</sub> Monthly Data Summary for October 2018**

| Site Name           | Maximum |          | Minimum |          | Sample   | Monthly |
|---------------------|---------|----------|---------|----------|----------|---------|
|                     | Conc.   | Date     | Conc.   | Date     | Recovery | Average |
| Firearms Training * | 13.7    | 10/8/18  | 3.6     | 10/11/18 | NA       | 6.9     |
| Durrett Lane        | 12.6    | 10/8/18  | 3.8     | 10/11/18 | NA       | 7.0     |
| Cannons Lane        | 11.4    | 10/8/18  | 3.3     | 10/11/18 | NA       | 6.4     |
| Watson Lane **      | 10.6    | 10/23/18 | 6.1     | 10/29/18 | NA       | 8.0     |
| Overall             | 13.7    | 10/8/18  | 3.3     | 10/11/18 | NA       | 7.1     |

\* Firearms Training replaced Southwick on 1/5/2018

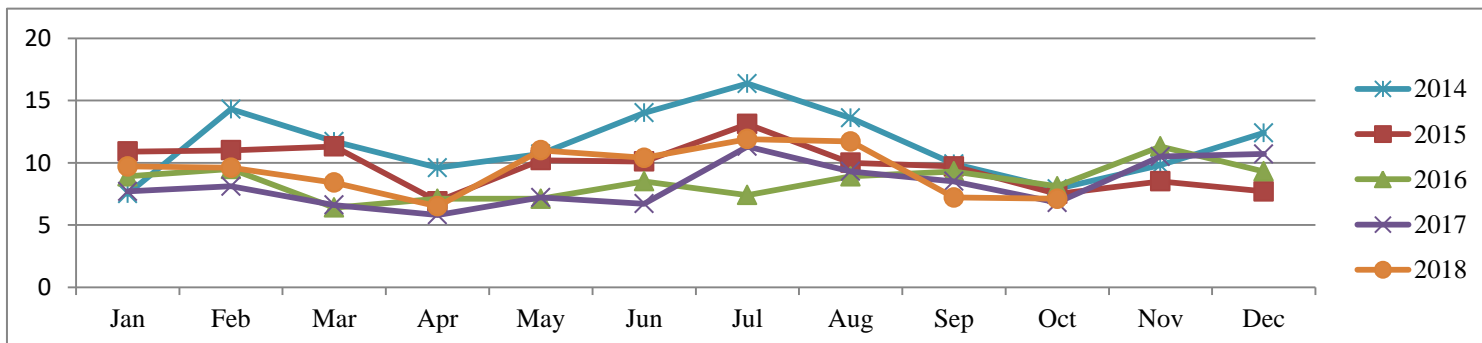
\*\* 2018 Data from FEM BAM Instrument

**PM<sub>2.5</sub> Monthly Averages Tracking Table for 2008-2018**

| Year    | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  | Months<br>>Annual<br>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 | 11.9 | 11.7 | 7.2  | 7.1  |      |      | 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<sub>2.5</sub> standard of 12 µg/m<sup>3</sup> became effective on March 18, 2013

**PM<sub>2.5</sub> 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<sub>2.5</sub> the levels of the primary and secondary standards are the same.

### National Ambient Air Quality Standard for PM<sub>2.5</sub> - Annual Standard:

The annual standard is designed to provide an appropriate level of protection from long-term exposure to PM<sub>2.5</sub>. The standard is met when the annual design value is less than or equal to 12 µg/m<sup>3</sup>. The standard changed from 15 µg/m<sup>3</sup> to 12 µg/m<sup>3</sup> 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<sub>2.5</sub> annual standard.

**PM<sub>2.5</sub> Annual Means and Annual Design Values**

| Site Name    | Annual Means µg/m <sup>3</sup> |      |      |      |      |      |      | 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  | 9.3  | 11.9                 | 11.3        | 10.0        | 9.0        | 8.6        |
| Durrett Lane | 10.3                           | 10.2 | 12.0 | 10.0 | 9.2  | 8.9  | 9.9  | 10.8                 | 10.7        | <b>10.4</b> | <b>9.4</b> | <b>9.3</b> |
| Cannons Lane | 12.3                           | 11.1 | 11.0 | 9.5  | 7.9  | 7.9  | 8.8  | 11.5                 | 10.5        | 9.5         | 8.4        | 8.2        |
| Watson Lane  | 13.3                           | 12.5 | 12.2 | 10.4 | 8.4  | 8.1  | 9.3  | <b>12.7</b>          | <b>11.7</b> | 10.3        | 9.0        | 8.6        |

**Bold:** Design value for Louisville

\* Firearms Training replaced Southwick in 2018

### National Ambient Air Quality Standard for PM<sub>2.5</sub> - 24-Hour (Daily) Standard:

The 24-hour standard is designed to provide an appropriate level of protection from short-term exposure to PM<sub>2.5</sub>. The standard is met when the 24-hour design value is less than or equal to 35 µg/m<sup>3</sup>. The design value is based on 3 consecutive complete years of air quality data and is calculated by taking the average of the 98<sup>th</sup> percentile value for each of the 3 years. The 98<sup>th</sup> percentile value is the 24-hour average out of a year of PM<sub>2.5</sub> 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<sub>2.5</sub>.

**PM<sub>2.5</sub> Annual 98<sup>th</sup> Percentiles and 24-Hour Design Values**

| Site Name    | Annual 98 <sup>th</sup> Percentile Value µg/m <sup>3</sup> |      |      |      |      |      |      | 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 | 20.6 | 24.1                  | 23.5        | 21.2        | 19.0        | 18.5        |
| Durrett Lane | 22.1   | 20.6 | 26.0 | 22.1 | 18.7 | 20.7 | 24.7 | 22.9                  | 22.9        | <b>22.3</b> | <b>20.5</b> | <b>21.4</b> |
| 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 | 20.6 | <b>25.4</b>           | <b>24.3</b> | 21.7        | 18.9        | 18.2        |

**Bold:** Design value for Louisville

\* Firearms Training replaced Southwick in 2018

**Louisville Metro Air Pollution Control District**  
**8-Hour Ozone Monitoring Report**  
**November 2018**

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.

**2018 8-Hour Ozone Maximum Values and Exceedances through October 31st**

| 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 |
|------------------------------|---------------------|-------------------|-----------------------------|----------------------------|--------------------------------|---------------------------------|----------------------------------|--------------------------|----------------------------------|
| 03/15/18                     | 0                   | 0                 | 54.5                        | 54.2                       | 52.1                           | 59.3                            | 57.1                             | 51.8                     | 55.6                             |
| 04/12/18                     | 0                   | 0                 | 55.2                        | 55.1                       | 57.3                           | 53.1                            | 55.5                             | 54.5                     | 57.1                             |
| 05/01/18                     | 0                   | 0                 | 63.3                        | 61.2                       | 67.3                           | 57.6                            | 65.0                             | 63.5                     | 67.6                             |
| 05/15/18                     | 0                   | 0                 | 54.2                        | 52.0                       | 67.3                           | 50.2                            | 64.3                             | 54.3                     | 54.7                             |
| 05/25/18                     | 0                   | 0                 | 66.6                        | 58.5                       | 61.3                           | 52.3                            | 65.8                             | 69.8                     | 57.7                             |
| 06/05/18                     | 0                   | 0                 | 61.7                        | 62.3                       | 66.3                           | 59.6                            | 69.0                             | 60.3                     | 61.5                             |
| 06/07/18                     | 2                   | 1                 | <b>73.5</b>                 | <b>73.1</b>                | 64.3                           | 59.8                            | 69.6                             | 61.0                     | 60.7                             |
| 06/08/18                     | 3                   | 1                 | <b>77.6</b>                 | 69.5                       | 70.3                           | 60.2                            | <b>84.6</b>                      | <b>73.1</b>              | 68.8                             |
| 06/14/18                     | 1                   | 1                 | 62.0                        | 63.7                       | 68.7                           | 69.2                            | 70.7                             | 59.2                     | <b>78.5</b>                      |
| 06/15/18                     | 3                   | 1                 | <b>75.6</b>                 | <b>81.0</b>                | 67.0                           | 65.7                            | <b>77.6</b>                      | 65.5                     | 65.8                             |
| 06/16/18                     | 1                   | 1                 | 66.7                        | <b>83.0</b>                | 60.3                           | 55.3                            | 70.8                             | 57.7                     | 59.7                             |
| 06/17/18                     | 1                   | 1                 | 60.1                        | 61.6                       | 67.5                           | 52.1                            | <b>71.3</b>                      | 65.0                     | 54.8                             |
| 06/28/18                     | 1                   | 1                 | 54.0                        | 59.8                       | 57.1                           | <b>72.2</b>                     | 68.0                             | 52.7                     | 55.2                             |
| 07/11/18                     | 0                   | 0                 | 55.2                        | 60.0                       | 62.6                           | 69.3                            | 59.6                             | 54.6                     | 57.6                             |
| 07/12/18                     | 0                   | 0                 | 61.7                        | 63.0                       | 57.2                           | 68.3                            | 63.2                             | 52.6                     | 56.8                             |
| 07/13/18                     | 5                   | 1                 | 62.6                        | <b>71.8</b>                | <b>72.2</b>                    | <b>92.3</b>                     | <b>78.0</b>                      | 62.8                     | <b>85.6</b>                      |
| 07/14/18                     | 4                   | 1                 | <b>71.7</b>                 | <b>78.5</b>                | <b>81.2</b>                    | 65.5                            | <b>88.3</b>                      | 69.6                     | 61.2                             |
| 08/10/18                     | 1                   | 1                 | 60.3                        | 48.0                       | 69.1                           | 45.2                            | <b>73.0</b>                      | 58.2                     | 56.0                             |
| 09/14/18                     | 1                   | 1                 | 60.3                        | 57.1                       | <b>71.1</b>                    | 67.7                            | 68.1                             | 69.1                     | 68.8                             |
| 10/07/18                     | 0                   | 0                 | 46.8                        | 40.7                       | 43.5                           | 37.2                            | 47.6                             | 46.1                     | 42.3                             |
|                              |                     |                   |                             |                            |                                |                                 |                                  |                          |                                  |
|                              |                     |                   |                             |                            |                                |                                 |                                  |                          |                                  |
|                              |                     |                   |                             |                            |                                |                                 |                                  |                          |                                  |
| <b>Total Exceeds</b>         | 23                  | 11                | 4                           | 5                          | 3                              | 2                               | 6                                | 1                        | 2                                |
| <b>Truncated 4th Maximum</b> |                     |                   | 71                          | 73                         | 70                             | 69                              | 77                               | 69                       | 68                               |

Values in **BOLD/RED** exceed the level of the 2016 ozone standard of 70 ppb (parts-per-billion)

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.

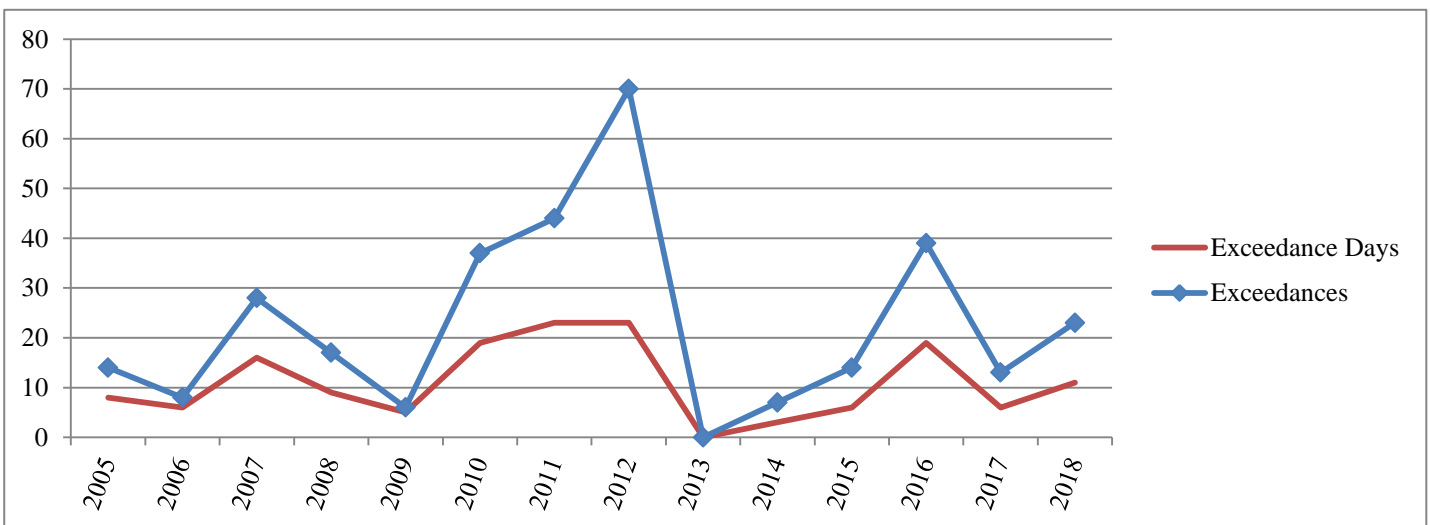
### 2005-2018 8-Hour Ozone Exceedance Summary through October 31st

| Year | Charlestown | New Albany | Bates & Carrithers | Watson | WLKY & Cannons Lane | Buckner | Shepherdsville | 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          | 3                  | 2      | 6                   | 1       | 2              | 23                   | 11   | 11                     | 8    |

\* 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:

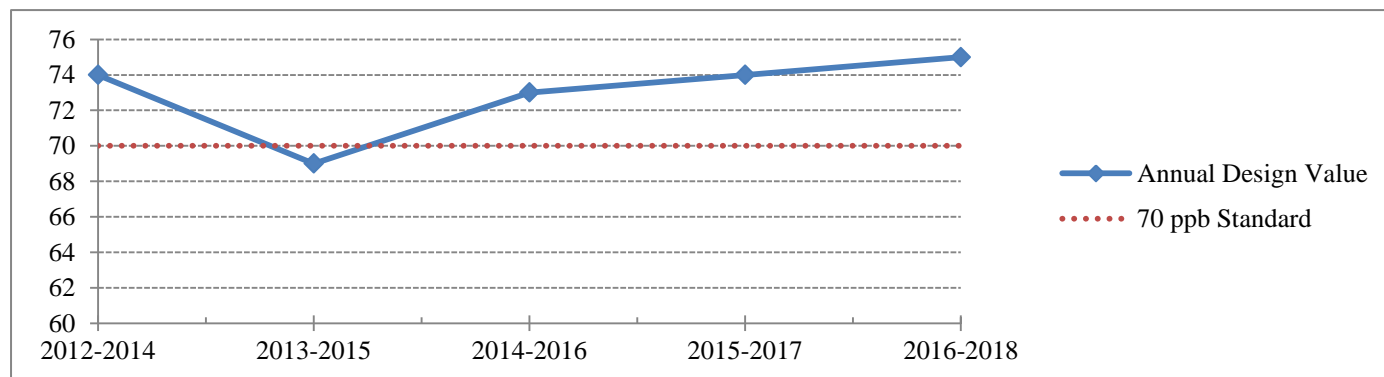
Attainment of the 8-hour standard for ozone at an individual monitor is achieved when the three-year average of the annual fourth-highest daily maximum (4<sup>th</sup> maximum) 8-hour average ozone concentration is less than 71 ppb. This three-year average is the design value for that monitor. The Louisville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

### 8-Hour Ozone 4<sup>th</sup> Maximums and Design Values through October 31st

| Site Name             | 4 <sup>th</sup> 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                   | <b>69</b> | 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   | 70   | 71                   | <b>66</b> | 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   | <b>74</b>            | <b>69</b> | <b>73</b> | <b>74</b> | <b>75</b> |
| Buckner               | 92                       | 64   | 68   | 73   | 69   | 64   | 69   | <b>74</b>            | <b>68</b> | 70        | 68        | 67        |
| Shepherdsville        | 80                       | 64   | 65   | 67   | 67   | 63   | 68   | 69                   | 65        | 66        | 65        | 66        |
| <b>Louisville MSA</b> | 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



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.

### SO<sub>2</sub> Daily Maximums and Exceedances through October 31st

| 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                  | 17.8      | 0                      | 24.3      | 0                  | 12.8      | 0                  | 34.8      |
| 99 <sup>th</sup> Percentile |                    | 9.0       |                        | 16.0      |                    | 6.6       |                    | 5.7       |

NA - Indicates data were not available



### Attainment of the SO<sub>2</sub> Standard:

Attainment of the new standard is achieved when the 3-year average of the 99<sup>th</sup> 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.

#### SO<sub>2</sub> Annual 99<sup>th</sup> Percentiles and Annual Design Values

| Site Name    | Annual 99 <sup>th</sup> 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   | 16   | 130                  | 99        | 76        | 31        | 18        |
| Fire Arms    | 35  | 37   | 42   | 25   | 16   | 8    | 9    | 38                   | 35        | 28        | 16        | 11        |
| Cannons Lane | 31  | 27   | 29   | 19   | 8    | 7    | 7    | 29                   | 25        | 19        | 11        | 7         |
| New Albany   | 32  | 21   | 44   | 26   | 11   | 5    | 6    | 32                   | 30        | 27        | 14        | 7         |

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