Indiana Department of Environmental Management

# The States' View of the Air

## Massachusetts

2019

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Office of Air Quality
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# EXECUTIVE SUMMARY

**Air quality across the nation has improved over the past ten years or more. Unfortunately the message often found in the press, is that the air quality is terrible. This analysis demonstrates the progress made from 2000 through 2017 for ozone and fine particles (PM-2.5).**

**Figures 1 through 3 show the progress made for ozone, 24-hour PM-2.5 and annual PM-2.5. The bars represent the population of each period (based on the last year in the period). The portion that is green represents the number of people living in counties that measure air quality better than the standard. The portion of the bar that is red represents the number of people living in counties that measure air quality at levels above the standard. The blue portion of the bar represents the number of people that live in counties where air quality is not measured.**

**These assessments have been based on results of individual monitors. For example, if a county has two ozone monitors and data for one is rated as a C and the other as a D, the population of the county is split in half and half is assigned to each category; meeting the standard and not meeting the standard. Compliance with standards is determined on a three year basis. In 2000 – 2002 approximately 110 million people lived in counties that measured ozone air quality levels better than the standard. By 2015 – 2017 this had increased to 158 million people.**

**The situation for fine particles (PM-2.5) is very similar. In 2000 – 2002, 184 million people lived in counties where 24-hour PM-2.5 levels were measured below the standard. By 2015 – 2017 this had increased to 197 million people.**

**In the 2000 – 2002 period, 137 million people lived in counties where annual PM-2.5 levels were measured below the standard. By 2015 – 2017 this had increased to 196 million people. Approximately 6.8 million people lived in counties where annual PM-2.5 levels were measured above the standard. Much of this increase is due to the implementation of the new annual PM-2.5 standard.**

**Even with the improvements made in air quality, there are still areas of the country that need further improvement. Table 1 shows states that have 8 hour ozone nonattainment areas based on 2015 – 2017 data. Twenty-eight states are included.**

**Table 2 shows those states that violate the 24-hour PM-2.5 standard based on 2015 – 2017 data. Only six states are included.**

**Table 3 shows those states that violate the annual PM-2.5 standard based on 2015 – 2017 data. Only three states are included.**

**Table 4 summarizes for each state, the number of counties exceeding the standard, the number of counties monitored, the total number of counties, the number of people living in counties above the standard and the total population of each state.**

**The bottom line is that most areas of the country were meeting the PM-2.5 standard at the 2015 – 2017 review. There are still several areas of the country that violate the current ozone standard. Many areas have made considerable progress in lowering ozone levels, but further work remains to be done. During 2017, the U.S. Environmental Protection Agency (EPA) lowered the 8-hour ozone standard. This analysis compares historical air quality levels with the appropriate standard for each time period.**

**Table 1**
**Counties Exceeding the Ozone Standard**
**2015 – 2017**

| County | State | 2017 Population | Ozone DV |
|---|---|---|---|
| Gila | AZ | 53,501 | 0.073 |
| Maricopa | AZ | 4,307,033 | 0.075 |
| Pinal | AZ | 430,237 | 0.074 |
| Yuma | AZ | 207,534 | 0.072 |
| Alameda | CA | 1,663,190 | 0.075 |
| Amador | CA | 38,626 | 0.072 |
| Butte | CA | 229,294 | 0.076 |
| Calaveras | CA | 45,670 | 0.078 |
| El Dorado | CA | 188,987 | 0.083 |
| Fresno | CA | 989,255 | 0.091 |
| Imperial | CA | 182,830 | 0.077 |
| Kern | CA | 893,119 | 0.090 |
| Kings | CA | 150,101 | 0.084 |
| Los Angeles | CA | 10,163,507 | 0.101 |
| Madera | CA | 156,890 | 0.084 |
| Mariposa | CA | 17,569 | 0.075 |
| Merced | CA | 272,673 | 0.081 |
| Nevada | CA | 99,814 | 0.087 |
| Orange | CA | 3,190,400 | 0.078 |
| Placer | CA | 386,166 | 0.079 |
| Riverside | CA | 2,423,266 | 0.101 |
| Sacramento | CA | 1,530,615 | 0.082 |
| San Bernardino | CA | 2,157,404 | 0.112 |
| San Diego | CA | 3,337,685 | 0.084 |
| San Joaquin | CA | 745,424 | 0.077 |
| San Luis Obispo | CA | 283,405 | 0.072 |
| Shasta | CA | 179,921 | 0.074 |
| Stanislaus | CA | 547,899 | 0.084 |
| Tulare | CA | 464,493 | 0.089 |
| Tuolumne | CA | 54,248 | 0.080 |
| Ventura | CA | 854,223 | 0.077 |
| Douglas | CO | 335,299 | 0.077 |
| Jefferson | CO | 574,613 | 0.079 |
| Larimer | CO | 343,976 | 0.075 |
| Fairfield | CT | 949,921 | 0.083 |
| Hartford | CT | 895,388 | 0.072 |
| Litchfield | CT | 182,177 | 0.072 |
| Middlesex | CT | 163,410 | 0.079 |
| New Haven | CT | 860,435 | 0.082 |
| New London | CT | 269,033 | 0.076 |
| Tolland | CT | 151,461 | 0.071 |
| New Castle | DE | 559,793 | 0.072 |
| District of Columbia | DC | 693,972 | 0.071 |
| DeKalb | GA | 753,253 | 0.071 |
| Fulton | GA | 1,041,423 | 0.075 |
| Gwinnett | GA | 920,260 | 0.071 |
| Henry | GA | 225,813 | 0.071 |
| Cook | IL | 5,211,263 | 0.073 |
| Lake | IL | 703,520 | 0.073 |
| Clark | IN | 116,973 | 0.071 |
| Floyd | IN | 77,071 | 0.071 |
| Jefferson | KY | 171,158 | 0.074 |

**Table 1 (Continued)**

| County | State | 2017 Population | Ozone DV |
|---|---|---|---|
| Hancock | ME | 54,497 | 0.072 |
| Anne Arundel | MD | 573,235 | 0.072 |
| Baltimore | MD | 832,468 | 0.072 |
| Cecil | MD | 102,746 | 0.074 |
| Harford | MD | 252,160 | 0.075 |
| Montgomery | MD | 4,058,810 | 0.072 |
| Prince Georges | MD | 912,756 | 0.071 |
| Bristol | MA | 561,483 | 0.073 |
| Hampden | MA | 469,818 | 0.072 |
| Allegan | MI | 116,447 | 0.073 |
| Berrien | MI | 154,259 | 0.073 |
| Cass | MI | 51,381 | 0.072 |
| Macomb | MI | 871,375 | 0.071 |
| Muskegon | MI | 173,693 | 0.074 |
| St. Clair | MI | 159,350 | 0.071 |
| Wayne | MI | 1,753,616 | 0.073 |
| St. Charles | MO | 395,504 | 0.072 |
| Clark | NV | 1,204,079 | 0.073 |
| Bergen | NJ | 948,406 | 0.074 |
| Camden | NJ | 510,719 | 0.076 |
| Gloucester | NJ | 292,206 | 0.074 |
| Hunterdon | NJ | 125,059 | 0.071 |
| Mercer | NJ | 374,733 | 0.073 |
| Middlesex | NJ | 842,798 | 0.075 |
| Ocean | NJ | 597,943 | 0.072 |
| Dona Ana | NM | 215,579 | 0.072 |
| Queens | NY | 2,358,682 | 0.074 |
| Richmond | NY | 479,458 | 0.076 |
| Rockland | NY | 328,868 | 0.072 |
| Suffolk | NY | 1,492,953 | 0.076 |
| Westchester | NY | 974,542 | 0.073 |
| Butler | OH | 380,604 | 0.071 |
| Franklin | OH | 1,291,981 | 0.071 |
| Geauga | OH | 93,918 | 0.073 |
| Hamilton | OH | 813,822 | 0.073 |
| Lake | OH | 230,117 | 0.074 |
| Warren | OH | 228,882 | 0.071 |
| Clackamas | OR | 412,672 | 0.072 |
| Bucks | PA | 628,341 | 0.078 |
| Delaware | PA | 564,696 | 0.071 |
| Northampton | PA | 303,405 | 0.071 |
| Philadelphia | PA | 1,580,863 | 0.076 |
| Kent | RI | 163,790 | 0.073 |
| Providence | RI | 637,357 | 0.073 |
| Washington | RI | 126,150 | 0.073 |
| Bexar | TX | 1,958,578 | 0.074 |
| Brazoria | TX | 362,457 | 0.073 |
| Dallas | TX | 2,618,148 | 0.074 |
| Denton | TX | 636,210 | 0.075 |
| El Paso | TX | 840,410 | 0.071 |
| Galveston | TX | 335,036 | 0.076 |
| Harris | TX | 4,652,980 | 0.078 |
| Johnson | TX | 167,301 | 0.073 |
| Montgomery | TX | 570,934 | 0.074 |
| Tarrant | TX | 2,054,475 | 0.074 |

**Table 1 (Continued)**

| County | State | 2017 Population | Ozone DV |
|---|---|---|---|
| Duchesne | UT | 20,076 | 0.077 |
| Salt Lake | UT | 1,135,649 | 0.078 |
| Uintah | UT | 35,150 | 0.088 |
| Utah | UT | 606,425 | 0.072 |
| Weber | UT | 251,769 | 0.073 |
| Arlington | VA | 234,965 | 0.071 |
| Fairfax | VA | 1,148,433 | 0.071 |
| King | WA | 2,188,649 | 0.075 |
| Kenosha | WI | 168,521 | 0.078 |
| Manitowoc | WI | 79,175 | 0.074 |
| Milwaukee | WI | 952,085 | 0.071 |
| Ozaukee | WI | 88,429 | 0.073 |
| Racine | WI | 196,071 | 0.074 |
| Sheboygan | WI | 115,344 | 0.080 |

**Table 2**
**Counties Exceeding the 24-hour PM-2.5 Standard**
**2015 – 2017**

| County | State | 2017 Population | 24-hr PM-2.5 DV |
|---|---|---|---|
| Fairbanks | AK | 99,703 | 86 |
| Fresno | CA | 989,255 | 52 |
| Kern | CA | 893,119 | 59 |
| Kings | CA | 150,101 | 54 |
| Madera | CA | 156,890 | 42 |
| Merced | CA | 272,673 | 39 |
| Plumas | CA | 18,742 | 39 |
| Riverside | CA | 2,423,266 | 37 |
| San Joaquin | CA | 745,424 | 38 |
| Stanislaus | CA | 546,899 | 45 |
| Tulare | CA | 484,493 | 54 |
| Lewis & Clark | MT | 67,773 | 36 |
| Crook | OR | 23,123 | 41 |
| Jackson | OR | 217,479 | 59 |
| Josephine | OR | 86,352 | 49 |
| Lake | OR | 7,863 | 37 |
| Lane | OR | 374,748 | 52 |
| Salt Lake | UT | 606,425 | 36 |
| Yakima | WA | 250,193 | 39 |

**Table 3**
**Counties Exceeding the Annual PM-2.5 Standard**
**2015 – 2017**

| County | State | 2017 Population | Annual PM-2.5 DV |
|---|---|---|---|
| Fairbanks | AK | 99,703 | 15.6 |
| Fresno | CA | 989,255 | 14.0 |
| Kern | CA | 893,119 | 17.3 |
| Kings | CA | 150,101 | 16.4 |
| Los Angeles | CA | 10,163,507 | 12.3 |
| Madera | CA | 156,890 | 12.8 |
| Merced | CA | 272,673 | 12.6 |
| Riverside | CA | 2,423,266 | 13.5 |
| San Bernardino | CA | 2,157,144 | 14.1 |
| San Joaquin | CA | 745,424 | 12.6 |
| Stanislaus | CA | 547,899 | 13.2 |
| Tulare | CA | 484,493 | 15.7 |
| Allegheny | PA | 1,223,048 | 12.8 |
| Lancaster | PA | 538,500 | 13.0 |

**Table 4**
**Counties Exceeding the Ozone or PM-2.5 Standards**
**2015 – 2017**

| | Ozone | | | | | PM-2.5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| State | No Above | No Monit. | Total Cnts | Pop Above | Total Pop | No Above | No Monit. | Total Cnts. | Pop Above | Total Pop |
| AL | 0 | 14 | 67 | 0 | 4,874,747 | 0 | 12 | 67 | 0 | 4,874,747 |
| AK | 0 | 3 | 27 | 0 | 739,795 | 1 | 3 | 27 | 99,703 | 739,795 |
| AZ | 4 | 10 | 15 | 4,998,305 | 7,016,270 | 0 | 7 | 15 | 0 | 7,016,270 |
| AR | 0 | 6 | 75 | 0 | 3,004,279 | 0 | 9 | 15 | 0 | 3,004,279 |
| CA | 27 | 45 | 58 | 31,246,694 | 39,536,653 | 12 | 84 | 58 | 19,002,773 | 39,536,653 |
| CO | 3 | 14 | 64 | 1,253,888 | 5,607,154 | 0 | 8 | 64 | 0 | 5,607,154 |
| CT | 7 | 11 | 8 | 3,471,925 | 3,588,184 | 0 | 5 | 8 | 0 | 3,588,184 |
| DE | 1 | 3 | 3 | 519,793 | 961,939 | 0 | 3 | 3 | 0 | 961,939 |
| DC | 1 | 1 | 1 | 693,972 | 693,972 | 0 | 1 | 1 | 0 | 693,972 |
| FL | 0 | 34 | 67 | 0 | 20,984,400 | 0 | 14 | 67 | 0 | 20,984,400 |
| GA | 4 | 20 | 159 | 2,940,749 | 10,429,379 | 0 | 16 | 159 | 0 | 10,429,379 |
| HI | 0 | 1 | 5 | 0 | 1,427,538 | 0 | 4 | 5 | 0 | 1,427,538 |
| ID | 0 | 2 | 44 | 0 | 1,716,943 | 0 | 6 | 44 | 0 | 1,716,943 |
| IL | 2 | 23 | 102 | 5,914,783 | 12,802,023 | 0 | 8 | 102 | 0 | 12,802,023 |
| IN | 2 | 29 | 92 | 194,044 | 6,666,818 | 0 | 23 | 92 | 0 | 6,666,818 |
| IA | 0 | 9 | 99 | 0 | 3,145,711 | 0 | 12 | 99 | 0 | 3,145,711 |
| KS | 0 | 8 | 105 | 0 | 2,913,123 | 0 | 4 | 105 | 0 | 2,913,123 |
| KY | 1 | 27 | 120 | 171,158 | 4,454,189 | 0 | 16 | 120 | 0 | 4,454,189 |
| LA | 0 | 18 | 64 | 0 | 4,684,333 | 0 | 12 | 64 | 0 | 4,684,333 |
| ME | 1 | 10 | 16 | 54,497 | 1,335,907 | 0 | 6 | 16 | 0 | 1,335,907 |
| MD | 6 | 15 | 23 | 3,732,175 | 6,052,177 | 0 | 11 | 23 | 0 | 6,052,177 |
| MA | 2 | 11 | 14 | 1,031,301 | 6,859,819 | 0 | 8 | 14 | 0 | 6,859,819 |
| MI | 7 | 25 | 83 | 3,286,121 | 9,962,311 | 0 | 16 | 83 | 0 | 9,962,311 |
| MN | 0 | 15 | 87 | 0 | 5,576,606 | 0 | 15 | 87 | 0 | 5,576,606 |
| MS | 0 | 9 | 82 | 0 | 2,984,100 | 0 | 7 | 82 | 0 | 2,984,100 |
| MO | 1 | 17 | 114 | 395,504 | 6,113,532 | 0 | 7 | 114 | 0 | 6,113,532 |
| MT | 0 | 7 | 56 | 0 | 1,050,493 | 1 | 11 | 56 | 67,773 | 1,050,493 |
| NE | 0 | 3 | 93 | 0 | 1,920,076 | 0 | 5 | 93 | 0 | 1,920,076 |
| NV | 1 | 6 | 16 | 1,204079 | 2,998,039 | 0 | 4 | 16 | 0 | 2,998,039 |
| NH | 0 | 6 | 10 | 0 | 1,342,795 | 0 | 5 | 10 | 0 | 1,342,795 |
| NJ | 7 | 15 | 21 | 3,691,864 | 9,005,644 | 0 | 12 | 21 | 0 | 9,005,644 |
| NM | 1 | 9 | 33 | 0 | 2,088,070 | 0 | 2 | 33 | 0 | 2,088,070 |
| NY | 5 | 26 | 62 | 5,640,205 | 19,849,399 | 0 | 13 | 62 | 0 | 19,849,399 |
| NC | 0 | 31 | 100 | 0 | 10,273,419 | 0 | 14 | 100 | 0 | 10,273,419 |
| ND | 0 | 8 | 53 | 0 | 755,393 | 0 | 9 | 53 | 0 | 755,393 |
| OH | 6 | 34 | 88 | 3,039,324 | 11,658,609 | 0 | 22 | 88 | 0 | 11,658,609 |
| OK | 0 | 7 | 77 | 0 | 3,930,864 | 0 | 7 | 77 | 0 | 3,930,864 |
| OR | 1 | 8 | 36 | 412,672 | 4,142,776 | 5 | 9 | 36 | 709,565 | 4,142,776 |
| PA | 4 | 35 | 67 | 3,277,305 | 12,805,537 | 1 | 22 | 67 | 1,223,048 | 12,805,537 |
| RI | 3 | 3 | 5 | 927,267 | 1,059,639 | 0 | 3 | 5 | 0 | 1,059,639 |
| SC | 0 | 15 | 46 | 0 | 5,024,369 | 0 | 8 | 46 | 0 | 5,024,369 |
| SD | 0 | 6 | 66 | 0 | 869,666 | 0 | 9 | 66 | 0 | 869,666 |
| TN | 0 | 15 | 95 | 0 | 6,715,984 | 0 | 14 | 95 | 0 | 6,715,984 |
| TX | 10 | 32 | 254 | 13,996,529 | 28,304,596 | 0 | 11 | 254 | 0 | 28,304,596 |
| UT | 5 | 9 | 29 | 2,049,019 | 3,101,833 | 1 | 5 | 29 | 606,425 | 3,101,833 |
| VT | 0 | 2 | 14 | 0 | 623,657 | 0 | 3 | 14 | 0 | 623,657 |
| VA | 2 | 22 | 134 | 1,383,398 | 8,470,020 | 0 | 14 | 134 | 0 | 8,470,020 |
| WA | 1 | 8 | 39 | 2,188,649 | 7,278,000 | 1 | 6 | 39 | 250,193 | 7,405,743 |
| WV | 0 | 10 | 55 | 0 | 1,815,857 | 0 | 11 | 55 | 0 | 1,815,857 |
| WI | 6 | 26 | 72 | 1,499,623 | 5,795,483 | 0 | 8 | 72 | 0 | 5,795,483 |
| WY | 0 | 12 | 23 | 0 | 579,315 | 0 | 10 | 23 | 0 | 579,315 |

**Figure 1**

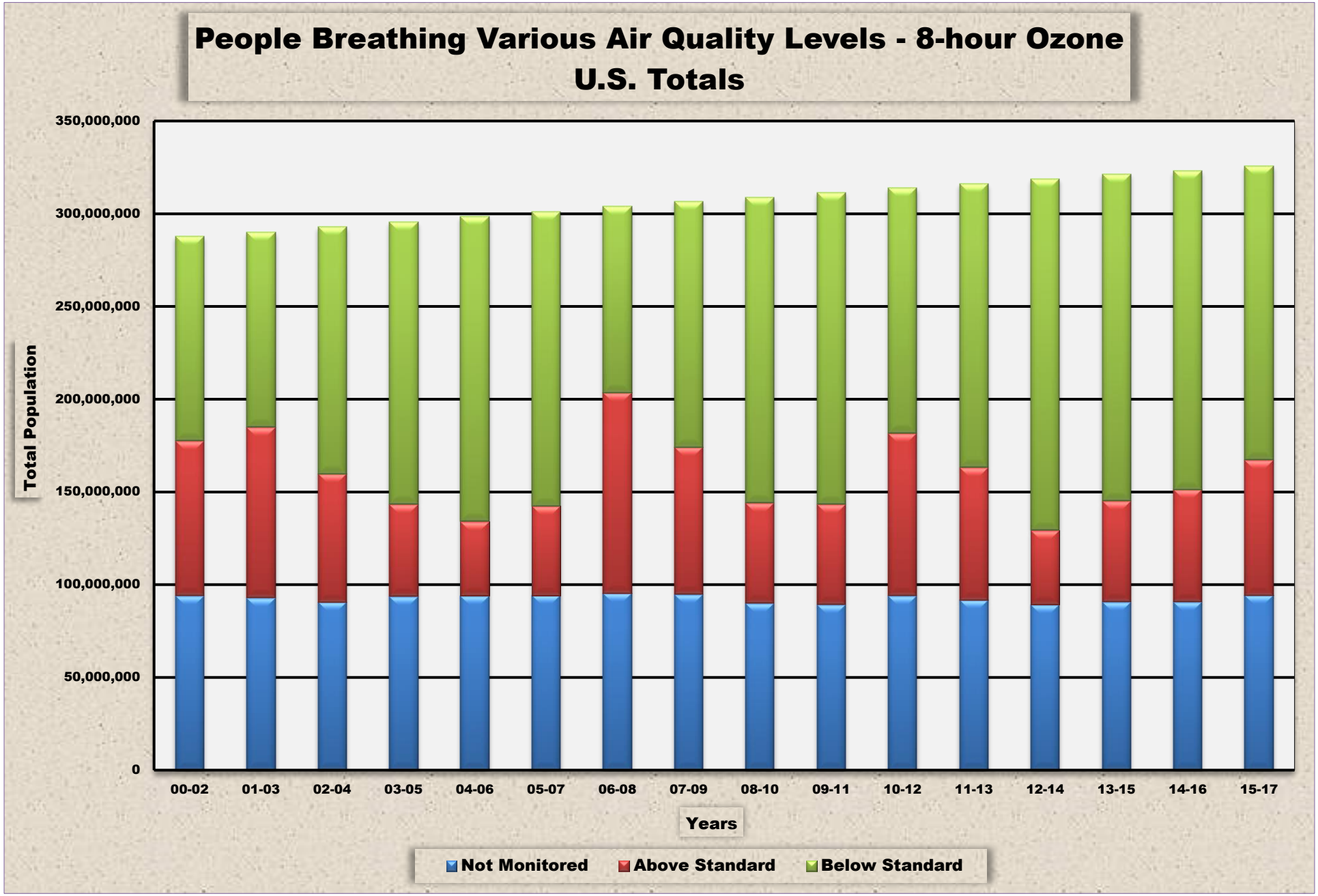

People Breathing Various Air Quality Levels - 8-hour Ozone
U.S. Totals
Total Population
350,000,000
300,000,000
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard
Below Standard

**Figure 2**

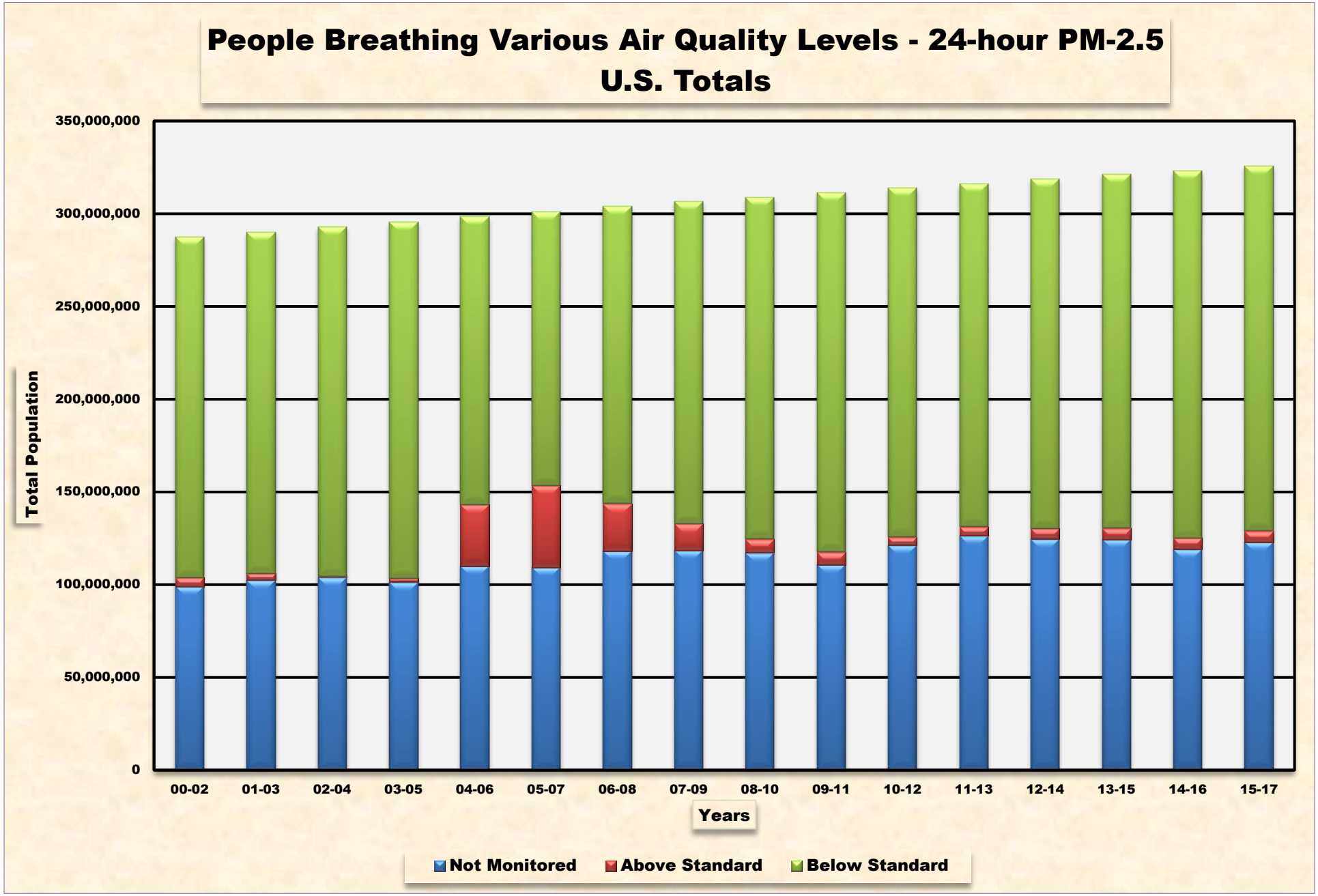
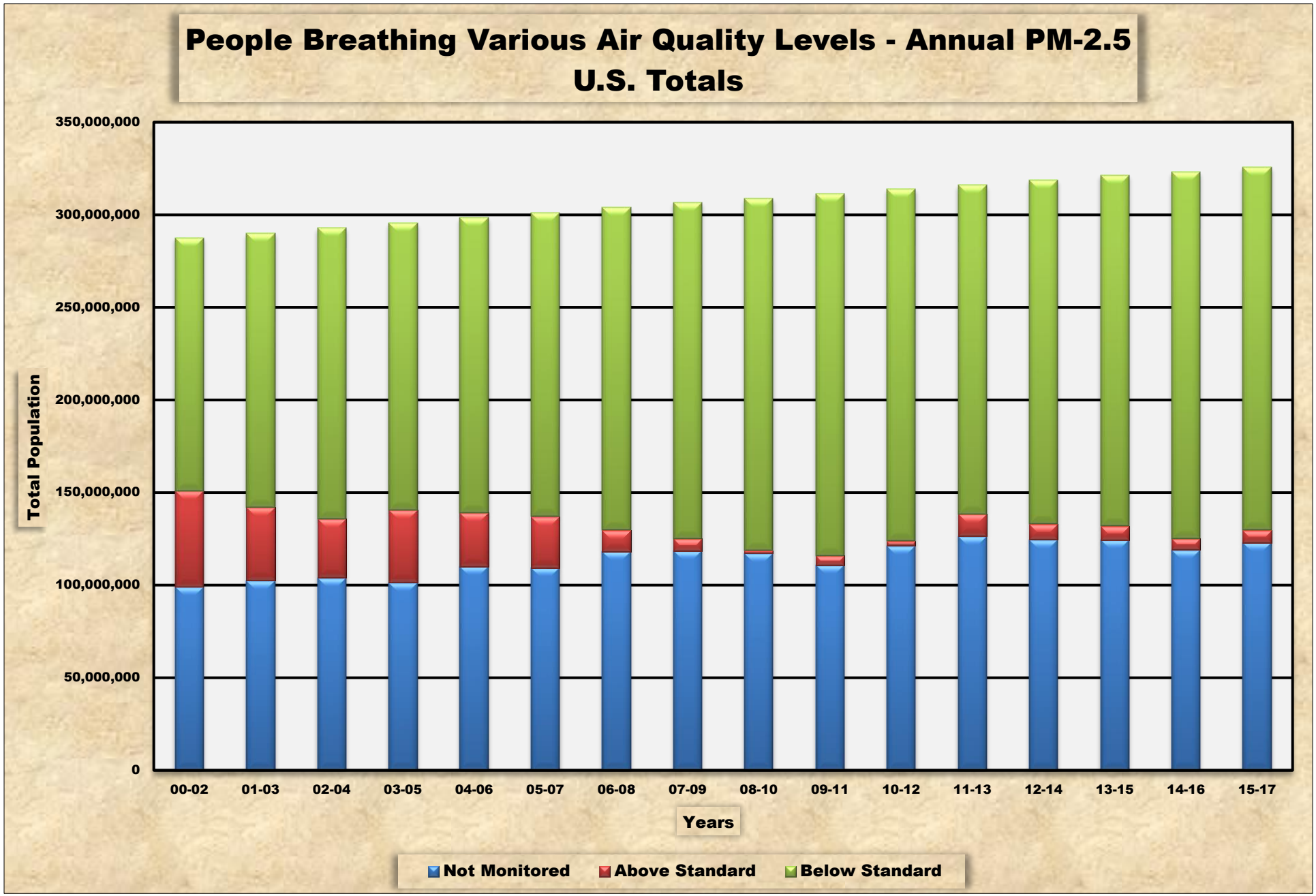

People Breathing Various Air Quality Levels - 24-hour PM-2.5
U.S. Totals
Total Population
350,000,000
300,000,000
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard
Below Standard

**Figure 3**


People Breathing Various Air Quality Levels - Annual PM-2.5
U.S. Totals
350,000,000
300,000,000
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
Total Population
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard
Below Standard

# The States' View of the Air – 2019

This is the eighth year for this report. It was originally intended as a complimentary document to the American Lung Association's (ALA) annual report called "The State of the Air." This report starts with the same air quality data used by the ALA. For this report, it includes data for the period of 2000 – 2017.

## What's New?

This report contains several revisions from previous reports. First, U.S. EPA revised the ozone standard in 2016. Previous reports had assumed that the ozone standard was constant (0.075 ppm) during the entire period. This is no longer the case. Table 5 outlines the appropriate grading scales for each year for each pollutant based upon the standard that was in place for each period.

**Table 5**
**Grading Scales by Year**
**Ozone**

| Standard | 0.085 ppm | 0.075 ppm | 0.070 ppm |
|---|---|---|---|
| Beginning Period | 2000 - 2002 | 2006 -2008 | 2013 – 2015 |
| Ending Period | 2005 - 2007 | 2012 – 2014 | |
| A | < 0.068 | < 0.060 | < 0.056 |
| B | 0.068 – 0.076 | 0.060 – 0.067 | 0.056 – 0.062 |
| C | 0.077 – 0.085 | 0.068 – 0.075 | 0.063 – 0.070 |
| D | 0.086 – 0.093 | 0.076 – 0.082 | 0.071 – 0.077 |
| F | ➢ 0.093 | ➢ 0.082 | ➢ 0.077 |

**24-hour PM-2.5**

| Standard | 65 µg/m3 | 35 µg/m3 |
|---|---|---|
| Beginning Period | 2000 – 2002 | 2004 - 2006 |
| Ending Period | 2003 – 2005 | |
| A | < 52 | < 28 |
| B | 52 – 58 | 29 – 31 |
| C | 59 – 65 | 32 – 35 |
| D | 66 – 71 | 36 – 38 |
| F | ➢ 71 | ➢ 38 |

**Annual PM-2.5**

| Standard | 15 µg/m3 | 12 µg/m3 |
|---|---|---|
| Beginning Period | 2000 – 2002 | 2011- 2013 |
| Ending Period | 2010 – 2012 | |
| A | < 12.0 | < 9.6 |
| B | 12.0 – 13.4 | 9.6 – 10.7 |
| C | 13.5 – 15.0 | 10.8 – 12.0 |
| D | 15.1 – 16.5 | 12.1 – 13.2 |
| F | ➢ 16.5 | ➢ 13.2 |

The review of data in this report differs from the ALA in a few significant ways. First, the design values used for both ozone and PM-2.5 are based on average values for each county. Average values are used to compare between cities or county ratings. However, when determining whether the population is exposed to air quality above or below the standard, the population is split based on values from individual monitors. This is an important distinction. While U.S. EPA's guidance for attainment/nonattainment designation purposes focuses on the worst design value for a county, this is not consistent with what

people are breathing. For example, if a county has ten monitors and nine have design values below the standard and one is slightly above the standard, U.S. EPA and ALA would assume that everyone in the county were breathing air at levels above the standard. That is obviously not correct. If you combine counties into metropolitan statistical areas (cities) consisting of several counties, the entire area would be assumed to be above the standard based on the one monitor described above. This report averages design values for all monitors in a county to determine the average level that is breathed by the residents of that county. This is not to say that some individuals could not be exposed to higher levels. However, not all residents in a county are exposed to levels associated with the highest monitor. This average design value is used only to compare between different states.

A second difference is that when design values for a number of counties are being grouped to determine the overall value for a metropolitan statistical area, the individual design values for each county are weighted by the population of that county to determine a population weighted average value. This value is more consistent with what the population is being exposed to and is in line with what health research professionals use in their analyses.

A grading system has been established for ozone and PM-2.5 in this report. Any grading system is arbitrary in nature. The key to this grading system is that any area meeting the national ambient air quality standards should not be rated lower than a "C". In essence, we have set the standard as a "C". Any level between 90 and 100 percent of the standard is rated a "C". Any level between 80 and 90 percent of the standard is rated as "B". Any level below 80 percent is set as an "A". Any level between 101 and 110 percent of the standard is set as a "D". Any level above 110 percent of the standard is rated as an "F".

This report does not report population groups by county or state (those less than 18 or 65 and older, diabetics, etc.). It is very difficult to obtain this data for each state. Also, the methodology which apportions state totals to individual counties is questionable. It is based solely upon a comparison of age distribution of the state versus the county. In many cases other variables, may be important in making these allocations more accurately.

Information on health effects is not included in this report. Instead we provide links to U.S. EPA websites that contain this information.

**Ozone:** http://epa.gov/airquality/ozonepollution/health.html

**PM-2.5:** http://epa.gov/airquality/particlepollution/health.html

The remainder of this report contains tables that are similar to those that are in the ALA report. The ALA report focuses solely on a three year block of data and does not provide any perspective. Our report looks at three year blocks of data from 2000 through 2017 so that the reader can see how the air quality is changing over time.

## Ozone

In the 2000 – 2002 period approximately 110 million people (38.3% of the U.S. population) lived in counties that met the ozone standard. During the same time period approximately 94 million people (32.7%) lived in counties where ozone was not monitored. By the 2015 – 2017 period 172 million people (53.2%) lived in counties that met the ozone standard. During the same time period over 91 million people (28.2%) lived in counties where ozone was not monitored. Figure 1 shows the distribution of people by year.

## 24-hour PM-2.5

In the 2000 – 2002 period approximately 184 million people (63.9% of the U.S. population) lived in counties that met the 24-hour PM-2.5 standard. During this same time period approximately 99 million people (34.4%) lived in counties where PM-2.5 was not monitored. By the 2015 – 2017 period over 198 million people (61.3%) lived in counties that met the 24-hour PM-2.5 standard. During the same time period

**nearly 119 million people (36.8%) lived in counties where PM-2.5 was not monitored. Figure 2 shows the distribution of people by year.**

## Annual PM-2.5

**In the 2000 – 2002 period approximately 137 million people (47.6% of the U.S. population) lived in counties that met the annual PM-2.5 standard. During the same time period approximately 99 million people (34.4%) lived in counties where PM-2.5 was not monitored. By the 2015 - 2017 period nearly 198 million people (61.3%) lived in counties that met the annual PM-2.5 standard. During the same time period nearly 119 million people (36.8%) lived in counties where PM-2.5 was not monitored. Figure 3 shows the distribution of people by year.**

## Table 6
## People Breathing Ozone

| Grades | 2000-2002 | 2002-2004 | 2004-2006 | 2006-2008 | 2008-2010 | 2010-2012 | 2011-2013 | 2012-2014 | 2013-2015 | 2014-2016 | 2015-2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 20,471,429 | 21,818,673 | 24,838,855 | 9,232,373 | 13,558,151 | 16,866,614 | 18,303,246 | 19,368,512 | 8,980,475 | 8,247,172 | 5,855,713 |
| B | 35,747,877 | 47,966,735 | 69,565,432 | 28,580,829 | 50,138,920 | 35,393,276 | 47,106,155 | 66,240,740 | 49,241,374 | 43,817,834 | 42,841,227 |
| C | 53,889,773 | 63,348,381 | 69,898,005 | 62,704,468 | 100,995,130 | 80,226,719 | 87,476,137 | 103,841,894 | 118,071,931 | 119,899,310 | 109,840,915 |
| D | 47,420,248 | 44,209,736 | 28,441,509 | 63,627,132 | 39,064,537 | 63,098,032 | 54,529,792 | 28,505,820 | 38,209,707 | 44,630,991 | 54,356,108 |
| F | 36,113,846 | 24,983,253 | 11,560,305 | 44,674,719 | 15,005,562 | 24,372,196 | 16,951,020 | 11,605,706 | 16,165,633 | 15,856,204 | 18,492,498 |
| Subtotals | 193,643,173 | 202,326,778 | 204,304,106 | 208,819,521 | 218,762,300 | 219,956,837 | 224,366,350 | 229,562,172 | 230,669,120 | 232,451,511 | 231,386,461 |
| NM | 93,983,020 | 90,478,571 | 94,075,816 | 95,274,448 | 89,983,238 | 94,047,203 | 91,762,290 | 89,294,876 | 90,749,700 | 90,682,002 | 94,332,717 |
| Totals | 287,626,193 | 292,805,349 | 298,379,922 | 304,093,969 | 308,745,538 | 314,004,040 | 316,128,640 | 318,857,048 | 321,418,820 | 323,133,513 | 325,719,178 |

## Table 7
## People Breathing Short-term Particle Pollution (24-hour PM-2.5)

| Grades | 2000-2002 | 2002-2004 | 2004-2006 | 2006-2008 | 2008-2010 | 2010-2012 | 2011-2013 | 2012-2014 | 2013-2015 | 2014-2016 | 2015-2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 169,108,273 | 173,403,112 | 72,518,745 | 74,200,491 | 128,242,741 | 161,215,778 | 161,978,674 | 172,722,788 | 165,483,980 | 183,955,310 | 183,780,750 |
| B | 7,530,636 | 10,295,816 | 38,502,559 | 54,061,231 | 43,725,167 | 23,690,673 | 17,737,378 | 10,254,436 | 15,939,160 | 10,433,359 | 9,979,505 |
| C | 7,178,534 | 4,611,123 | 44,218,230 | 32,125,829 | 12,236,695 | 3,494,256 | 5,301,992 | 5,636,932 | 9,589,819 | 3,705,688 | 2,922,037 |
| D | 2,629,580 | 349,670 | 21,475,576 | 12,781,119 | 4,102,958 | 1,205,709 | 443,326 | 1,134,946 | 460,719 | 1,288,728 | 1,946,053 |
| F | 2,141,065 | 139,259 | 11,544,108 | 12,716,115 | 3,172,492 | 3,122,751 | 4,387,046 | 4,509,547 | 5,611,560 | 4,742,355 | 4,154,977 |
| Subtotals | 188,588,088 | 188,798,980 | 188,259,218 | 185,884,785 | 191,480,053 | 192,729,167 | 189,848,417 | 194,258,649 | 197,085,238 | 204,125,440 | 202,783,322 |
| NM | 99,038,105 | 104,006,369 | 110,120,704 | 118,209,184 | 117,265,485 | 121,274,873 | 126,280,224 | 124,598,399 | 124,333,582 | 119,008,073 | 122,935,856 |
| Totals | 287,626,193 | 292,805,349 | 298,379,922 | 304,093,969 | 308,745,538 | 314,004,040 | 316,128,640 | 318,857,048 | 321,418,820 | 323,133,513 | 325,719.178 |

## Table 8
## People Breathing Year Round Particle Pollution (Annual PM-2.5)

| Grades | 2000-2002 | 2002-2004 | 2004-2006 | 2006-2008 | 2008-2010 | 2010-2012 | 2011-2013 | 2012-2014 | 2013-2015 | 2014-2016 | 2015-2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 66,662,352 | 85,102,824 | 79,877,728 | 99,566,055 | 159,917,270 | 171,873,326 | 106,652,246 | 126,495,698 | 137,088,639 | 157,803,914 | 165,342,204 |
| B | 33,699,590 | 34,165,126 | 44,068,553 | 44,713,857 | 22,491,224 | 15,926,224 | 48,841,463 | 37,421,140 | 32,856,467 | 31,924,284 | 24,174,117 |
| C | 36,472,438 | 37,608,751 | 35,436,747 | 30,049,147 | 7,635,978 | 2,391,571 | 22,208,353 | 21,911,492 | 19,515,709 | 8,380,880 | 6,447,073 |
| D | 24,175,664 | 14,825,460 | 15,420,277 | 6,595,531 | 489,623 | 1,932,071 | 6,845,156 | 5,441,356 | 4,633,342 | 3,078,166 | 3,154,418 |
| F | 27,578,044 | 17,096,819 | 13,455,913 | 4,960,195 | 945,958 | 605,975 | 5,301,199 | 2,988,963 | 2,991,081 | 2,938,196 | 3,665,510 |
| Subtotals | 188,588,088 | 188,798,980 | 198,259,218 | 185,884,785 | 191,480,053 | 192,729,167 | 189,848,417 | 194,258,649 | 197,085,238 | 204,125,440 | 202,783,322 |
| NM | 99,038,105 | 104,006,369 | 110,120,704 | 118,209,184 | 117,265,485 | 121,274,873 | 126,280,223 | 124,598,399 | 124,333,582 | 119,008,073 | 122,935,856 |
| Totals | 287,626,193 | 292,805,349 | 298,379,922 | 304,093,969 | 308,745,538 | 314,004,040 | 316,128,640 | 318,857,048 | 321,418,820 | 323,130,513 | 325,719,178 |

**NM = Not Monitored**

**Table 9**
**High Cities - Year Round Particle Pollution (Annual PM-2.5)**
**(2015 - 2017)**

| Rank | MSA | PW DV | Grade | 2017 Population |
|---|---|---|---|---|
| 1 | Visalia-Porterville-Hanford, CA | 15.9 | F | 614,594 |
| 2 | Fairbanks, AK | 15.6 | F | 99,703 |
| 3 | Bakersfield, CA | 13.7 | F | 893,119 |
| 4 | Madera, CA | 12.7 | D | 1,146,145 |
| 5 | Modesto-Merced, CA | 12.1 | D | 820,572 |
| 6 | Medford-Grants Pass, OR | 11.4 | C | 303,831 |
| 7 | Baton Rouge, LA | 10.9 | C | 834,159 |
| 8 | Lancaster, PA | 10.8 | C | 542,903 |
| 8 | Johnstown-Somerset, PA | 10.8 | C | 207,555 |
| 10 | Brownsville-Harlingen-Raymondville, TX | 10.3 | B | 445,309 |
| 11 | Allen-Edinburg, TX | 10.2 | B | 625,115 |
| 11 | Harrisburg-Work-Lebanon, PA | 10.1 | B | 440,933 |
| 13 | Kokomo-Peru, IN | 10.1 | B | 118,208 |
| 15 | Los Angeles-Long Beach, CA | 10.0 | B | 18,788,800 |
| 16 | Little Rock-North Little Rock, AR | 9.7 | B | 908,323 |
| 16 | Houston-The Woodlands, TX | 9.7 | B | 7,093,190 |
| 16 | El Centro, CA | 9.7 | B | 182,830 |
| 16 | Birmingham-Hoover-Talladega, AL | 9.7 | B | 1,364,062 |
| 20 | Yakima, WA | 9.6 | B | 250,193 |
| 20 | Pittsburg-New Castle-Weirton, PA-OH-WV | 9.6 | B | 1,623,639 |
| 20 | Philadelphia-Reading-Camden, PA,NJ-DE-MD | 9.6 | B | 7,206,807 |
| 23 | Youngstown-Warren, OH-PA | 9.5 | A | 645,003 |
| 23 | Cincinnati-Wilmington-Maysville, OH-KY-IN | 9.5 | A | 2,238,265 |
| 25 | Austin-Round Rock, TX | 9.4 | A | 547,545 |
| 25 | Atlanta-Clarke County, GA | 9.4 | A | 6,264,801 |

**MSA = Metropolitan Statistical Area PW = Population Weighted DV = Design Value**
**Of the top 26 cities, three have air quality rated as F and two rated as D. Four cities are rated as C, twelve are rated as B and four are rated as A.**

**Table 10**
**Highest Cities – Short Term Particle Pollution (24-hour PM-2.5)**
**(2015 - 2017)**

| Rank | MSA | PW DV | Grade | 2017 Population |
|---|---|---|---|---|
| 1 | Fairbanks, AK | 86 | F | 99,703 |
| 2 | Medford-Grants Pass, OR | 56 | F | 303,831 |
| 3 | Visalia-Porterville-Hanford, CA | 54 | F | 614,594 |
| 4 | Bakersfield, CA | 48 | F | 893,119 |
| 5 | Fresno-Madera, CA | 45 | F | 1,146,145 |
| 6 | Modesto-Merced, CA | 41 | F | 820,572 |
| 6 | Bend-Redmond-Pineville, OR | 41 | F | 209,998 |
| 8 | Yakima, WA | 37 | D | 250,193 |
| 9 | Eugene, OR | 36 | D | 374,748 |
| 10 | Salt Lake City-Provo-Orem, UT | 35 | C | 2,559,450 |
| 11 | Anchorage, AK | 32 | C | 400,888 |
| 12 | Lancaster, PA | 28 | B | 542,903 |
| 12 | Clarksville, TN-KY | 28 | B | 285,042 |
| 12 | Chico, CA | 28 | B | 229,294 |
| 12 | Boise City-Mountain Home, ID-OR | 28 | B | 790,993 |
| 16 | Seattle-Tacoma, WA | 26 | A | 2,764,736 |
| 16 | San Jose-San Francisco-Oakland, CA | 26 | A | 8,837,789 |
| 16 | Portland-Vancouver-Salem, OR-WA | 26 | A | 3,263,978 |
| 16 | Missoula, MT | 26 | A | 117,441 |
| 16 | McAllen-Edinburg, TX | 26 | A | 625,115 |
| 21 | Los Angeles-Long Beach, CA | 25 | A | 18,788,800 |
| 21 | Johnstown-Somerset, PA | 25 | A | 207,555 |
| 21 | Harrisburg-Work-Lebanon, PA | 25 | A | 1,260,071 |
| 21 | El Centro, CA | 25 | A | 182,830 |
| 21 | Brownsville-Harlingen-Raymondville, TX | 25 | A | 445,309 |

**MSA = Metropolitan Statistical Area PW = Population Weighted DV = Design Value**
**Of the 25 highest cities, seven have ratings of F, two are D, two are C, four are B, and ten are A.**

**Table 11**
**Highest 8-hour Ozone Cities**
**(2015 - 2017)**

| Rank | MSA | PW DV | Grade | 2017 Population |
|---|---|---|---|---|
| 1 | Visalia-Porterville-Hanford, CA | 0.086 | F | 614,594 |
| 1 | Fresno-Madera, CA | 0.086 | F | 1,146,145 |
| 3 | Bakersfield, CA | 0.084 | F | 893,119 |
| 4 | Los Angeles-Long Beach, CA | 0.083 | F | 18,788,800 |
| 5 | Modesto-Merced, CA | 0.082 | F | 820,572 |
| 6 | Sheboygan, WI | 0.080 | F | 115,344 |
| 7 | Salt Lake City-Provo-Orem, UT | 0.076 | D | 2,559,450 |
| 7 | Norwich-New London, CT | 0.076 | D | 269,033 |
| 7 | Sacramento-Roseville, CA | 0.075 | D | 2,598,377 |
| 10 | Muskegon, MI | 0.074 | D | 173,693 |
| 11 | Hartford-West Hartford, CT | 0.073 | D | 1,479,292 |
| 12 | Yuma, AZ | 0.072 | D | 207,534 |
| 12 | Providence-Warwick, RI-MA | 0.072 | D | 1,621,122 |
| 12 | Philadelphia-Reading-Camden, PA-NJ | 0.072 | D | 7,206,807 |
| 12 | New York-Newark, NY-NJ-CT-PA | 0.072 | D | 23,776,155 |
| 16 | Trenton, NJ | 0.071 | D | 374,733 |
| 16 | Springfield-Greenfield Town, MA | 0.071 | D | 702,354 |
| 16 | San Diego-Carlsbad, CA | 0.071 | D | 3,337,685 |
| 16 | Phoenix-Scottsdale, AZ | 0.071 | D | 4,737,270 |
| 16 | Houston-The Woodlands, TX | 0.071 | D | 7,093,190 |
| 16 | Dallas-Fort Worth, TX | 0.071 | D | 7,848,293 |
| 16 | Chico, CA | 0.071 | D | 229,294 |
| 16 | Atlanta-Clarke County, GA | 0.071 | D | 6,264,801 |
| 24 | San Antonio-New Braunfels, TX | 0.070 | C | 1,473,974 |
| 24 | Fort Collins, CO | 0.070 | C | 343,976 |
| 24 | El Centro, CA | 0.070 | C | 182,830 |
| 24 | Denver-Aurora, CO | 0.070 | C | 3,515,374 |
| 24 | Cincinnati-Wilmington-Maysville, OH-KY | 0.070 | C | 2,238,265 |

**MSA = Metropolitan Statistical Area PW = Population Weighted DV = Design Value**
**Of the 28 highest rated cities, six are rated F, seventeen are rated D and five are rated C.**

**Table 12**
**Highest Counties - Short Term Particle Pollution (24-hour PM-2.5)**
**(2015 - 2017)**

| Rank | County/State | DV | Grade | 2017 Population |
|---|---|---|---|---|
| 1 | Fairbanks, AK | 70 | F | 100,605 |
| 2 | Kings, CA | 57 | F | 149,785 |
| 3 | Tulare, CA | 54 | F | 460,437 |
| 4 | Fresno, CA | 46 | F | 979,915 |
| 5 | Madera, CA | 44 | F | 154,697 |
| 6 | Stanislaus, CA | 42 | F | 541,560 |
| 7 | Salt Lake, UT | 41 | F | 1,121,354 |
| 8 | Kern, CA | 40 | F | 884,788 |
| 8 | Merced, CA | 40 | F | 268,672 |
| 8 | Plumas, CA | 40 | F | 18,627 |
| 11 | San Joaquin, CA | 38 | D | 733,709 |
| 11 | Siskiyou, CA | 38 | D | 43,603 |
| 11 | Crook, OR | 38 | D | 22,570 |
| 14 | Jackson, OR | 33 | C | 216,527 |
| 15 | Lebanon, PA | 32 | C | 138,863 |
| 16 | Lake, OR | 31 | B | 7,837 |
| 16 | Lancaster, PA | 31 | B | 538,500 |
| 16 | Weber, UT | 31 | B | 247,560 |
| 19 | San Bernardino, CA | 30 | B | 2,140,086 |
| 19 | Imperial, CA | 30 | B | 180,883 |
| 19 | Weld, CO | 30 | B | 294,962 |
| 19 | Northampton, PA | 30 | B | 302,294 |
| 23 | Benewah, ID | 29 | B | 9,092 |
| 23 | Dauphin, PA | 29 | B | 273,707 |
| 23 | Utah, UT | 29 | B | 592,299 |
| 23 | Yakima, WA | 29 | B | 249,636 |

**DV = Design Value**
**Of the 26 highest counties, ten are rated F, three are D, two are C and eleven are B.**

**Table 13**
**Highest Counties Year Round Particle Pollution (Annual PM-2.5)**
**(2015 - 2017)**

| Rank | County/State | DV | Grade | 2017 Population |
|---|---|---|---|---|
| **1** | **Fairbanks, CA** | **18.0** | **F** | 100,605 |
| **2** | **Tulare, CA** | **16.2** | **F** | 460,437 |
| **3** | **Kings, CA** | **15.9** | **F** | 149,785 |
| **4** | **Fresno, CA** | **12.7** | **D** | 979,915 |
| **4** | **Madera, CA** | **12.7** | **D** | 154,697 |
| **6** | **Lebanon, PA** | **12.2** | **D** | 138,863 |
| 7 | Plumas, CA | 11.8 | C | 18,627 |
| 8 | Merced, CA | 11.7 | C | 268,672 |
| 8 | Stanislaus, CA | 11.7 | C | 541,560 |
| 10 | San Joaquin, CA | 11.6 | C | 733,709 |
| 11 | Kern, CA | 11.5 | C | 884,788 |
| 11 | Delaware, PA | 11.5 | C | 563,402 |
| 11 | Lancaster, PA | 11.5 | C | 538,500 |
| 14 | Northampton, PA | 11.3 | C | 302,294 |
| 15 | Imperial, CA | 11.1 | C | 180,883 |
| 16 | Armstrong, PA | 11.0 | C | 66,486 |
| 17 | Howard, IN | 10.9 | C | 22,568 |
| 17 | Madison, IN | 10.9 | C | 129,723 |
| 17 | Marion, IN | 10.9 | C | 941,229 |
| 20 | San Bernardino, CA | 10.8 | C | 2,140,086 |
| 21 | Cambria, PA | 10.7 | B | 134,732 |
| 21 | Chester, PA | 10.7 | B | 516,312 |
| 23 | Cuyahoga, OH | 10.6 | B | 1,249,352 |
| 24 | Los Angeles, CA | 10.4 | B | 10,137,915 |
| 24 | Napa. CA | 10.4 | B | 142,166 |
| 24 | Harris, TX | 10.4 | B | 4,589,928 |

**DV = Design Value**
**Of the 26 highest counties, three are rated an F and three are D. All others meet the National Ambient Air Quality Standards with fourteen being rated as C and six rated as B.**

**Table 14**
**Highest Ozone Counties**
**(2015 - 2017)**

| Rank | County/State | DV | Grade | 2017 Population |
|---|---|---|---|---|
| 1 | San Bernardino, CA | 0.091 | F | 2,140,086 |
| 2 | Fresno, CA | 0.089 | F | 979,915 |
| 3 | Nevada, CA | 0.084 | F | 99,107 |
| 3 | Riverside, CA | 0.084 | F | 2,387,741 |
| 3 | Tulare, CA | 0.084 | F | 460,437 |
| 6 | El Dorado, CA | 0.083 | F | 185,625 |
| 6 | Kern, CA | 0.083 | F | 884,788 |
| 8 | Merced, CA | 0.082 | F | 268,672 |
| 9 | Stanislaus, CA | 0.081 | F | 541,560 |
| 10 | Los Angeles, CA | 0.080 | F | 10,137,915 |
| 10 | Fairfield, CT | 0.080 | F | 944,177 |
| 12 | Tehama, CA | 0.079 | F | 63,276 |
| 12 | Middlesex, CT | 0.079 | F | 163,329 |
| 12 | Tuolumne, CA | 0.079 | F | 53,804 |
| 12 | Sheboygan, WI | 0.079 | F | 115,427 |
| 16 | Douglas, CO | 0.077 | D | 328,632 |
| 16 | Kenosha, WI | 0.077 | D | 168,183 |
| 18 | Calaveras, CA | 0.076 | D | 45,171 |
| 18 | New Haven, CT | 0.076 | D | 856,875 |
| 18 | Richmond, NY | 0.076 | D | 476,015 |
| 18 | Galveston, TX | 0.076 | D | 329,431 |
| 22 | Fulton, GA | 0.075 | D | 1,023,336 |
| 22 | Allegan, MI | 0.075 | D | 115,548 |
| 22 | Muskegon, MI | 0.075 | D | 173,408 |
| 22 | Bucks, PA | 0.075 | D | 626,399 |
| 22 | Salt Lake, UT | 0.075 | D | 1,121,354 |

**DV = Design Value**
**Of the top 26 counties, fourteen are rated as F and eleven are rated as D.**

**Table 15**
**Cleanest U.S. Cities for Short-term Particle Pollution (24-hour PM-2.5)**
**(2015 - 2017)**

| Rank | MSA | PW DV | Grade | 2017 Population |
|---|---|---|---|---|
| 1 | Manchester-Nashua, NH | 11 | A | 409,697 |
| 1 | St. George, UT | 11 | A | 165,662 |
| 1 | Urban-Honolulu, HI | 11 | A | 988,650 |
| 4 | Burlington-South Burlington, VT | 12 | A | 218,395 |
| 4 | Elmira-Chemung, NY | 12 | A | 96,281 |
| 4 | Kahului-Wailuku-Lahaina, HI | 12 | A | 166,348 |
| 4 | Sierra Vista-Douglas, AZ | 12 | A | 124,756 |
| 8 | Cape Coral-For Myers, FL | 13 | A | 1,112,104 |
| 8 | Tucson-Nogales, AZ | 13 | A | 1,068,981 |
| 10 | Grand Island, NE | 14 | A | 85,045 |
| 11 | Greenville-Washington, NC | 14 | A | 226,130 |
| 11 | Lakeland-Winter haven, FL | 14 | A | 686,493 |
| 11 | Lynchburg, VA | 14 | A | 261,254 |
| 11 | Orlando-Deltona-Daytona Beach, FL | 14 | A | 3,284,198 |
| 11 | Palm Bay-Melbourne-Titusville, FL | 14 | A | 589,162 |
| 11 | Salinas, CA | 14 | A | 437,907 |
| 11 | Syracuse-Auburn, NY | 14 | A | 132,444 |
| 11 | Virginia Beach-Norfolk, VA-NC | 14 | A | 1,829,525 |

**MSA= Metropolitan Statistical Area PW = Population Weighted DV = Design Value**
**Of the 18 cleanest cities, all are rated as A.**

**Table 16**
**Cleanest U.S. Cities for Year Round Particle Pollution (Annual PM-2.5)**
**(2015 - 2017)**

| Rank | MSA | PW DV | Grade | 2017 Population |
|---|---|---|---|---|
| 1 | Urban-Honolulu, HI | 3.7 | A | 988,650 |
| 2 | Manchester-Nashua, NH | 4.1 | A | 409,697 |
| 3 | Kahului-Wailuku-Lahaina, HI | 4.2 | A | 166,348 |
| 4 | Cheyenne, WY | 4.3 | A | 98,327 |
| 5 | Burlington-South Burlington, VT | 4.4 | A | 218,395 |
| 6 | Duluth, MN-WI | 4.8 | A | 278,782 |
| 7 | St. George, UT | 4.9 | A | 165,662 |
| 8 | Sierra Vista-Douglas, AZ | 5.0 | A | 124,756 |
| 9 | Casper, WY | 5.1 | A | 79,547 |
| 9 | Elmira-Corning, NY | 5.1 | A | 96,281 |
| 11 | Pueblo-Canon City, CO | 5.2 | A | 214,034 |
| 12 | Rapid City-Spearfish, SD | 5.3 | A | 76,492 |
| 13 | Bellingham, WA | 5.5 | A | 221,404 |
| 13 | Norwich-New London, CT | 5.5 | A | 269,033 |
| 13 | Salinas, CA | 5.5 | A | 437,907 |
| 16 | Springfield-Greenfield Town, MA | 5.6 | A | 702,354 |
| 16 | Tucson-Nogales, AZ | 5.6 | A | 1,068,981 |
| 18 | Bismarck, ND | 5.7 | A | 132,142 |
| 18 | Palm Bay-Melbourne-Titusville, FL | 5.7 | A | 589,162 |
| 18 | Syracuse-Auburn, NY | 5.7 | A | 732,444 |
| 21 | Grand Island, NE | 5.9 | A | 85,045 |
| 22 | Worcester, MA-CT | 6.0 | A | 942,475 |
| 23 | Anchorage, AK | 6.1 | A | 400,888 |
| 23 | Boston-Worcester-Providence, MA-RI-NH-CT | 6.1 | A | 7,504,657 |
| 23 | Cape Coral-Fort Myers, FL | 6.1 | A | 1,112,104 |
| 23 | Gainesville-Lake City, FL | 6.1 | A | 354,299 |
| 23 | Orlando-Deltona-Daytona Beach, FL | 6.1 | A | 3,284,198 |

**MSA = Metropolitan Statistical Area PW = Population Weighted DV = Design Value**
**Of the 27 cleanest cities all are rated as A.**

**Table 17**
**Cleanest U.S. Cities for Ozone Air Pollution**
**(2015 - 2017)**

| Rank | MSA | PW DV | Grade | 2017 Population |
|---|---|---|---|---|
| 1 | Anchorage, AK | 0.044 | A | 400,888 |
| 1 | Fairbanks, AK | 0.044 | A | 99,703 |
| 3 | Bellingham, WA | 0.047 | A | 221,404 |
| 4 | Urban-Honolulu, HI | 0.048 | A | 988,650 |
| 5 | Duluth, MN-WI | 0.054 | A | 278,782 |
| 6 | Missoula, MT | 0.055 | A | 117,441 |
| 8 | Brownsville-Harlingen-Raymondville, TX | 0.056 | B | 445,309 |
| 8 | Rapid City-Spearfish, SD | 0.056 | B | 76,492 |
| 8 | Salinas, CA | 0.056 | B | 437,907 |
| 12 | Fargo-Wahpeton, ND-MN | 0.057 | B | 264,031 |
| 12 | Savannah-Hinesville-Statesboro, GA | 0.057 | B | 544,092 |
| 14 | Charleston-North Charleston, SC | 0.058 | B | 775,831 |
| 14 | New Bern-Morehead City, NC | 0.058 | B | 448,150 |
| 14 | Wilmington, NC | 0.058 | B | 288,156 |

**MSA = Metropolitan Statistical Area PW = Population Weighted DV = Design Value**
**Of the cleanest 16 cities, six are rated A and eight are rated as B.**

**Table 18**
**Cleanest Counties – Short Term Particle Pollution (24-hour PM-2.5)**
**(2015 - 2017)**

| Rank | County/State | DV | Grade | 2015 Population |
|---|---|---|---|---|
| 1 | La Plata, CO | 7 | A | 55,623 |
| 2 | La Paz, AZ | 8 | A | 20,317 |
| 3 | Bennington, VT | 10 | A | 36,191 |
| 3 | Belknap, NH | 10 | A | 60,779 |
| 3 | Fergus, MT | 10 | A | 11,413 |
| 3 | Kauai, HI | 10 | A | 72,029 |
| 3 | Lake. CA | 10 | A | 64,116 |
| 8 | Washington, UT | 11 | A | 160,245 |
| 8 | Essex, NY | 11 | A | 38,102 |
| 8 | Dona Ana, NM | 11 | A | 214,207 |
| 8 | Philips, MT | 11 | A | 4,133 |
| 8 | Honolulu, HI | 11 | A | 992,605 |
| 13 | Kitsap, WA | 12 | A | 264,811 |
| 13 | Steuben, NY | 12 | A | 96,940 |
| 13 | Richland, MT | 12 | A | 11,482 |
| 13 | Hawaii, HI | 12 | A | 198,449 |
| 13 | Alachua, FL | 12 | A | 263,496 |
| 13 | San Benito, CA | 12 | A | 59,414 |
| 13 | Nevada, CA | 12 | A | 99,107 |
| 13 | Cochise, AZ | 12 | A | 125,770 |

**DV = Design Value**
**The cleanest 20 counties are all rated as A.**

**Table 19**
**Cleanest Counties - Year Round Particle Pollution (Annual PM-2.5)**
**(2015 - 2017)**

| Rank | County/State | DV | Grade | 2015 Population |
|---|---|---|---|---|
| 1 | La Paz, AZ | 1.8 | A | 20,317 |
| 2 | Custer, SD | 2.7 | A | 8,596 |
| 3 | McKenzie, ND | 2.8 | A | 12,621 |
| 4 | Bennington, VT | 3.0 | A | 36,191 |
| 5 | La Plata, CO | 3.3 | A | 55,623 |
| 6 | Lake, CA | 3.4 | A | 64,116 |
| 7 | Jackson, SD | 3.7 | A | 3,326 |
| 7 | Kauai, HI | 3.7 | A | 72,029 |
| 9 | Mercer, ND | 3.8 | A | 8,694 |
| 9 | Burke, ND | 3.8 | A | 2,197 |
| 9 | Essex, NY | 3.8 | A | 38,102 |
| 9 | Fergus, MT | 3.8 | A | 11,413 |
| 13 | Washington, UT | 3.9 | A | 160,245 |
| 14 | Park, WY | 4.1 | A | 29,353 |
| 14 | Laramie, WY | 4.1 | A | 96,136 |
| 14 | Campbell, WY | 4.1 | A | 48,803 |
| 14 | Oliver, ND | 4.1 | A | 1,870 |
| 18 | Albany, WY | 4.2 | A | 38,256 |
| 18 | Williams, ND | 4.2 | A | 34,337 |
| 18 | Billings, ND | 4.2 | A | 934 |
| 21 | Lake, MN | 4.3 | A | 10,625 |
| 21 | Honolulu, HI | 4.3 | A | 992,605 |
| 23 | Philips, MT | 4.4 | A | 4,133 |
| 23 | San Benito, CA | 4.4 | A | 59,414 |
| 23 | Nevada, CA | 4.4 | A | 99,107 |

**DV = Design Value**
**The cleanest 25 counties are all rated as A.**

**Table 20**
**Cleanest Counties - Ozone Air Pollution**
**(2015 - 2017)**

| Rank | County/State | DV | Grade | 2015 Population |
|---|---|---|---|---|
| 1 | Fairbanks, AK | 0.042 | A | 100,605 |
| 2 | Humboldt, CA | 0.044 | A | 136,646 |
| 3 | Matanuska, AK | 0.045 | A | 104,365 |
| 4 | Whatcom, WA | 0.046 | A | 216,800 |
| 5 | Skagit, WA | 0.048 | A | 123,681 |
| 6 | San Francisco, CA | 0.049 | A | 870,887 |
| 7 | Honolulu, HI | 0.051 | A | 992,605 |
| 7 | Mendocino, CA | 0.051 | A | 87,628 |
| 9 | Clallam, WA | 0.052 | A | 74,570 |
| 9 | Rio Blanco, CO | 0.052 | A | 6,545 |
| 11 | Missoula, MT | 0.053 | A | 116,130 |
| 11 | Flathead, MT | 0.053 | A | 98,082 |
| 11 | Oxford, ME | 0.053 | A | 57,517 |
| 11 | Aroostook, ME | 0.053 | A | 67,959 |
| 11 | Denali, AK | 0.053 | A | 1,953 |
| 16 | Columbia, OR | 0.054 | A | 50,785 |
| 16 | Ottawa, OK | 0.054 | A | 31,691 |
| 16 | St. Louis, MN | 0.054 | A | 199,980 |
| 19 | Hidalgo, TX | 0.055 | A | 849,843 |
| 19 | Bradford, PA | 0.055 | A | 60,770 |
| 19 | Multnomah, OR | 0.055 | A | 799,766 |
| 19 | Richland, MT | 0.055 | A | 11,482 |
| 19 | Philips, MT | 0.055 | A | 4,133 |
| 19 | Fergus, MT | 0.055 | A | 11,413 |
| 19 | Sonoma, CA | 0.055 | A | 503,070 |

**DV = Design Value of the 25 cleanest counties, all are rated A.**

**Table 21**
**States Ranked by Population Weighted Ozone Design Values**
**(2015 – 2017)**

| Rank | State | PW Ozone Design Value |
|---|---|---|
| 1 | AK | 0.044 |
| 2 | HI | 0.051 |
| 3 | MT | 0.054 |
| 4 | ND | 0.056 |
| 5 | WA | 0.057 |
| 6 | OR | 0.059 |
| 7 | IA | 0.060 |
| 7 | NE | 0.060 |
| 9 | FL | 0.061 |
| 9 | ME | 0.061 |
| 9 | SC | 0.061 |
| 9 | VT | 0.061 |
| 9 | WY | 0.061 |
| 14 | KS | 0.062 |
| 14 | SD | 0.062 |
| 16 | AR | 0.063 |
| 16 | MS | 0.063 |
| 16 | NH | 0.063 |
| 19 | AL | 0.064 |
| 19 | IN | 0.064 |
| 19 | MA | 0.064 |
| 19 | OK | 0.064 |
| 23 | ID | 0.065 |
| 23 | NM | 0.065 |
| 23 | NC | 0.065 |
| 23 | TN | 0.065 |
| 23 | WV | 0.065 |
| 28 | KY | 0.066 |
| 28 | LA | 0.066 |
| 28 | MO | 0.066 |
| 28 | VA | 0.066 |
| 32 | OH | 0.067 |
| 32 | WI | 0.067 |
| 34 | DE | 0.068 |
| 34 | IL | 0.068 |
| 34 | MD | 0.068 |
| 34 | MN | 0.068 |
| 34 | NY | 0.068 |
| 34 | PA | 0.068 |
| 34 | TX | 0.068 |
| 41 | AZ | 0.069 |
| 41 | CO | 0.069 |
| 41 | GA | 0.069 |
| 41 | MI | 0.069 |
| 41 | NV | 0.069 |
| 41 | RI | 0.069 |
| 47 | DC | 0.070 |
| 47 | NJ | 0.070 |
| 49 | UT | 0.072 |
| 50 | CA | 0.074 |
| 51 | CT | 0.076 |

**Table 22**
**States Ranked by Population Weighted 24-hour PM-2.5 Design Values**
**(2015 – 2017)**

| Rank | State | PW 24-hr Design Value |
|---|---|---|
| 1 | HI | 11 |
| 2 | NH | 14 |
| 3 | FL | 15 |
| 4 | MA | 16 |
| 4 | NM | 16 |
| 4 | TN | 16 |
| 4 | VT | 16 |
| 4 | WY | 16 |
| 9 | ME | 17 |
| 9 | NE | 17 |
| 9 | NC | 17 |
| 9 | ND | 17 |
| 9 | RI | 17 |
| 9 | SC | 17 |
| 15 | AL | 18 |
| 15 | AZ | 18 |
| 15 | MN | 18 |
| 15 | MS | 18 |
| 15 | SD | 18 |
| 15 | VA | 18 |
| 21 | CO | 19 |
| 21 | CT | 19 |
| 21 | GA | 19 |
| 21 | ID | 19 |
| 21 | NV | 19 |
| 21 | NY | 19 |
| 21 | OK | 19 |
| 28 | AR | 20 |
| 28 | KS | 20 |
| 28 | KY | 20 |
| 28 | TX | 20 |
| 28 | WV | 20 |
| 33 | DE | 21 |
| 33 | IL | 21 |
| 33 | IA | 21 |
| 33 | MD | 21 |
| 33 | MO | 21 |
| 33 | NJ | 21 |
| 33 | OH | 21 |
| 33 | WA | 21 |
| 41 | DC | 22 |
| 41 | MT | 22 |
| 41 | WI | 22 |
| 44 | OR | 23 |
| 45 | IN | 24 |
| 45 | LA | 24 |
| 45 | MI | 24 |
| 48 | PA | 25 |
| 49 | CA | 26 |
| 50 | AK | 27 |
| 51 | UT | 34 |

**Table 23**
**States Ranked by Population Weighted 24-hour PM-2.5 Design Values (2015 – 2017)**

| Rank | State | PW Annual Design Value |
|---|---|---|
| 1 | WY | 4.5 |
| 2 | HI | 4.7 |
| 3 | ND | 5.2 |
| 4 | VT | 6.0 |
| 5 | CO | 6.2 |
| 6 | MA | 6.3 |
| 7 | NV | 6.4 |
| 7 | RI | 6.4 |
| 9 | FL | 6.5 |
| 10 | SD | 6.7 |
| 11 | WA | 6.8 |
| 12 | ME | 6.9 |
| 12 | MT | 6.9 |
| 12 | NH | 6.9 |
| 15 | ID | 7.0 |
| 15 | MN | 7.0 |
| 17 | OR | 7.1 |
| 18 | AZ | 7.4 |
| 18 | NE | 7.4 |
| 20 | CT | 7.6 |
| 20 | KS | 7.6 |
| 22 | NM | 7.7 |
| 23 | NY | 7.8 |
| 23 | VA | 7.8 |
| 25 | UT | 7.9 |
| 26 | IA | 8.2 |
| 26 | OK | 8.2 |
| 28 | NC | 8.3 |
| 28 | SC | 8.3 |
| 28 | WI | 8.3 |
| 31 | NJ | 8.4 |
| 32 | DE | 8.6 |
| 32 | TN | 8.6 |
| 34 | MD | 8.7 |
| 35 | AL | 8.8 |
| 36 | MI | 8.9 |
| 36 | MS | 8.9 |
| 36 | WV | 8.9 |
| 39 | AK | 9.0 |
| 40 | KY | 9.1 |
| 40 | MO | 9.1 |
| 42 | AR | 9.2 |
| 43 | DC | 9.3 |
| 43 | GA | 9.3 |
| 45 | CA | 9.4 |
| 45 | TX | 9.4 |
| 47 | IL | 9.5 |
| 48 | OH | 9.6 |
| 49 | IN | 9.8 |
| 49 | LA | 9.8 |
| 51 | PA | 10.2 |

**Table 24**
**Overall Ranking Based on Population Weighted Design Values**
**(2015 – 2017)**

| | PW Design Value | | | Percent of Standard | | | | |
|---|---|---|---|---|---|---|---|---|
| State | Ozone | 24-hr. PM2.5 | Ann. PM2.5 | Ozone | 24-hr. PM2.5 | Ann PM2.5 | Average | Rank |
| HI | 0.051 | 11 | 4.7 | 72.86 | 31.43 | 39.17 | 47.82 | 1 |
| WY | 0.061 | 16 | 4.5 | 87.14 | 45.71 | 37.50 | 56.79 | 2 |
| ND | 0.056 | 17 | 5.2 | 80.00 | 48.57 | 43.33 | 57.30 | 3 |
| VT | 0.061 | 16 | 6.0 | 87.14 | 45.71 | 50.00 | 60.95 | 4 |
| FL | 0.061 | 15 | 6.5 | 87.14 | 42.86 | 54.17 | 61.39 | 5 |
| NH | 0.063 | 14 | 6.9 | 90.00 | 40.00 | 57.50 | 62.50 | 6 |
| MA | 0.064 | 16 | 6.3 | 91.43 | 45.71 | 52.50 | 63.21 | 7 |
| ME | 0.061 | 17 | 6.9 | 87.14 | 48.57 | 57.50 | 64.40 | 8 |
| SD | 0.062 | 18 | 6.7 | 88.57 | 51.43 | 55.83 | 65.28 | 9 |
| NE | 0.060 | 17 | 7.4 | 85.71 | 48.57 | 61.67 | 65.32 | 10 |
| MT | 0.054 | 22 | 6.9 | 77.14 | 62.86 | 57.50 | 65.83 | 11 |
| WA | 0.057 | 21 | 6.8 | 81.43 | 60.00 | 56.67 | 66.03 | 12 |
| RI | 0.069 | 17 | 6.4 | 98.57 | 48.57 | 53.33 | 66.83 | 13 |
| NM | 0.065 | 16 | 7.7 | 92.86 | 45.71 | 64.17 | 67.58 | 14 |
| CO | 0.069 | 19 | 6.2 | 98.57 | 54.29 | 51.67 | 68.17 | 15 |
| SC | 0.061 | 17 | 8.3 | 87.14 | 48.57 | 69.17 | 68.29 | 16 |
| ID | 0.065 | 19 | 7.0 | 92.86 | 54.29 | 58.33 | 68.49 | 17 |
| NV | 0.069 | 19 | 6.4 | 98.57 | 54.29 | 53.33 | 68.73 | 18 |
| MN | 0.068 | 18 | 7.0 | 97.14 | 51.43 | 58.33 | 68.97 | 19 |
| KS | 0.062 | 20 | 7.6 | 88.57 | 57.14 | 63.33 | 69.68 | 20 |
| OR | 0.059 | 23 | 7.1 | 84.29 | 65.71 | 59.17 | 69.72 | 21 |
| TN | 0.065 | 16 | 8.6 | 92.86 | 45.71 | 71.67 | 70.08 | 22 |
| NC | 0.065 | 17 | 8.3 | 92.86 | 48.57 | 69.17 | 70.20 | 23 |
| VA | 0.066 | 18 | 7.8 | 94.29 | 51.43 | 65.00 | 70.24 | 24 |
| AZ | 0.069 | 18 | 7.4 | 98.57 | 51.43 | 61.67 | 70.56 | 25 |
| IA | 0.060 | 21 | 8.2 | 85.71 | 60.00 | 68.33 | 71.35 | 26 |
| OK | 0.064 | 19 | 8.2 | 91.43 | 54.29 | 68.33 | 71.35 | 27 |
| AK | 0.044 | 27 | 9.0 | 62.86 | 77.14 | 75.00 | 71.67 | 28 |
| MS | 0.063 | 18 | 8.9 | 90.00 | 51.43 | 74.17 | 71.87 | 29 |
| AL | 0.064 | 18 | 8.8 | 91.43 | 51.43 | 73.33 | 72.06 | 30 |
| NY | 0.068 | 19 | 7.8 | 97.14 | 54.29 | 65.00 | 72.14 | 31 |
| AR | 0.063 | 20 | 9.2 | 90.00 | 57.14 | 76.67 | 74.60 | 32 |
| WV | 0.065 | 20 | 8.9 | 92.86 | 57.14 | 74.17 | 74.72 | 33 |
| CT | 0.076 | 19 | 7.6 | 108.57 | 54.29 | 63.33 | 75.40 | 34 |
| KY | 0.066 | 20 | 9.1 | 94.29 | 57.14 | 75.83 | 75.75 | 35 |
| WI | 0.067 | 22 | 8.3 | 95.71 | 62.86 | 69.17 | 75.91 | 36 |
| DE | 0.068 | 21 | 8.6 | 97.14 | 60.00 | 71.67 | 76.27 | 37 |
| MD | 0.068 | 21 | 8.7 | 97.14 | 60.00 | 72.50 | 76.55 | 38 |
| NJ | 0.070 | 21 | 8.4 | 100.00 | 60.00 | 70.00 | 76.67 | 39 |
| MO | 0.068 | 21 | 9.1 | 94.29 | 60.00 | 75.83 | 76.71 | 40 |
| GA | 0.069 | 19 | 9.3 | 98.57 | 54.29 | 77.50 | 76.79 | 41 |
| TX | 0.068 | 20 | 9.4 | 97.14 | 57.14 | 78.33 | 77.54 | 42 |
| OH | 0.067 | 21 | 9.6 | 95.71 | 60.00 | 80.00 | 78.57 | 43 |
| IL | 0.068 | 21 | 9.5 | 97.14 | 60.00 | 79.17 | 78.77 | 11 |
| DC | 0.070 | 22 | 9.3 | 100.00 | 62.86 | 77.50 | 80.12 | 45 |
| MI | 0.069 | 24 | 8.9 | 98.57 | 68.57 | 74.17 | 80.44 | 46 |
| IN | 0.064 | 24 | 9.8 | 91.43 | 68.57 | 81.67 | 80.56 | 47 |
| LA | 0.066 | 24 | 9.8 | 94.29 | 68.57 | 81.67 | 81.51 | 48 |
| PA | 0.068 | 25 | 10.2 | 97.14 | 71.43 | 85.00 | 84.52 | 49 |
| CA | 0.074 | 26 | 9.4 | 105.71 | 74.29 | 78.33 | 86.11 | 50 |
| UT | 0.072 | 34 | 7.9 | 102.86 | 97.14 | 65.83 | 88.61 | 51 |

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# MASSACHUSETTS

## Ozone

In the 2000 – 2002 time period, approximately 1 million people (16.1%) lived in counties that met the ozone standard. By 2015 – 2017 this had increased to approximately 6.0 million people (86.8%). The remainder of the population lived in counties where ozone was no monitored. The ozone standard was lowered from 0.085 ppm to 0.070 ppm. Figure MA-1 shows the distribution of people by year. The population weighted ozone design value in 2000 – 2002 was 0.086 ppm. By 2015 – 2017 this had lowered to a value of 0.067 ppm, a reduction of 22.1 percent.

## 24-hour PM-2.5

In the 2000 – 2002 time period, approximately 6.1 million people (95.0%) lived in counties where 24-hour PM-2.5 levels met the standard. By 2015 - 2017 this was approximately 4.3 million people (62.9%). The remainder of the population lived in counties where PM-2.5 was not measured. The standard was lowered from 65 µg/m3 to 35 µg/m3. Figure MA-2 shows the distribution of people by year. The population weighted 24-hour PM-2.5 design value in 2000 – 2002 was 29 µg/m3. By 2015 – 2017 this had lowered to a value of 15 µg/m3, a reduction of 48.3 percent.

## Annual PM-2.5

In the 2000 – 2002 time period, approximately 6.1 million people (95.0%) lived in counties where annual PM-2.5 levels met the standard. By 2015 – 2017 this was approximately 4.3 million people (62.9%). The remainder of the population lived in counties where PM-2.5 was not measured. The standard was lowered from 15 µg/m3 to 12 µg/m3. Figure MA-3 shows the distribution of people by year. The population weighted annual PM-2.5 design value in 2000 – 20002 was 11.3 µg/m3. By 2015 – 2017 this had lowered to a value of 6.0 µg/m3, a reduction of 46.9 percent.

**Table MA-1**
**2015 – 2017**

| | | Ozone | | | Particle Pollution (PM-2.5) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| County | Population | Avg. DV | Grade | MM | Avg. 24-hr DV | Grade | Avg. Ann DV | Grade | MM |
| Barnstable | 213,444 | 0.069 | C | N | ND | ND | ND | ND | ND |
| Berkshire | 126,313 | ND | ND | ND | 17 | A | 7.0 | A | N |
| **Bristol** | **561,483** | **0.071** | **D** | **Y** | 15 | A | 5.9 | A | N |
| Essex | 785,205 | 0.064 | C | Y | 14 | A | 5.3 | A | Y |
| Franklin | 70,702 | 0.065 | C | N | 15 | A | 6.2 | A | N |
| **Hampden** | **469,818** | **0.072** | **D** | **N** | 15 | A | 6.0 | A | Y |
| Hampshire | 161,834 | 0.070 | C | N | 13 | A | 4.2 | A | N |
| Middlesex | 1,602,947 | 0.064 | C | N | ND | ND | ND | ND | ND |
| Norfolk | 700,322 | 0.070 | C | N | ND | ND | ND | ND | ND |
| Plymouth | 515,142 | 0.068 | C | N | 15 | A | 5.6 | A | N |
| Suffolk | 797,939 | 0.061 | B | N | 15 | A | 7.0 | A | Y |
| Worcester | 826,116 | 0.065 | C | Y | 16 | A | 6.0 | A | Y |

**DV = Design Value** **ND = No Data** **MM = Multiple Monitors**

# MASSACHUSETTS

**Table MA-2**
**Population Weighted Design Values**

| Period | Ozone (ppm) | 24-hour PM-2.5 (µg/m3) | Annual PM-2.5 (µg/m3) |
|---|---|---|---|
| 2000 – 2002 | 0.086 | 29 | 11.3 |
| 2001 – 2003 | 0.090 | 33 | 11.8 |
| 2002 – 2004 | 0.084 | 32 | 11.2 |
| 2003 – 2005 | 0.079 | 30 | 10.9 |
| 2004 – 2006 | 0.079 | 28 | 10.3 |
| 2005 – 2007 | 0.081 | 27 | 10.0 |
| 2006 – 2008 | 0.078 | 25 | 9.5 |
| 2007 – 2009 | 0.076 | 24 | 9.2 |
| 2008 – 2010 | 0.072 | 23 | 8.7 |
| 2009 – 2011 | 0.069 | 21 | 8.2 |
| 2010 – 2012 | 0.069 | 21 | 8.3 |
| 2011 – 2013 | 0.068 | 19 | 7.9 |
| 2012 – 2014 | 0.068 | 17 | 6.9 |
| 2013 – 2015 | 0.064 | 16 | 6.3 |
| 2014 – 2016 | 0.064 | 16 | 6.3 |
| 2015 - 2017 | 0.067 | 15 | 6.0 |

## Is Progress Really Being Made?

Table MA-3 shows the number of counties where the design values have changed over the last year, the last 5 years, the last 10 years and the last 15 years. In the last year, 9 of 10 counties had increasing ozone design values. Over the last 15 years, all ozone design values are down. For 24-hour PM-2.5 design values, 2 of 8 counties had increased design values in the last year. In the last 15 years, all counties had decreasing 24-hour PM-2.5 design values. In the last year, 3 of 8 counties had increasing annual PM-2.5 design values. Over the last 15 years, all counties had decreasing annual PM-2.5 design values.

**Table MA-3**
**Number of Counties**

| | Last Year | | | Last 5 Years | | | Last 10 Years | | | Last 15 Years | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Up | Stb. | Dn. | Up | Stb. | Dn. | Up | Stb. | Dn. | Up | Stb. | Dn. |
| Ozone | 9 | 1 | 0 | 1 | 0 | 7 | 0 | 0 | 9 | 0 | 0 | 7 |
| 24-hr PM-2.5 | 2 | 2 | 4 | 0 | 0 | 7 | 0 | 0 | 7 | 0 | 0 | 8 |
| Ann PM-2.5 | 3 | 1 | 4 | 0 | 0 | 7 | 0 | 0 | 7 | 0 | 0 | 8 |

# MASSACHUSETTS

## Table MA-4
## People Breathing Ozone

| Grade | 2000-2002 | 2002-2004 | 2004-2006 | 2006-2008 | 2008-2010 | 2010-2012 | 2011-2013 | 2012-2014 | 2013-2015 | 2014-2016 | 2015-2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 0 | 0 | 343,596 | 0 | 0 | 0 | 0 | 383,627 | 0 | 0 | 0 |
| B | 594,744 | 423,146 | 2,031,317 | 702,201 | 361,012 | 824,324 | 2,414,905 | 2,896,132 | 778,121 | 1,043,903 | 1,059,674 |
| C | 439,650 | 2,034,709 | 2,927,382 | 817,332 | 4,036,650 | 4,542,085 | 3,018,020 | 2,876,909 | 4,903,630 | 5,398,443 | 4,894,718 |
| D | 3,381,572 | 2,594,251 | 539,492 | 3,820,330 | 1,556,970 | 17,041 | 0 | 0 | 0 | 0 | 750,560 |
| F | 0 | 0 | 0 | 556,993 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 4,415,965 | 5,052,105 | 5,841,786 | 5,896,855 | 5,954,631 | 5,383,449 | 5,432,924 | 6,156,668 | 5,681,751 | 6,442,346 | 6,704,952 |
| NM | 2,001,241 | 1,360,176 | 568,298 | 572,112 | 481,998 | 1,262,695 | 1,259,900 | 588,740 | 1,112,671 | 369,433 | 154,867 |
| Total | 6,417,206 | 6,412,281 | 6,410,084 | 6,468,967 | 6,547,629 | 6,646,144 | 6,692,824 | 6,745,408 | 6,794,422 | 6,811,779 | 6,859,819 |

## People Breathing Short-term Particle Pollution (24-hour PM-2.5)

| Grade | 2000-2002 | 2002-2004 | 2004-2006 | 2006-2008 | 2008-2010 | 2010-2012 | 2011-2013 | 2012-2014 | 2013-2015 | 2014-2016 | 2015-2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 6,094,986 | 2,499,982 | 1,184,593 | 2,933,416 | 5,404,732 | 3,952,987 | 3,678,758 | 4,007,912 | 3,528,417 | 4,120,498 | 4,314,552 |
| B | 0 | 0 | 2,642,050 | 2,401,294 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| D | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 6,094,986 | 2,499,982 | 3,826,643 | 5,334,710 | 5,404,732 | 3,952,987 | 3,678,758 | 4,007,912 | 3,528,417 | 4,120,498 | 4,314,552 |
| NM | 322,220 | 3,912,299 | 2,583,441 | 1,134,257 | 1,142,897 | 2,893,157 | 3,013,866 | 2,737,496 | 3,266,005 | 2,691,281 | 2,545,267 |
| Total | 6,417,206 | 6,412,281 | 6,410,084 | 6,468,967 | 6,547,629 | 6,646,144 | 6,692,824 | 6,745,408 | 6,794,422 | 6,811,779 | 6,859,819 |

## People Breathing Year round Particle Pollution (Annual PM-2.5)

| Grade | 2000-2002 | 2002-2004 | 2004-2006 | 2006-2008 | 2008-2010 | 2010-2012 | 2011-2013 | 2012-2014 | 2013-2015 | 2014-2016 | 2015-2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 4,170,584 | 1,827,914 | 3,329,244 | 5,334,710 | 5,404,732 | 3,952,987 | 3,678,758 | 4,007,912 | 3,528,417 | 4,120,498 | 4,314,552 |
| B | 1,092,549 | 499,250 | 497,399 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C | 831,853 | 172,818 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| D | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Subtotal | 6,094,986 | 2,499,982 | 3,826,643 | 5,334,710 | 5,404,732 | 3,952,987 | 3,678,725 | 4,007,912 | 3,528,417 | 4,120,498 | 4,314,552 |
| NM | 322,220 | 3,912,299 | 2,583,441 | 1,134,257 | 1,142,897 | 2,693,157 | 3,013,866 | 2,737,496 | 3,266,005 | 2,691,281 | 2,545,267 |
| Total | 6,417,206 | 6,412,281 | 5,410,084 | 6,468,967 | 6,547,629 | 6,646,144 | 6,692,824 | 6,745,408 | 6,794,422 | 6,811,779 | 6,859,819 |

**NM = Not Monitored**

**Figure MA-1**

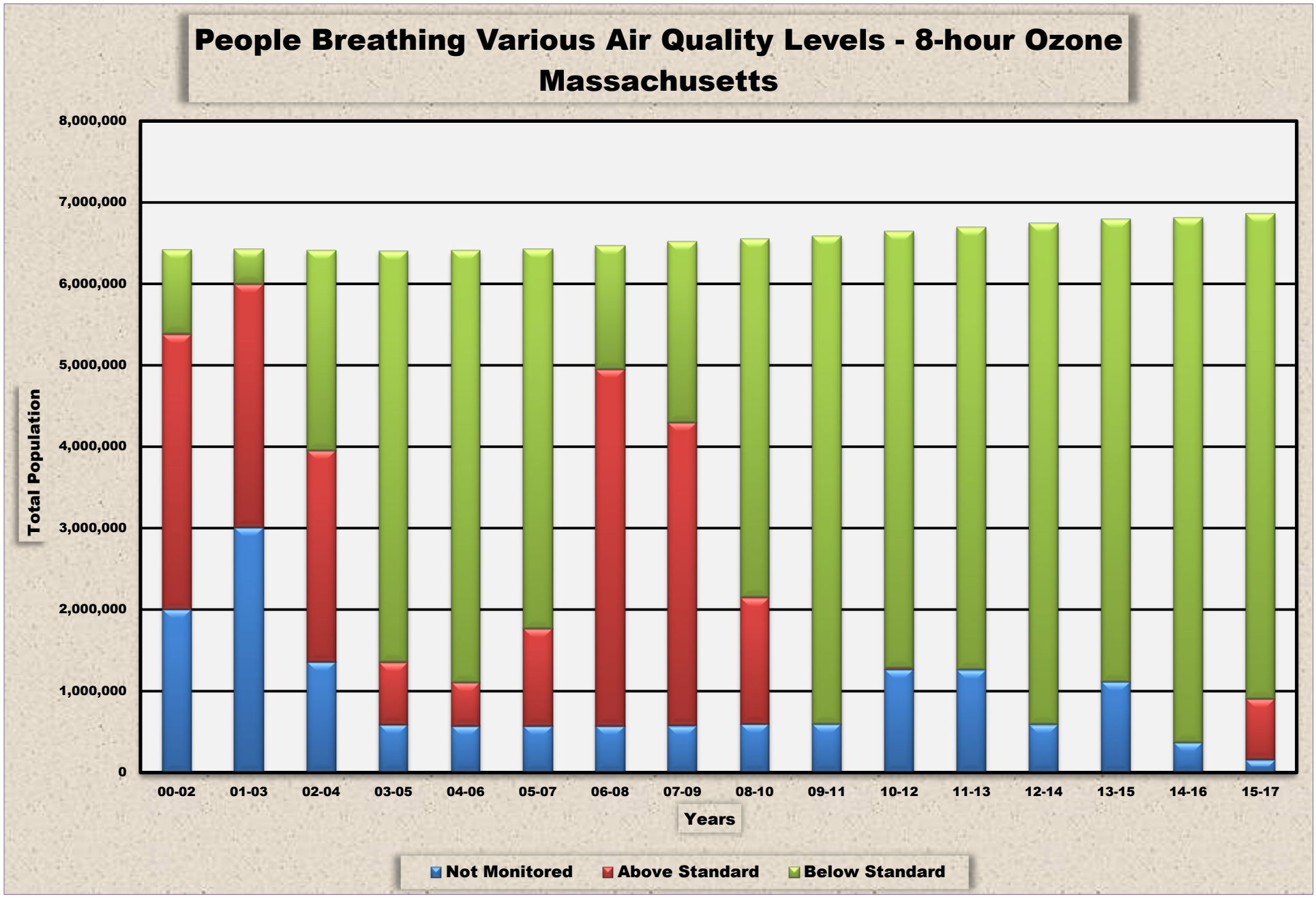

People Breathing Various Air Quality Levels - 8-hour Ozone
Massachusetts
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Total Population
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard
Below Standard

**Figure MA-2**

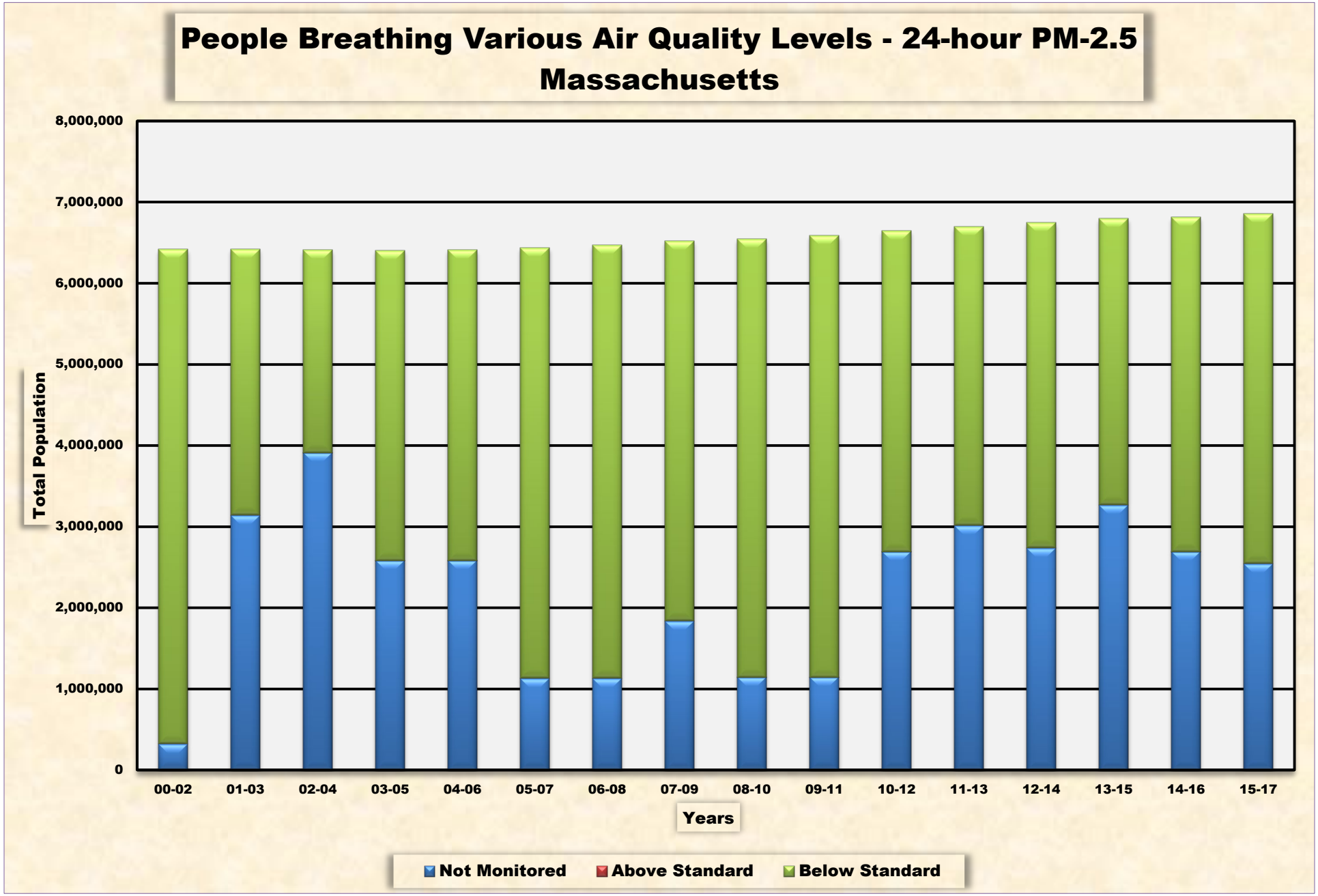
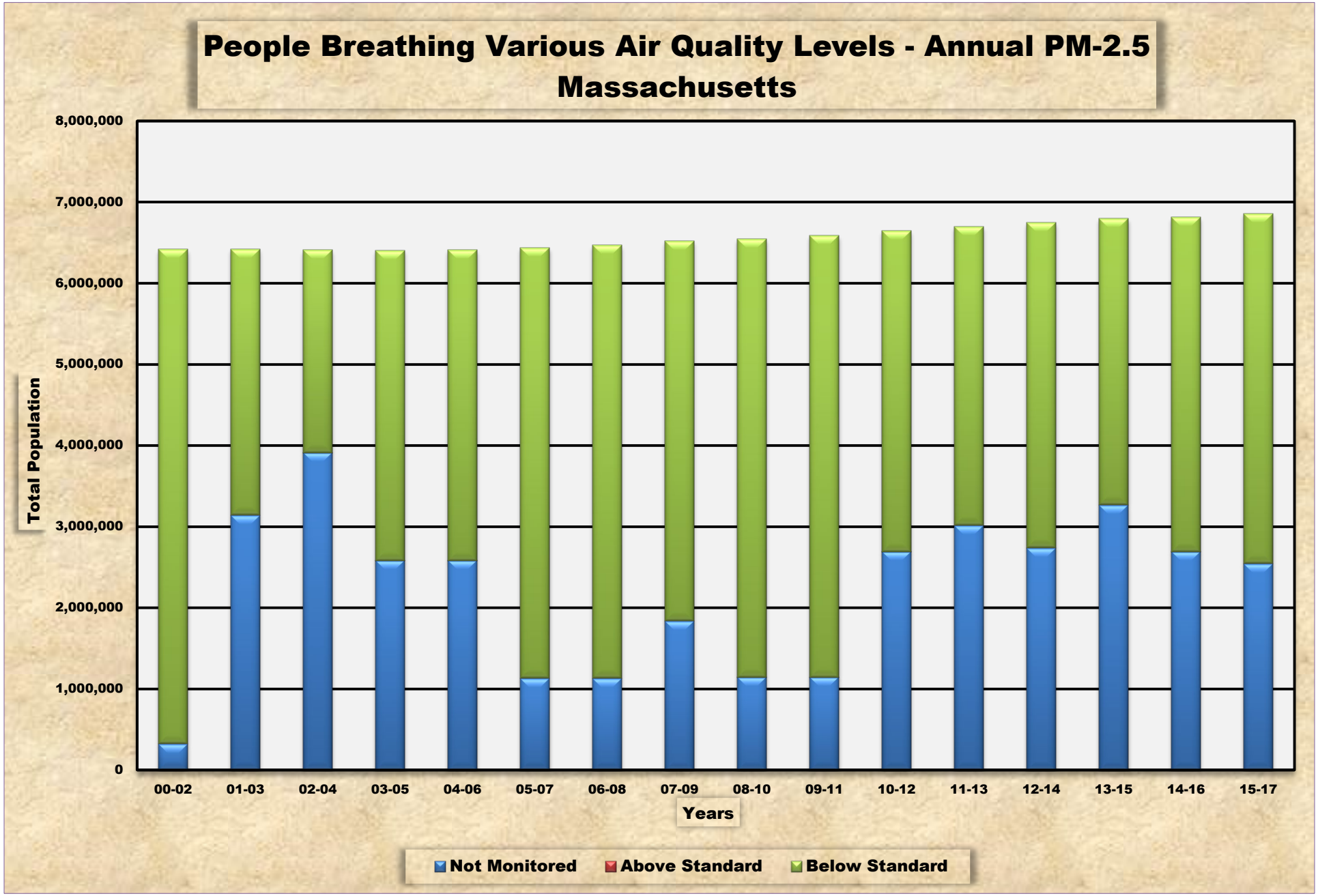

People Breathing Various Air Quality Levels - 24-hour PM-2.5
Massachusetts
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Total Population
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard
Below Standard

**Figure MA-3**


People Breathing Various Air Quality Levels - Annual PM-2.5
Massachusetts
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Total Population
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard
Below Standard