Indiana Department of Environmental Management

The States' View of the Air

Virginia

2019

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Indiana Department of Environmental Management
Office of Air Quality
April, 2019

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

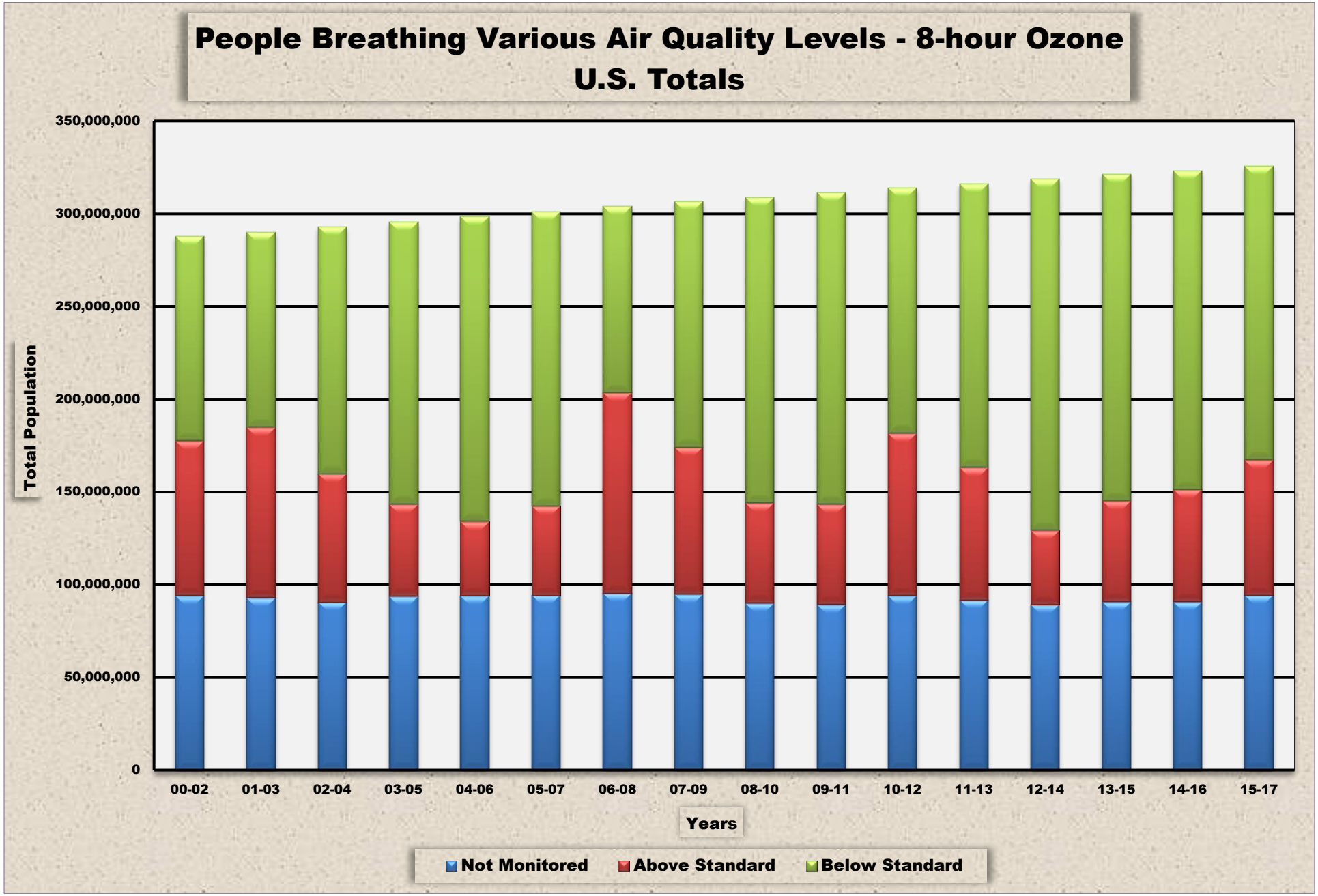
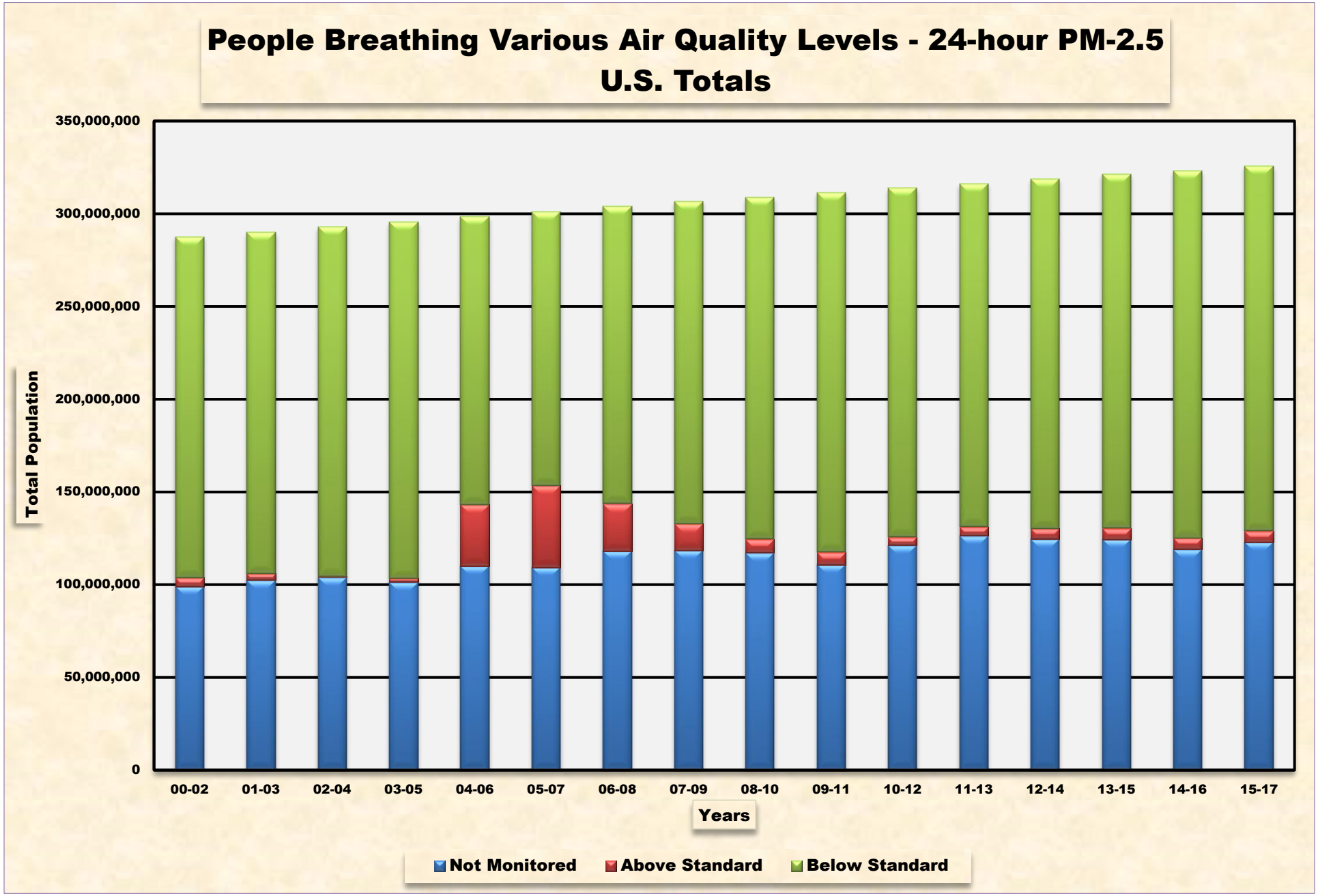

People Breathing Various Air Quality Levels - 8-hour Ozone
U.S. Totals
Total Population
350,000,000
300,000,000
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard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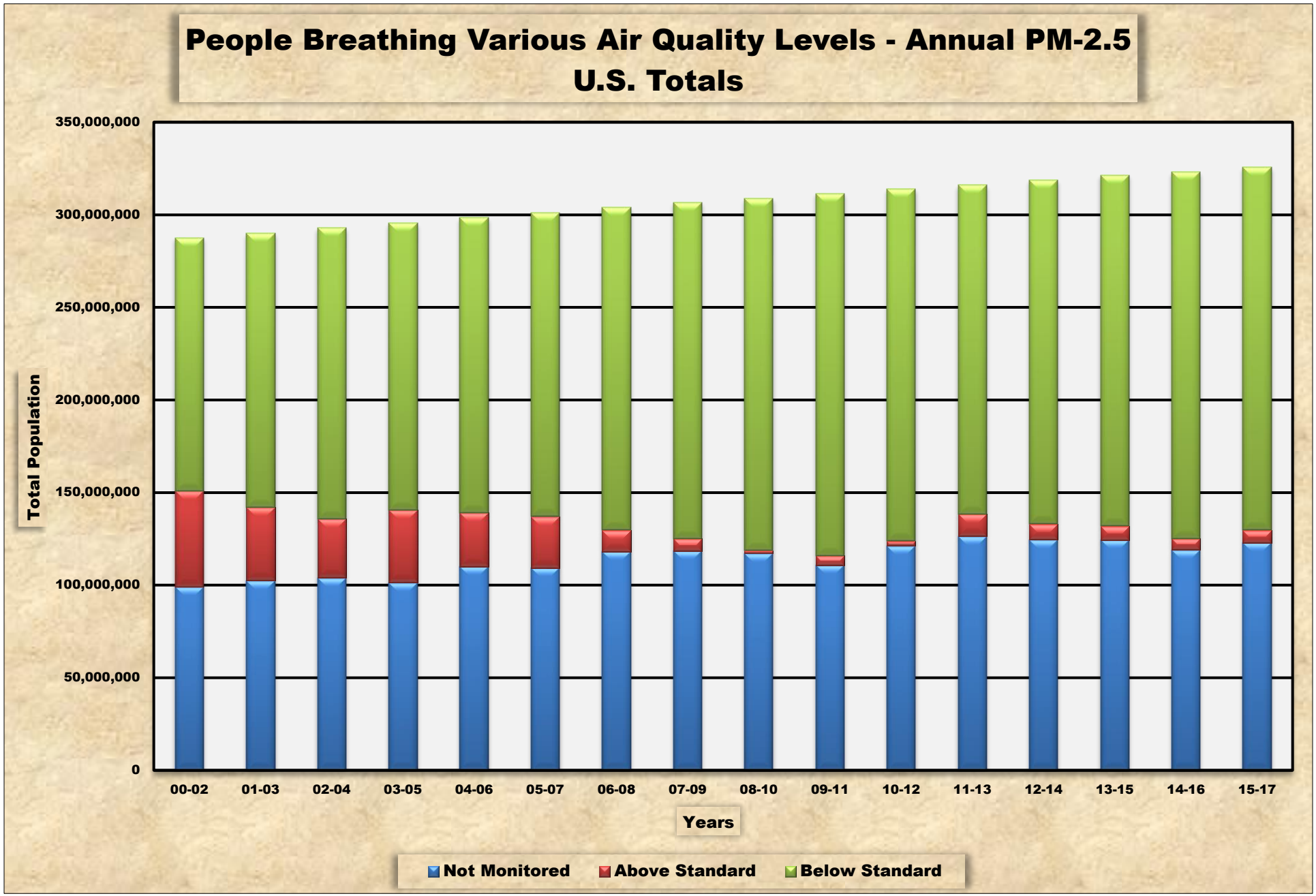
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard
Below Standard

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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VIRGINIA

Ozone

In the 2000 – 2002 time period, 0.57 million people (7.8%) lived in counties that met the ozone standard. By 2015 – 2017 this had increased to approximately 2.6 million people (30.5%). The ozone standard was lowered from 0.085 ppm to 0.070 ppm. Figure VA-1 shows the distribution of people by year. The population weighted ozone design value in 2000 – 2002 was 0.089 ppm. By 2015 – 2017 this had lowered to a value of 0.066 ppm, a reduction of 25.8 percent.

24-hour PM-2.5

In the 2000 – 2002 time period, approximately 3.1 million people (42.9%) lived in counties where 24-hour PM-2.5 levels met the standard. By 2015 - 2017 this was approximately 3.0 million people (35.3%). The remainder of the population lived in counties where PM-2.5 was not measured. The standard was lowered from 65 to 35 µg/m3. Figure VA-2 shows the distribution of people by year. The population weighted 24-hour PM-2.5 design value in 2000 – 2002 was 33 µg/m3. By 2015 – 2017 this had lowered to a value of 17 µg/m3, a reduction of 48.5 percent.

Annual PM-2.5

In the 2000 – 2002 time period, approximately 3.1 million people (42.3%) lived in counties where annual PM-2.5 levels met the standard. By 2015 – 2017 this was approximately 3.0 million people (35.3%). The remainder of the population lived in counties where PM-2.5 was not measured. The standard was lowered from 15 to 12 µg/m3. Figure VA-3 shows the distribution of people by year. The population weighted annual PM-2.5 design value in 2000 – 2002 was 13.6 µg/m3. By 2015 – 2017 this had lowered to a value of 7.4 µg/m3, a reduction of 45.6 percent.

VIRGINIA

Table VA-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
Albemarle	107,702	0.059	B	N	15	A	6.7	A	N
Arlington	**234,965**	**0.071**	**D**	**N**	18	A	8.1	A	N
Caroline	30,461	0.061	B	N	ND	ND	ND	ND	ND
Charles City	7,004	0.061	B	N	15	A	7.0	A	N
Chesterfield	343,599	0.062	B	N	ND	ND	ND	ND	ND
Fairfax	**1,148,433**	**0.071**	**D**	**N**	**17**	**A**	**7.2**	**A**	**N**
Fauquier	69,465	0.058	B	N	ND	ND	ND	ND	ND
Frederick	86,484	0.062	B	N	19	A	9.0	A	N
Giles	16,837	0.062	B	N	ND	ND	ND	ND	ND
Hanover	105,923	0.063	C	N	ND	ND	ND	ND	ND
Henrico	327,898	0.065	C	N	16	A	7.5	A	Y
Loudoun	398,080	0.068	C	N	17	A	7.8	A	N
Madison	13,277	0.063	C	N	ND	ND	ND	ND	ND
Prince Edward	22,703	0.058	B	N	ND	ND	ND	ND	ND
Prince William	463,023	0.066	C	N	ND	ND	ND	ND	ND
Roanoke	93,703	0.061	B	N	16	A	7.0	A	N
Rockbridge	22,659	0.057	B	N	ND	ND	ND	ND	ND
Rockingham	80,227	0.060	B	N	19	A	7.5	A	N
Stafford	146,649	0.062	B	N	ND	ND	ND	ND	ND
Wythe	28,882	0.060	B	N	ND	ND	ND	ND	ND
Bristol City	16,790	ND	ND	ND	18	A	7.5	A	N
Hampton City	134,669	0.065	C	N	14	A	6.6	A	N
Lynchburg City	80,995	ND	ND	ND	14	A	6.8	A	N
Norfolk City	244,703	ND	ND	ND	14	A	6.8	A	N
Salem City	25,862	ND	ND	ND	16	A	7.7	A	N
Suffolk City	90,237	0.060	B	Y	ND	ND	ND	ND	ND

DV – Design Value **ND - No Data** **MM – Multiple Monitors**

VIRGINIA

Table VA-2
Population Weighted Design Values

Period	Ozone (ppm)	24-hour PM-2.5 (µg/m3)	Annual PM-2.5 (µg/m3)
2000 – 2002	0.089	33	13.6
2001 – 2003	0.090	33	13.4
2002 – 2004	0.087	32	13.3
2003 – 2005	0.081	33	13.5
2004 – 2006	0.081	32	13.3
2005 – 2007	0.081	32	13.1
2006 – 2008	0.080	29	12.1
2007 – 2009	0.075	25	11.1
2008 – 2010	0.075	22	10.2
2009 – 2011	0.075	22	9.6
2010 – 2012	0.078	22	9.4
2011 – 2013	0.073	21	8.7
2012 – 2014	0.068	20	8.4
2013 – 2015	0.065	19	8.2
2014 – 2016	0.066	18	7.8
2015 - 2017	0.066	17	7.4

Is Progress Really Being Made?

Table VA-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, 7 of 19 counties had increasing ozone design values. Over the last 15 years, no counties had increasing ozone design values. For 24-hour PM-2.5 design values, no counties had increased design values in the last year. In the last 15 years, no counties had increasing 24-hour PM-2.5 design values. In the last year, 1 of 14 counties had increasing annual PM-2.5 design values. Over the last 15 years, no counties had increasing annual PM-2.5 design values.

Table VA-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	7	6	6	0	0	20	0	0	17	0	0	17
24-hr PM-2.5	0	2	12	0	0	13	0	0	9	0	0	9
Ann PM-2.5	1	0	13	0	0	13	0	0	9	0	0	9

VIRGINIA

Table VA-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	0	0	0	0	0	0	0	0	0
B	0	21,432	820,936	22,368	217,101	118,187	537,990	437,766	1,278,432	979,209	1,144,612
C	570,834	1,569,757	1,450,998	479,244	2,109,619	1,595,151	1,944,788	1,936,969	2,496,516	2,279,727	1,442,870
D	2,455,734	839,744	799,565	1,326,669	1,289,353	693,945	1,355,830	1,364,446	0	230,050	1,383,398
F	54,911	794,464	0	1,624,415	0	1,339,647	0	0	0	0	0
Subtotal	3,081,479	3,255,396	3,071,489	3,452,696	3,616,073	3,746,930	3,838,608	3,739,181	3,774,948	3,488,986	3,970,880
NM	4,201,894	4,250,279	4,602,237	4,380,800	4,384,951	4,438,937	4,421,797	4,587,100	4,608,045	4,922,822	4,499,140
Total	7,286,873	7,475,576	7,673,725	7,833,496	8,001,024	8,186,867	8,260,405	8,326,269	8,382,93	8,411,808	8,470,020

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	3,127,068	2,987,810	0	363,074	3,380,954	3,653,197	3,617,571	3,500,700	3,531,610	3,971,320	2,987,542
B	0	0	1,531,744	2,812,405	0	0	0	0	0	0	0
C	0	0	1,568,598	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	3,127,068	2,987,810	3,100,342	3,175,479	3,380,954	3,653,197	3,617,571	3,500,700	3,531,610	3,971,320	2,987,542
NM	4,159,805	4,487,765	4,573,383	4,658,017	4,620,070	4,532,670	4,642,834	4,825,589	4,851,383	4,440,488	5,482,478
Total	7,286,873	7,475,576	7,673,725	7,833,496	8,001,024	8,186,867	8,260,405	8,326,269	8,382,993	8,411,808	8,470,020

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	135,304	0	0	1,069,046	3,380,954	3,653,197	3,505,118	3,500,700	3,531,610	3,971,320	2,987,542
B	700,874	1,780,751	1,853,720	2,106,433	0	0	112,453	0	0	0	0
C	2,249,249	1,207,059	1,246,622	0	0	0	0	0	0	0	0
D	41,641	0	0	0	0	0	0	0	0	0	0
F	0	0	0	0	0	0	0	0	0	0	0
Subtotal	3,127,068	2,987,610	3,100,342	3,175,479	3,380,954	3,653,197	3,617,571	3,500,700	3,531,510	3,971,320	2,987,542
NM	4,159,805	4,487,765	4,573,383	4,658,017	4,620,070	4,532,670	4,642,834	4,825,589	4,851,383	4,440,488	5,482,478
Total	7,286,873	7,475,576	7,673,725	7,833,496	8,001,024	8,186,867	8,260,405	8,326,269	8,382,993	8,411,808	8,470,020

NM – Not Monitored

Figure VA-1

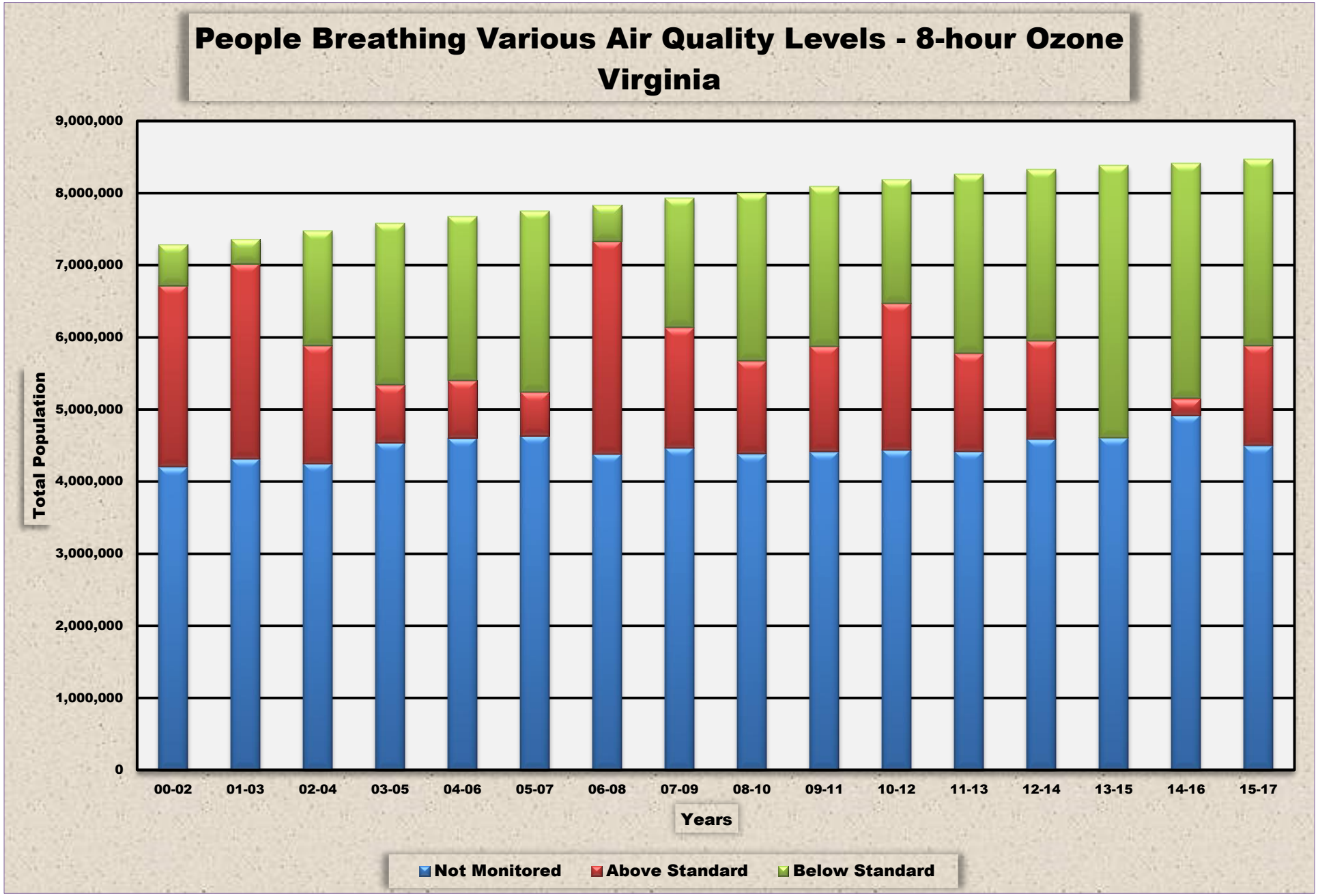

People Breathing Various Air Quality Levels - 8-hour Ozone
Virginia
Total Population
9,000,000
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard
Below Standard

Figure VA-2

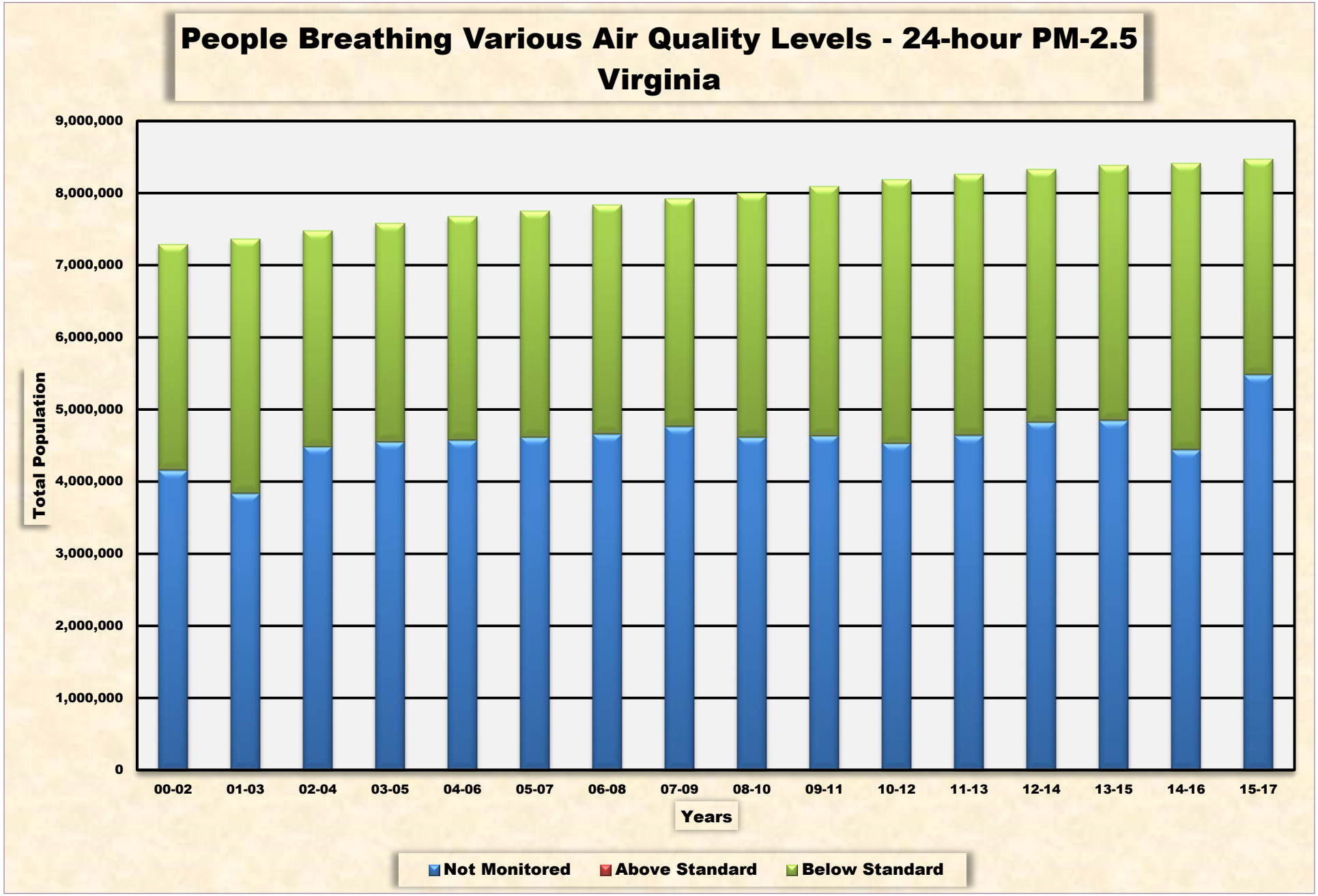
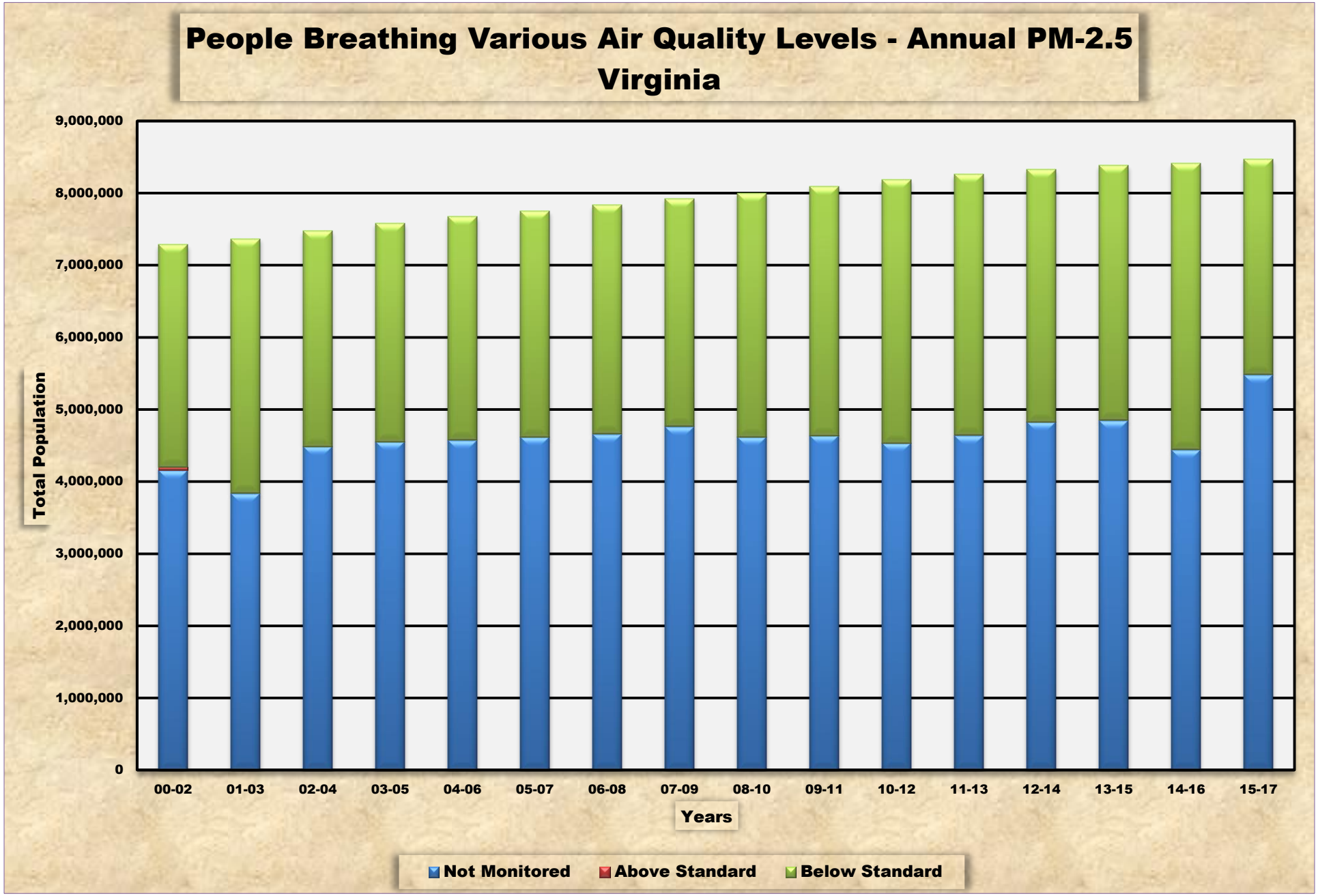

People Breathing Various Air Quality Levels - 24-hour PM-2.5
Virginia
Total Population
9,000,000
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
Years
Not Monitored
Above Standard
Below Standard

Figure VA-3


People Breathing Various Air Quality Levels - Annual PM-2.5
Virginia
9,000,000
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