Iowa Fine Particulate Monitoring Network Design Values

2019-2021



What is Fine Particulate Matter $(PM_{2.5})$?

The term "particulate matter" (PM) includes both solid particles and liquid droplets (excluding water droplets) that are found in outdoor air. Particulate matter may be emitted directly into the air or can form from pollutants that react in the atmosphere. Small particles tend to pose the greatest health concern because they can be inhaled into and accumulate in the respiratory system.

Particles of less than 2.5 microns in diameter are referred to as fine particulate or $PM_{2.5}$.

Sources of PM_{2.5} emissions include all types of combustion (motor vehicles, power plants, wood burning, etc.) and some industrial processes. Secondary PM_{2.5} is produced in the atmosphere away from sources through atmospheric chemistry.

What are the Design Values for PM_{2.5}?

Design values for $PM_{2.5}$ are numbers that are calculated from three years of data gathered at a particular monitoring site. If a design value is greater than the associated standard, the monitor is said to "fail the attainment test". The annual standard for $PM_{2.5}$ is $12.0 \,\mu\text{g/m}^3$ and the twenty-four hour standard is $35 \,\mu\text{g/m}^3$.

The design value for the 24-hour PM_{2.5} standard is the three year average of the annual 98th percentile values measured at a monitoring site. The design value for the annual PM_{2.5} standard is the three year average of the annual averages measured at a monitoring site. Additional details about design value calculations are contained in 40 CFR Part 50 Appendix N.

Data Completeness and Validation

If a monitor records 75% of the scheduled samples in each quarter of the year, the year's data is considered complete. EPA allows the use of data substitution in some cases where data is close to the 75% goal. Data used in this report includes all monitors with complete data for 2019-2021 as well as data from one site where substitution was performed.

All values in this report should be considered preliminary. Data values will be certified in May, 2022 and EPA will calculate design values for determination of compliance with the National Ambient Air Quality Standards (NAAQS) later this year.

All Iowa monitoring sites currently have annual and 24-hour design values less than the NAAQS.

What Types of PM_{2.5} Monitoring Data May be Used to Calculate Design Values?

Iowa currently operates two different types of PM_{2.5} samplers. One type collects fine particles by drawing ambient air through a filter over a 24-hour period. The filters are then returned to an analytical laboratory where they are weighed. Provided EPA protocols for handling and weighing the filters are followed, these manual samplers produce data that may be used for design value calculations. Although manual samplers provide accurate concentrations, the data produced is not available in real time, and so EPA has encouraged States to use automated continuous samplers to inform the public of current air quality levels.

EPA has approved the use of certain types of continuous samplers for computing design values, but advises States to conduct ongoing evaluations of the comparability of the data from these samplers to filter samplers. Iowa's humid summers and wintertime nitrate episodes represent a challenging environment in which to demonstrate this comparability. Iowa continues to evaluate the performance of continuous samplers.

Iowa PM_{2.5} Monitors (2021)

| AQS Site ID | Site Name | Location | County |
|-------------|----------------------------------|----------------|---------------|
| 190130009 | Water Tower | Waterloo | Blackhawk |
| 190450019 | Chancy Park | Clinton | Clinton |
| 190450021 | Rainbow Park | Clinton | Clinton |
| 191032001 | Hoover Sch. | Iowa City | Johnson |
| 191110008 | Fire Station | Keokuk | Lee |
| 191130040 | Public Health | Cedar Rapids | Linn |
| 191370002 | Viking Lake State Park | Rural Site | Montgomery |
| 191390015 | Muscatine HS E Campus (Garfield) | Muscatine | Muscatine |
| 191390016 | Muscatine, Greenwood Cemetery | Muscatine | Muscatine |
| 191390020 | Muscatine, Musser Park | Muscatine | Muscatine |
| 191471002 | lowa Lakes Community College | Emmetsburg | Palo Alto |
| 191530030 | Public Health | Des Moines | Polk |
| 191532510 | Indian Hills School | Clive | Polk |
| 191550009 | Franklin Sch. | Council Bluffs | Pottawattamie |
| 191630015 | Jefferson School | Davenport | Scott |
| 191630020 | Hayes School | Davenport | Scott |
| 191770006 | Lake Sugema | Rural Site | Van Buren |
| 191930021 | Irving School | Sioux City | Woodbury |

Iowa PM_{2.5} Design Values 2021

(from AQS database 3/21/2022)

| County | Site Name | City | EPA Site Id | Years | Daily Design Value (μg/m³) | Annual Design Value (µg/m³) |
|---------------|----------------------------------|----------------|-------------|-----------|-------------------------------|--------------------------------|
| Black Hawk | Water Tower | Waterloo | 19-013-0009 | 2019-2021 | 22 | 8.1 |
| Clinton | Chancy Park | Clinton | 19-045-0019 | 2019-2021 | 23 | 8.9** |
| Clinton | Rainbow Park | Clinton | 19-045-0021 | 2019-2021 | 21 | 8.1 |
| Johnson | Hoover Sch. | lowa City | 19-103-2001 | 2019-2021 | 21 | 7.9 |
| Lee | Fire Station | Keokuk | 19-111-0008 | 2019-2021 | 18 | 8.3 |
| Linn | Public Health | Cedar Rapids | 19-113-0040 | 2019-2021 | 22 | 8.3 |
| Montgomery | Viking Lake State Park | Not in a City | 19-137-0002 | 2019-2021 | 17 | 6.9 |
| Muscatine | Muscatine HS E Campus (Garfield) | Muscatine | 19-139-0015 | 2019-2021 | 21 | 8.2 |
| Muscatine | Greenwood Cemetery | Muscatine | 19-139-0016 | 2019-2021 | 19 | 7.7 |
| Muscatine | Musser Park | Muscatine | 19-139-0020 | 2019-2021 | 22 | 8.3** |
| Palo Alto | Iowa Lakes Community College | Emmetsburg | 19-147-1002 | 2019-2021 | 21 | 7.1 |
| Polk | Health Dept. | Des Moines | 19-153-0030 | 2019-2021 | 20 | 7.6 |
| Polk | Indian Hills School | Clive | 19-153-2510 | 2019-2021 | 18 | 7.5 |
| Pottawattamie | Franklin Sch. | Council Bluffs | 19-155-0009 | 2019-2021 | 21 | 8.3 |
| Scott | Jefferson School | Davenport | 19-163-0015 | 2019-2021 | 22 | 8.2 |
| Scott | Hayes School | Davenport | 19-163-0020 | 2019-2021 | 23 | 8.7 |
| Van Buren | Lake Sugema | Not in a City | 19-177-0006 | 2019-2021 | 18 | 7.3 |
| Woodbury | Irving School | Sioux City | 19-193-0021 | 2019-2021 | 22 | 8.1 |

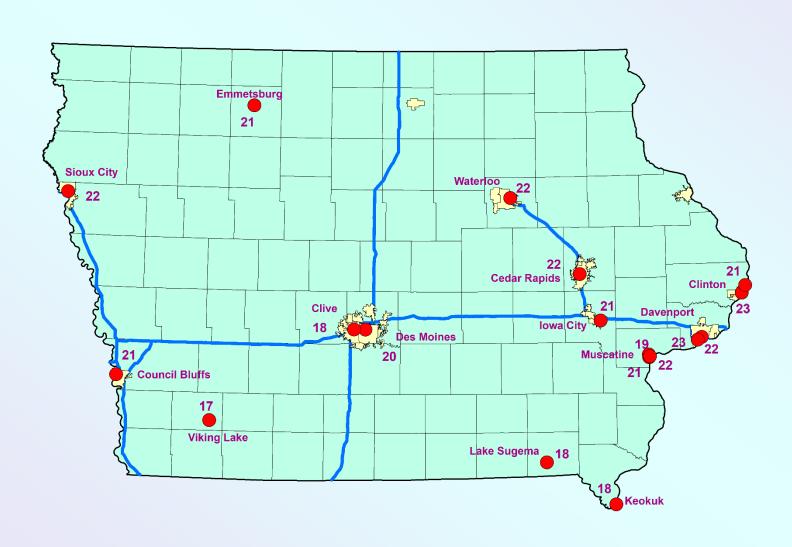
Values greater than 12.0 μg/m³ indicate non-attainment with the annual NAAQS.

Values greater than 35 µg/m3 indicate non-attainment with the Daily NAAQS.

**Source-oriented site. Annual NAAQS are not applicable.

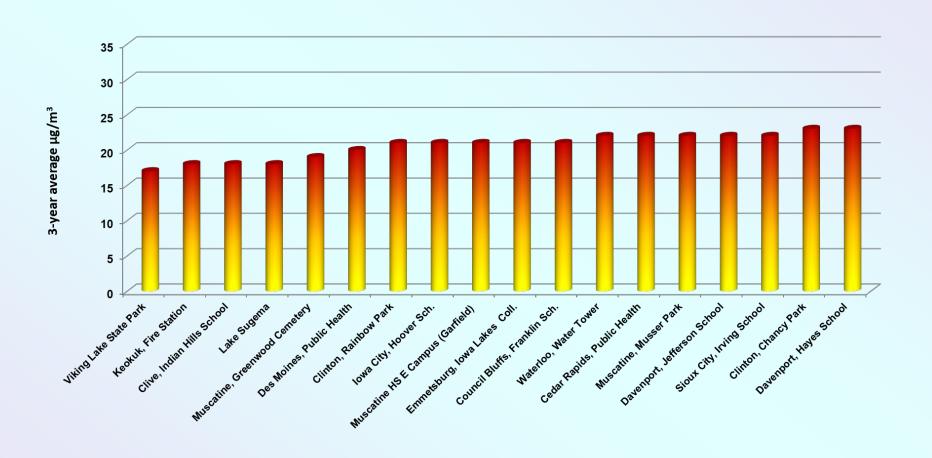
Iowa PM_{2.5} 24-hour Design Values 2019-2021

(NAAQS Standard is $35 \mu g/m^3$)



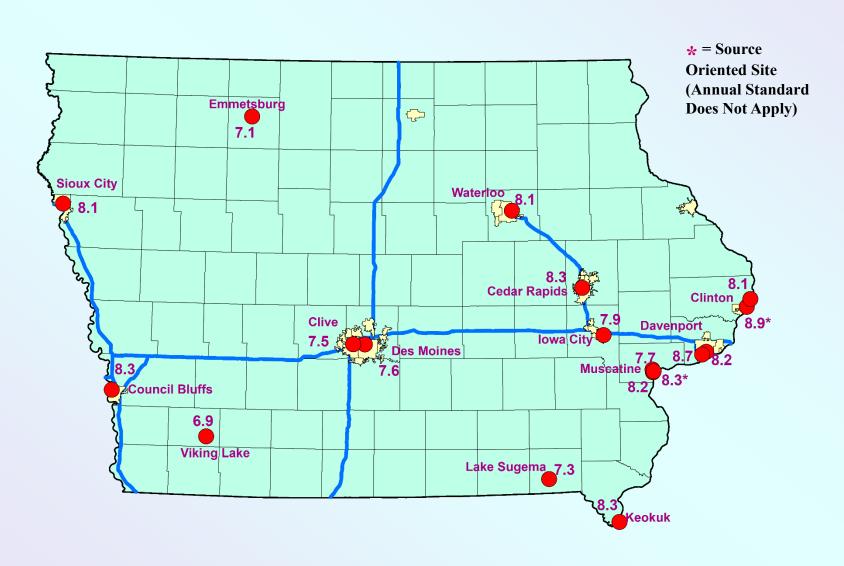
24-hour PM_{2.5} Design Values 2019-2021

(NAAQS Standard is 35 μg/m³)



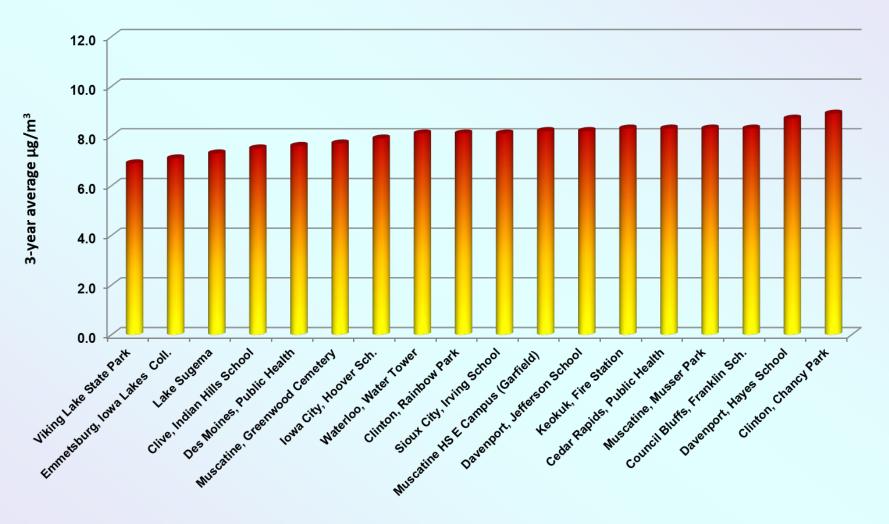
Iowa PM_{2.5} Annual Design Values 2019-2021

(NAAQS Standard is 12.0 µg/m³)

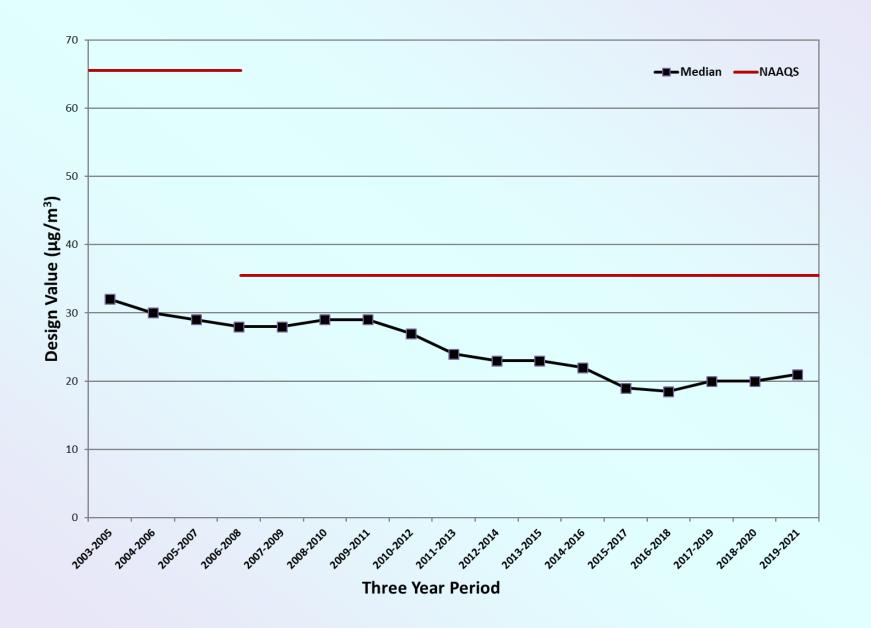


Annual PM_{2.5} Design Values 2019-2021

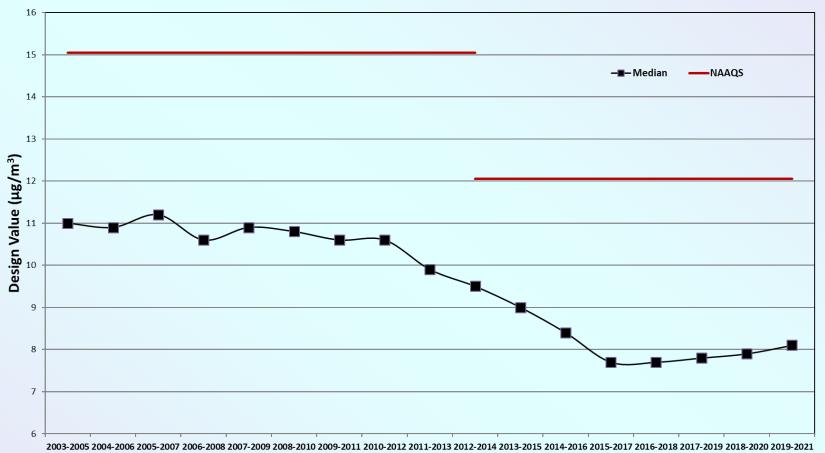
(NAAQS Standard is 12.0 μg/m³)



Median PM_{2.5} 24-Hour Design Values in Iowa PM_{2.5} Monitoring Network



Median PM_{2.5} Annual Design Values in Iowa PM_{2.5} Monitoring Network (Source oriented monitoring sites are not included)



2009-2011 2010-2012 2011-2013 2012-2014 2013-2015 2014-2016 2015-2017 2016-2018 2017-2019 2018-2020 2019-2021

Three Year Period

Web Resources

Calculation of the PM_{2.5} Design Values is treated in Appendix N of 40 CFR Pt. 50:

http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr50 main 02.tpl

EPA's Design Value calculations for PM_{2.5} and other pollutants:

https://www.epa.gov/air-trends

Information from EPA on PM_{2.5} standards:

https://www.epa.gov/naaqs/particulate-matter-pm-air-quality-standards

Historical Air Pollution Data for Iowa and Other States:

https://www.epa.gov/outdoor-air-quality-data