Iowa Fine Particulate Monitoring Network Design Values

2007-2009

Iowa DNR
Ambient Air Monitoring Group

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 15.0 µg/m^3 and the twenty-four hour standard is 35 µg/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 2007-2009, as well as one site in Des Moines where the EPA data substitution algorithm has been applied.

All values in this report should be considered preliminary. Data values will be certified in May, 2010 and EPA will calculate design values for determination of compliance with the NAAQS later this year.

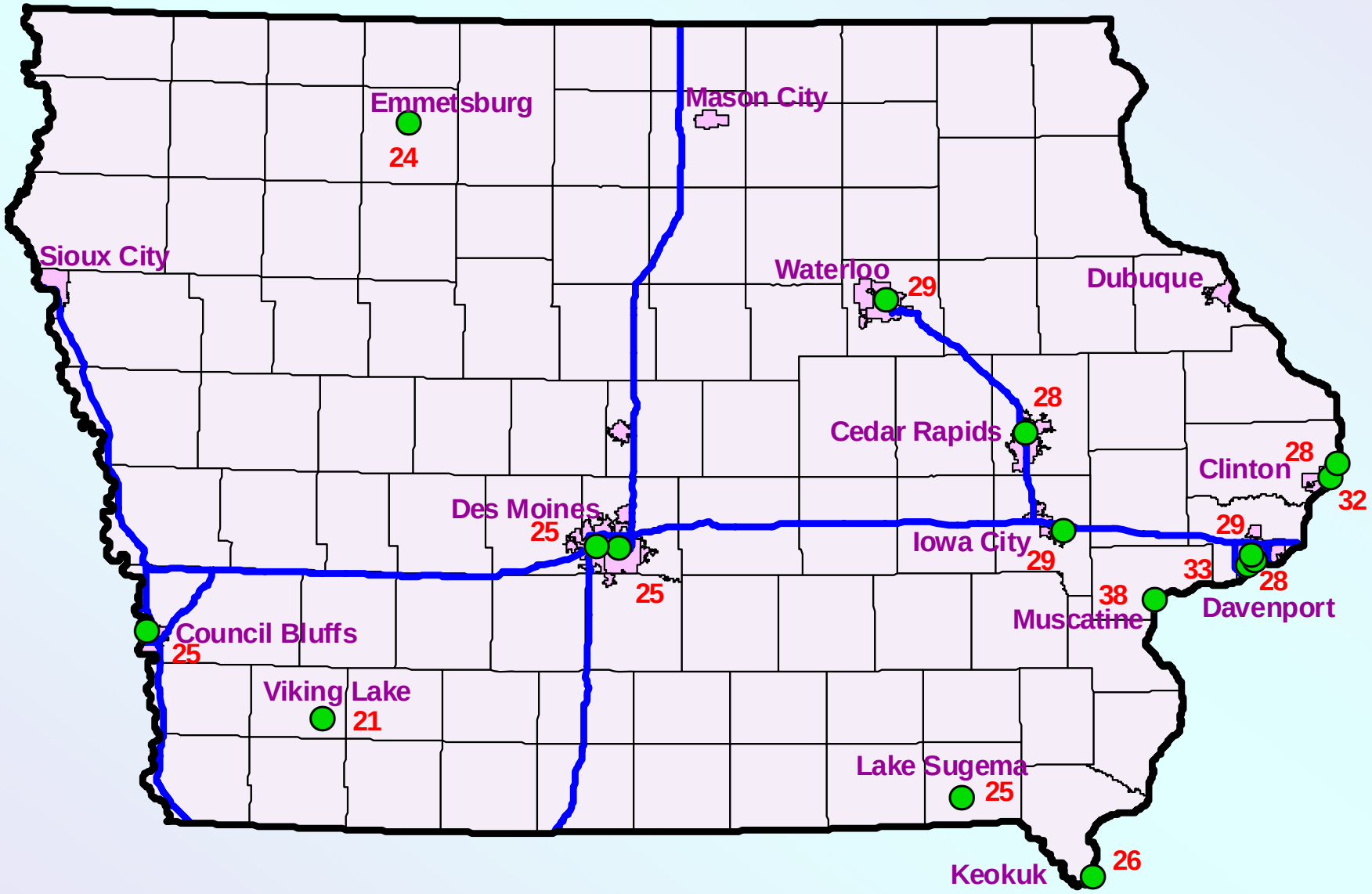
One monitoring site at Garfield School in Muscatine shows non-attainment with EPA's 35 $\mu g/m^3$ 24-hour fine particle NAAQS for the 2007-2009 period. All other monitoring sites have design values less than the NAAQS.

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

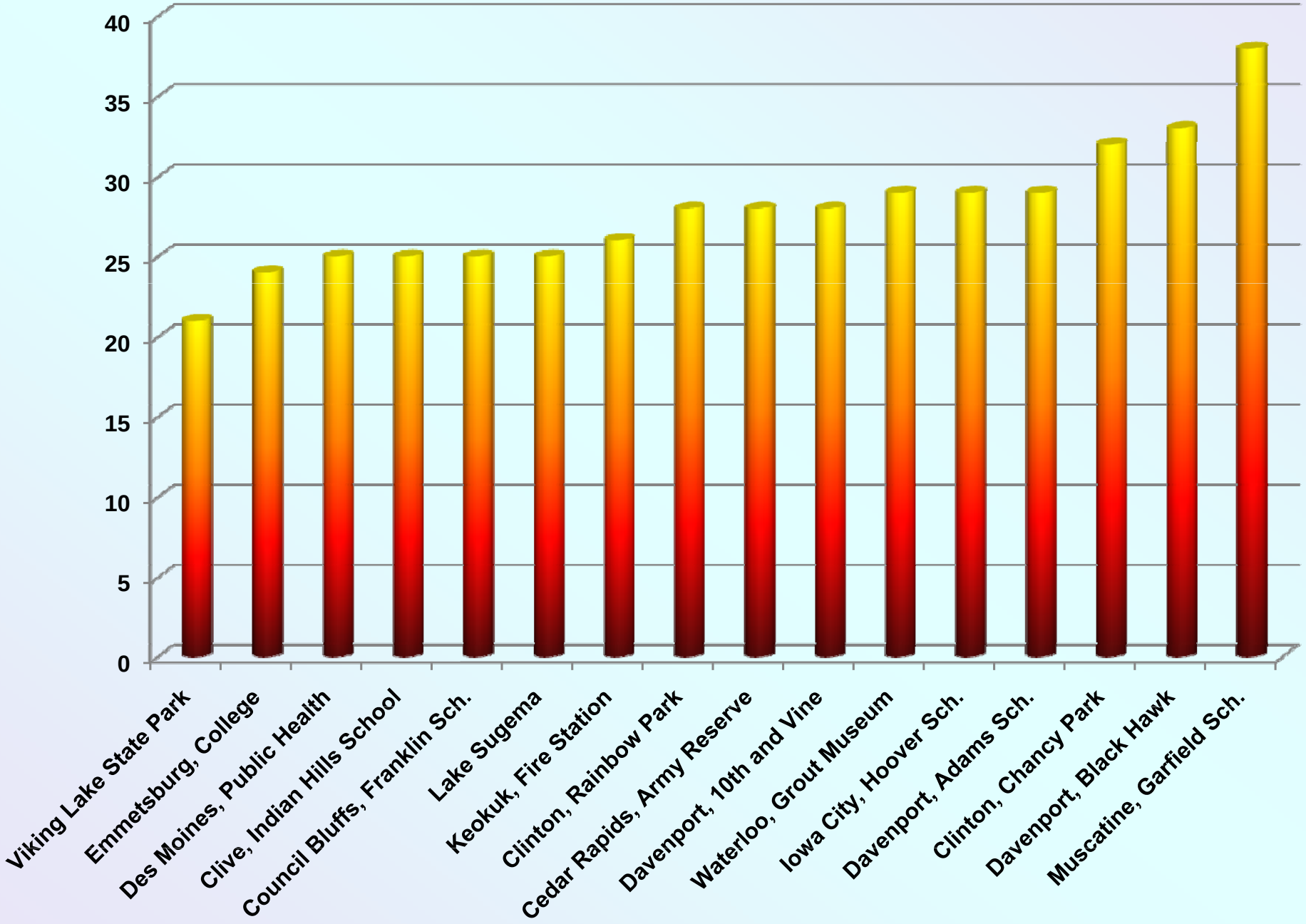
Iowa currently operates two different types of $PM_{2.5}$ samplers. One type collects fine particles by drawing ambient air through a filter over a 24-hour period. The filters are then returned to an analytical laboratory where they are weighed. Provided EPA protocols for handling and weighing the filters 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. Recently, EPA has approved the use of data from certain types of continuous samplers for computing design values. Data from continuous monitors that pass EPA equivalency tests may be included in computing design values in the future.

Iowa $PM_{2.5}$ 24-hour Design Values 2007-2009

(NAAQS Standard is 35 µg/m^3)

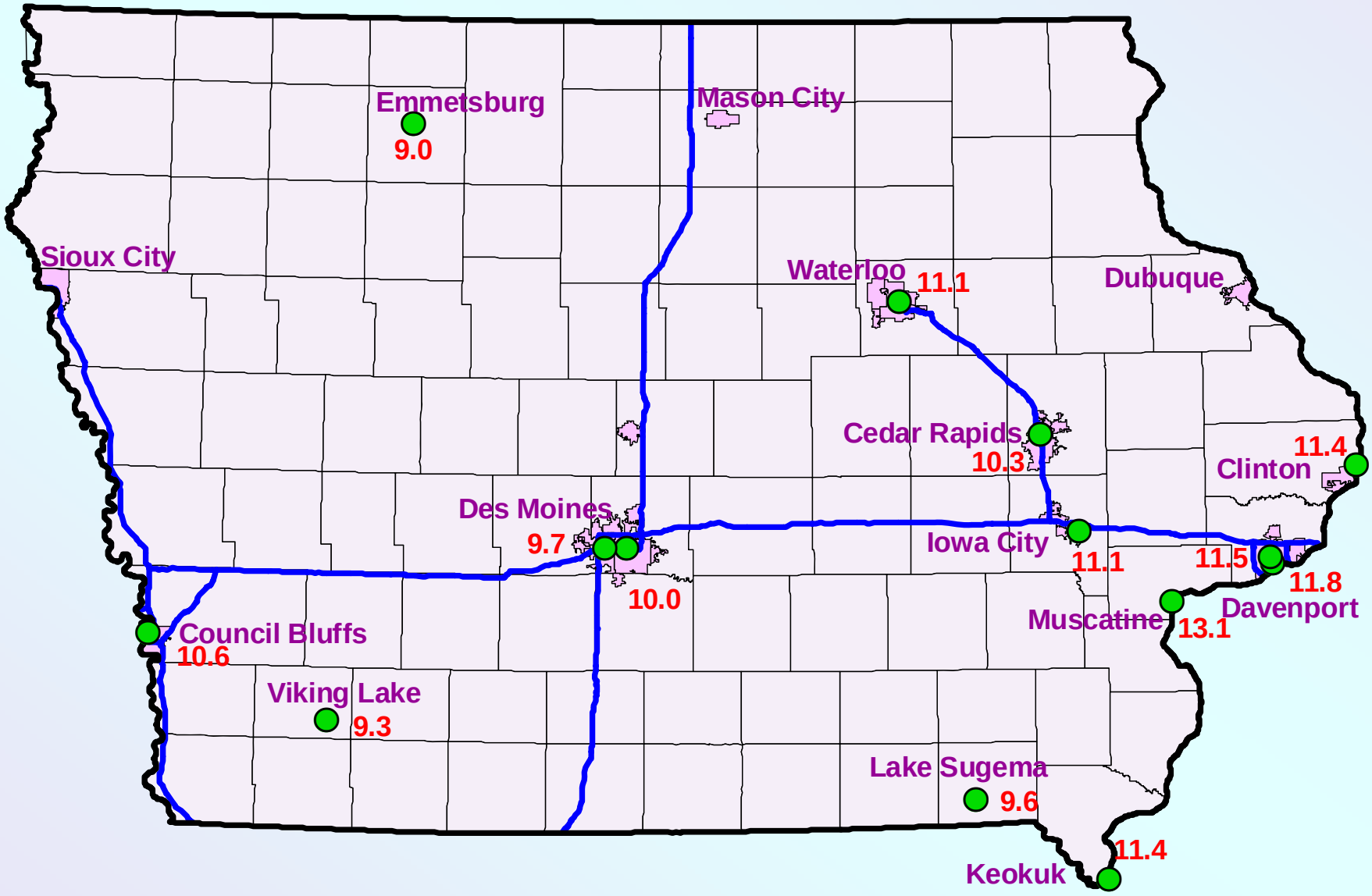


24-hour PM2.5 Design Values 2007-2009

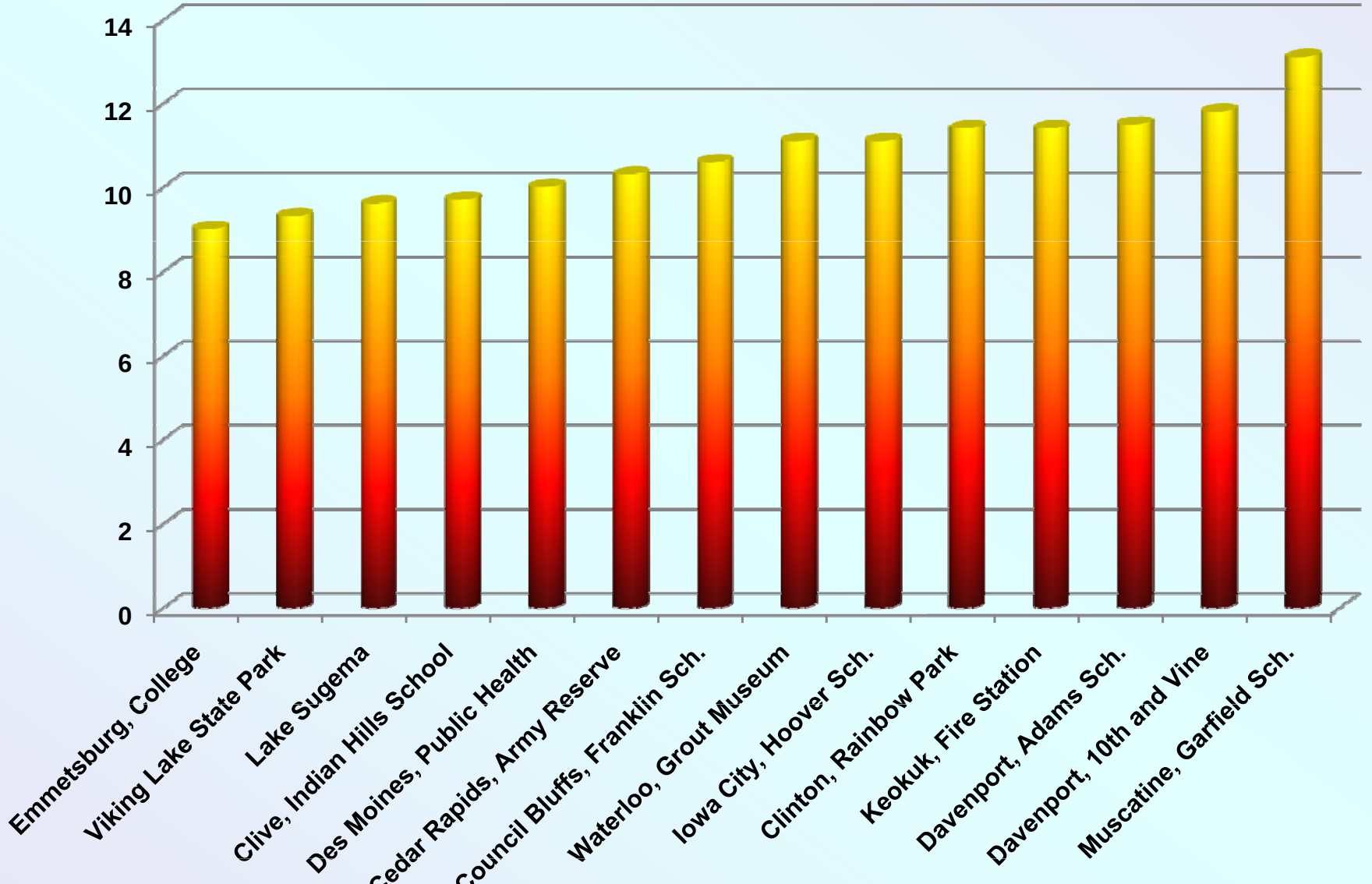


Iowa $PM_{2.5}$ Annual Design Values 2007-2009

(NAAQS Standard is 15.0 µg/m^3)



Annual PM2.5 Design Values 2007-2009



Preliminary Iowa $PM_{2.5}$ Attainment Calculations 2007-2009

Site Name	City/County	EPA Monitor Id	Year	Annual 98th percentile (ug/m3)	24-hour $PM_{2.5}$ Design Value	Annual averages (ug/m3)	Annual $PM_{2.5}$ Design Value
Grout	Waterloo	190130008	2007	31.5		12.4	
Museum	Black Hawk		2008	28.5		10.4	
			2009	28.2	29	10.5	**11.1**
Chancy Park	Clinton	190450019	2007	36.6		n/a	
	Clinton		2008	31.0		n/a	
			2009	27.7	32	n/a	**n/a***
Rainbow	Clinton	190450021	2007	29.6		12.1	
Park	Clinton		2008	28.3		11.0	
			2009	27.2	28	11.0	**11.4**
Hoover	Iowa City	191032001	2007	32.8		12.2	
Elementary	Johnson		2008	28.3		10.7	
			2009	25.8	29	10.6	**11.1**
Keokuk	Keokuk	191110008	2007	29.6		12.7	
Fire Station	Lee		2008	23.8		11.4	
			2009	24.8	26	10.1	**11.4**
Army Reserve	Cedar Rapids	191130037	2007	25.9		11.1	
	Linn		2008	25.4		10.3	
			2009	32.1	28	9.6	**10.3**
Viking Lake	Red Oak	191370002	2007	24.7		10.0	
	Montgomery		2008	18.8		8.7	
			2009	18.3	21	9.2	**9.3**
Garfield	Muscatine	191390015	2007	44.0		14.2	
Elementary	Muscatine		2008	33.7		12.6	
			2009	35.1	38	12.5	**13.1**
Iowa Lakes	Emmetsburg	191471002	2007	25.0		9.3	
Community	Emmet		2008	21.3		8.6	
College			2009	25.0	24	9.1	**9.0**
Public Health	Des Moines	191530030	2007	27.9		11.0	
	Polk		2008	24.2		9.8	
			2009	22.9	25**	9.2	**10.0****
Indian Hills	Clive	191532510	2007	25.2		10.5	
Elementary	Polk		2008	22.6		9.5	
			2009	26.8	25	9.1	**9.7**
Franklin	Council Bluffs	191550009	2007	33.0		11.2	
Elementary	Pottawattamie		2008	20.2		10.3	
			2009	21.1	25	10.2	**10.6**
Jefferson	Davenport	191630015	2007	30.4		12.5	
Elementary	Scott		2008	28.2		11.7	
			2009	26.7	28	11.1	**11.8**
Adams	Davenport	191630018	2007	32.8		12.5	
Elementary	Scott		2008	27.5		11.2	
			2009	26.3	29	10.8	**11.5**
Blackhawk	Davenport	191630019	2007	37.4		n/a	
Foundry	Scott		2008	31.3		n/a	
			2009	30.3	33	n/a	**n/a***
Lake Sugema	Keosauqua	191770006	2007	26.5		10.8	
	Van Buren		2008	25.7		9.4	
			2009	21.4	25	8.7	**9.6**

*** Annual Standard Not Applicable**

**** EPA Data Substitution Techniques Used to show attainment**

24-hour Design Values Less than or Equal to 35 ug/m^3 Indicate Attainment with the 24-hour NAAQS.

Annual Design Values Less than or Equal to 15.0 ug/m^3 Indicate Attainment with the Annual NAAQS.

Sites without enough data to calculate summary statistics have been excluded from this report.

Web Resources

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

http://edocket.access.gpo.gov/cfr_2009/julqtr/pdf/40cfr50AppN.pdf

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

http://www.epa.gov/airtrends/values.html

EPA's timeline for meeting the $PM_{2.5}$ standards (page 21).

http://epa.gov/pm/pdfs/20061013_presentation.pdf

Historical Air Pollution Data for Iowa and Other States:

http://www.epa.gov/air/data/

Web links listed are as accessed on 2/10/2010.