Iowa Fine Particulate Monitoring Network Design Values

2009-2011

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 98^{th} 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 2009-2011.

All values in this report should be considered preliminary. Data values will be certified in May, 2012 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 design values less than the NAAQS.

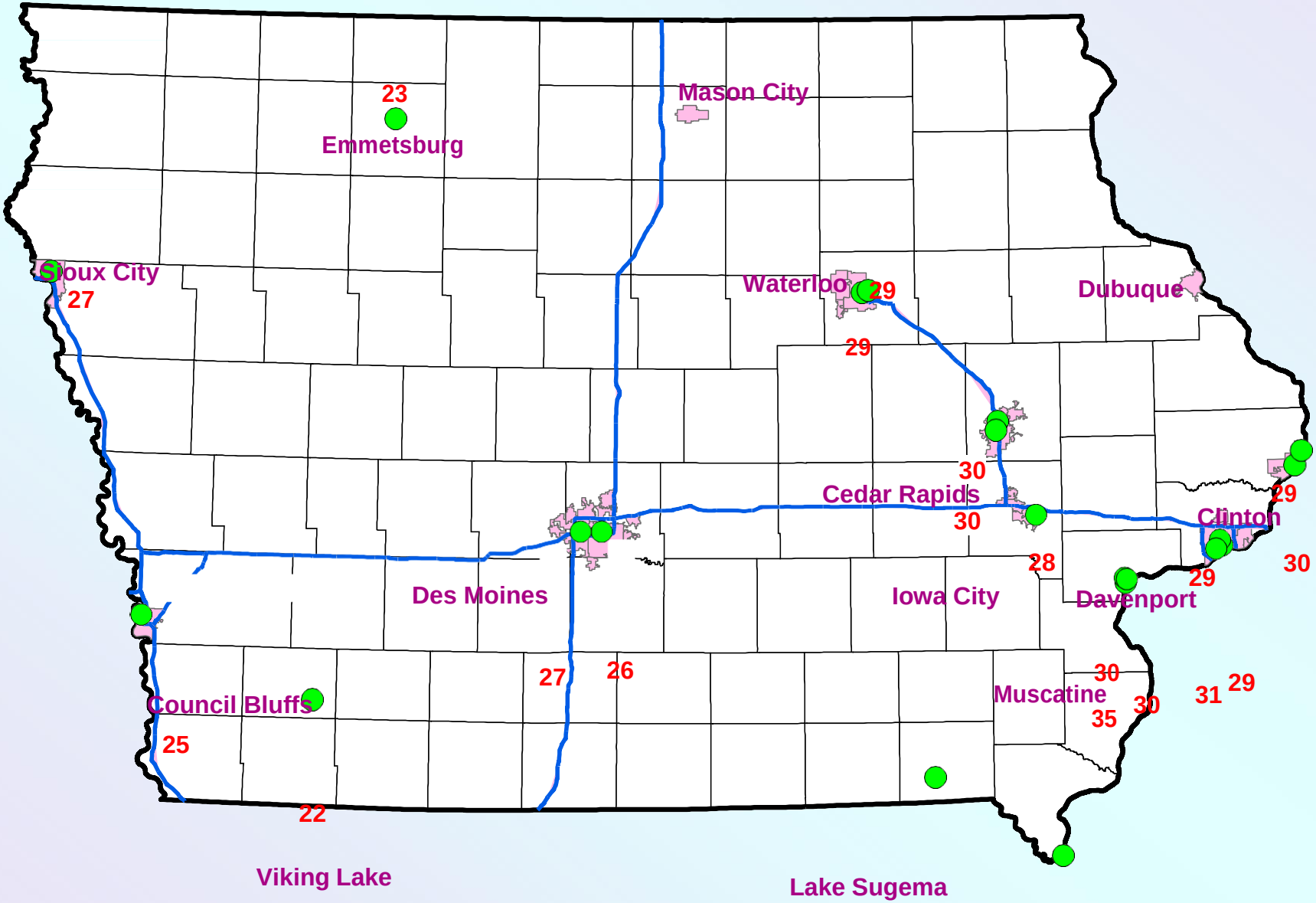
What Types of $PM_{2.5}$ Monitoring Data May be Used to Calculate Design Values?

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 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 with designs that are similar to those approved by EPA, but, to date, has not been able to consistently demonstrate comparability of the data generated from continuous samplers to filter sampler data.

Iowa $PM_{2.5}$ 24-hour Design Values 2009-2011

(NAAQS Standard is 35 µg/m^3)



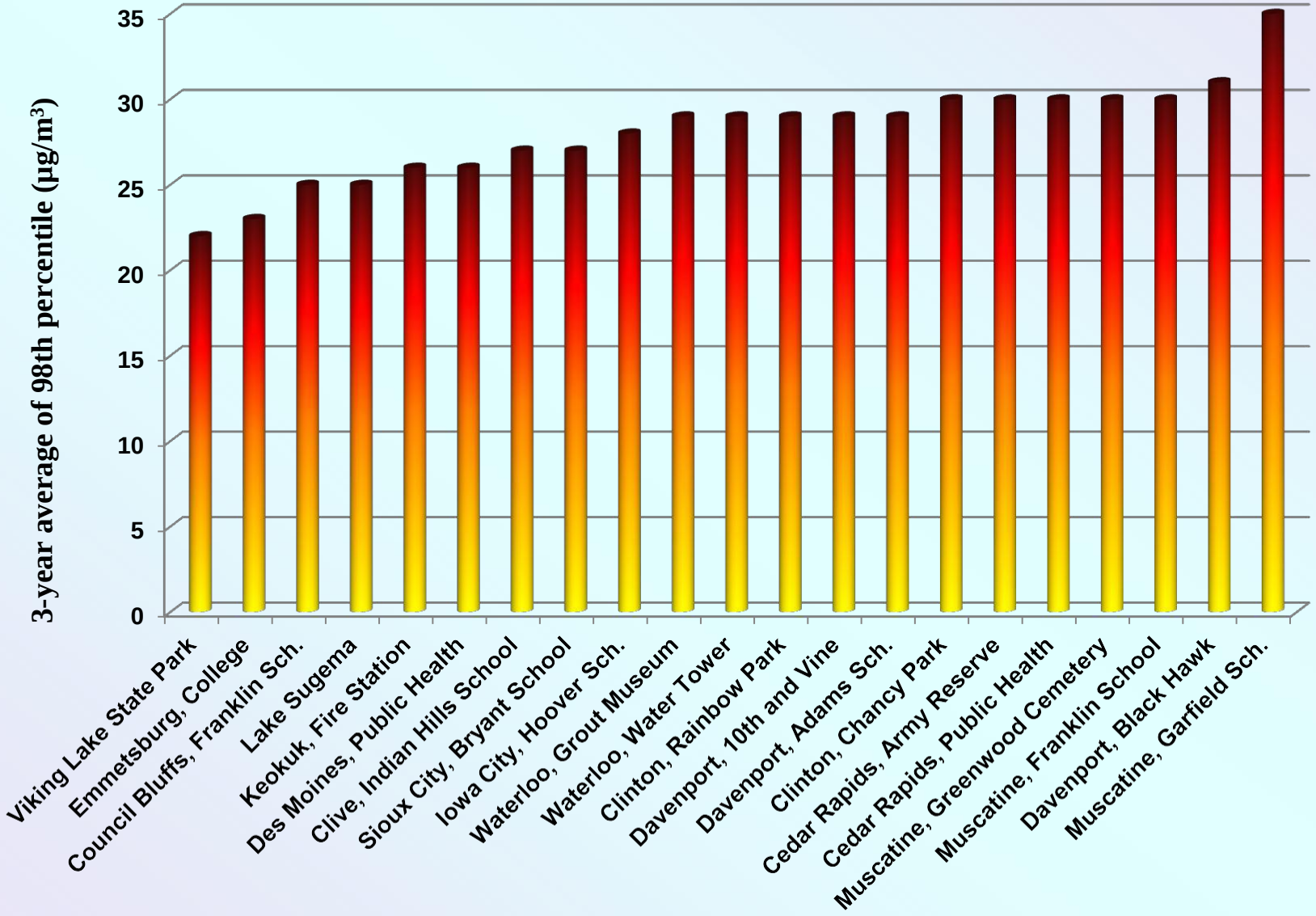
25

26

Keokuk

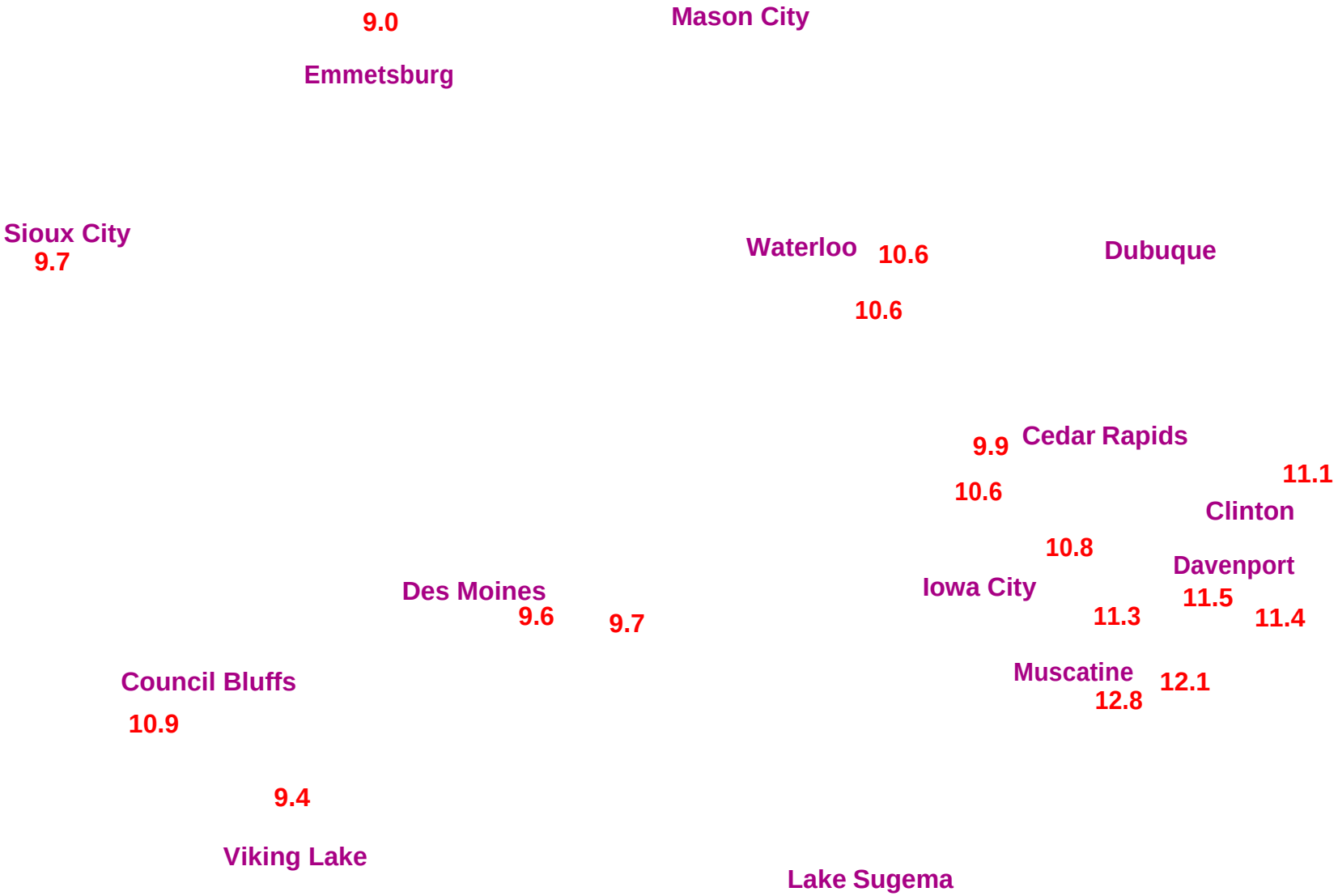
24-hour $PM_{2.5}$ Design Values 2009-2011

(NAAQS Standard is 35 µg/m³)



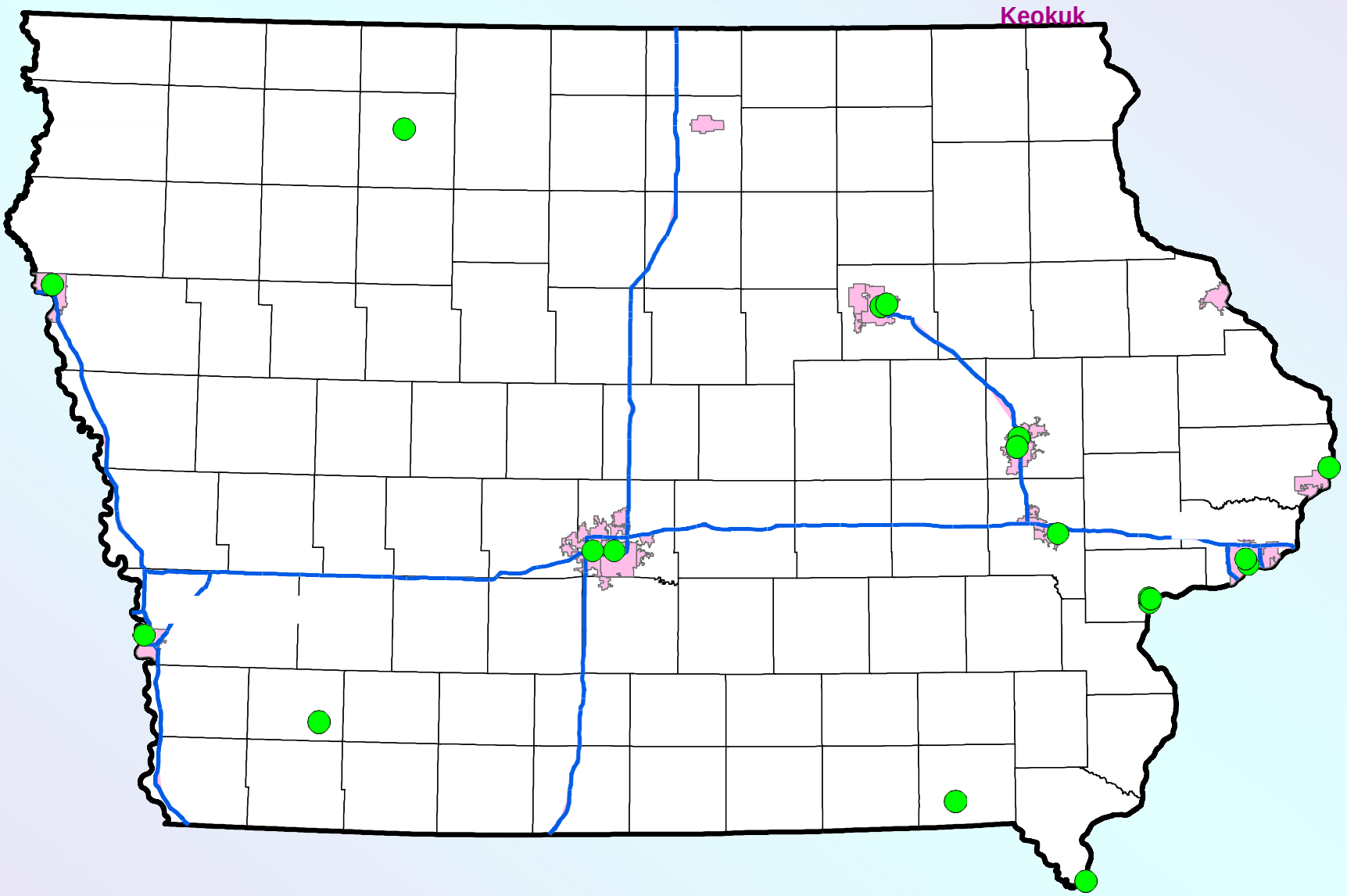
Iowa $PM_{2.5}$ Annual Design Values 2009-2011

(NAAQS Standard is 15.0 µg/m^3)



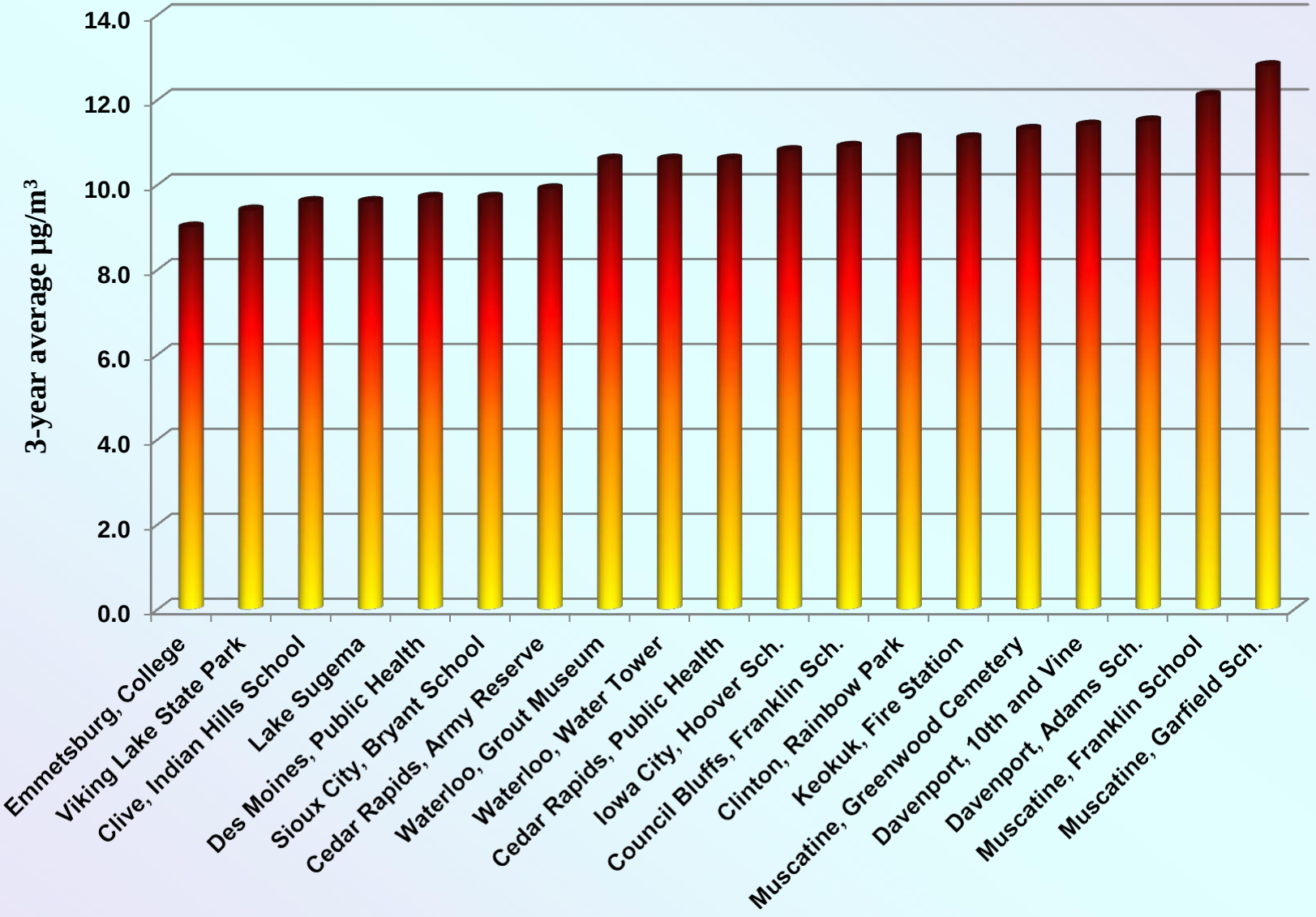
9.6

11.1



Annual $PM_{2.5}$ Design Values 2009-2011

(NAAQS Standard is 15.0 µg/m³)



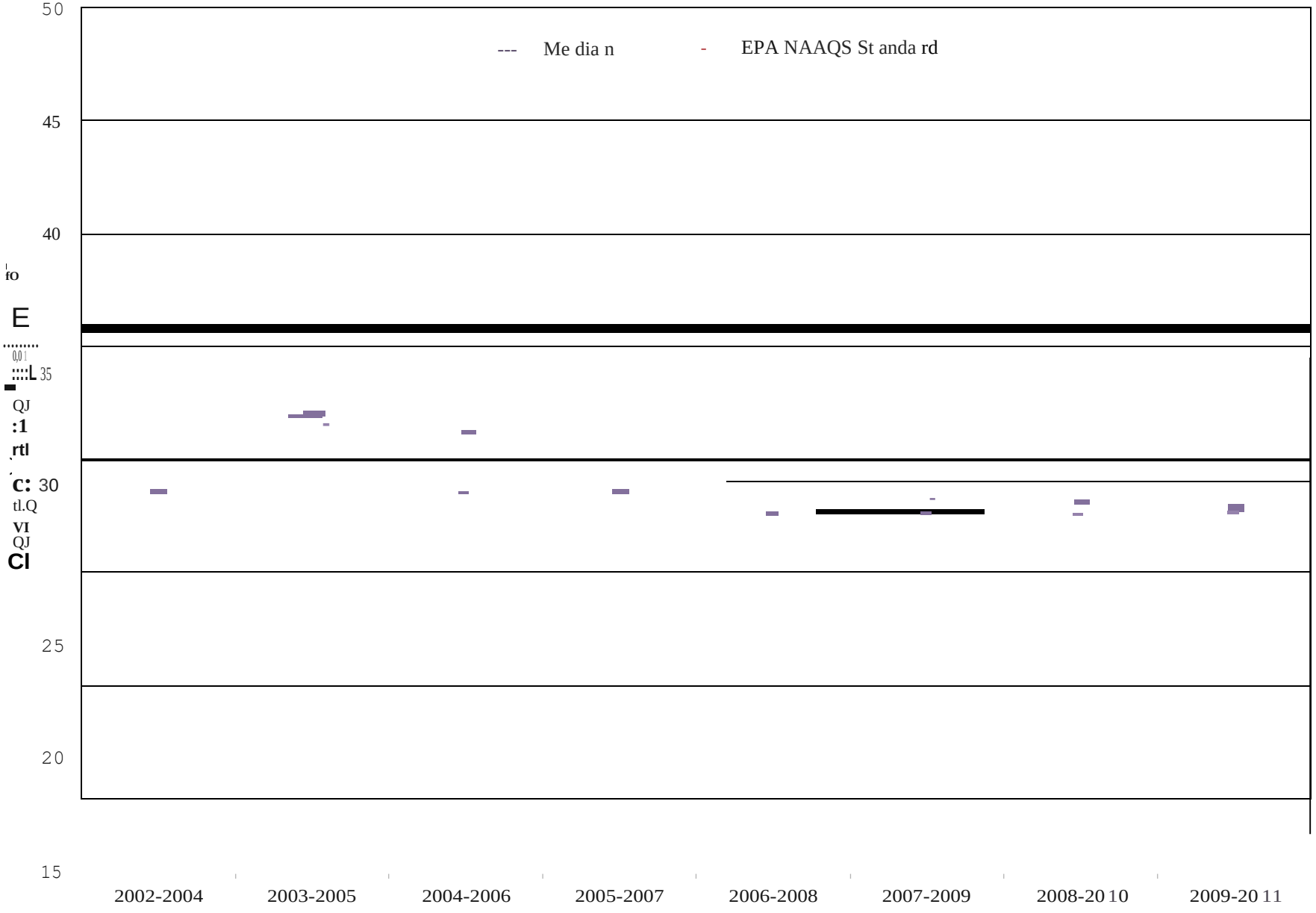
Preliminary Iowa $PM_{2.5}$ Attainment Calculations 2009-2011							
Site Name	**City/County**	**EPA Monitor Id**	**Year**	**Annual 98th percentile (ug/m3)**	**24-hour $PM_{2.5}$ Design Value**	**Annual averages (ug/m3)**	**Annual $PM_{2.5}$ Design Value**
Grout Museum	Waterloo Black Hawk	190130008	2009	28.2		10.5	
			2010	36.7		10.9	
			2011	22.7	**29**	10.6	**10.6**
Water Tower	Waterloo Black Hawk	190130009	2009	27.7		10.4	
			2010	35.8		10.9	
			2011	23.6	**29**	10.4	**10.6**
Chancy Park	Clinton Clinton	190450019	2009	27.7		n/a	
			2010	35.3		n/a	
			2011	25.8	**30**	n/a	**n/a***
Rainbow Park	Clinton Clinton	190450021	2009	27.2		11.0	
			2010	33.5		11.9	
			2011	26.3	**29**	10.5	**11.1**
Hoover Elementary	Iowa City Johnson	191032001	2009	25.8		10.6	
			2010	33.1		11.5	
			2011	26.4	**28**	10.3	**10.8**
Keokuk Fire Station	Keokuk Lee	191110008	2009	24.8		10.1	
			2010	30.4		11.9	
			2011	23.9	**26**	11.3	**11.1**
Army Reserve	Cedar Rapids Linn	191130037	2009	32.1		9.6	
			2010	35.8		10.2	
			2011	23.5	**30**	9.9	**9.9**
Public Health	Cedar Rapids Linn	191130040	2009	30.7		10.4	
			2010	34.6		11.1	
			2011	24.5	**30**	10.2	**10.6**
Viking Lake	Red Oak Montgomery	191370002	2009	18.3		9.2	
			2010	27.4		9.9	
			2011	21.5	**22**	9.0	**9.4**
Garfield Elementary	Muscatine Muscatine	191390015	2009	35.1		12.5	
			2010	40.7		13.9	
			2011	28.8	**35**	12.0	**12.8**
Greenwood Cemetery	Muscatine Muscatine	191390016	2009	30.4		11.0	
			2010	34.5		12.0	
			2011	23.9	**30**	11.1	**11.3**

Preliminary Iowa $PM_{2.5}$ Attainment Calculations 2009-2011 (continued)							
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**
Franklin School	Muscatine Muscatine	191390018	2009	30.3		11.2	
			2010	35.6		12.7	
			2011	25.3	**30**	12.4	**12.1**
Iowa Lakes Community College	Emmetsburg Emmet	191471002	2009	25.0		9.1	
			2010	20.9		8.7	
			2011	22.0	**23**	9.2	**9.0**
Public Health	Des Moines Polk	191530030	2009	22.9		9.2	
			2010	30.7		10.3	
			2011	23.7	**26**	9.5	**9.7**
Indian Hills Elementary	Clive Polk	191532510	2009	26.8		9.1	
			2010	33.4		10.1	
			2011	20.9	**27**	9.6	**9.6**
Franklin Elementary	Council Bluffs Pottawattamie	191550009	2009	21.1		10.2	
			2010	32.3		12.2	
			2011	20.8	**25**	10.2	**10.9**
Jefferson Elementary	Davenport Scott	191630015	2009	26.7		11.1	
			2010	32.7		12.1	
			2011	27.0	**29**	11.0	**11.4**
Adams Elementary	Davenport Scott	191630018	2009	26.3		10.8	
			2010	34.4		12.0	
			2011	26.5	**29**	11.5	**11.5**
Blackhawk Foundry	Davenport Scott	191630019	2009	30.3		n/a	
			2010	34.5		n/a	
			2011	29.0	**31**	n/a	**n/a***
Lake Sugema	Keosauqua Van Buren	191770006	2009	21.4		8.7	
			2010	29.7		9.8	
			2011	24.8	**25**	10.4	**9.6**
Bryant School	Sioux City Woodbury	191930019	2009	24.4		9.1	
			2010	34.0		10.7	
			2011	23.4	**27**	9.2	**9.7**

*** Annual Standard Not Applicable**

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

Median $PM_{2.5}$ Design Values in Iowa $PM_{2.5}$ Monitoring Network



Three Year Period

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_2010/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/airdata/

Web links listed are as accessed on 2/20/2012.