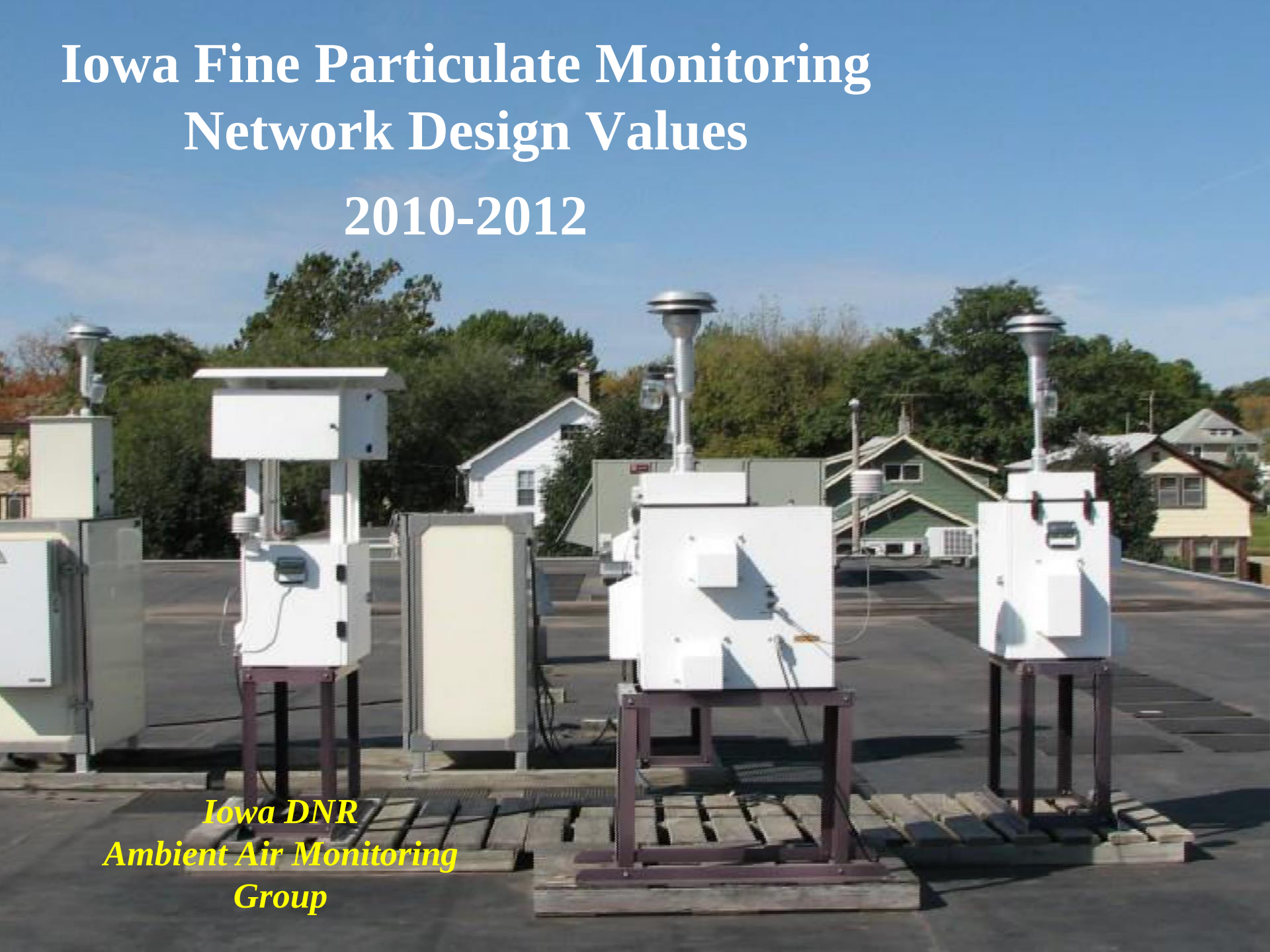
Iowa Fine Particulate Monitoring Network Design Values

2010-2012



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 12.0 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 2010-2012 as well as data from two sites where substitution was performed.

All values in this report should be considered preliminary. Data values will be certified in May, 2013 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 24-hour design values less than the NAAQS. One site in Muscatine has an annual design value greater than the NAAQS standard.

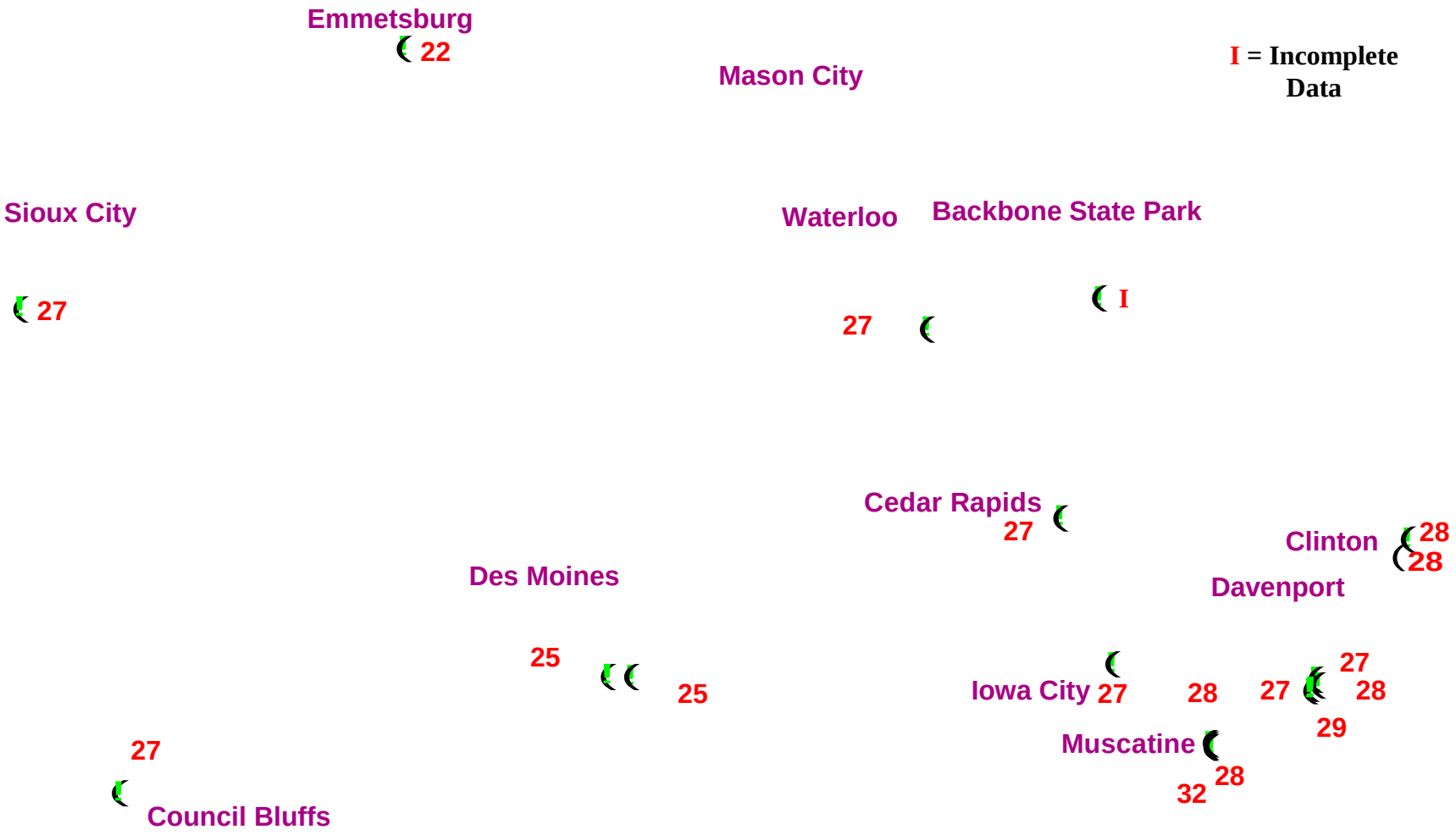
What Types of $PM_{2.5}$ Monitoring Data May be Used to Calculate Design Values?

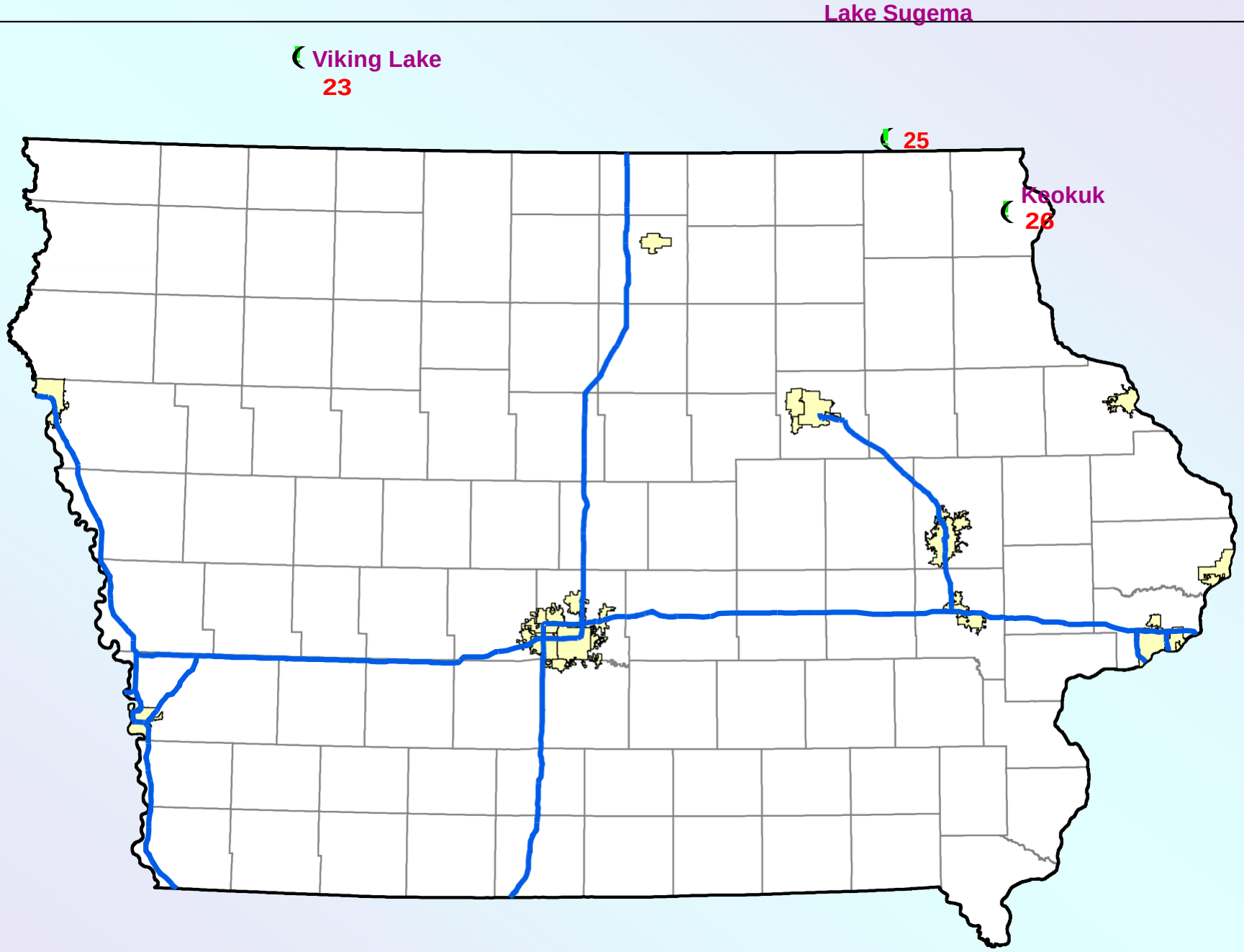
Iowa currently operates two different types of $PM_{2.5}$ samplers. One type collects fine particles by drawing ambient air through a filter over a 24-hour period. The filters are then returned to an analytical laboratory where they are weighed. Provided EPA protocols for handling and weighing the filters 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 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 2010-2012

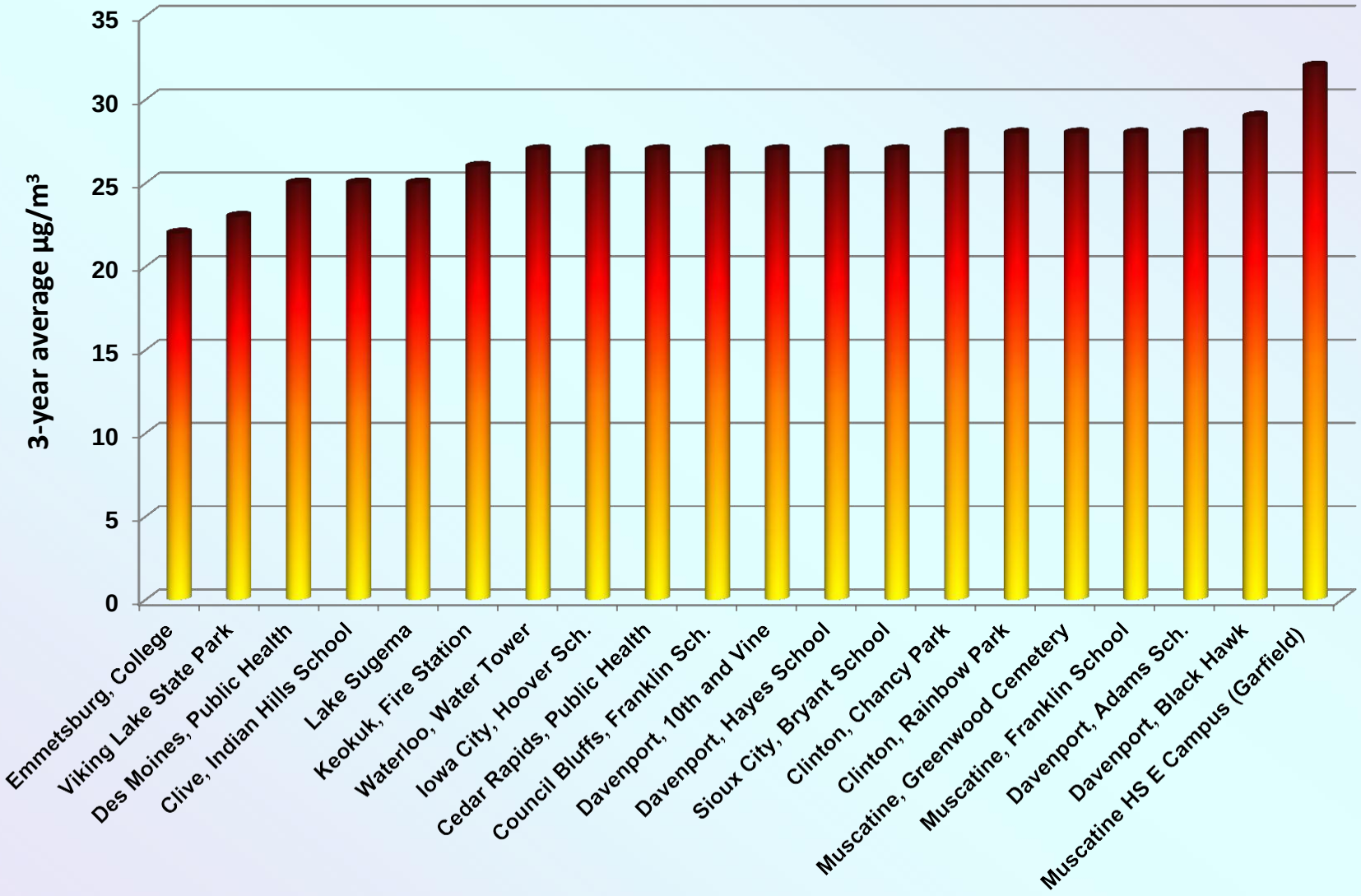
(NAAQS Standard is 35 µg/m³)




Lake Sugema
Viking Lake
23
25
Keokuk
26

24-hour $PM_{2.5}$ Design Values 2010-2012

(NAAQS Standard is 35 µg/m³)



Iowa $PM_{2.5}$ Annual Design Values 2010-2012

(NAAQS Standard is 12.0 µg/m^3)

I = Incomplete Data
S = Source Oriented Site (Annual Standard Does Not Apply)

Emmetsburg
8.8

Mason City

Sioux City
9.9

Waterloo
10.4

Backbone State Park
I

Cedar Rapids
10.3

Clinton
S
10.7

Davenport

Des Moines
9.6
9.7

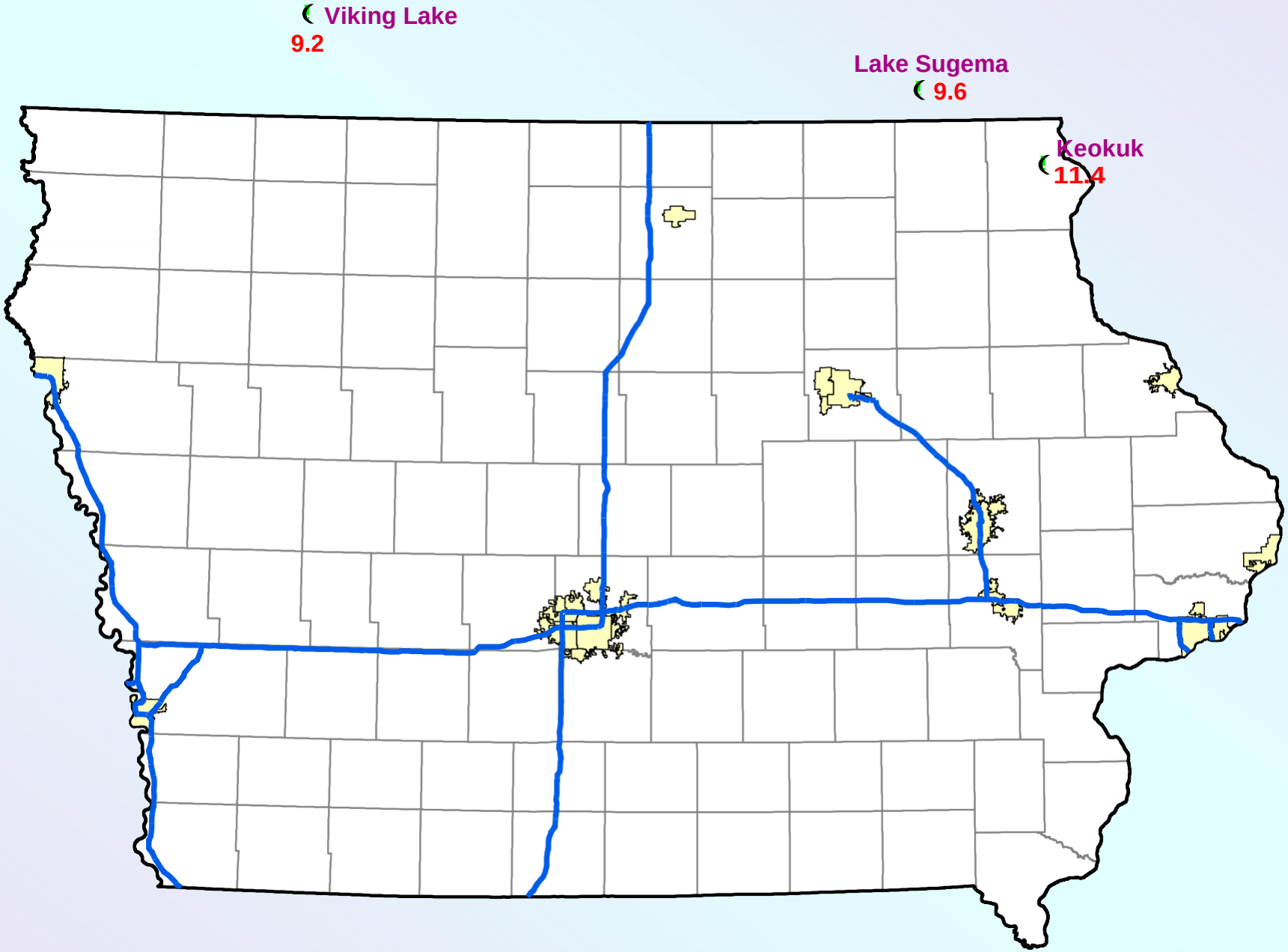
Iowa City
10.5
11.1

S
11.0

Muscatine
11.8
11.3
11.2

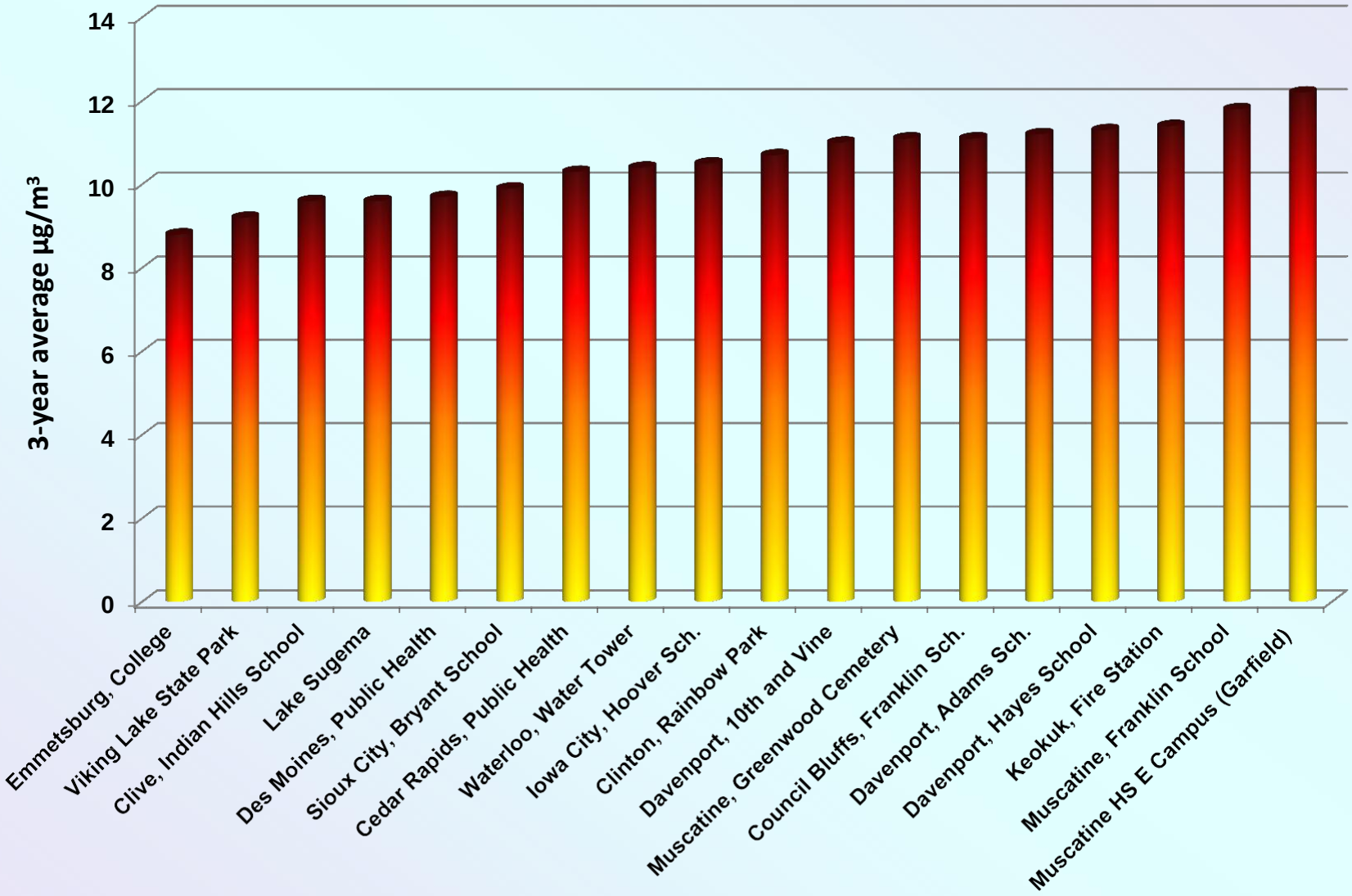
12.2

11.1
Council Bluffs


Viking Lake
9.2
Lake Sugema
9.6
Keokuk
11.4

Annual $PM_{2.5}$ Design Values 2010-2012

(NAAQS Standard is 12.0 µg/m³)



Preliminary Iowa $PM_{2.5}$ Attainment Calculations 2010-2012

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
Water	Waterloo	190130009	2010	35.8		10.9	
Tower	Black Hawk		2011	23.6		10.4	
			2012	22.5	**27**	9.9	**10.4**
Chancy Park	Clinton	190450019	2010	35.3		n/a	
	Clinton		2011	25.8		n/a	
			2012	23.7	**28**	n/a	**n/a***
Rainbow	Clinton	190450021	2010	33.5		11.9	
Park	Clinton		2011	26.3		10.5	
			2012	22.9	**28**	9.7	**10.7**
Hoover	Iowa City	191032001	2010	33.1		11.5	
Elementary	Johnson		2011	26.4		10.3	
			2012	21.8	**27**	9.6	**10.5**
Keokuk	Keokuk	191110008	2010	30.4		11.9	
Fire Station	Lee		2011	23.9		11.3	
			2012	22.7 **	**26**	11.0	**11.4 ******
Public Health	Cedar Rapids	191130040	2010	34.6		11.1	
	Linn		2011	24.5		10.2	
			2012	22.5	**27**	9.5	**10.3**
Viking Lake	Red Oak	191370002	2010	27.4		9.9	
	Montgomery		2011	21.5		9.0	
			2012	20.5	**23**	8.8	**9.2**
Muscatine HS	Muscatine	191390015	2010	40.7		13.9	
E Campus	Muscatine		2011	28.8		12.0	
(Garfield)			2012	26.6	**32**	10.8	**12.2**
Greenwood	Muscatine	191390016	2010	34.5		12.0	
Cemetery	Muscatine		2011	23.9		11.1	
			2012	26.1	**28**	10.2	**11.1**
Franklin	Muscatine	191390018	2010	35.6		12.7	
School	Muscatine		2011	25.3		12.4	
			2012	24.2	**28**	10.3	**11.8**

*** Annual Standard Not Applicable**

**** Incomplete Data, Data Substitution Performed and Passed Data Substitution Test**

Annual Design Values Less than or Equal to 12.0 ug/m³ Indicate Attainment with the Annual NAAQS

24-hour Design Values Less than or Equal to 35 ug/m³ Indicate Attainment with the 24-hour NAAQS.

Preliminary Iowa $PM_{2.5}$ Attainment Calculations 2010-2012 (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
Iowa Lakes	Emmetsburg	191471002	2010	20.9		8.7	
Community	Emmet		2011	22.0		9.2	
College			2012	22.4	**22**	8.7	**8.8**
Public Health	Des Moines	191530030	2010	30.7		10.3	
	Polk		2011	23.7		9.5	
			2012	21.2	**25**	9.2	**9.7**
Indian Hills	Clive	191532510	2010	33.4		10.1	
Elementary	Polk		2011	20.9		9.6	
			2012	21.3	**25**	9.1	**9.6**
Franklin	Council Bluffs	191550009	2010	32.3		12.2	
Elementary	Pottawattamie		2011	20.8		10.2	
			2012	28.5	**27**	10.8	**11.1**
Jefferson	Davenport	191630015	2010	32.7		12.1	
Elementary	Scott		2011	27.0		11.0	
			2012	22.0	**27**	9.8	**11.0**
Adams	Davenport	191630018	2010	34.4		12.0	
Elementary	Scott		2011	26.5		11.5	
			2012	21.7	**28**	10.0	**11.2**
Blackhawk	Davenport	191630019	2010	34.5		n/a	
Foundry	Scott		2011	29.0		n/a	
***			2012	24 **	**29**	n/a	**n/a***
Hayes	Davenport	191630020	2010	32.6		12.3	
School	Scott		2011	23.8		11.3	
			2012	24.6	**27**	10.4	**11.3**
Lake Sugema	Keosauqua	191770006	2010	29.7		9.8	
	Van Buren		2011	24.8		10.4	
			2012	20.6	**25**	8.5	**9.6**
Bryant	Sioux City	191930019	2010	34.0		10.7	
School	Woodbury		2011	23.4		9.2	
			2012	24.9	**27**	9.7	**9.9**

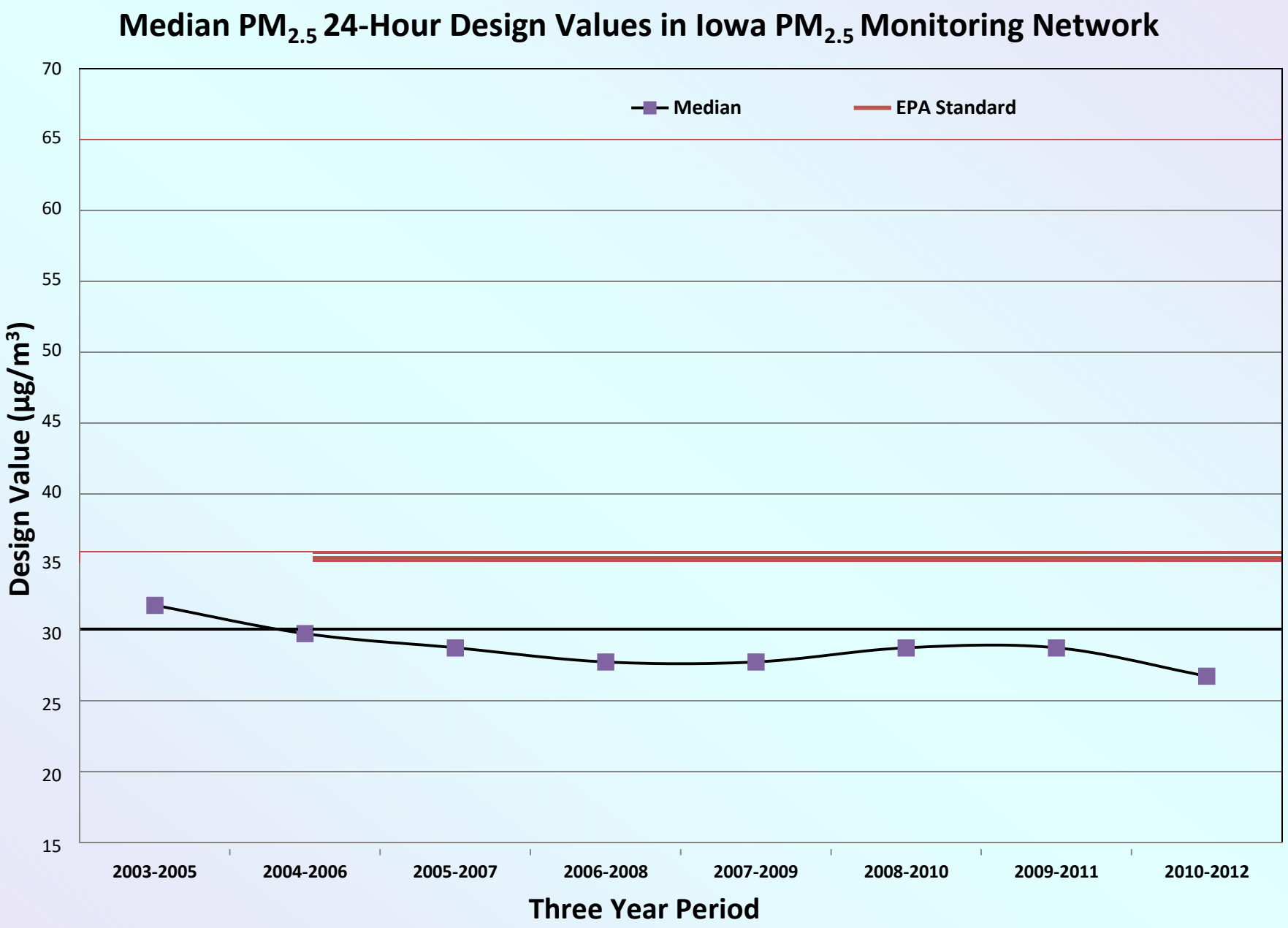
*** Annual Standard Not Applicable**

**** Incomplete Data, Data Substitution Performed and Passed Data Substitution Test**

***** Blackhawk Foundry Ceased Melting Operations on February 11, 2010 (now population oriented site)**

Annual Design Values Less than or Equal to 12.0 ug/m³ Indicate Attainment with the Annual NAAQS

24-hour Design Values Less than or Equal to 35 ug/m³ Indicate Attainment with the 24-hour NAAQS.


Median $PM_{2.5}$ 24-Hour Design Values in Iowa $PM_{2.5}$ Monitoring Network
Median
EPA Standard
Design Value (µg/m³)
70
65
60
55
50
45
40
35
30
25
20
15
2003-2005
2004-2006
2005-2007
2006-2008
2007-2009
2008-2010
2009-2011
2010-2012
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.gpo.gov/fdsys/pkg/CFR-2012-title40-vol2/pdf/CFR-2012-title40-vol2-part50-appN.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 3/12/2013.