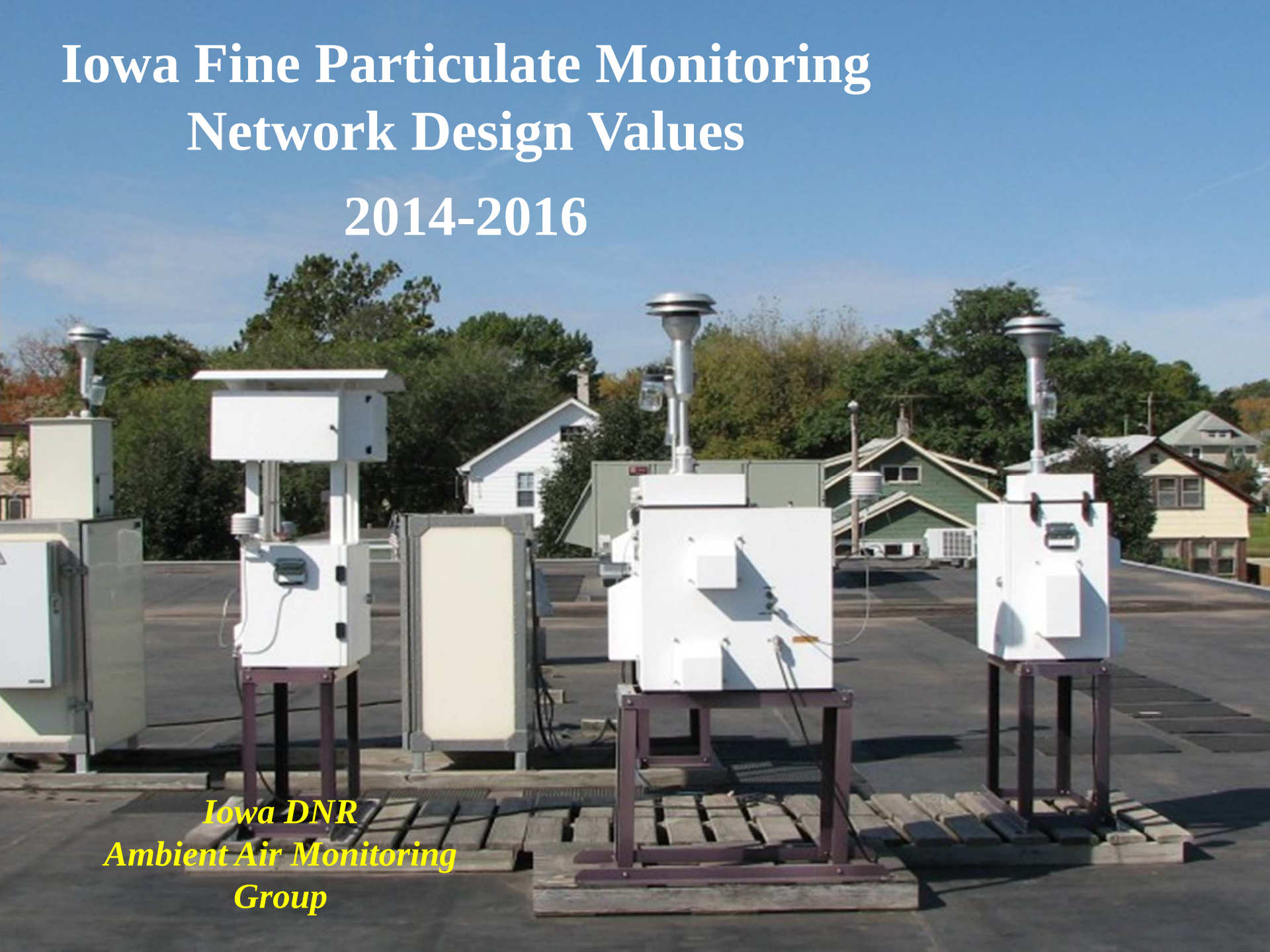
Iowa Fine Particulate Monitoring Network Design Values

2014-2016



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 2014-2016 as well as data from four sites where substitution was performed.

All values in this report should be considered preliminary. Data values will be certified in May, 2017 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 (2016)			
AQS Site ID	**Site Name**	**Location**	**County**
190130009	Water Tower	Waterloo	Blackhawk
190450019	Chancy Park	Clinton	Clinton
190450021	Rainbow Park	Clinton	Clinton
190550001	Backbone State Park	Rural Site	Buchanan
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
191390018	Muscatine, Franklin School	Muscatine	Muscatine
191390020	Muscatine, Musser Park	Muscatine	Muscatine
191471002	Iowa 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
191630018	Adams Sch.	Davenport	Scott
191630020	Hayes School	Davenport	Scott
191770006	Lake Sugema	Rural Site	Van Buren
191930021	Irving School+	Sioux City	Woodbury

+ Site began operation on January 1, 2016, no design value is available.

Iowa $PM_{2.5}$ Design Values 2016 – Preliminary Until May 2017

County	Site Name	City	EPA Site Id	Year	Annual 98th Percentile (µg/m³)	Daily Design Value (µg/m³)	Annual Mean (µg/m³)	Annual Design Value (µg/m³)
Black Hawk	Water Tower	Waterloo	19-013-0009	2014	21.1		9.3	
				2015	22.1		8.6	
				2016	19.7	21	7.6	8.5
Clinton	Chancy Park	Clinton	19-045-0019	2014	28.2		10.4	
				2015	24.9		9.7	
				2016	18.5	24	8.3	9.4**
Clinton	Rainbow Park	Clinton	19-045-0021	2014	24.8*		9.3*	
				2015	23.1*		9.1*	
				2016	17.8	22	7.7	8.7
Buchanan	Backbone State Park	Not in a City	19-055-0001	2014	23.6		9.0	
				2015	20.9		8.1	
				2016	17.3	21	7.4	8.1
Johnson	Hoover Sch.	Iowa City	19-103-2001	2014	23.8*		9.0*	
				2015	21.1		8.4	
				2016	17.4	21	7.4	8.3
Lee	Fire Station	Keokuk	19-111-0008	2014	24.8		10.7	
				2015	23.6		8.7	
				2016	18.1	22	8.4	9.2
Linn	Public Health	Cedar Rapids	19-113-0040	2014	24.1		9.7	
				2015	23.0		8.8	
				2016	18.5	22	7.8	8.8
Montgomery	Viking Lake State Park	Not in a City	19-137-0002	2014	18.4		7.7	
				2015	18.5		6.9	
				2016	15.5	17	6.1	6.9

Iowa $PM_{2.5}$ Design Values 2016 – Preliminary Until May 2017 (continued)

County	Site Name	City	EPA Site Id	Year	Annual 98th Percentile (µg/m³)	Daily Design Value (µg/m³)	Annual Mean (µg/m³)	Annual Design Value (µg/m³)
Muscatine	Muscatine HS E Campus (Garfield)	Muscatine	19-139-0015	2014	32.7		10.6	
				2015	22.3		9.0	
				2016	21.4	25	8.0	9.2
Muscatine	Greenwood Cemetery	Muscatine	19-139-0016	2014	24.5		9.6	
				2015	24.4		8.2	
				2016	17.0	22	7.2	8.3
Muscatine	Franklin School	Muscatine	19-139-0018	2014	27.2		10.3	
				2015	26.3		8.4	
				2016	16.0	23	7.7	8.8
Muscatine	Musser Park	Muscatine	19-139-0020	2014	32.2		11.3	
				2015	27.2		8.9	
				2016	18.9	26	8.1	9.4**
Palo Alto	Iowa Lakes Community College	Emmetsburg	19-147-1002	2014	20.4		7.8	
				2015	16.1*		7.5*	
				2016	15.3	17	6.6	7.3
Polk	Health Dept.	Des Moines	19-153-0030	2014	21.0		8.4	
				2015	18.1		7.7	
				2016	17.5	19	7.1	7.7
Polk	Indian Hills School	Clive	19-153-2510	2014	19.4		8.6	
				2015	18.0		7.4	
				2016	18.1	19	6.9	7.6
Pottawattamie	Franklin Sch.	Council Bluffs	19-155-0009	2014	19.6		9.1	
				2015	18.8		8.3	
				2016	17.0	18	7.2	8.2

Iowa $PM_{2.5}$ Design Values 2016 – Preliminary Until May 2017 (continued)

County	Site Name	City	EPA Site Id	Year	Annual 98th Percentile (µg/m³)	Daily Design Value (µg/m³)	Annual Mean (µg/m³)	Annual Design Value (µg/m³)
Scott	Jefferson School	Davenport	19-163-0015	2014	24.3		9.4	
				2015	23.0		9.3	
				2016	18.8	22	7.7	8.8
Scott	Adams Sch.	Davenport	19-163-0018	2014	24.8		10.3	
				2015	26.5		8.9	
				2016	16.4	23	7.6	8.9
Scott	Hayes School	Davenport	19-163-0020	2014	26.6*		10.0*	
				2015	25.9		9.9	
				2016	21.5	25	8.2	9.4
Van Buren	Lake Sugema	Not in a City	19-177-0006	2014	22.0		8.6	
				2015	19.7		7.4	
				2016	19.3	20	6.8	7.6

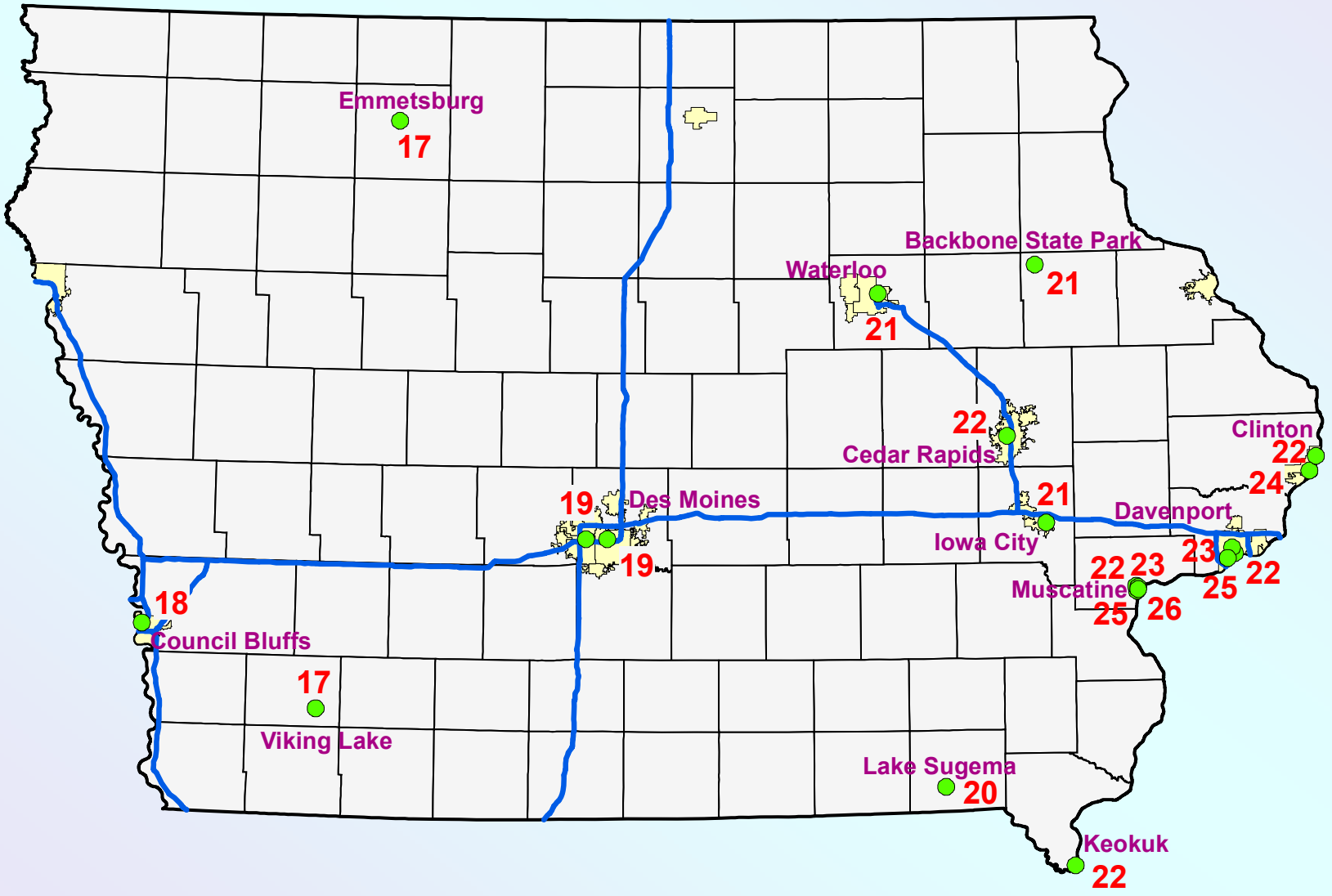
Three-year averages greater than 12.05 µg/m³ indicate non-attainment with the annual NAAQS.

*Data did not meet completeness requirements, but annual and daily design values passed substitution tests and are considered valid.

**Source-oriented site. Therefore annual design values are not applicable to the NAAQS.

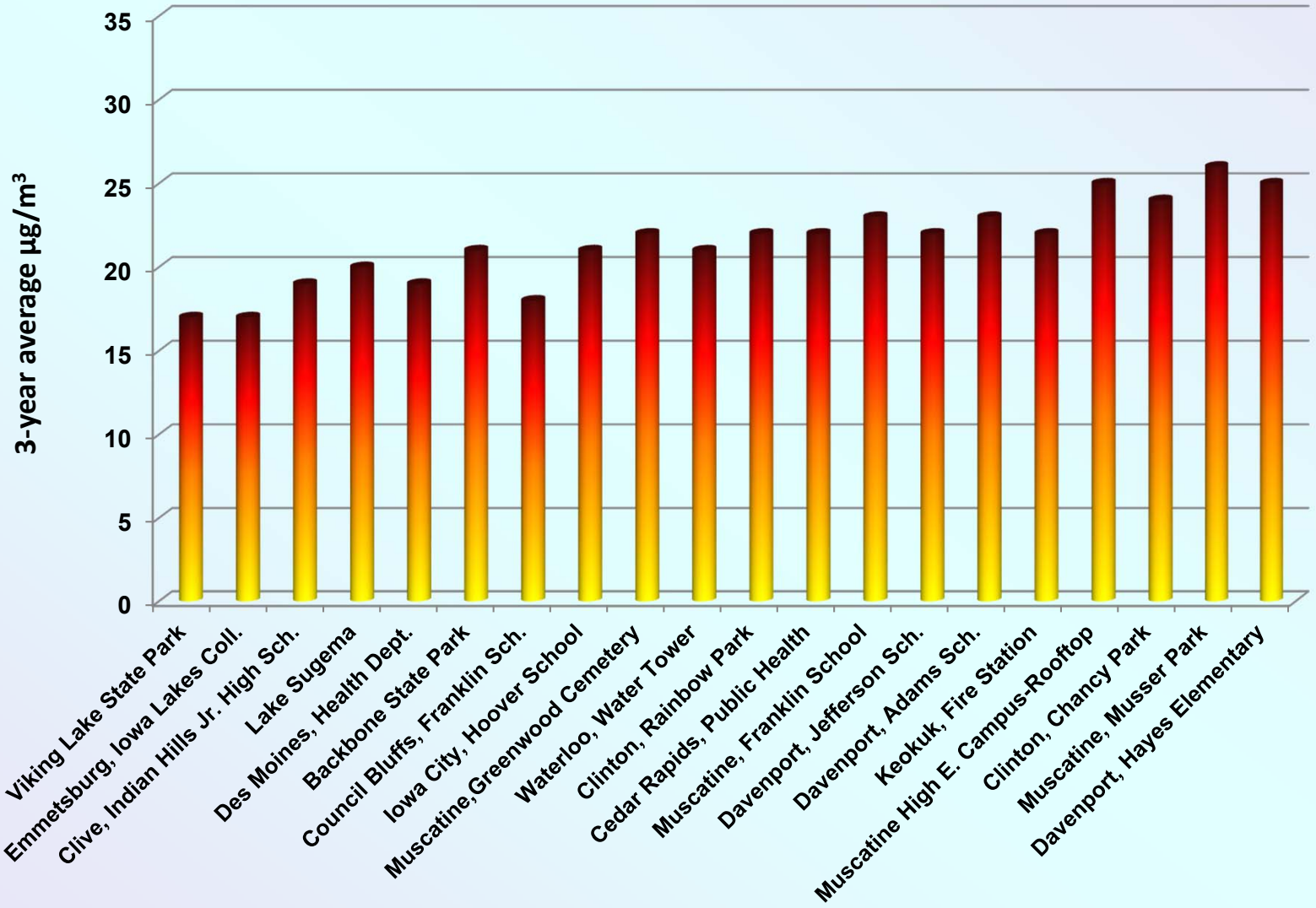
Iowa $PM_{2.5}$ 24-hour Design Values 2014-2016

(NAAQS Standard is 35 µg/m^3)



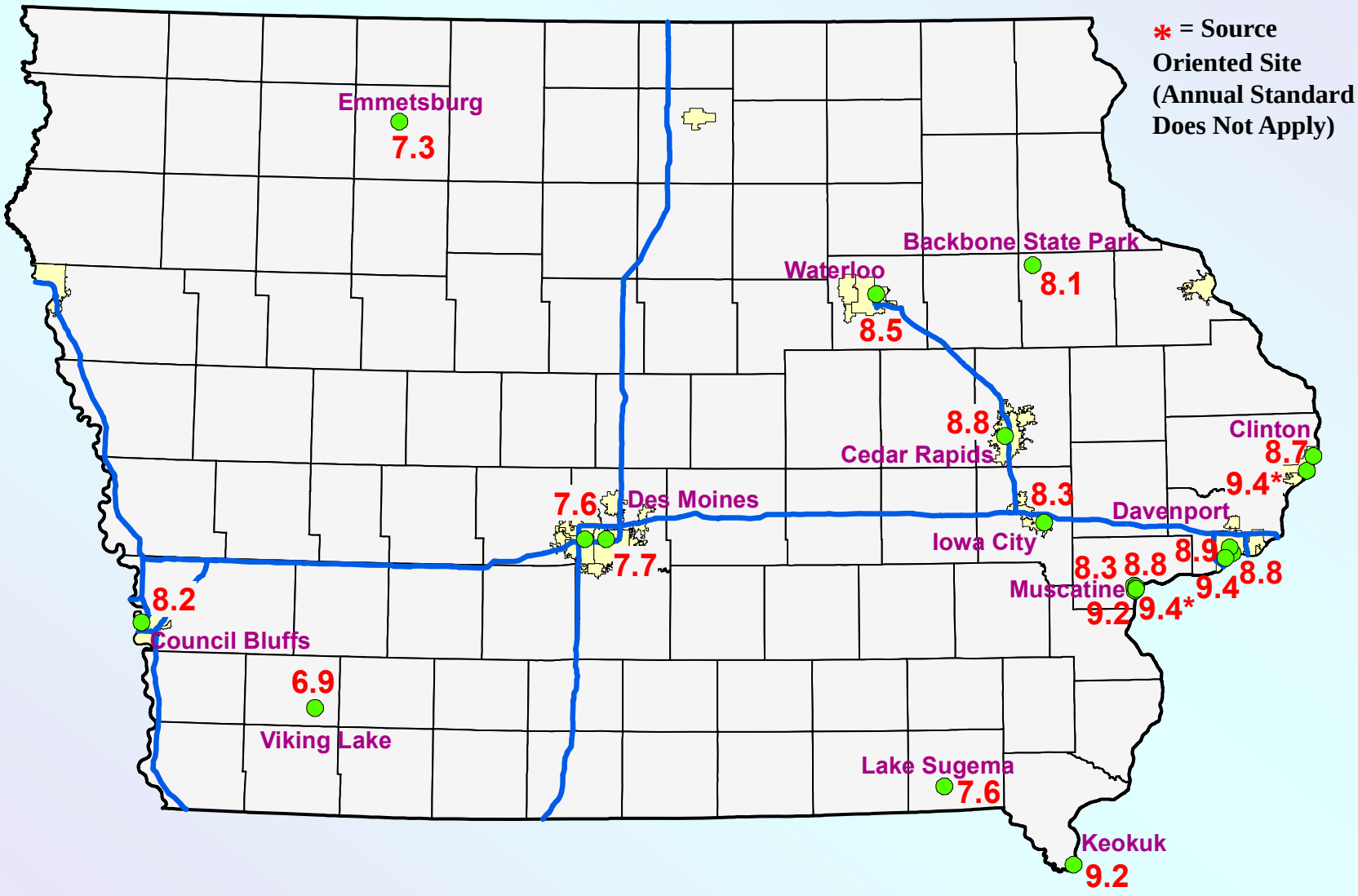
24-hour $PM_{2.5}$ Design Values 2014-2016

(NAAQS Standard is 35 µg/m³)



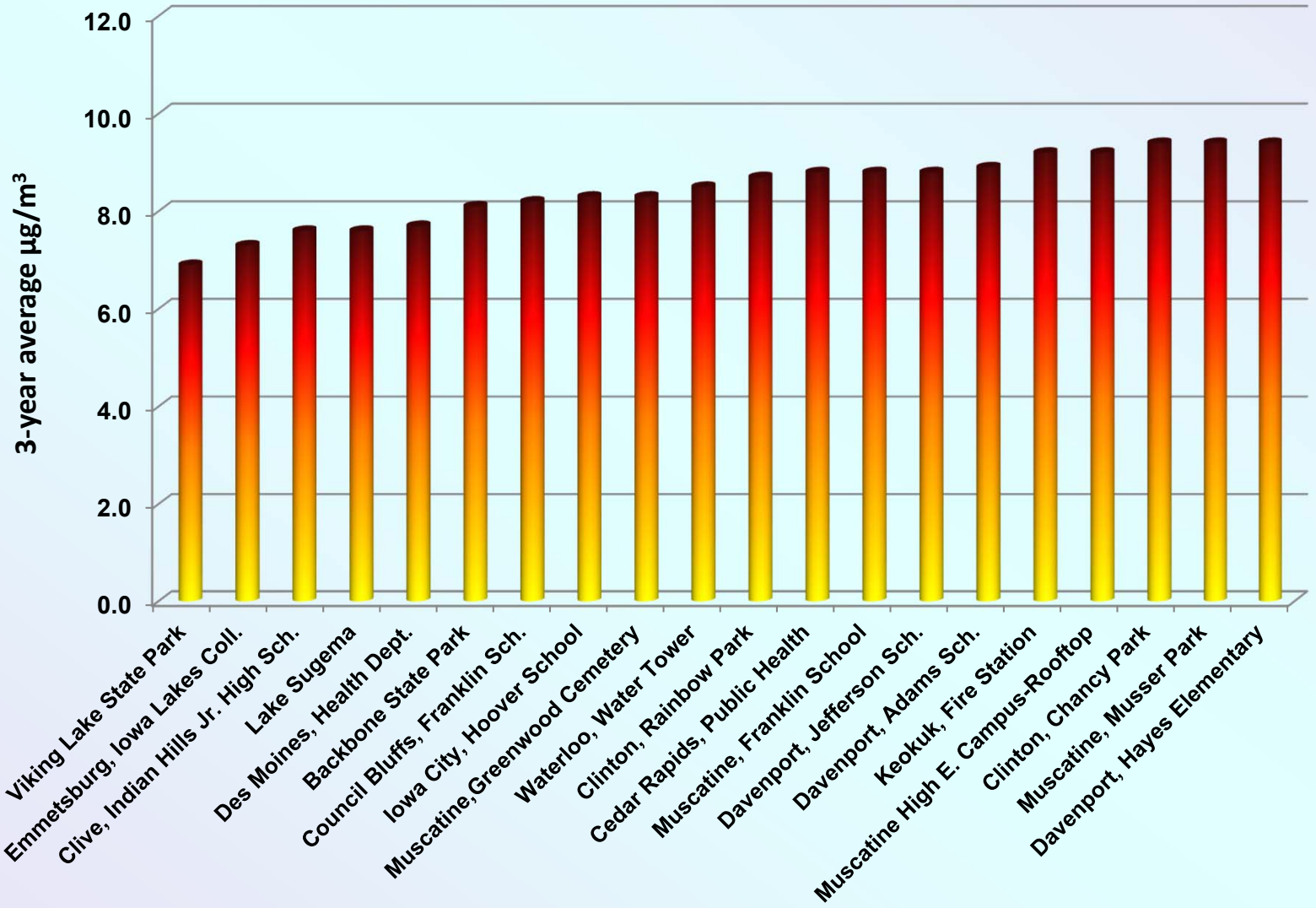
Iowa $PM_{2.5}$ Annual Design Values 2014-2016

(NAAQS Standard is 12.0 µg/m^3)

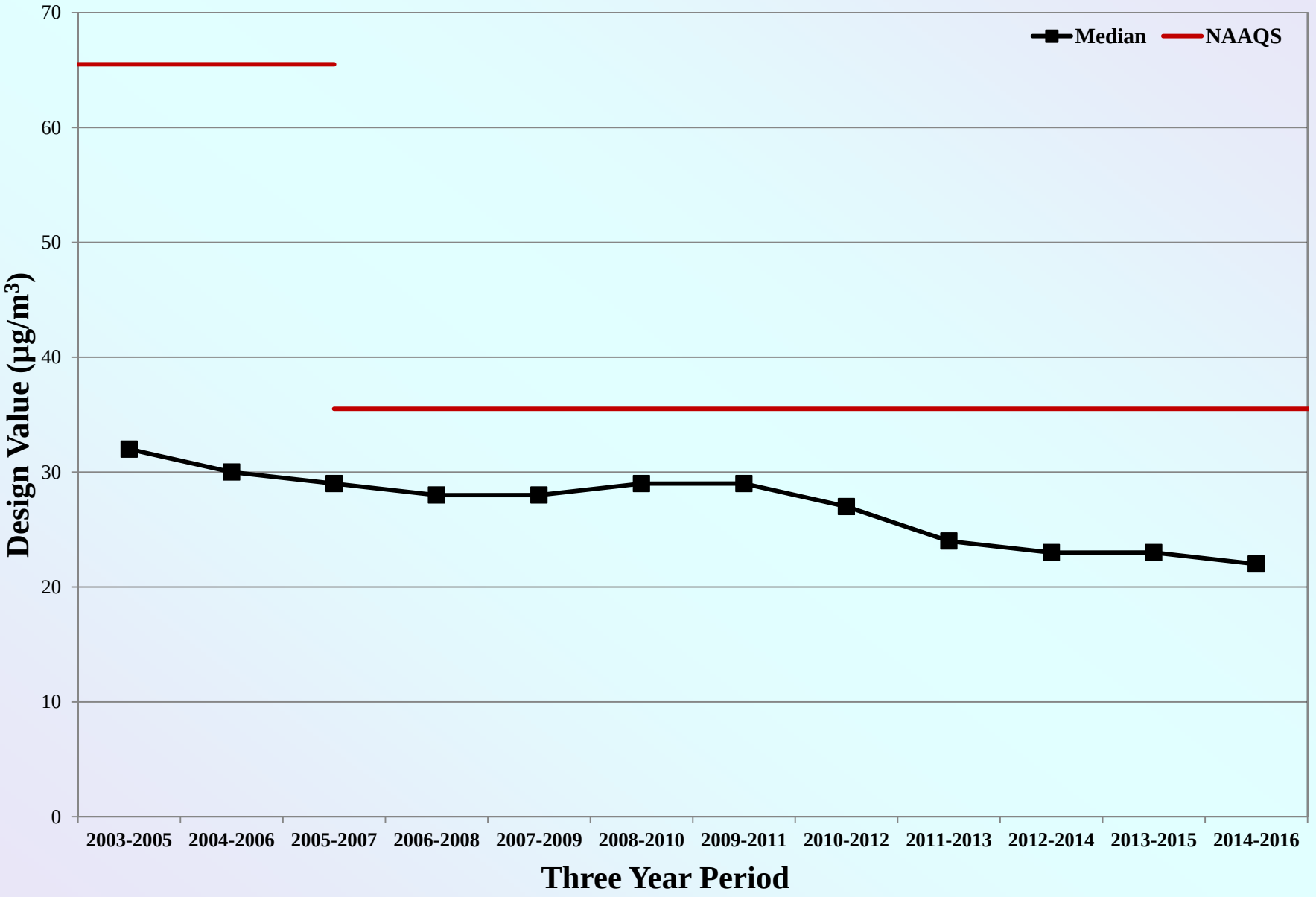


Annual $PM_{2.5}$ Design Values 2014-2016

(NAAQS Standard is 12.0 µg/m³)

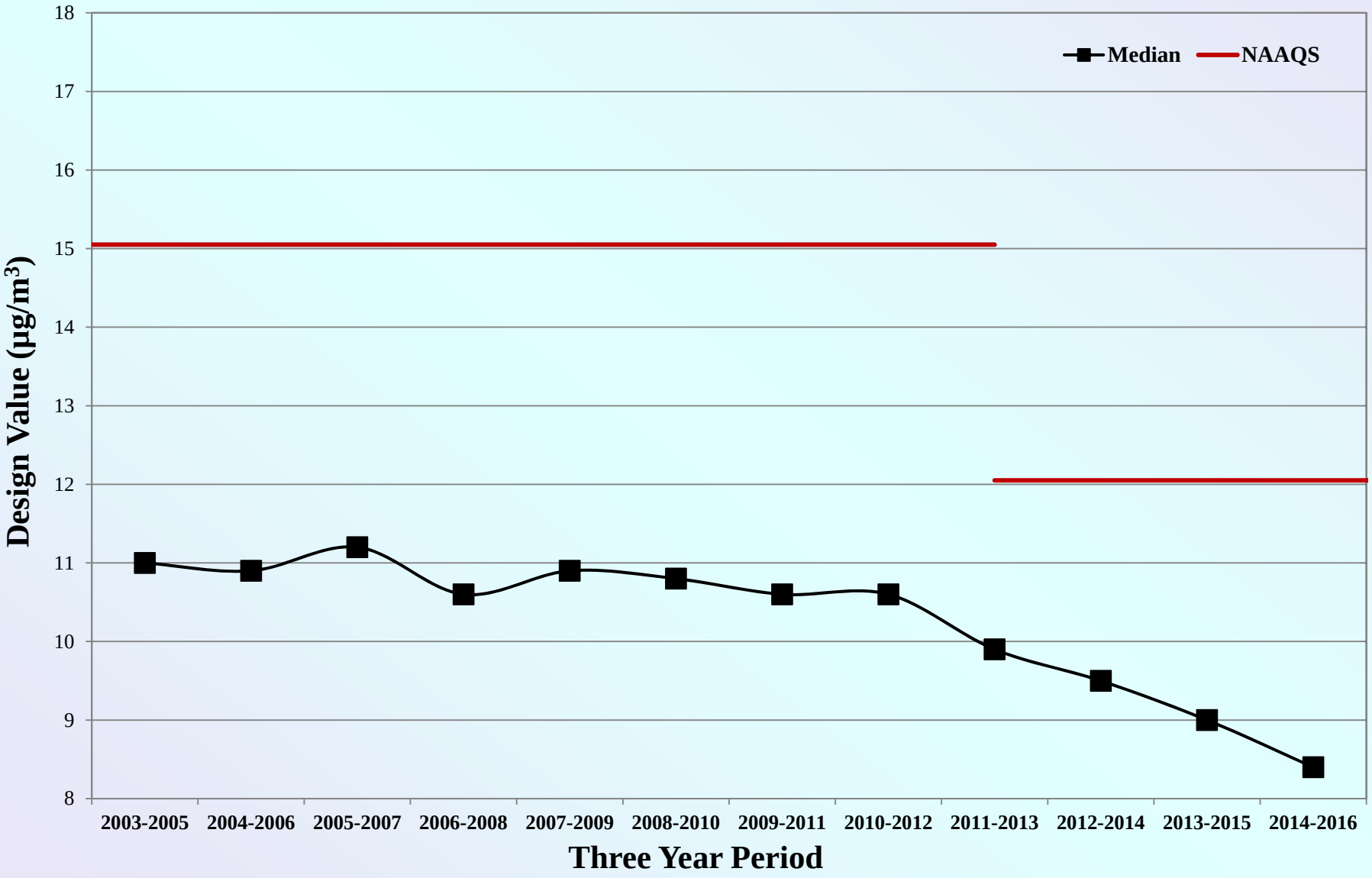


Median $PM_{2.5}$ 24-Hour Design Values in Iowa $PM_{2.5}$ Monitoring Network



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

(Source oriented monitoring sites are not included)



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

Web links listed are as accessed on 3/13/2017.