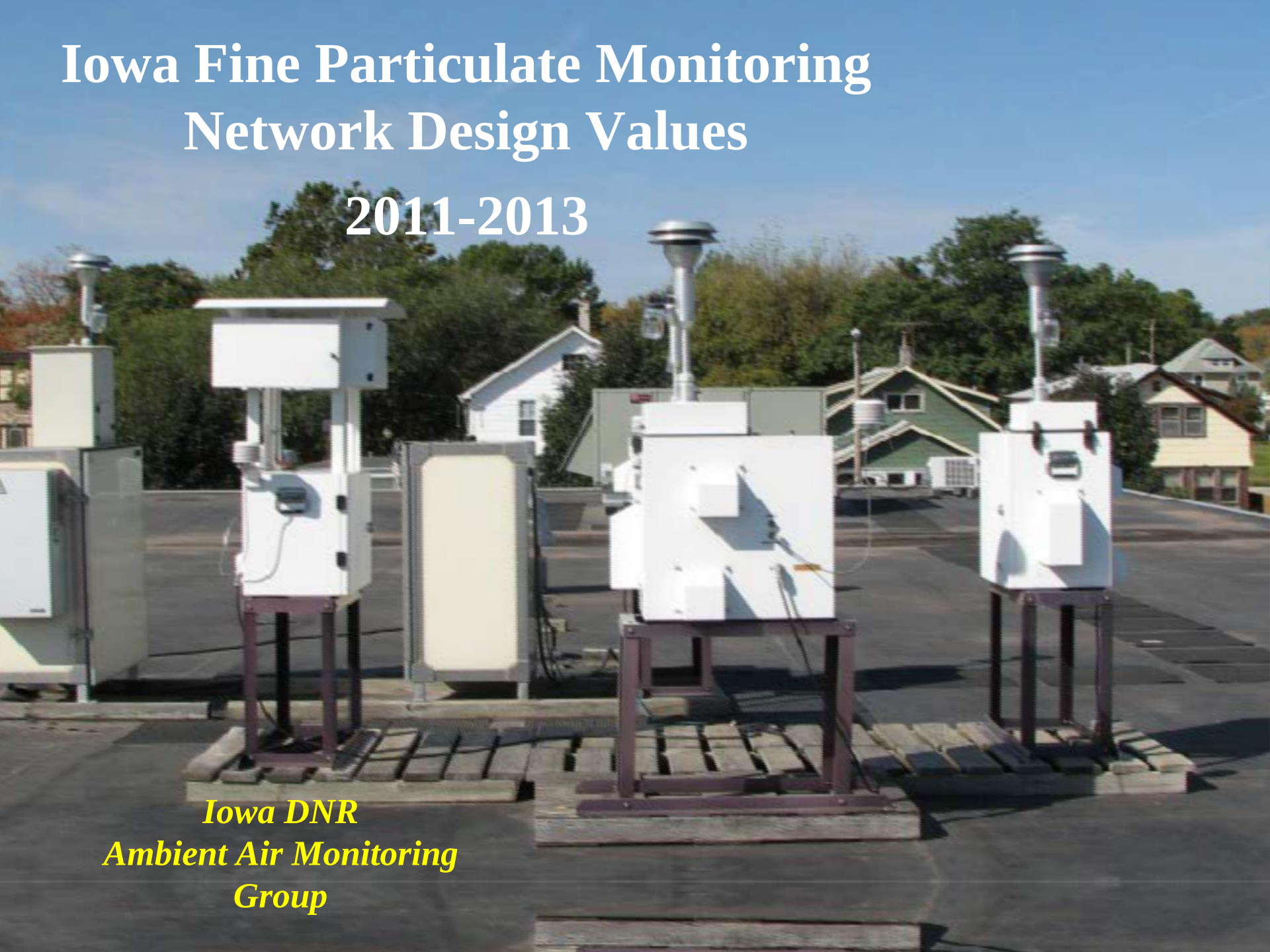
Iowa Fine Particulate Monitoring Network Design Values

2011-2013



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 2011-2013 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, 2014 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 and annual design values less than the NAAQS.

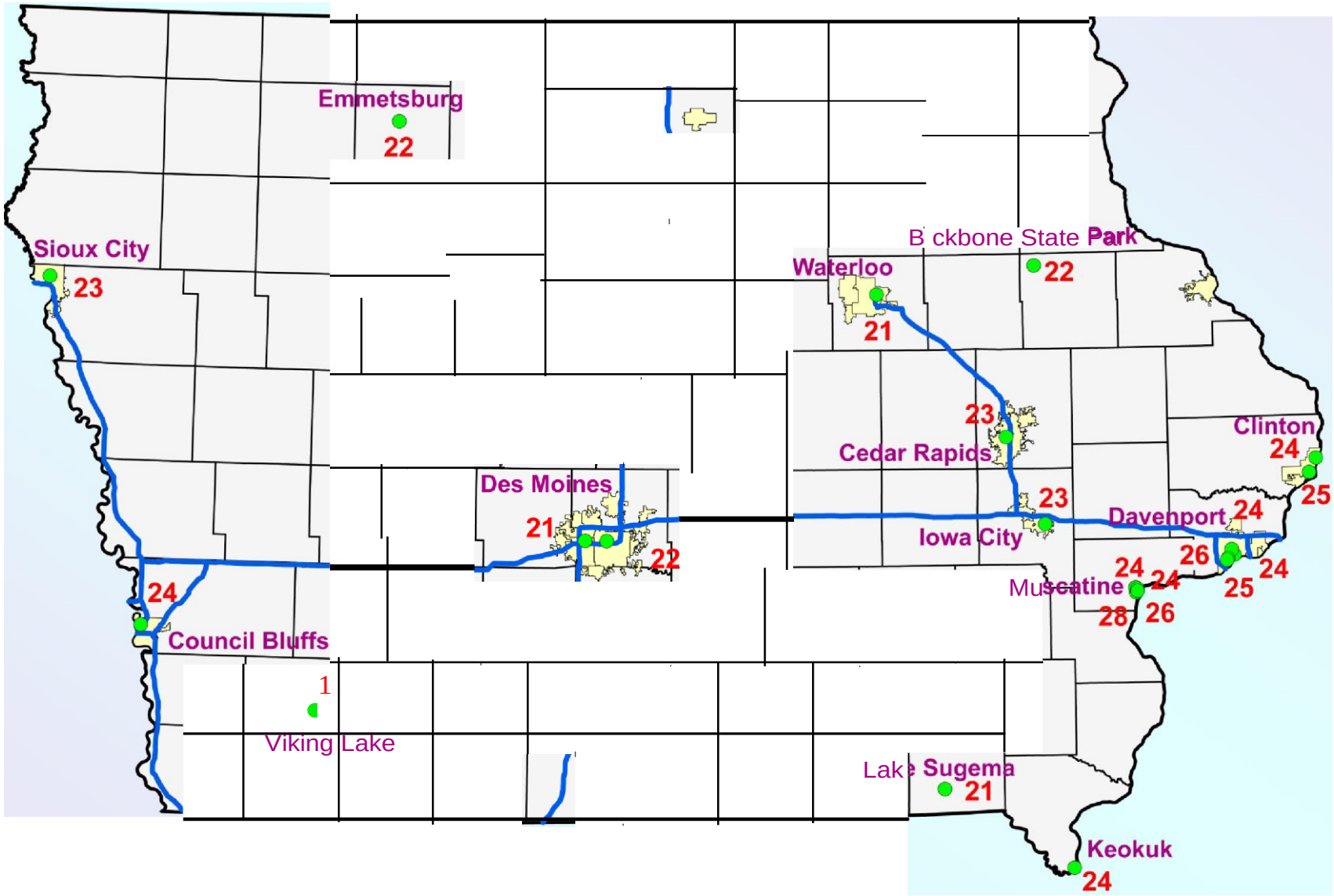
What Types of $PM_{2.5}$ Monitoring Data May be Used to Calculate Design Values?

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 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.

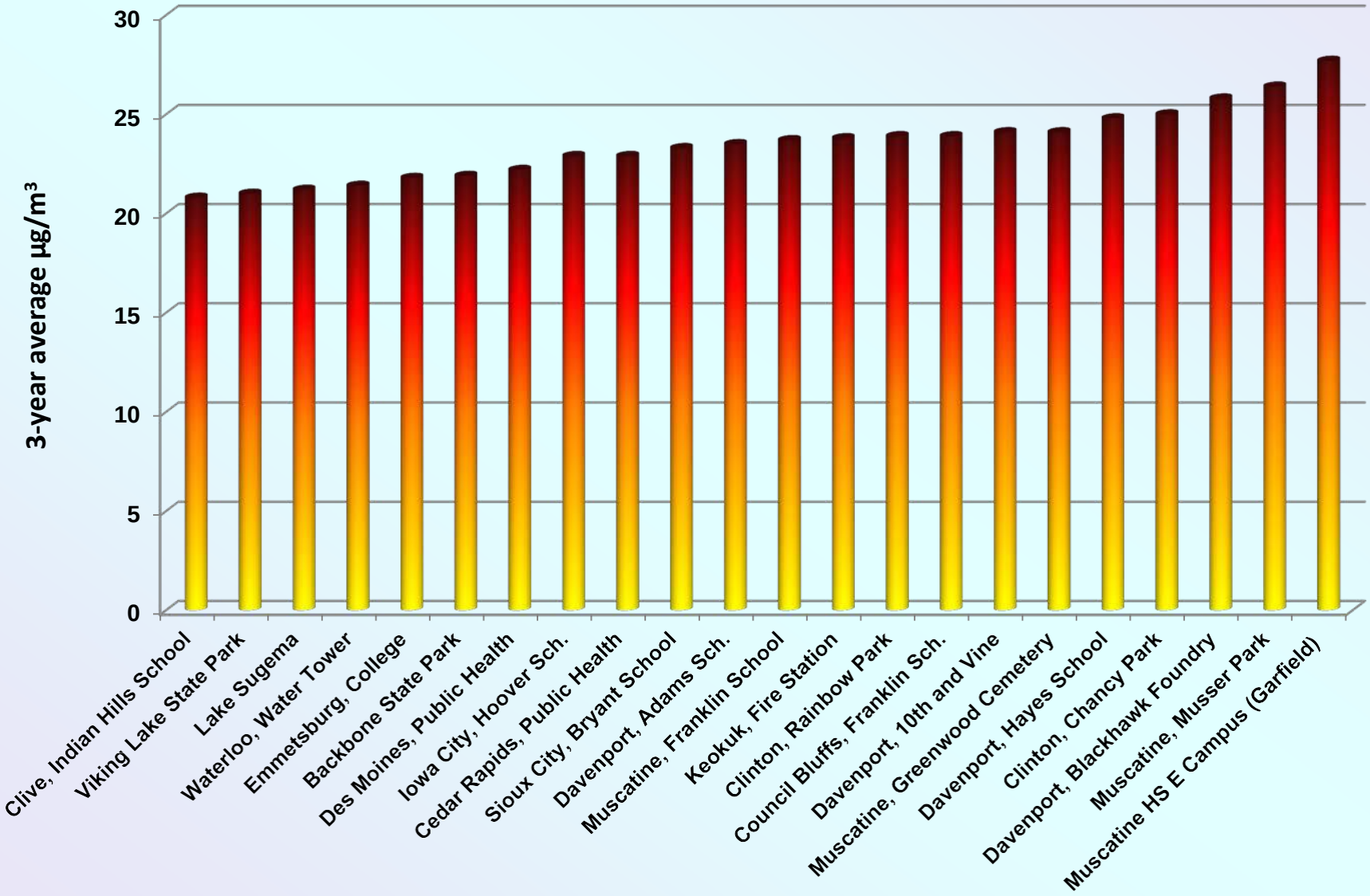
Iowa $PM_{2.5}$ 24-hour Design Values 2011-2013

(NAAQS Standard is 35 µg/m³)



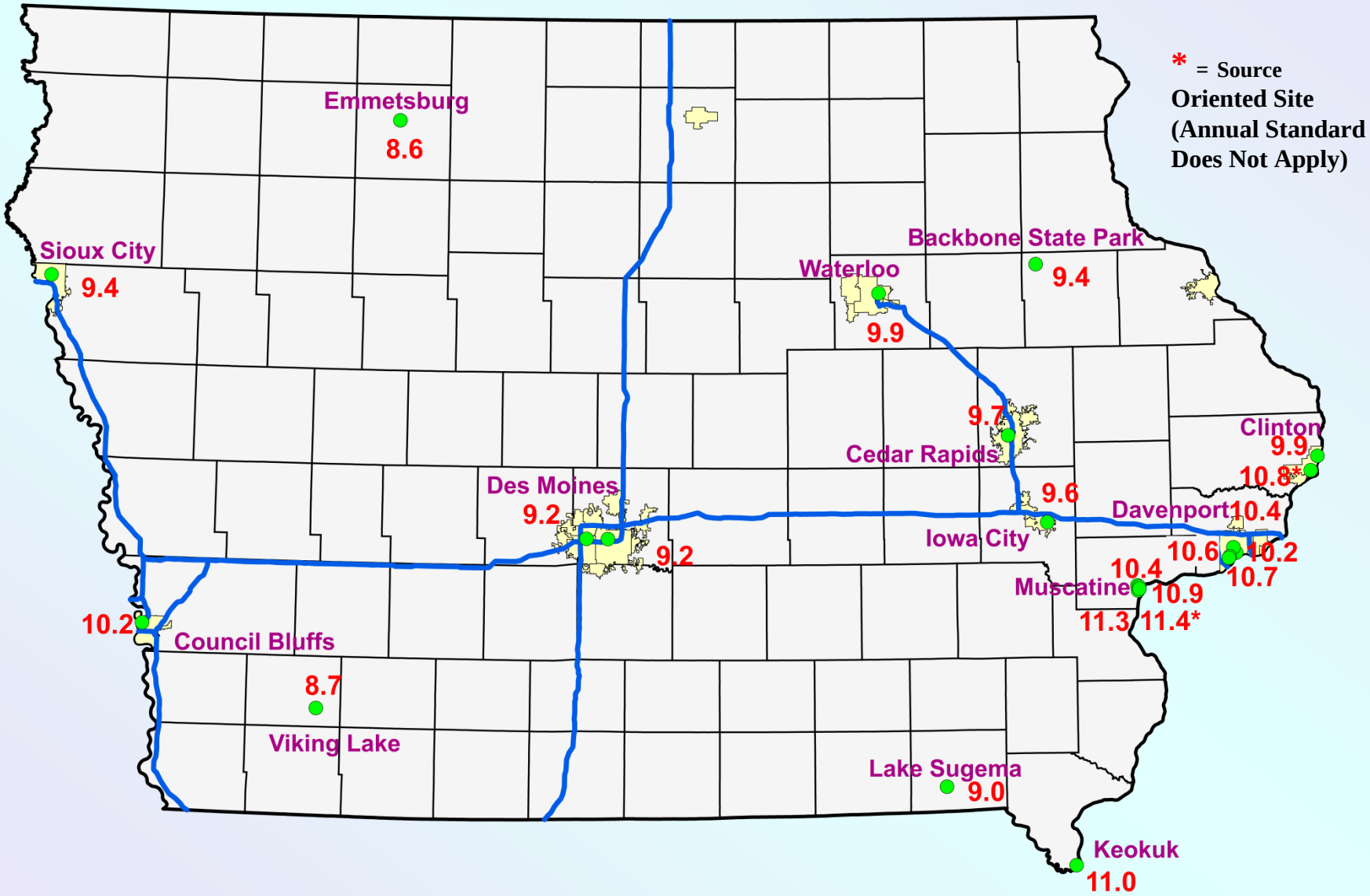
24-hour $PM_{2.5}$ Design Values 2011-2013

(NAAQS Standard is 35 µg/m³)



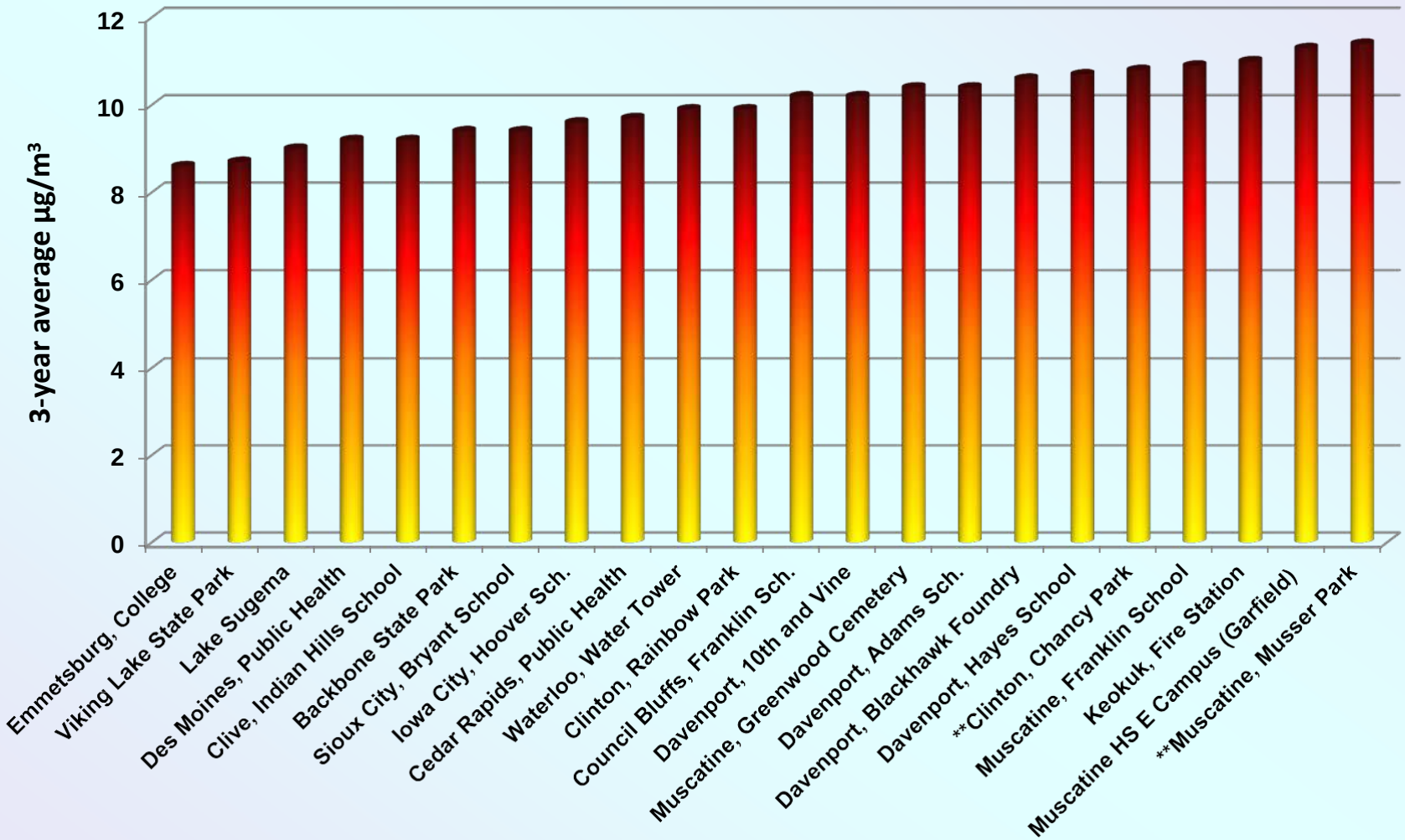
Iowa $PM_{2.5}$ Annual Design Values 2011-2013

(NAAQS Standard is 12.0 µg/m^3)

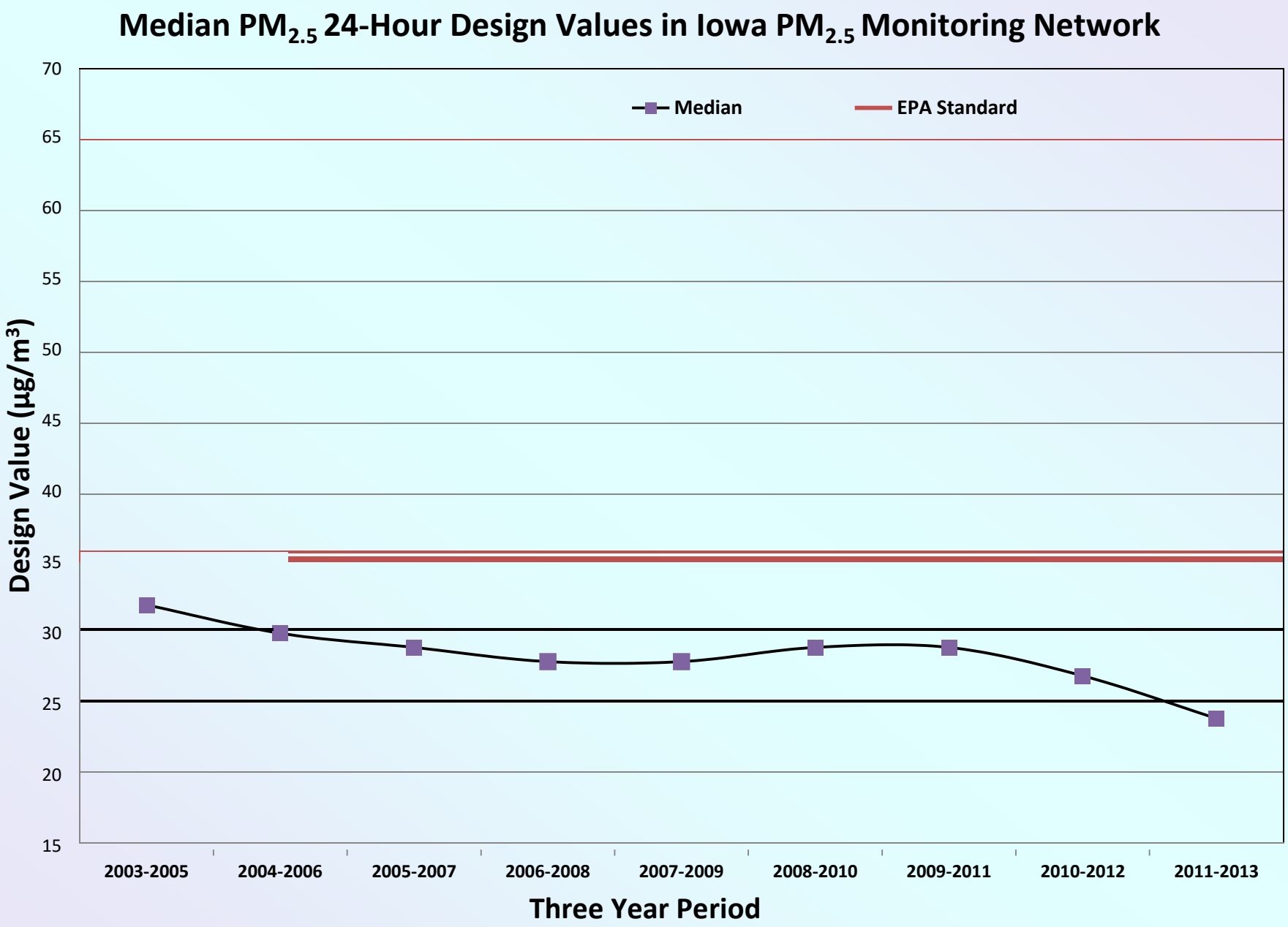


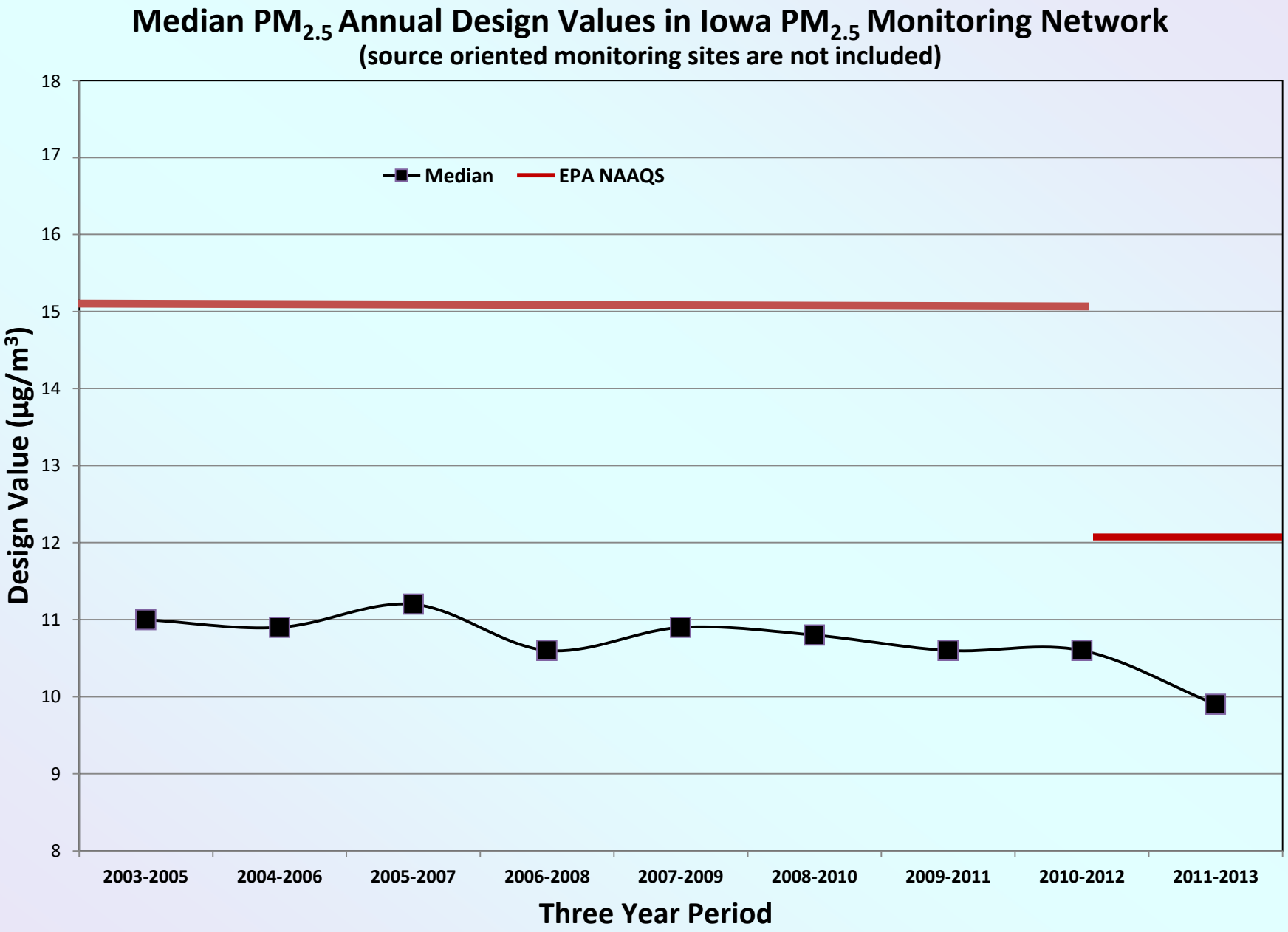
Annual $PM_{2.5}$ Design Values 2011-2013

(NAAQS Standard is 12.0 µg/m³)



**** Muscatine, Musser Park and Clinton, Chancy Park are "source oriented" sites and the annual standard does not apply.**


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
2011-2013
Three Year Period


Median PM2.5 Annual Design Values in Iowa PM2.5 Monitoring Network
(source oriented monitoring sites are not included)
Median
EPA NAAQS
Design Value (µg/m³)
18
17
16
15
14
13
12
11
10
9
8
2003-2005
2004-2006
2005-2007
2006-2008
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
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:

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

Information from EPA on $PM_{2.5}$ standards:

http://www.epa.gov/airquality/particlepollution/actions.html#dec12

Historical Air Pollution Data for Iowa and Other States:

http://www.epa.gov/airdata/

This report was updated on 5/27/14 as the original report had the Clinton sites transposed on the map of annual $PM_{2.5}$ design values.

Web links listed are as accessed on 4/17/2014.