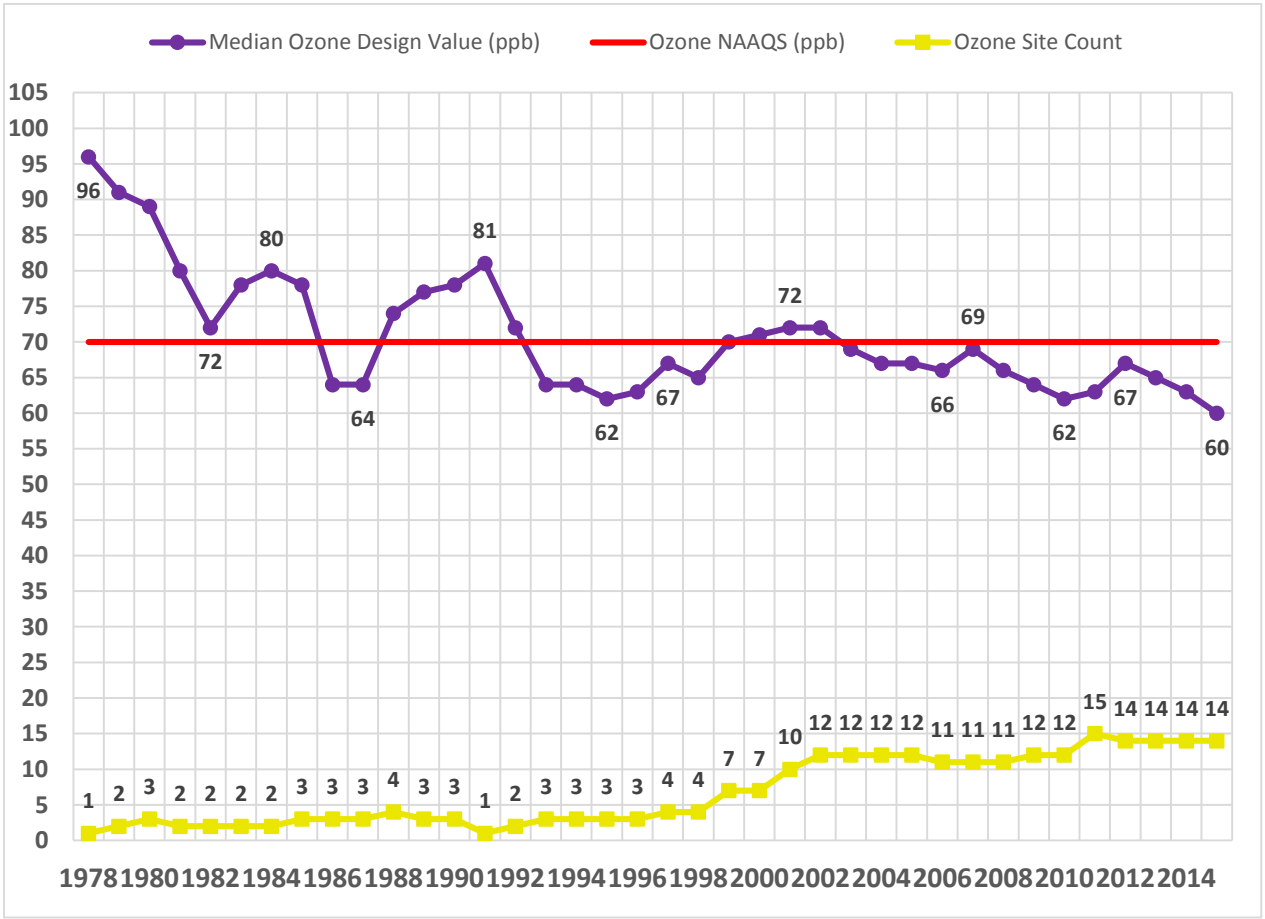
AMBIENT AIR QUALITY IMPROVEMENTS IN IOWA

Iowa's air quality has improved dramatically over the last 30 years. Controlling air pollution protects public health and encourages a stronger economy. Nitrogen oxides and sulfur dioxide air pollutants have the most serious effects on the young, elderly, those with lung diseases and people who exercise outdoors. These pollutants contribute to forming ozone and particulate matter, which have decreased in Iowa since 1978 as seen in Figures 1 and 2.

The Iowa DNR tracks the levels of air pollutants to see how they change over time. Air quality trends are based on readings from monitors located across Iowa*. Iowa's air quality is compared to the current National Ambient Air Quality Standards or NAAQS, in figures 1 and 2. The national standards are set by the U.S. Environmental Protection Agency to protect public health and the environment.

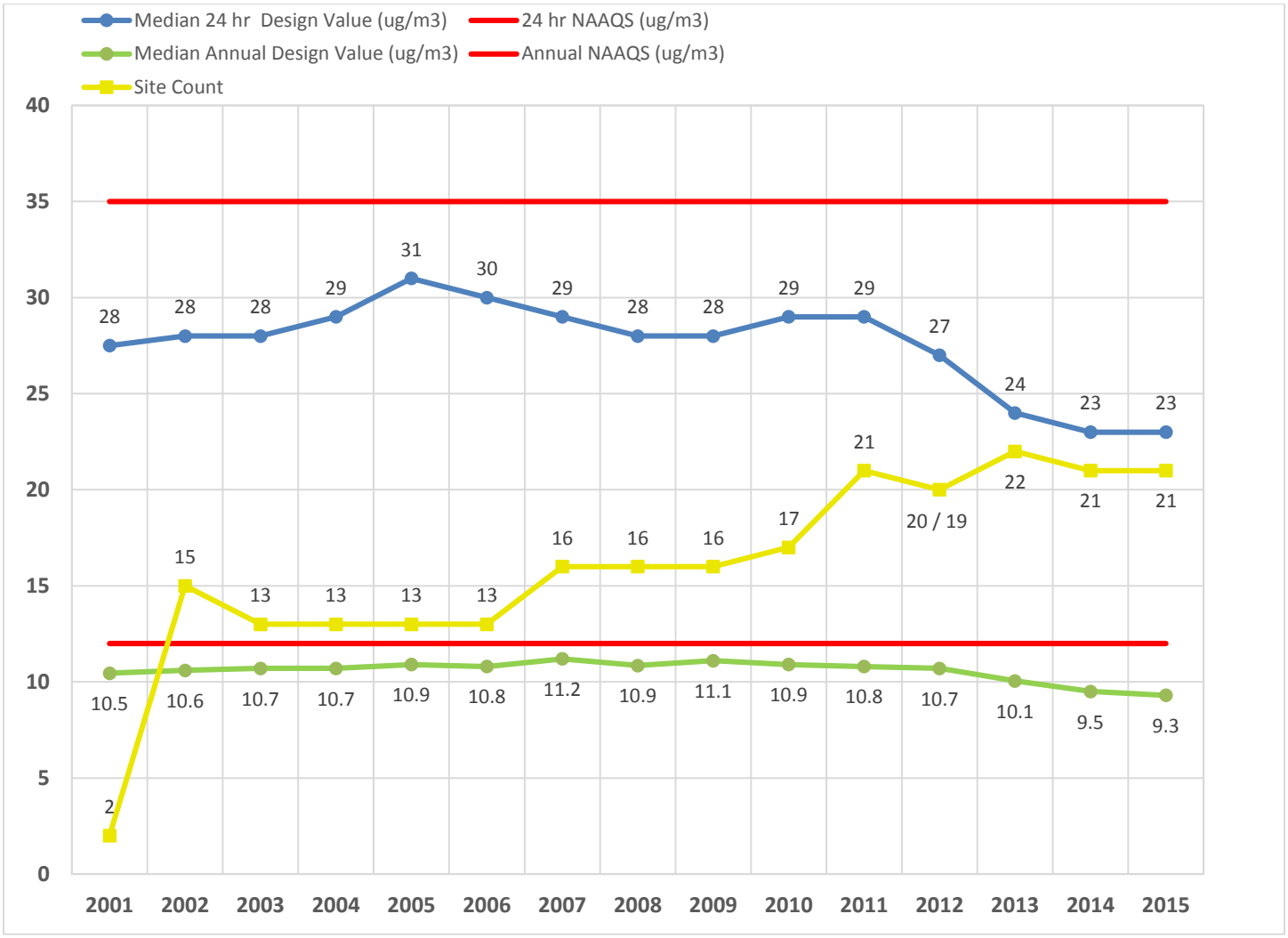
Figure 1. Count of Ozone Sites and Comparison of Ozone Design Values to the Current NAAQS



* The number of monitors used to compute the median concentration is included along with the median concentration to characterize air quality in a given year. The median concentration was calculated from monitors in the network to characterize historical monitoring results. The median concentration separates the higher half of monitored concentrations from the lower half. At the beginning of the ozone and $PM_{2.5}$ programs, the number of monitors was small, and the median depended on readings of the individual available monitors. As the network grew, and monitors were placed in more areas, the median became less sensitive to the readings of individual monitors, and more representative of overall air quality.

Particulate matter, also known as PM, is made up of many materials including acids, organic chemicals, metals and dust particles. The smaller the particle size, the greater its potential to cause health problems. Fine particles or $PM_{2.5}$ are 2.5 micrometers in diameter or smaller. Figure 2 shows improvement in Iowa's Fine Particle Levels over the last 14 years.

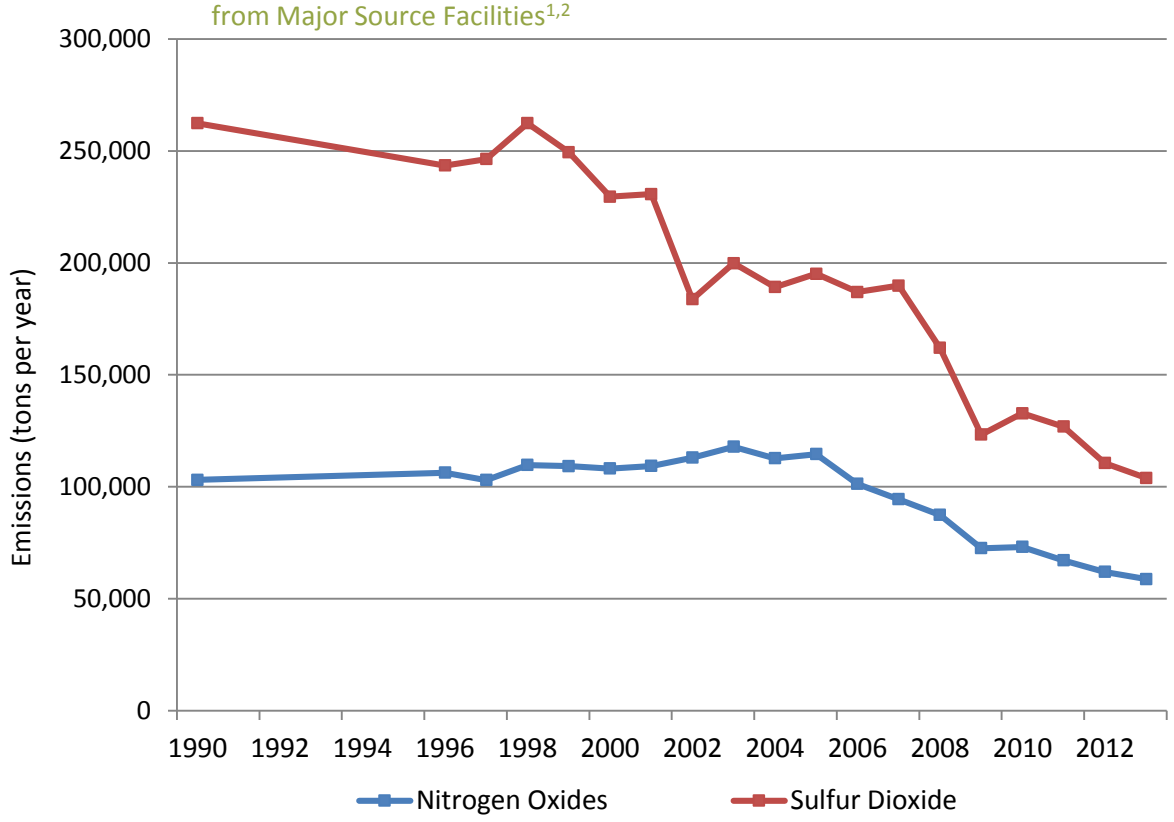
Figure 2. Count of Fine Particle ($PM_{2.5}$) Sites and Comparison of Iowa $PM_{2.5}$ Design Values to the Current NAAQS



Emissions Reductions Reported in Iowa

Large facilities across Iowa have actively worked to reduce emissions, replacing aging equipment with more efficient technology that incorporates the latest emissions controls. Since 1990, sulfur dioxide emissions (Figure 4) have decreased by 60 percent and nitrogen oxides are down 43 percent, despite increases in the number of emission sources, and growth in Iowa's population and industries.

Figure 3. Ongoing Reduction in Emissions of Sulfur Dioxide and Nitrogen Oxides from Major Source Facilities[1,2]



1. Data is from EPA and DNR emissions estimates: : http://www.epa.gov/ttn/chief/net/critsummary.html and http://www.iowadnr.gov/InsideDNR/RegulatoryAir/EmissionsInventory/EmissionsSummaries.aspx
2. Major Source facilities are those subject to Title V of the Federal Clean Air Act. Estimates are based on EPA data from 1990-2001 and DNR data from 2002-2013, the most recent year available.

Reductions in Number of Communities Experiencing High Air Pollution Levels

Compare the air quality in 1978 and 2015. As the next four maps show, counties unable to meet federal and state air quality standards (in nonattainment) have dropped from 13 to 2 since 1978 (Figures 4 and 5). The number of pollutants exceeding federal standards decreased from 17 to two. Likewise, the number of nonattainment areas have decreased from 26 to two (Figures 6 and 7).

While this 30-year trend shows substantial benefits in air quality and decreases in air pollutant emissions, Iowa's productivity, population and travel miles increased – all potential sources of pollution. Iowa's gross domestic product soared (up by 65 percent since 1990), vehicle miles traveled climbed by 38 percent and population increased by 11 percent.

Attaining good air quality allows existing facilities to expand and attracts new industry to Iowa.

Figure 4. Iowa Counties Containing Nonattainment Areas (1978)

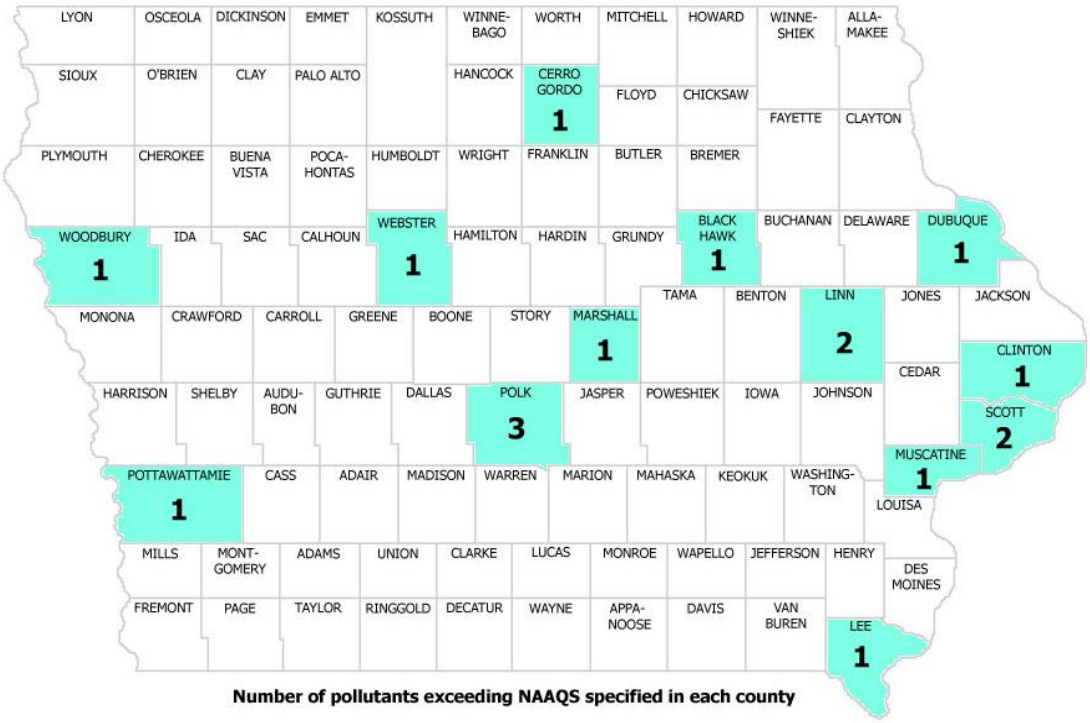


Figure 5. Iowa Counties Containing Nonattainment Areas (2015)

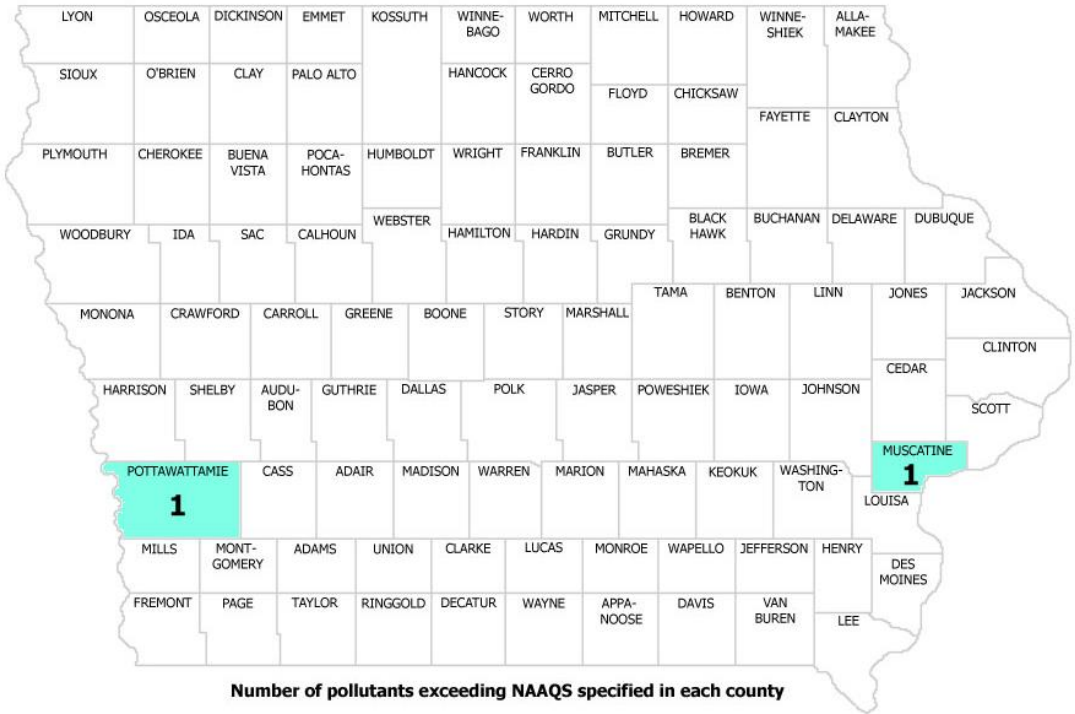


Figure 6. Iowa Nonattainment Areas (1978)

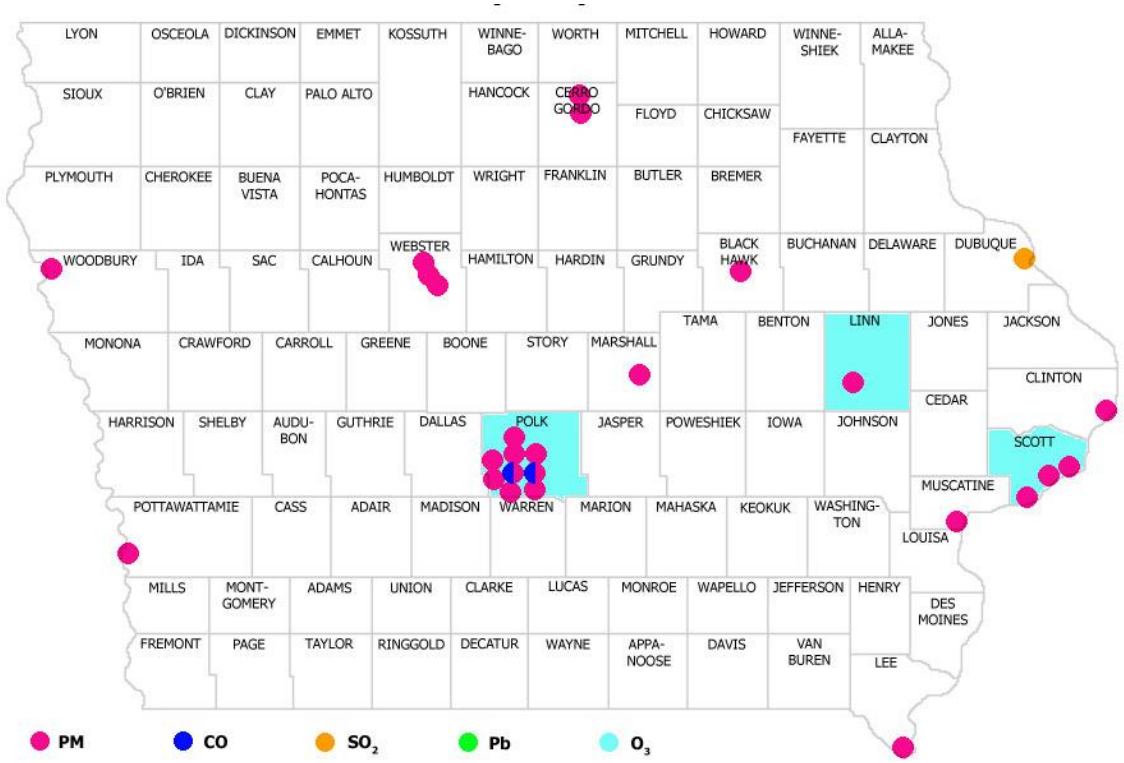
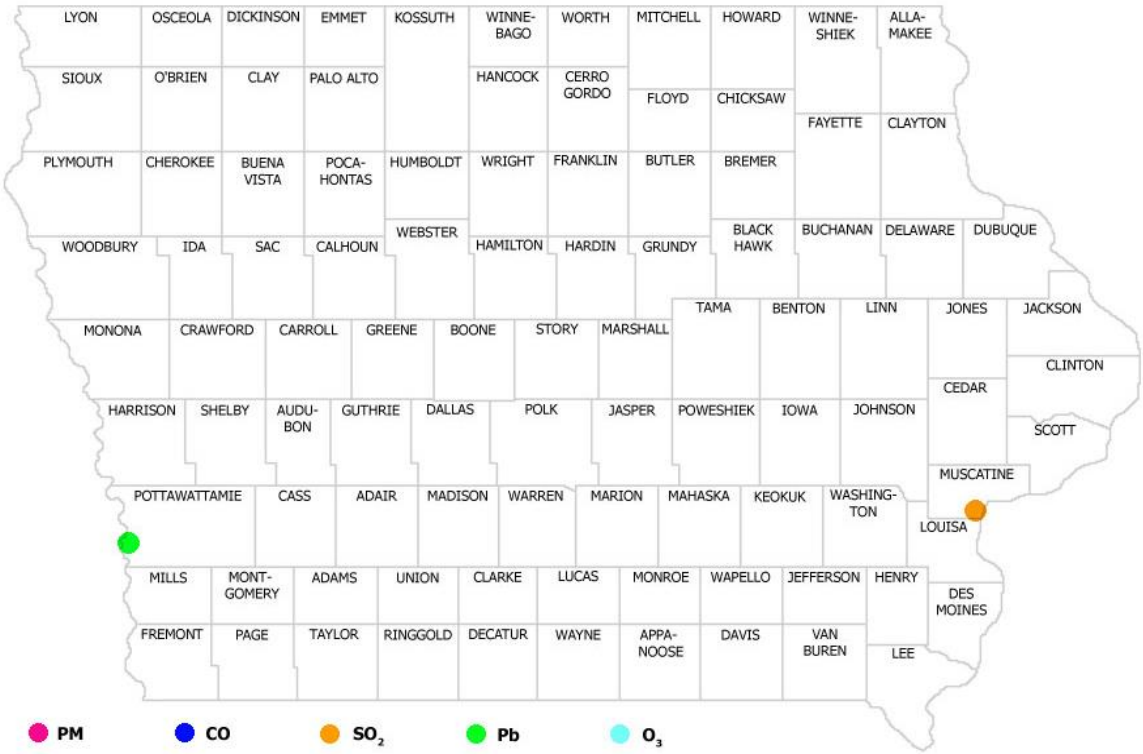


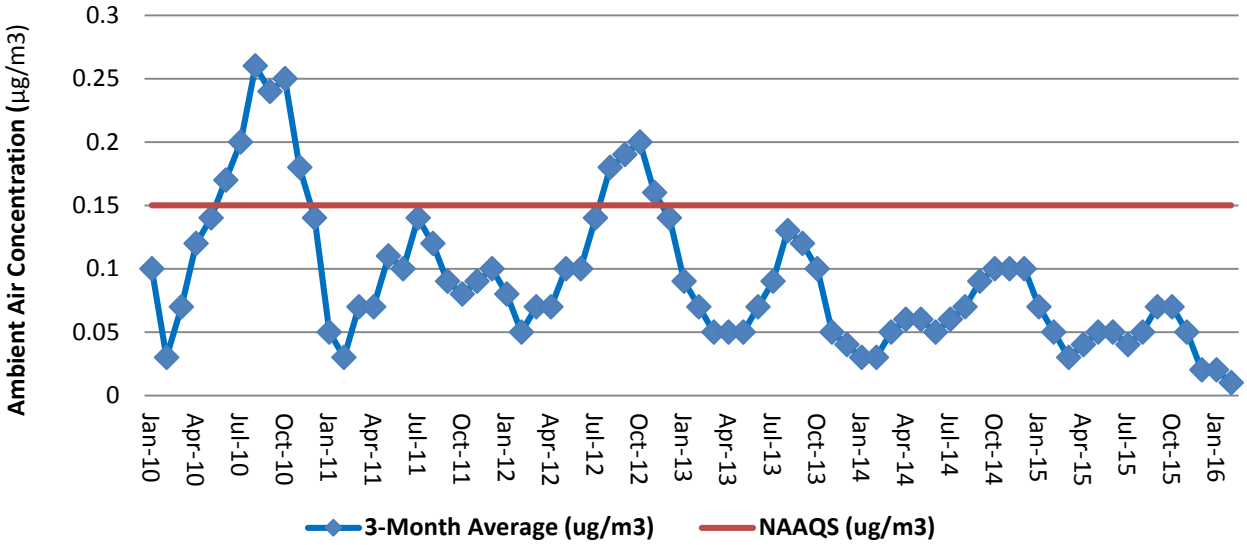
Figure 7. Iowa Nonattainment Areas (2015)



RECENT DEVELOPMENT OF AIR POLLUTION CONTROL STRATEGIES TO ATTAIN NATIONAL AMBIENT AIR QUALITY STANDARDS

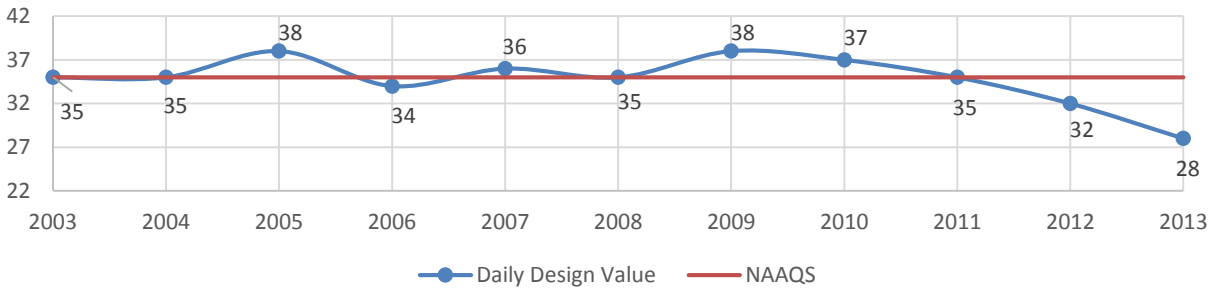
- Council Bluffs (lead - Pb)-Violations of the lead NAAQS were recorded in 2010 at a lead monitor in Council Bluffs, resulting in a non-attainment designation. DNR and two facilities developed a strategy to reduce lead emissions in the area. The strategy included air pollution emissions control, paving unpaved roads and sweeping roads. As seen in Figure 8, there were no three-month periods over the national standards (NAAQS) in 2013 or 2014, and 2015 levels appear to be significantly less than the NAAQS.

Figure 8. Council Bluffs Lead, 3-Month Rolling Average



- Muscatine $PM_{2.5}$ (24hr) – Violations of the 24-hour fine particulate ambient air quality standards were monitored in 2005 to 2007 at Garfield School. Changes in operations, combined with emissions reductions and reconfigurations of emissions equipment were incorporated into consent orders with three facilities. As a result, $PM_{2.5}$ levels in the area fell in 2012 and 2013, with local emissions reductions and modifications aided by a drop in the regional background of fine particulates. Preliminary data from 2014 and 2015 suggest that the downward trend is continuing.

Figure 9. Daily $PM_{2.5}$ Design Value at Garfield School in Muscatine
(year indicated below is the last year of the three-year period)



- Muscatine SO_2 (1hr)-EPA designated an area that includes the incorporated cities of Muscatine and Fruitland in Muscatine County as non-attainment based on 2008 to 2010 ambient air quality data obtained at Musser Park. Three facilities are beginning to reduce emissions and make changes in operations as part of the control strategy. As a result, there have been no monitored exceedances of the SO_2 NAAQS since July 2015.