

Wisconsin Air Quality Trends

Wisconsin Department of Natural Resources

2013 Wisconsin Air Quality Trends Report

Data From 2001 - 2011



Wisconsin Air Quality Trends

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Acronyms and Abbreviations

AQI: Air Quality Index

BAM/AM: Bureau of Air Management

CAA: Clean Air Act

CASAC: Clean Air Scientific Advisory Committee

CBSA: County Based Statistical Area

EOM: Enhanced Ozone Monitoring

FEM: Federal Alternate Method

FRM: Federal Reference Method

NAAQS: National Ambient Air Quality Standards

O₃: Ozone

NO_x: Oxides of nitrogen

PAMS: Photochemical Assessment Monitoring Site

PM_{2.5}: Particulate Matter 2.5 micron or smaller in size

PPB: Parts Per Billion

SLAMS: State and Local Air Monitoring Sites

US EPA: United States Environmental Protection Agency

VOC: Volatile Organic Compound

WDNR: Wisconsin Department of Natural Resources

Introduction and Background

Federal Regulatory History

The Clean Air Act requires US EPA to set NAAQS for pollutants considered harmful to public health and the environment. The technical basis for the NAAQS is provided through the independent advice of the CASAC. The current standards for fine particulate (PM_{2.5}) and Ozone are:

- PM_{2.5} (Annual) 15 micrograms per cubic meter*
- PM_{2.5} (24 hour) 35 micrograms per cubic meter
- O₃ (8 hour) 75 parts per billion**

*Note: The annual standard for PM_{2.5} is changing to 12 micrograms per cubic meter, but all information identified here should be compared to 15 micrograms per cubic meter

**Note: A lower ozone standard is expected to be announced by US EPA later in 2013

Fine Particulate (PM_{2.5})

Particle pollution is made up of a number of components, including acids, organic chemicals, metals, soil or dust, and allergens. Fine particle pollution can be emitted directly or formed secondarily in the atmosphere.

Health studies have shown that there is an association between exposure to fine particles and premature death from heart or lung disease. Individuals that may be most sensitive to fine particle exposure include people with heart or lung disease, older adults, and children.

The 1997 PM_{2.5} 24-hour standard was established at 65 micrograms per cubic meter, determined by the 3-year average of the annual 98th percentile concentrations. The 1997 annual standard was established at 15 micrograms per cubic meter, based on the 3-year average of the annual mean PM_{2.5} concentrations. In 2006, the 24-hour standard was lowered to 35 micrograms per cubic meter. In 2012, the annual standard was lowered to 12 micrograms per cubic meter, but this study focuses on data through 2011.

In 2009, Milwaukee, Racine, and Waukesha counties were designated nonattainment by US EPA, based on monitoring data from 2006 – 2008 that showed those areas were not meeting the fine particulate standard set by US EPA. In June 2012, the DNR submitted a request to US EPA to redesignate these counties from nonattainment to attainment based on monitoring data collected between 2008 – 2011.

Ozone

Ozone is a gas composed of three atoms of oxygen. Ozone can be found in the Earth's upper atmosphere and at ground level. Monitored values of ozone found in this report represent ground level ozone, which is not directly emitted into the air. Ozone found at higher levels in the atmosphere (stratospheric ozone) filters out harmful UV rays, while ground level (tropospheric) ozone is created by photochemical reactions between NO_x and VOC and can have an adverse impact on health. Ozone concentrations typically reach higher levels on hot sunny days in urban environments and can be transported long distances by wind.

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Breathing ozone has been shown to be harmful to health and can cause problems like chest pain, coughing, throat irritation, and congestion. Children are at the greatest risk from exposure to ozone because their lungs are still developing.

Ozone has also been shown to affect vegetation and ecosystems.

In July 1997, US EPA announced an 8-hour ozone standard of 84 ppb, replacing the 1-hour standard to protect the public against longer term exposure. In March 2008, the 8-hour standard was lowered to 75 ppb. The 8-hour standard is met when the three year average of the annual fourth highest daily maximum 8-hour O₃ concentration measured at a monitoring site is equal to or less than 75 ppb.

Report Summary

WDNR monitors for many compounds including coarse particulate matter, nitrogen oxides, sulfur dioxide, carbon monoxide, lead, and toxics. The focus for this report is fine particulate (PM_{2.5}) and ozone because they are important health concerns, for which WDNR issues advisories. In the future, WDNR will expand on this report to display trends for other monitored compounds.

The trends in this report plotted along with the appropriate National Ambient Air Quality Standard (NAAQS) generally show that air quality has improved over the time period (2002-2011). There are counties that show trends of concern, and the WDNR is committed to improving air quality in those areas.

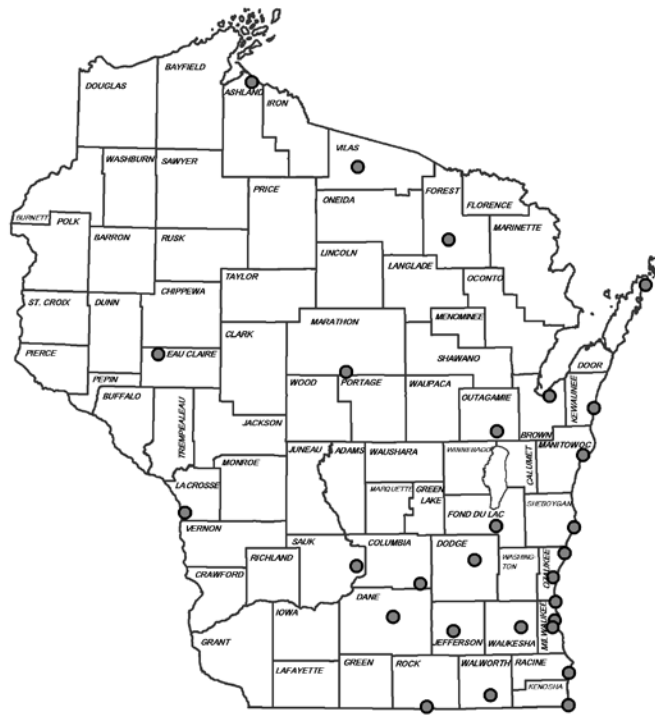
Annual differences in meteorological conditions can lead to variability in measured concentrations. The summer of 2012 was very hot with weather conditions that were conducive to the formation of ozone around Wisconsin. The WDNR will update trend charts within this report as data for 2012 reaches certification completion. It is important to note that annual data is important to consider, but long term trends in air quality are what help guide decisions about management of air quality issues.

The fine particulate information presented in this report is measured at WDNR Federal Reference Method monitoring sites, which operate on a daily, every third day, or every sixth day basis. WDNR also operates a network of continuously operating monitors, which are the basis for real-time health advisories.

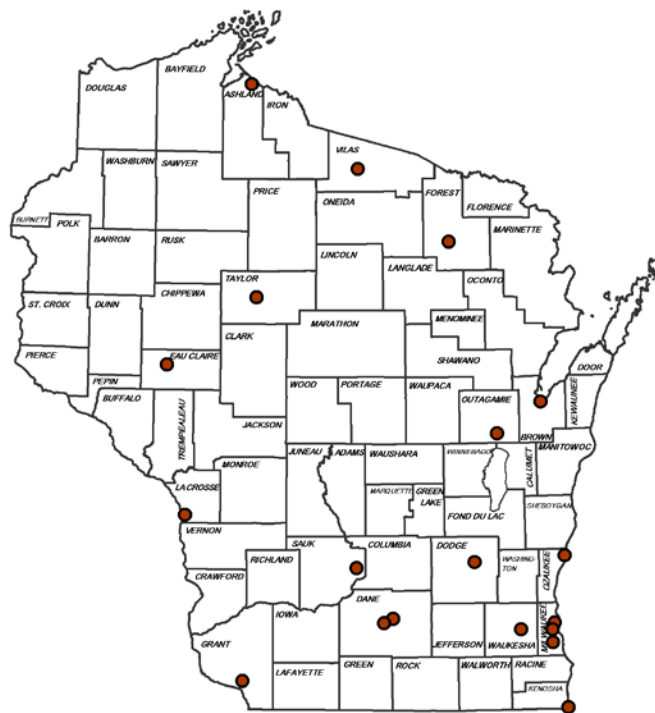
For the 2008 8-hour ozone standard, Sheboygan County and a portion of Kenosha County (mainly east of I-94) are considered nonattainment.

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Ozone Network Map



PM2.5 Continuous and Filter Based (FRM) Network Map

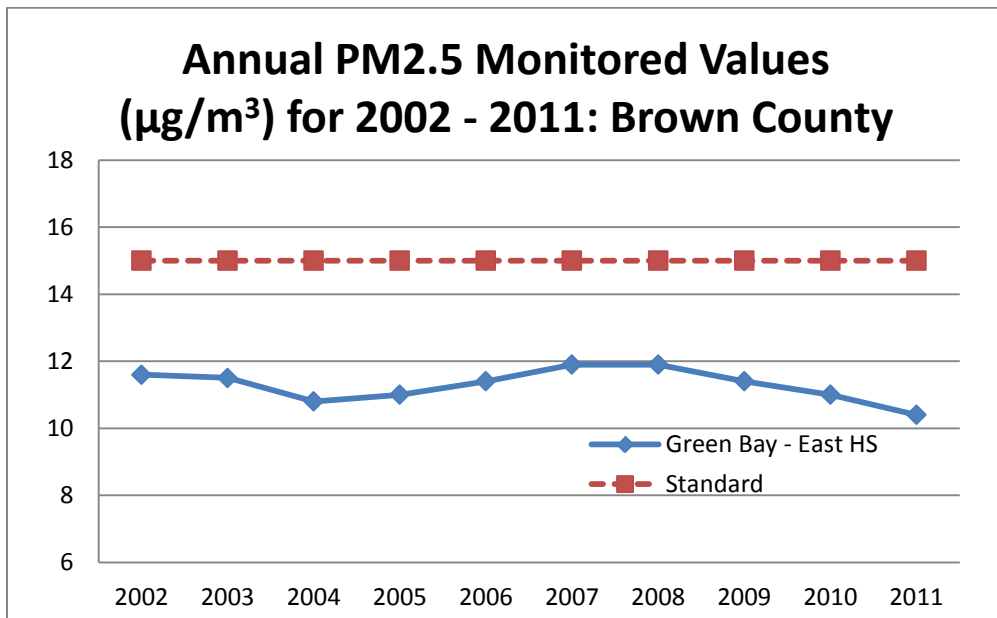
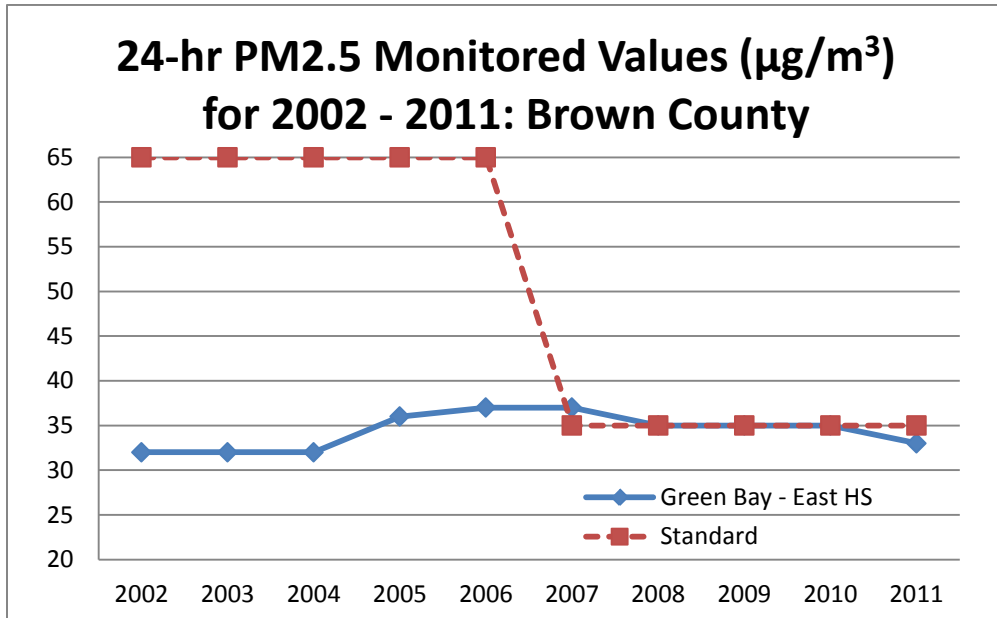


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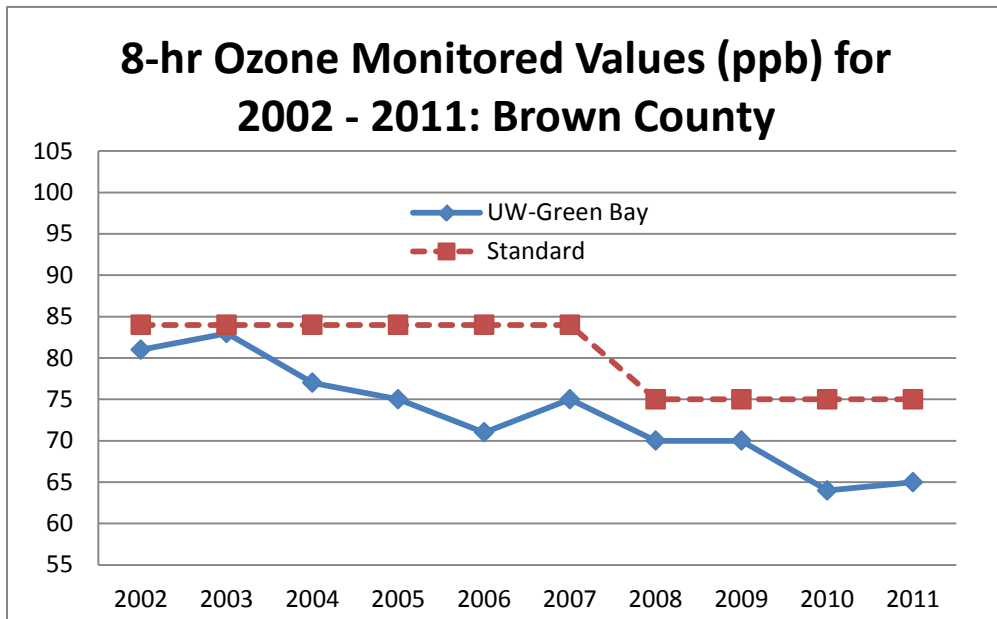
Air Quality by County

Brown County

PM_{2.5} monitoring in Brown County is done at Green Bay East High School, located at 1415 East Walnut Street. Ozone monitoring in Brown County takes place at the University of Wisconsin – Green Bay.

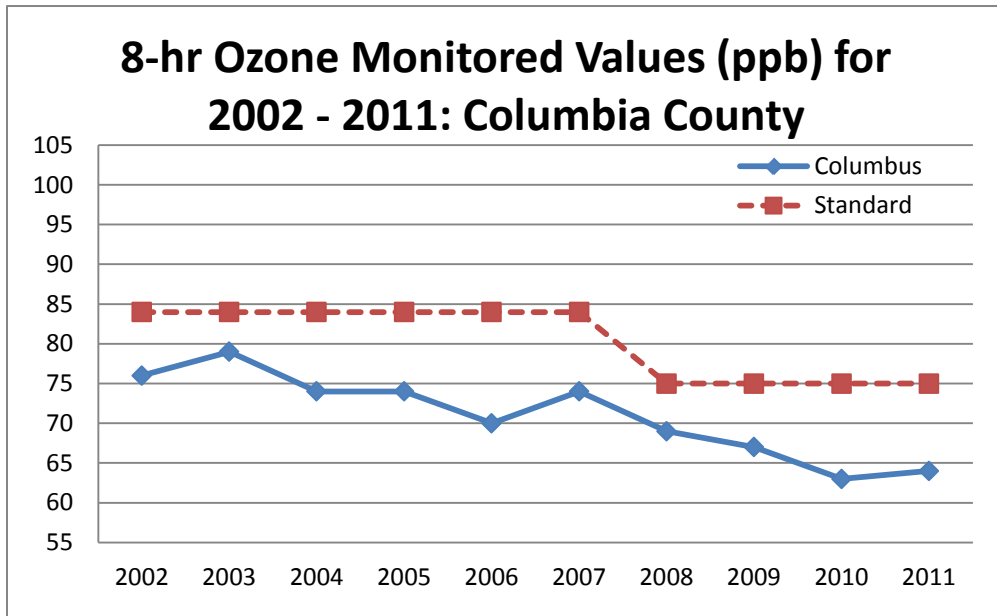


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Columbia County

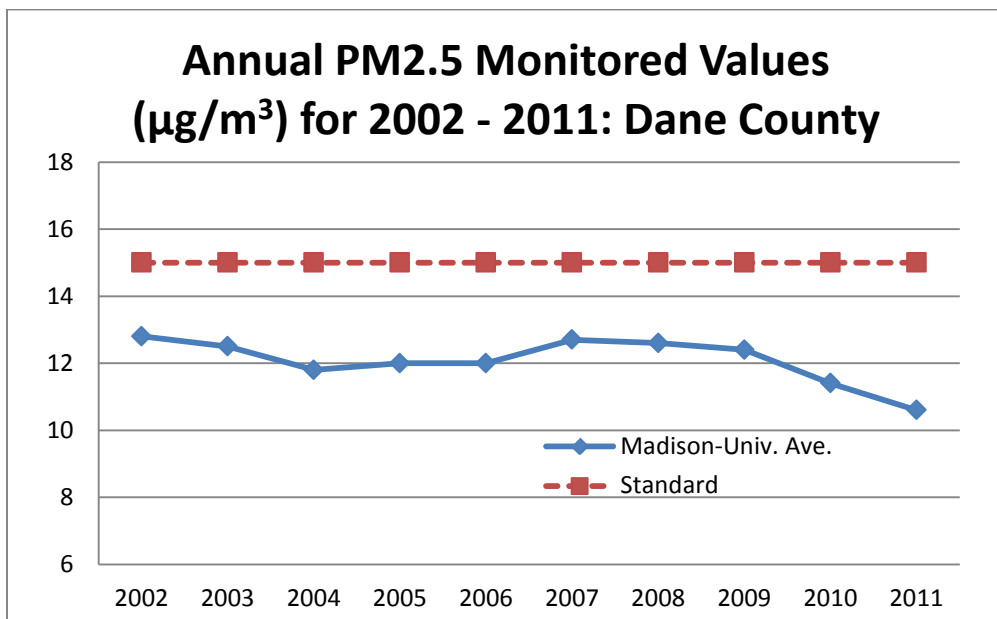
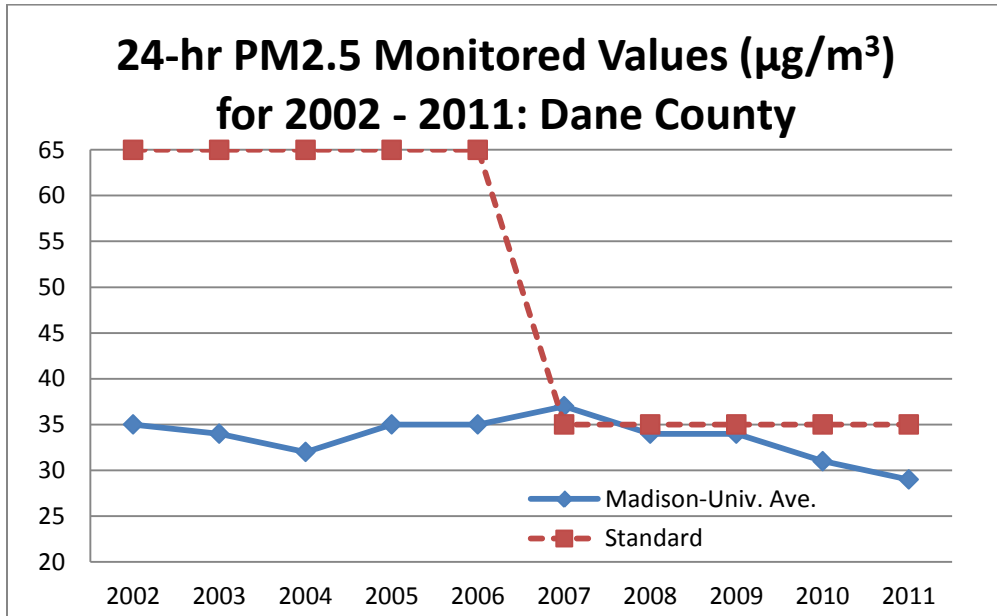
Ozone monitoring in Columbia County is done at a rural location on Wendt Road in Columbus Township. The ozone monitor serves as the downwind ozone instrument in the Madison CBSA.



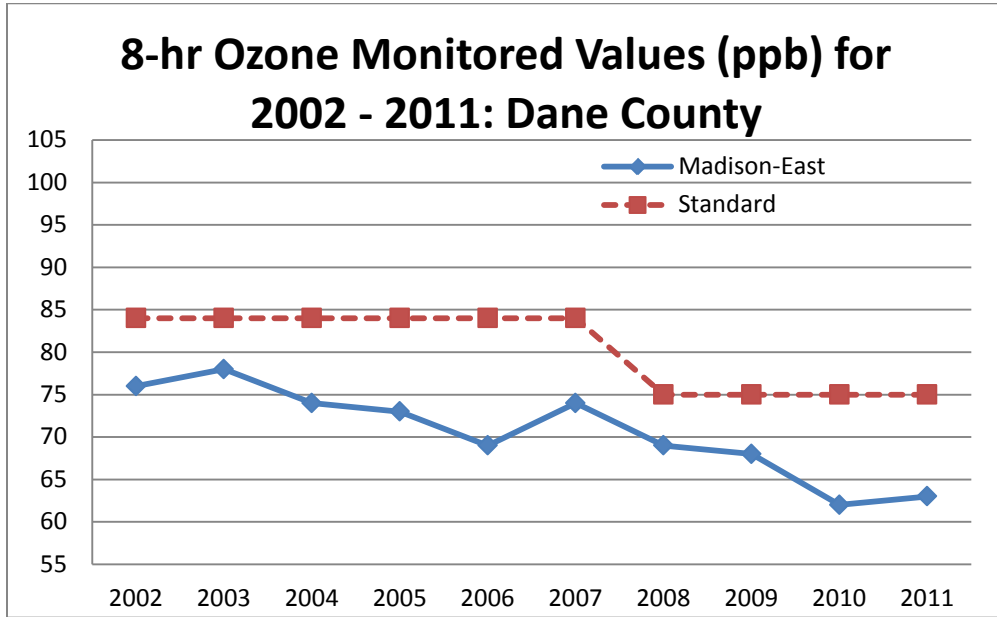
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Dane County

PM_{2.5} monitoring in Dane County is currently done at Madison East High School and Madison – University Avenue, but East High School PM_{2.5} monitoring did not begin until 2010 and therefore is not shown in this report. The Madison East site is located at 2302 North Hoard Street, next to the Madison East High School Sports Field. The University Avenue site is at 2757 University Avenue. Ozone monitoring is done at Madison East High School.

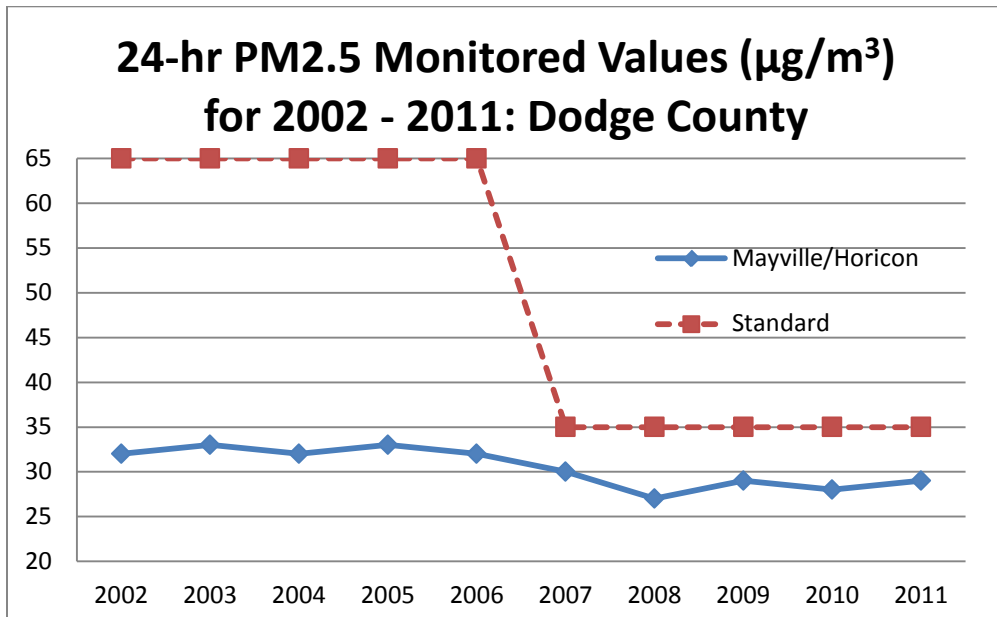


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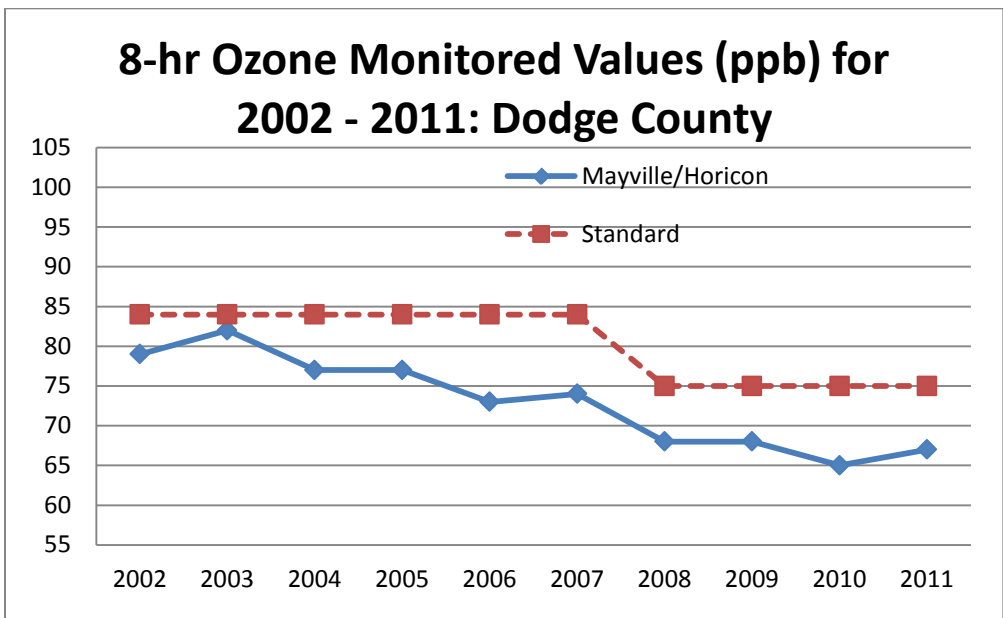
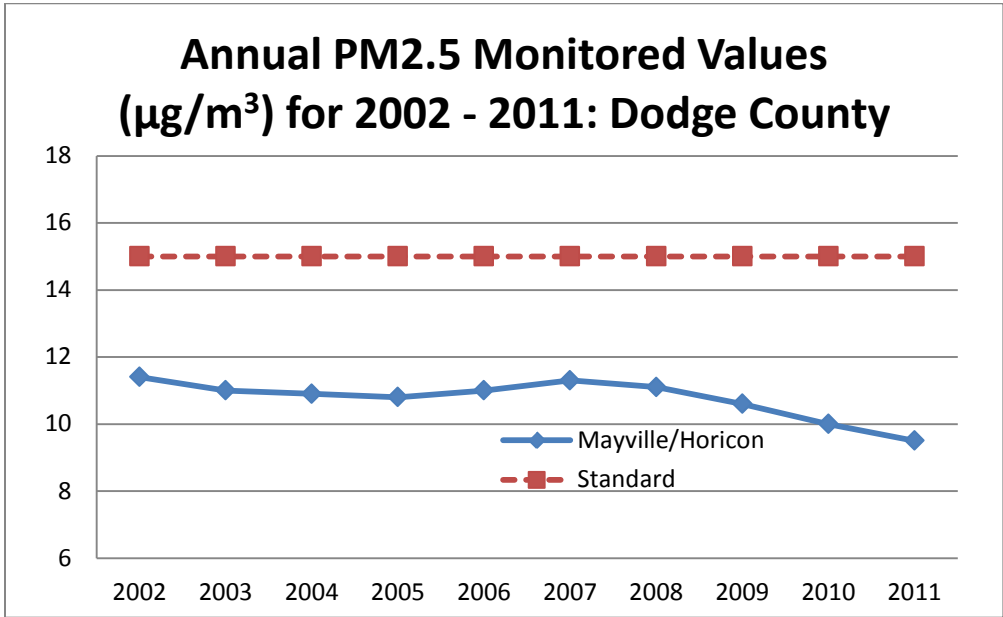


Dodge County

PM_{2.5} monitoring in Dodge County is done at the Horicon Wildlife Area monitoring station located at 1210 North Palmatory Street. The Horicon site began sampling for daily PM_{2.5} on December 18, 2009 and for ozone on January 22, 2010. Prior to these dates, sampling in Dodge County was performed at a site near Iron Ridge. Consequently, data from both sites is used to calculate design values for 2010 and 2011.



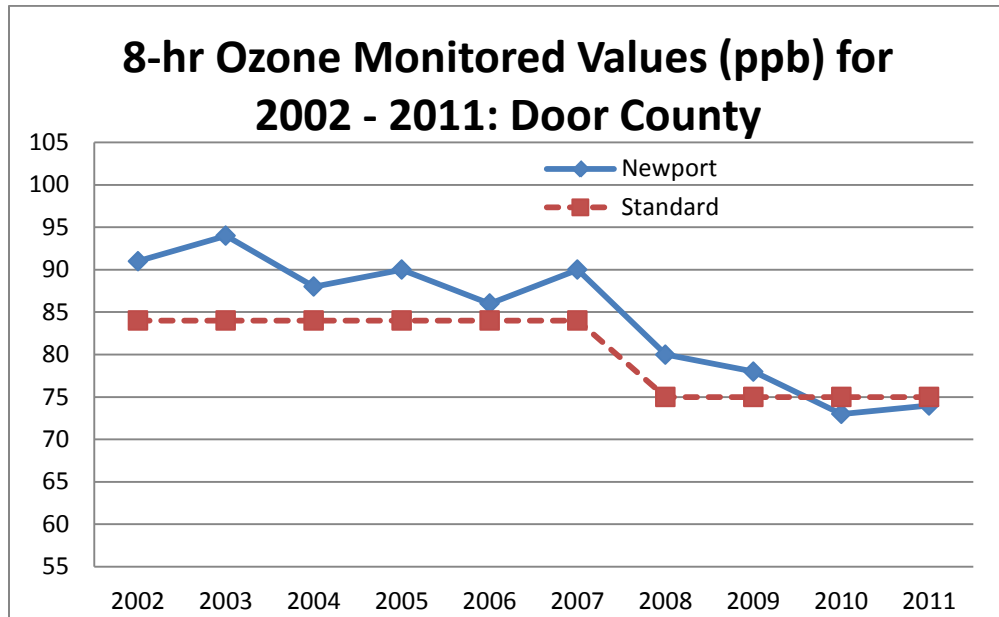
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Door County

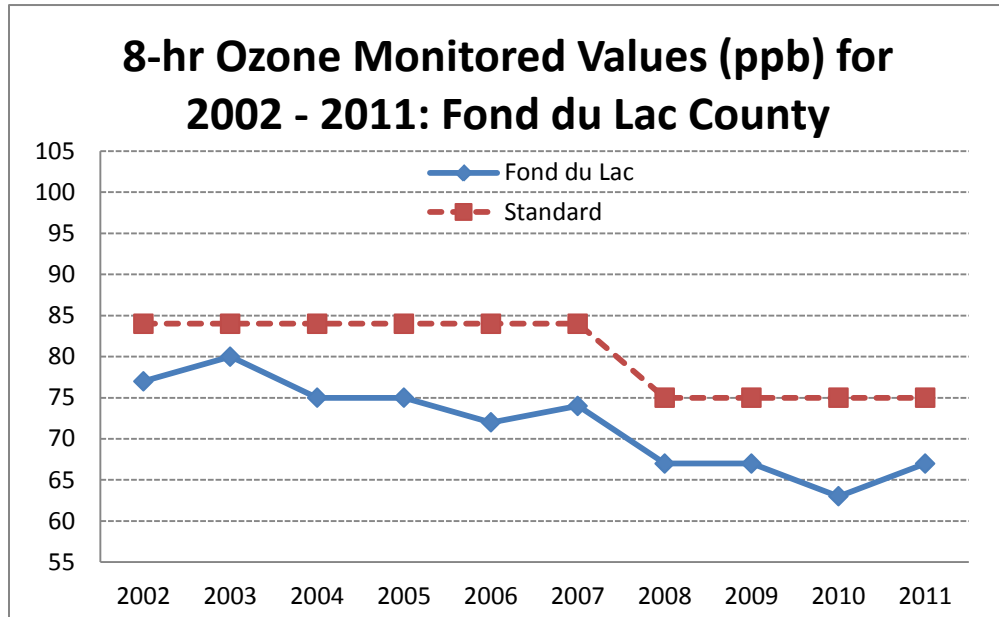
Ozone monitoring in Door County is done at Newport State Park at 475 County Trunk Highway NP in Ellison Bay. The monitor site is inside the state park.



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Fond du Lac County

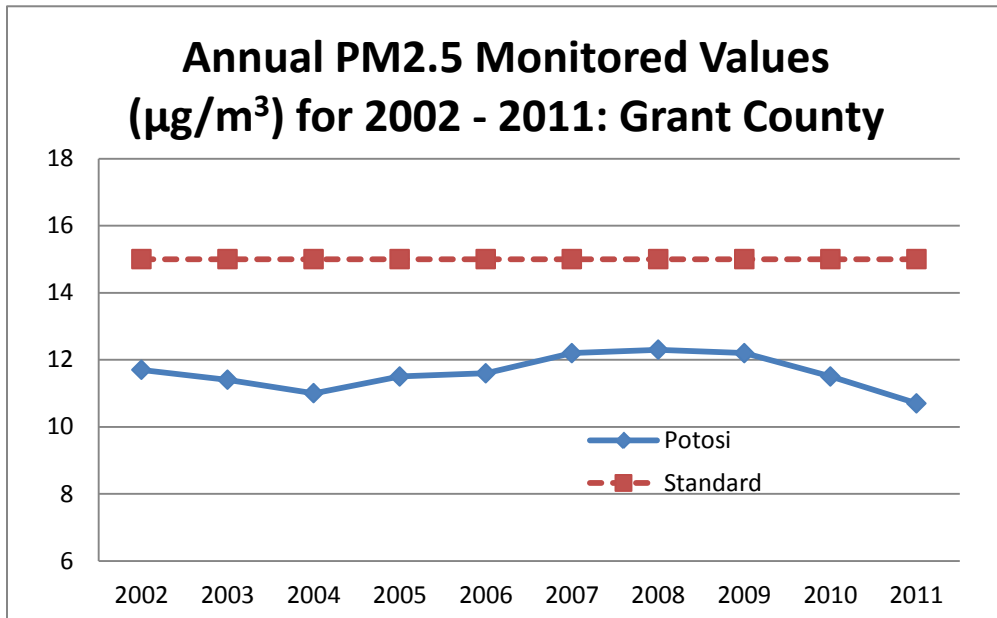
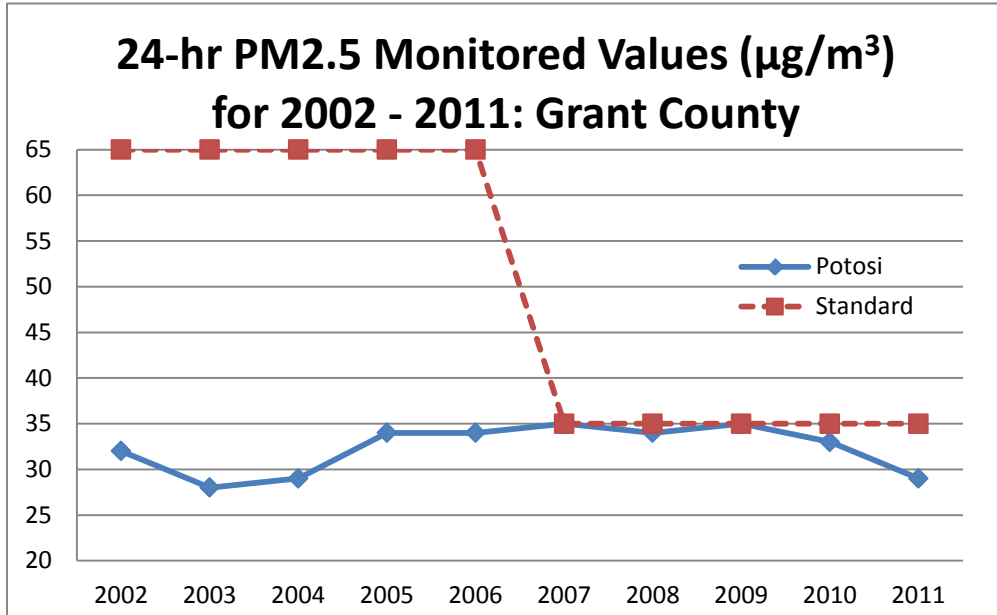
Ozone monitoring in Fond du Lac County is done at N3996 Kelly Road in the Town of Byron. The site is located at the edge of a farm field.



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Grant County

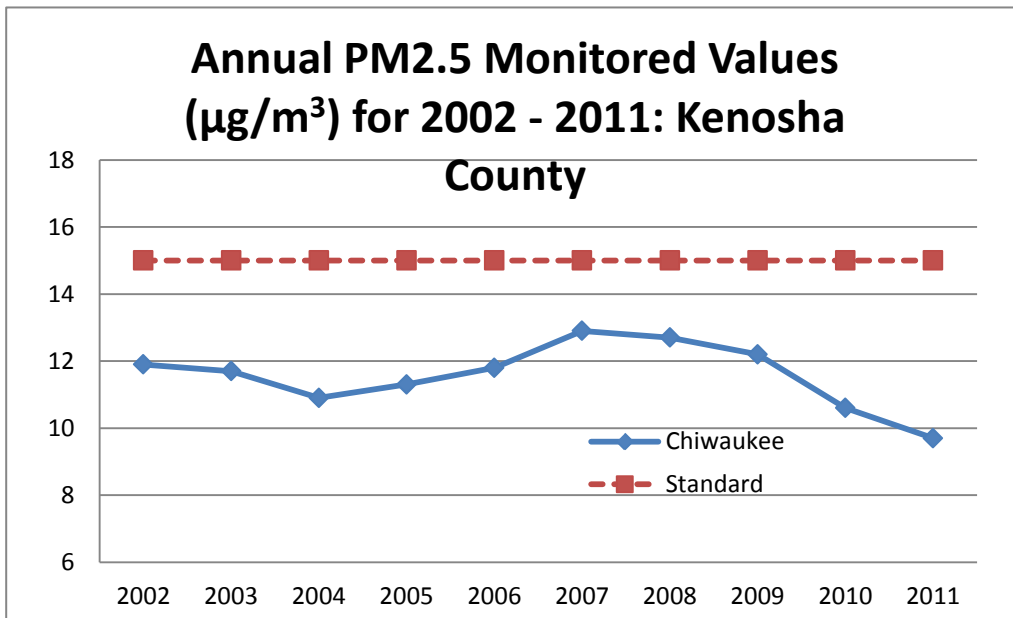
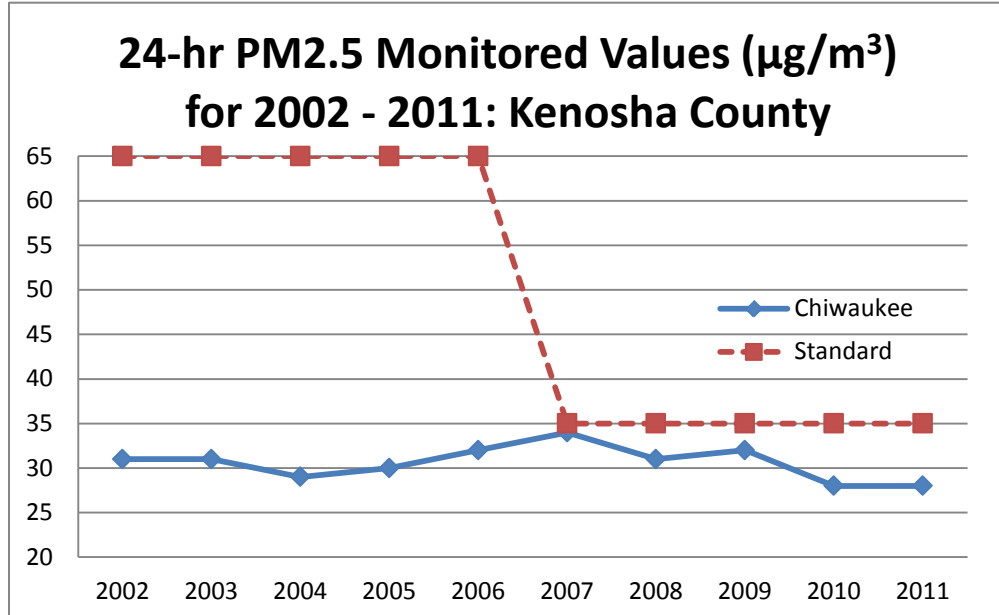
PM_{2.5} monitoring in Grant County is done at 128 Highway 61 on Potosi High School property.



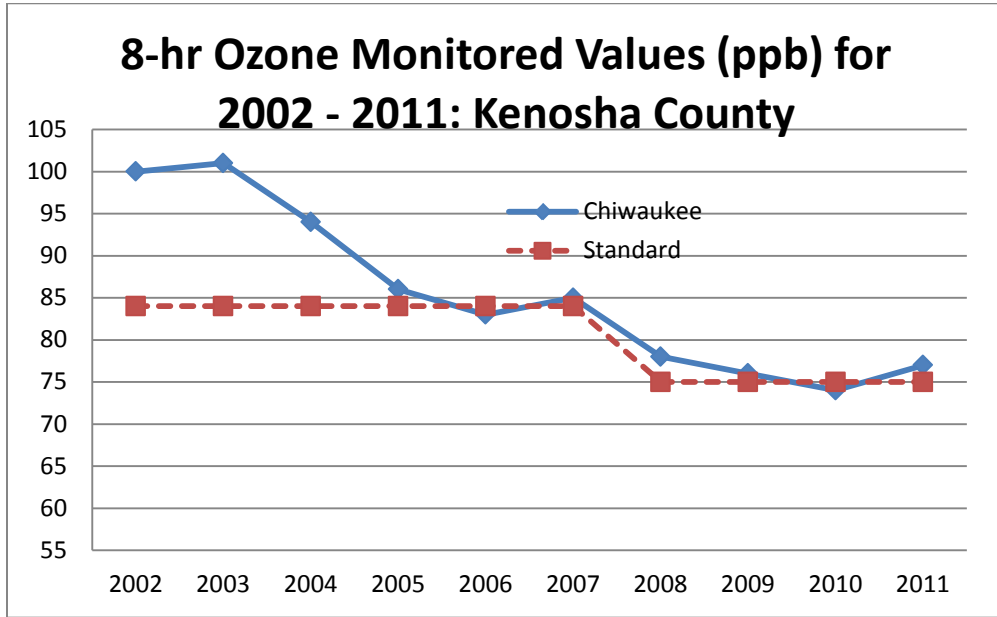
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Kenosha County

PM_{2.5} and ozone monitoring for Kenosha County is done at 11838 First Court in the Chiwaukee Prairie, which is a rural area near the Wisconsin – Illinois border.

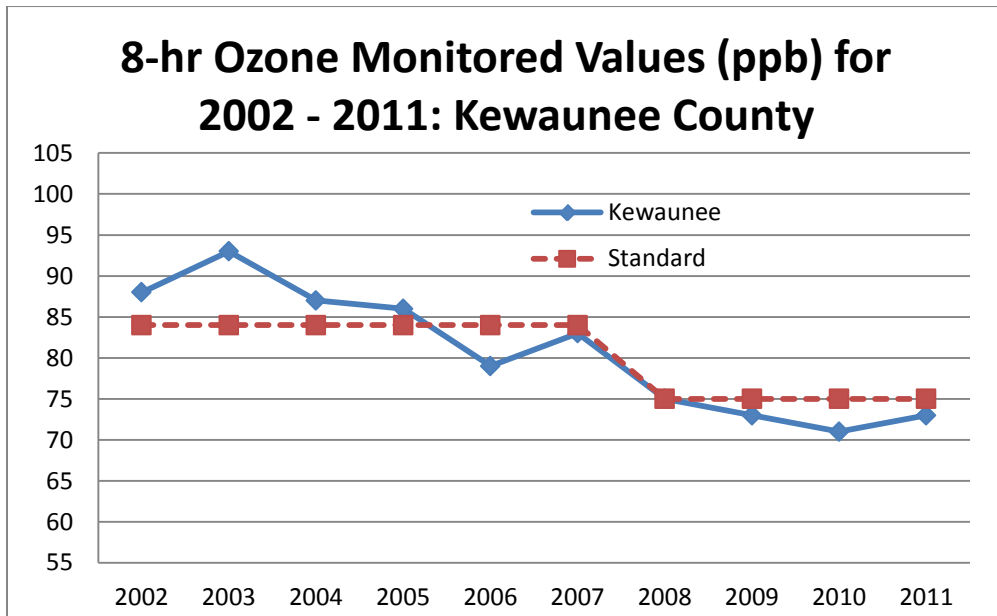


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Kewaunee County

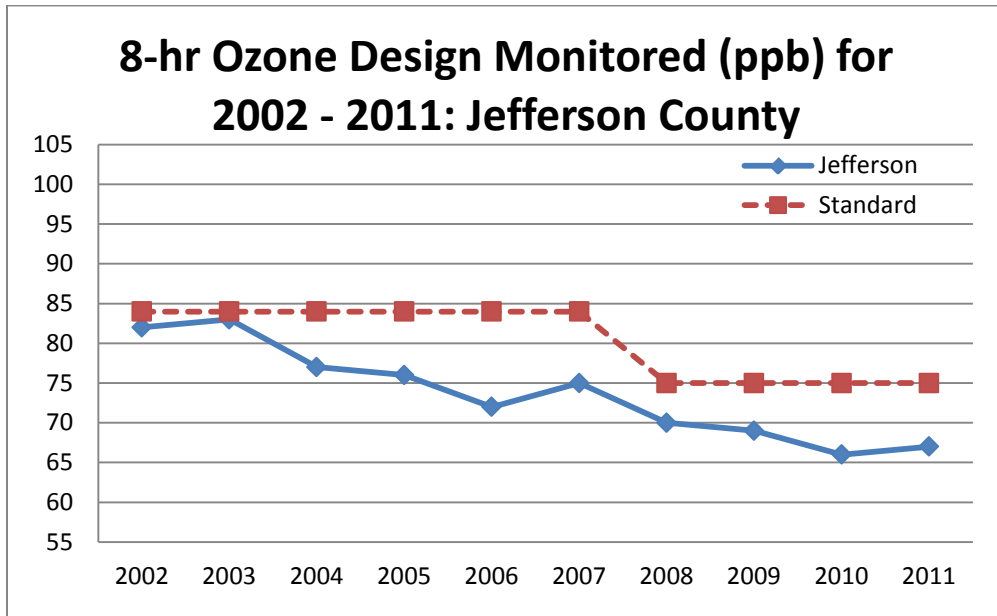
Ozone monitoring in Kewaunee County is done at Rural Route #1, Highway 42 on a bluff over Lake Michigan.



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Jefferson County

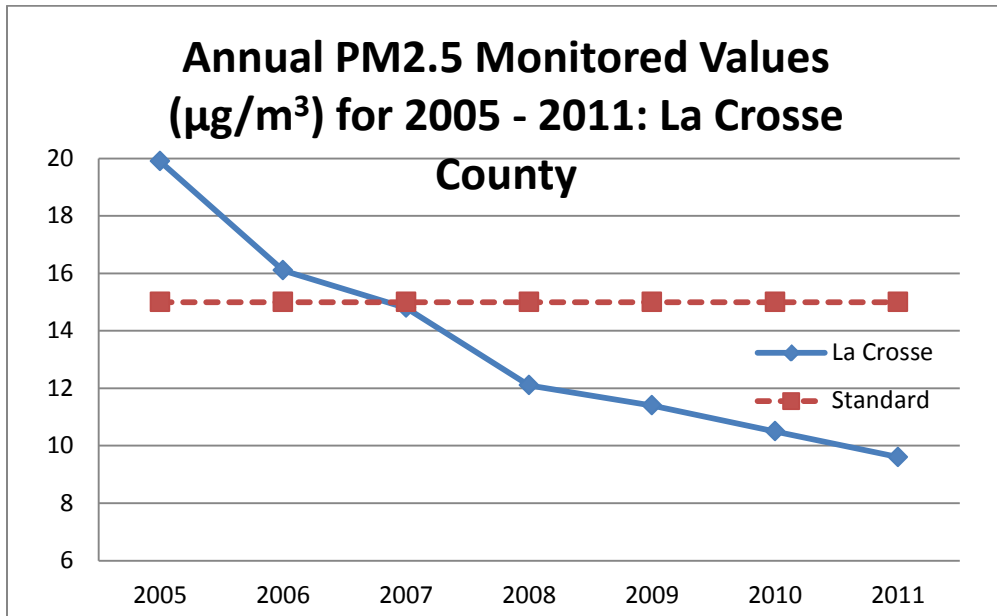
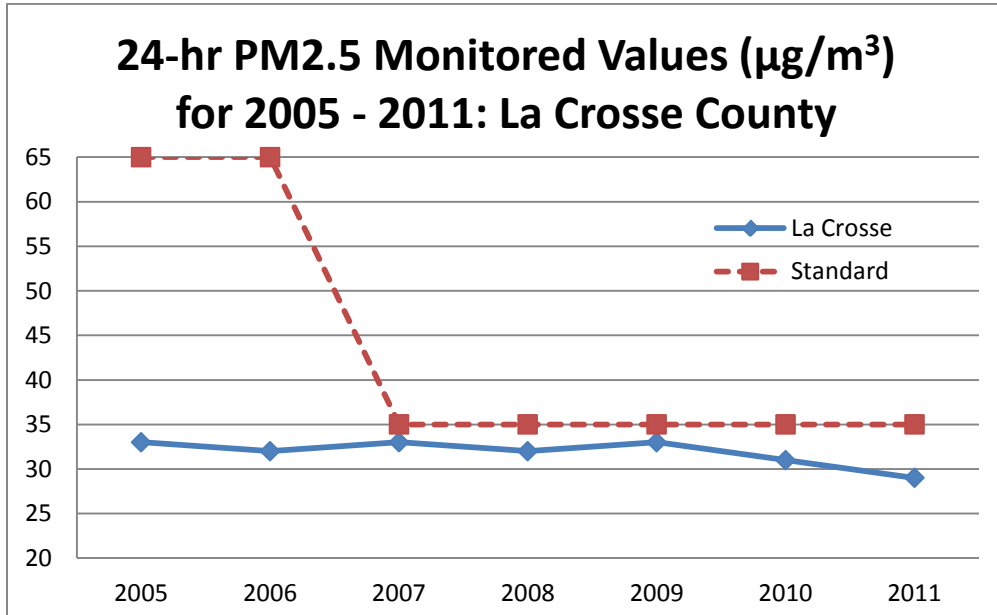
Ozone monitoring in Jefferson County has previously been done on the Jefferson High School grounds at 634 West Linden Drive. For the 2013 ozone season, the monitoring location will be near the elementary school grounds, at Laatsch Lane. This is approximately ¾ mile from the previous site (associated with the data shown here), which was next to the high school sports field.



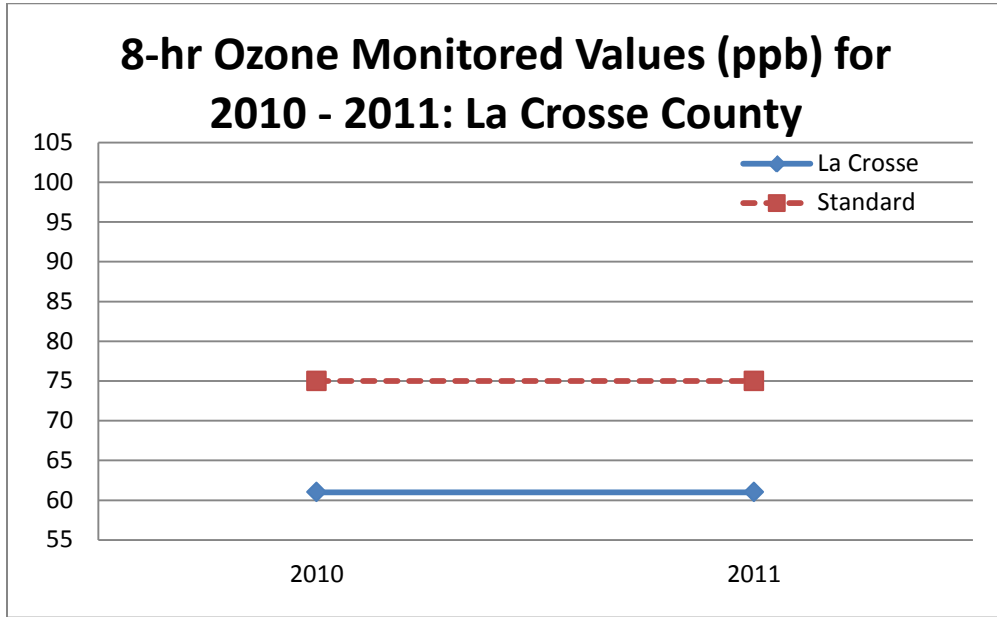
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La Crosse County

PM_{2.5} and ozone monitoring for La Crosse County are done at the Department of Transportation office located at 3350 Mormon Coulee Road in La Crosse.

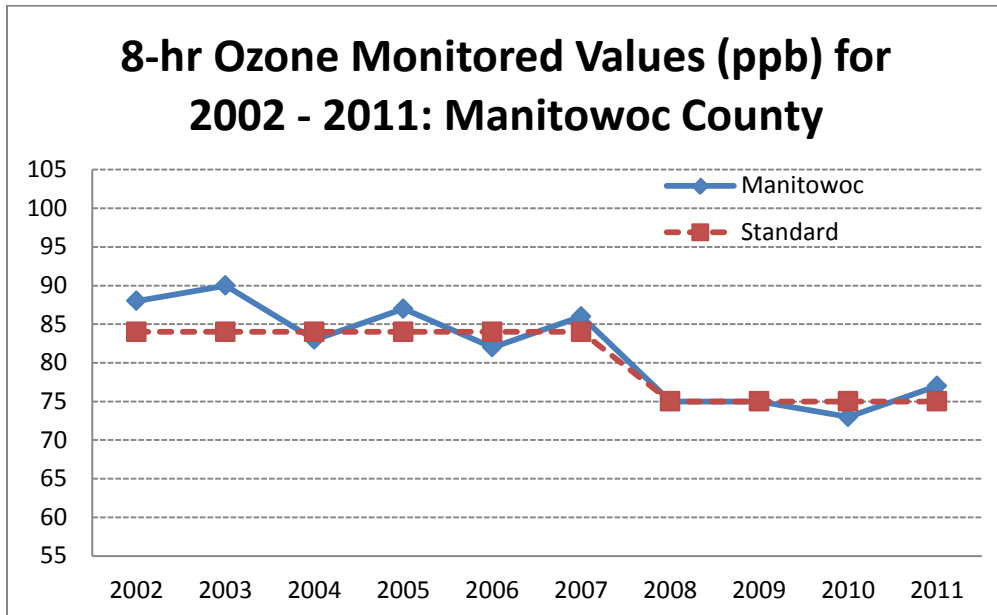


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Manitowoc County

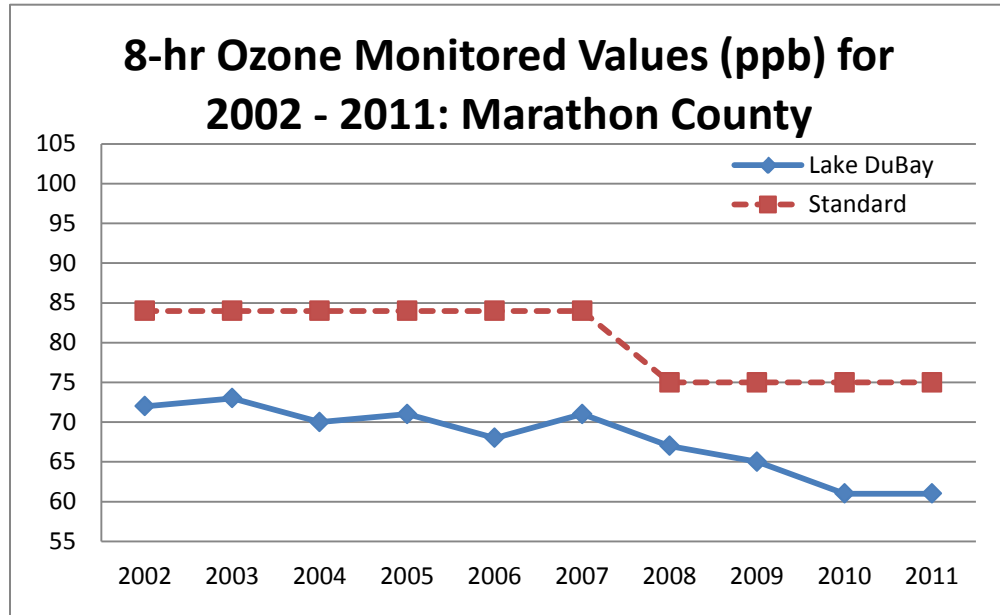
Ozone monitoring for Manitowoc County is done at 2315 Goodwin Road in Two Rivers at the Woodland Dunes Nature Center and Preserve.



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Marathon County

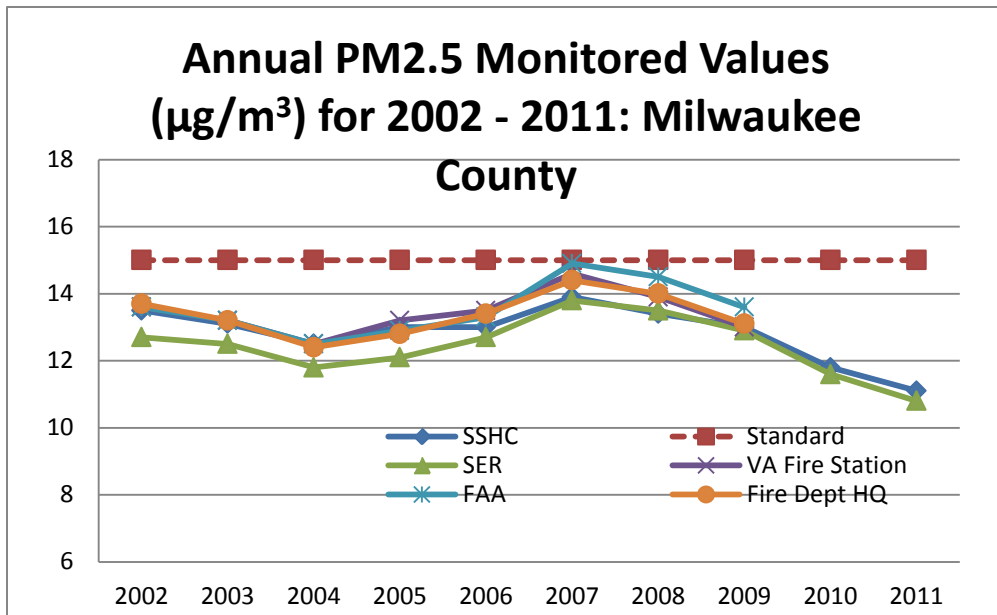
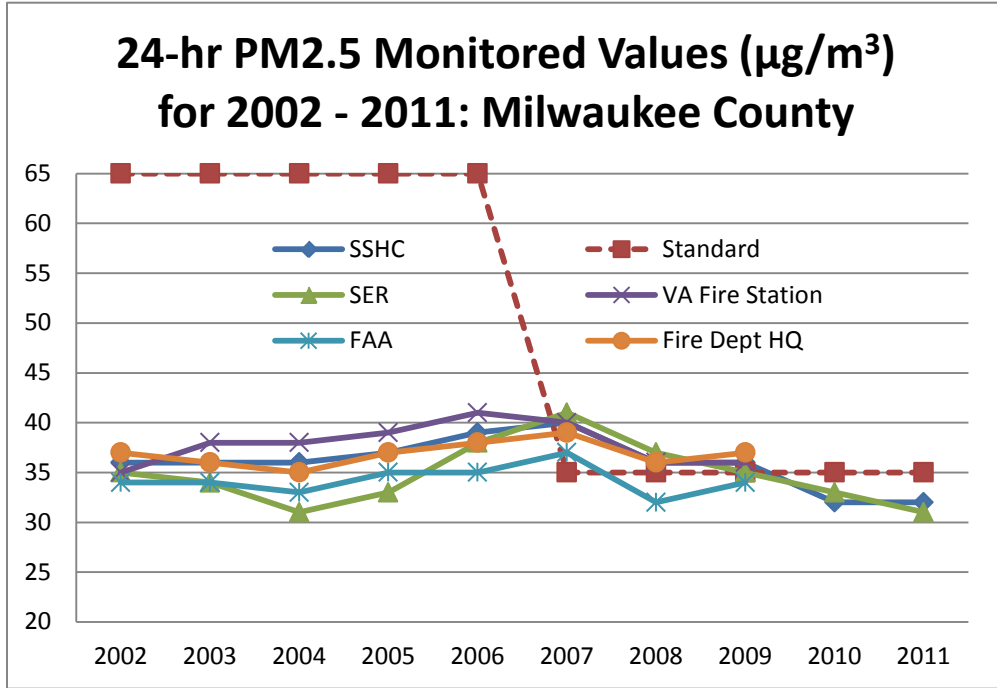
Ozone monitoring in Marathon County is done at 1780 Bergen Road near Lake Dubay, in Bergen Township.



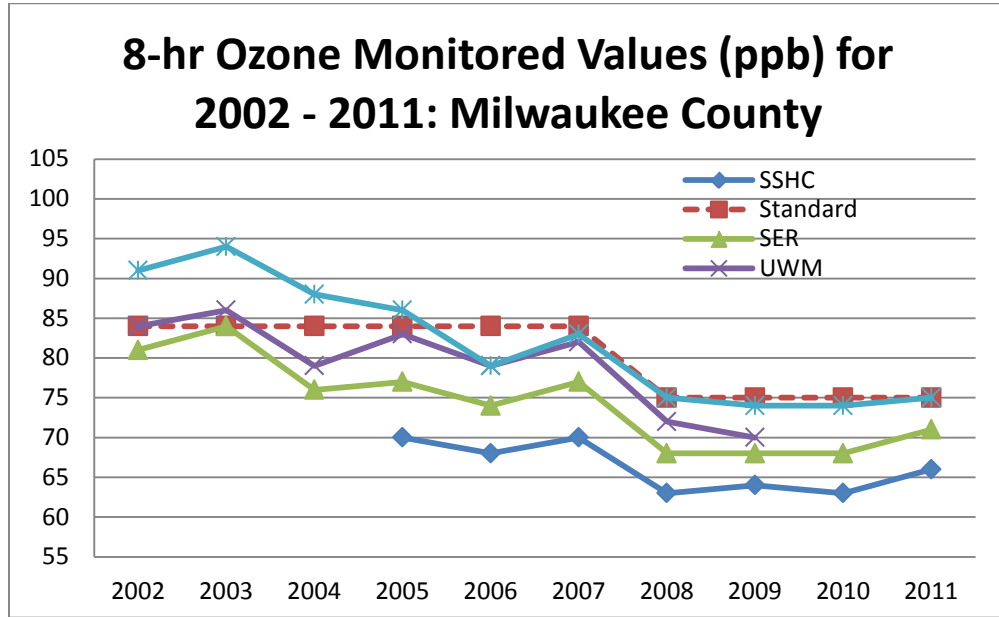
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Milwaukee County

PM2.5 and ozone monitoring for Milwaukee County is done at many locations. They are all shown together in the following plots, for comparison.



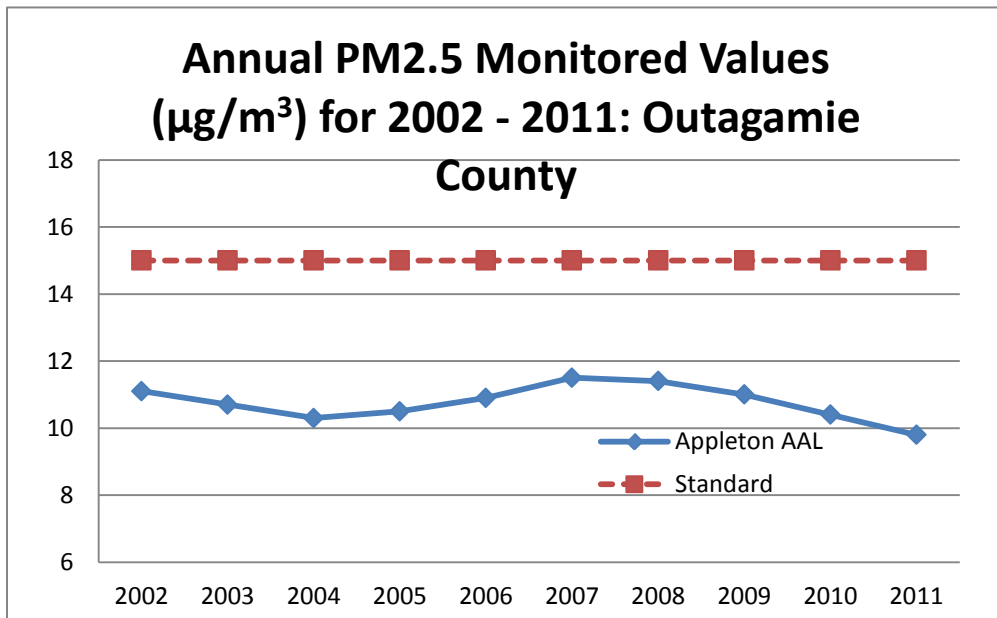
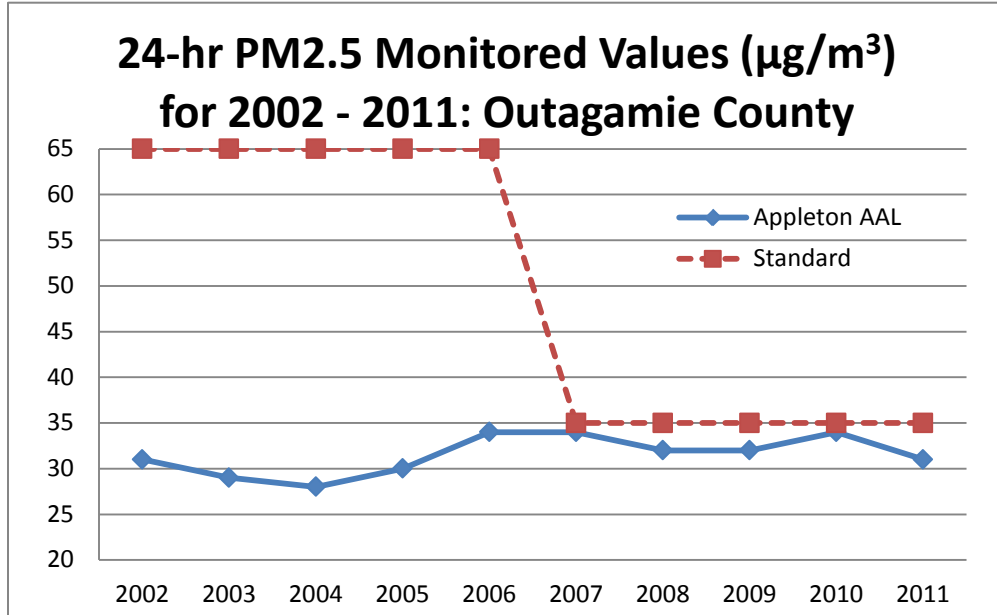
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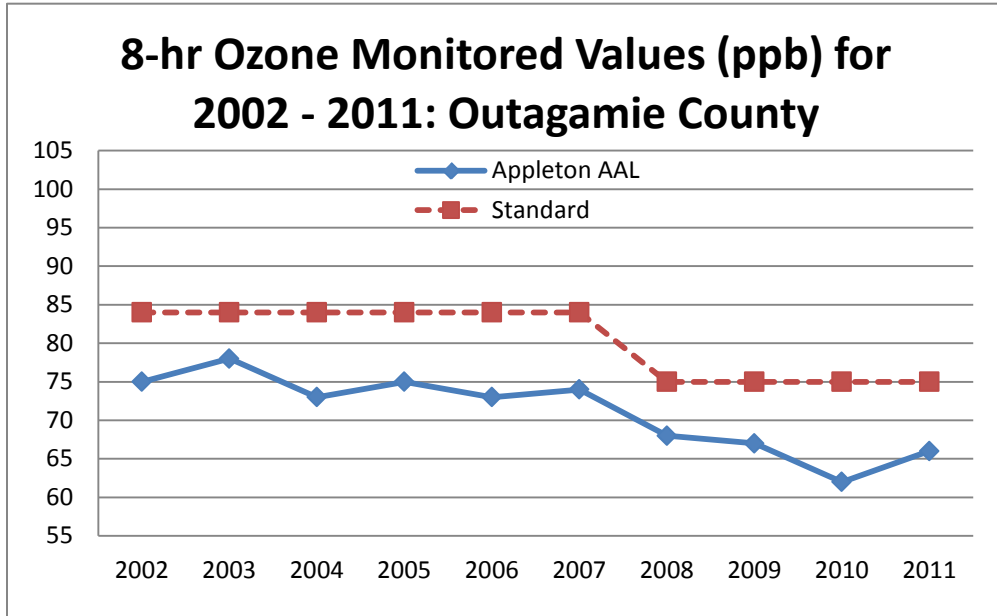
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Outagamie County

PM_{2.5} and ozone monitoring in Outagamie County is done at 4432 North Meade Street in Appleton near a neighborhood.

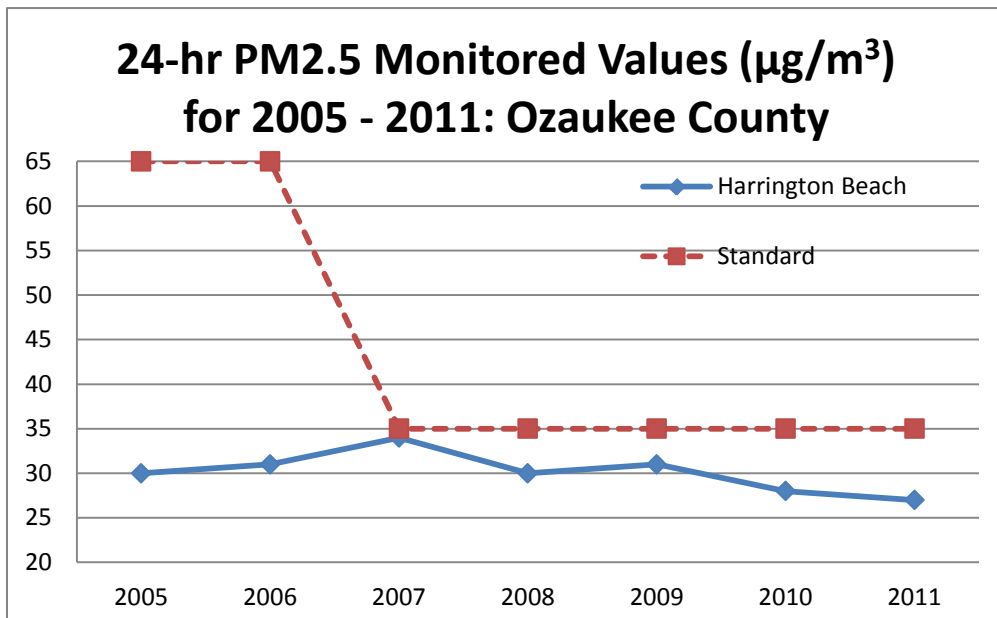


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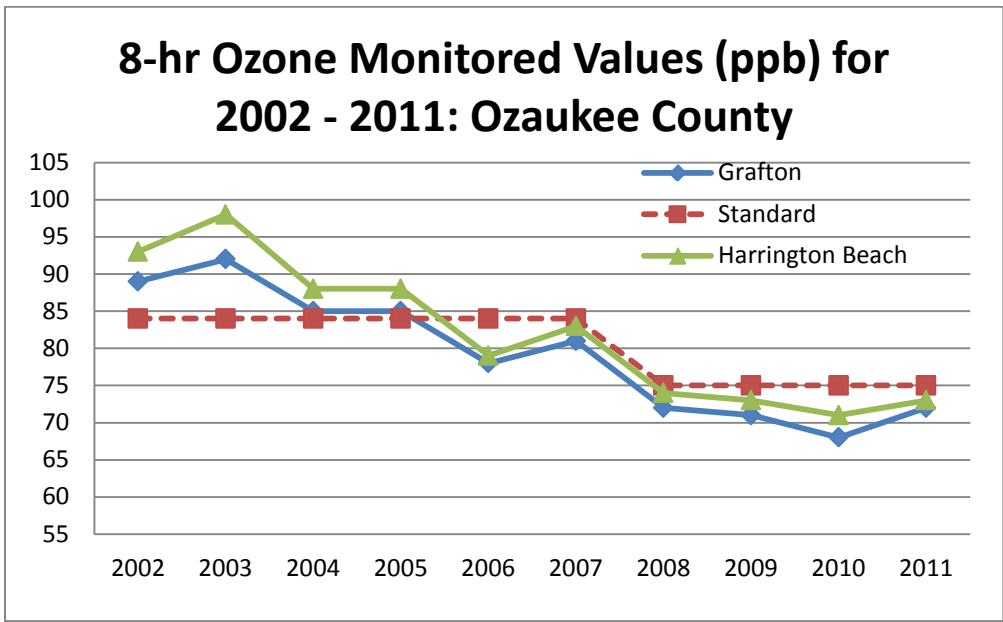
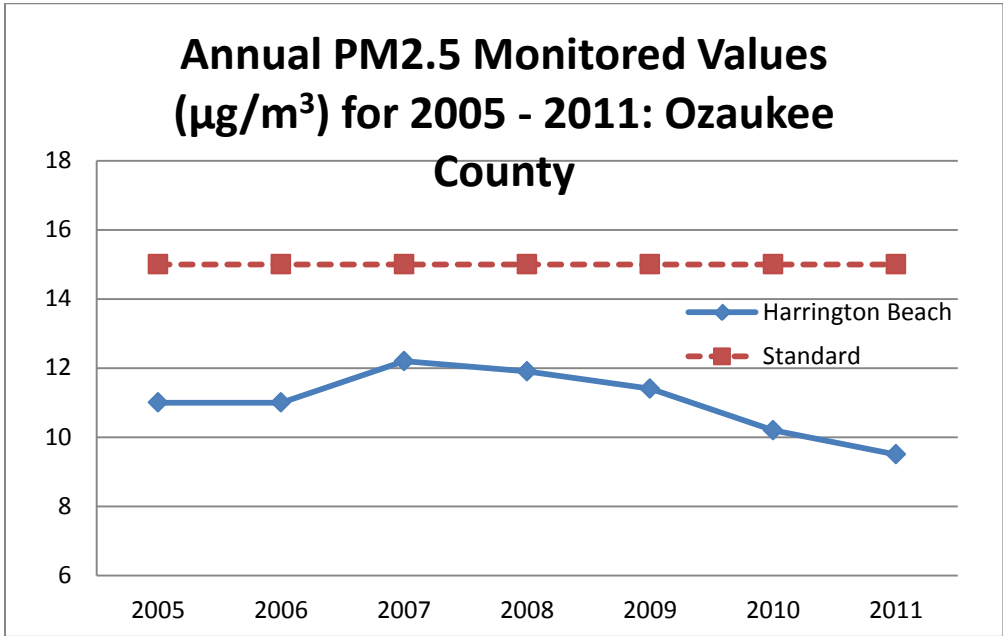


Ozaukee County

PM_{2.5} monitoring in Ozaukee County is done at 531 Highway D in Harrington Beach State Park, while ozone monitoring is done both at Harrington Beach and at Highway 57 and I43 in Grafton next to the WE Energies landfill.



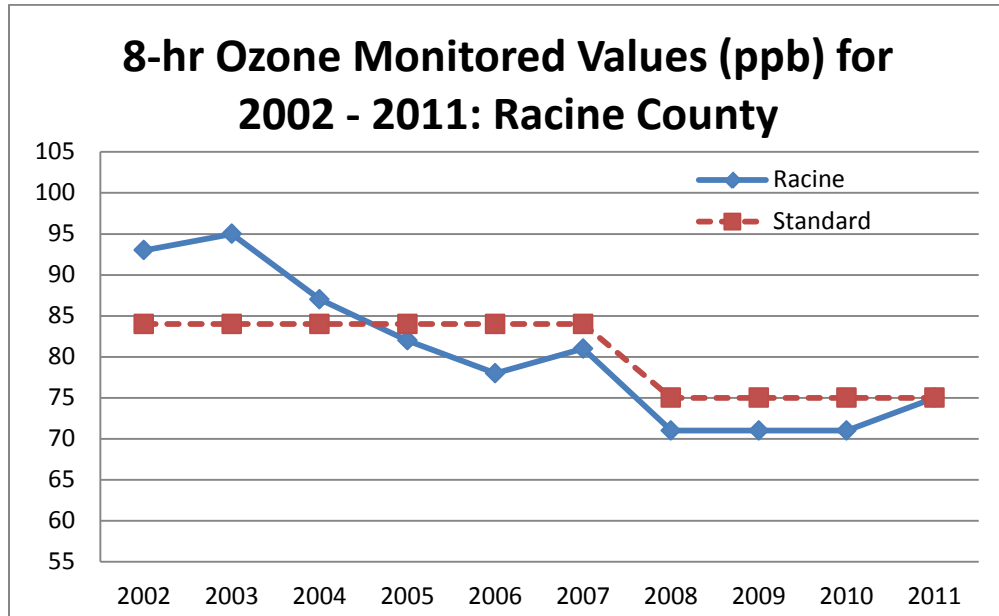
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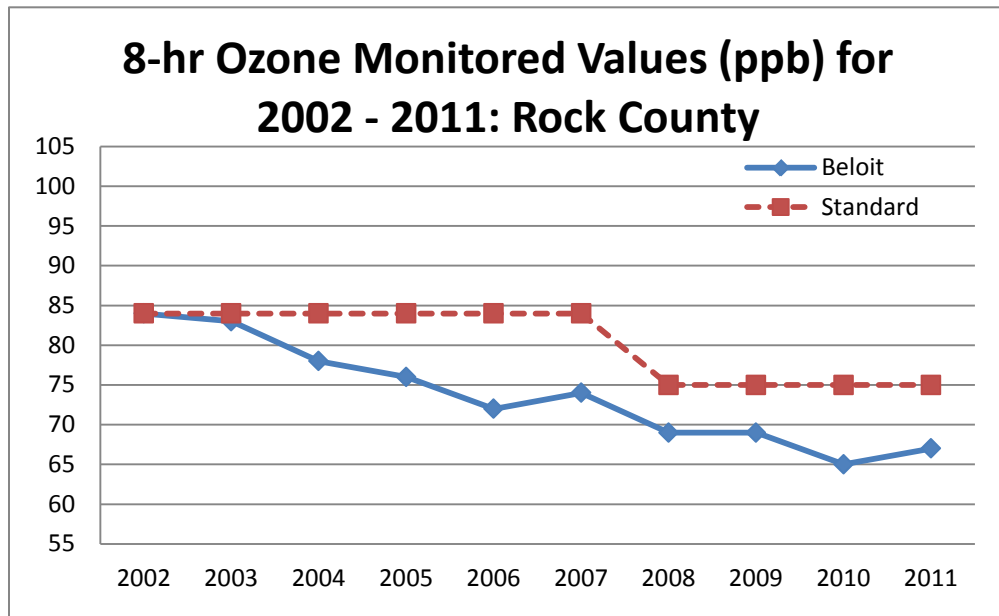
Racine County

Ozone monitoring in Racine County is done at 1519 Washington Avenue inside a local business.



Rock County

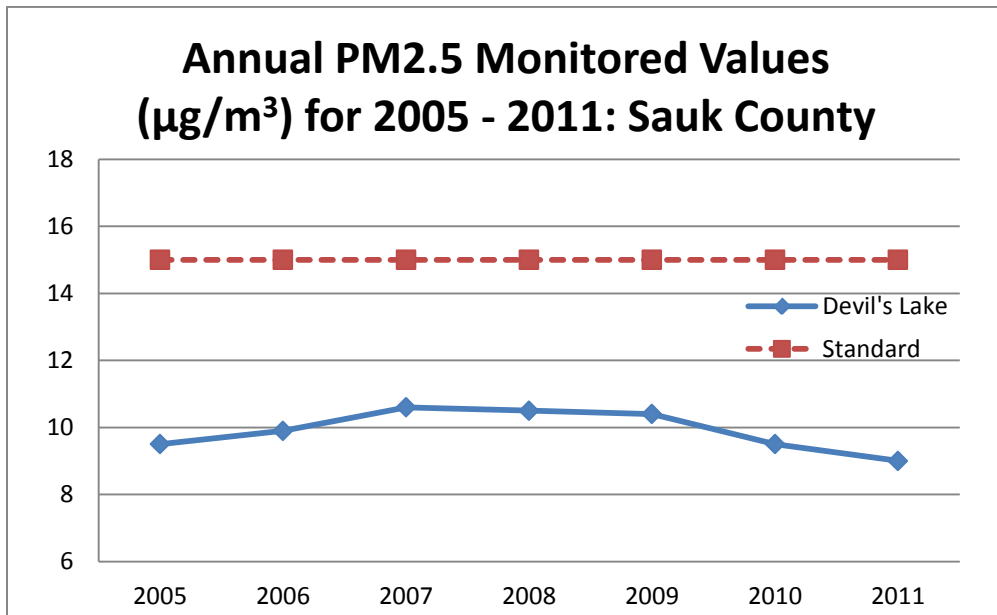
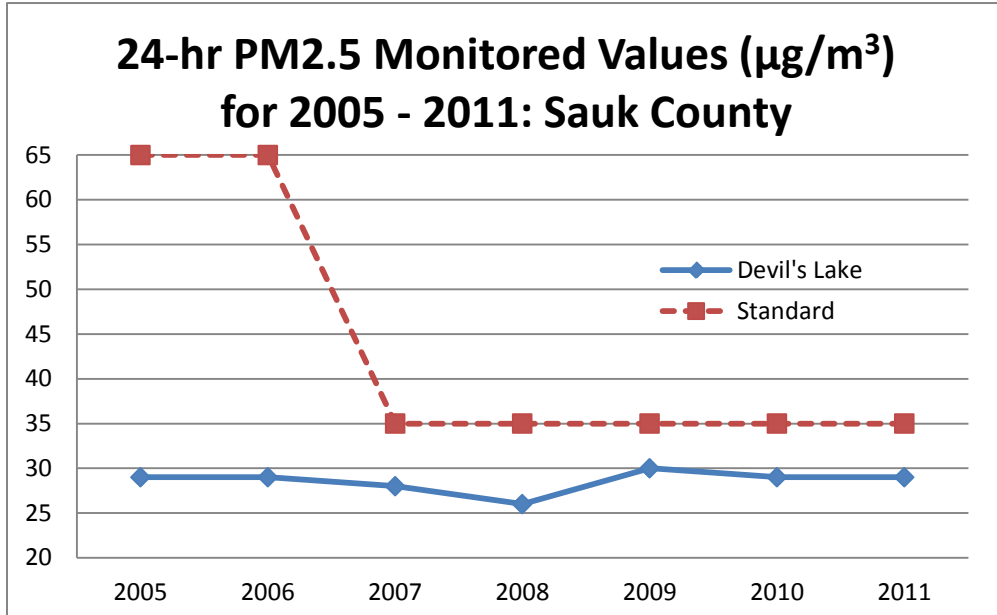
Ozone monitoring in Rock County is done at 1948 Merrill Street in Beloit. The site is located in a fenced area at the Cunningham School.



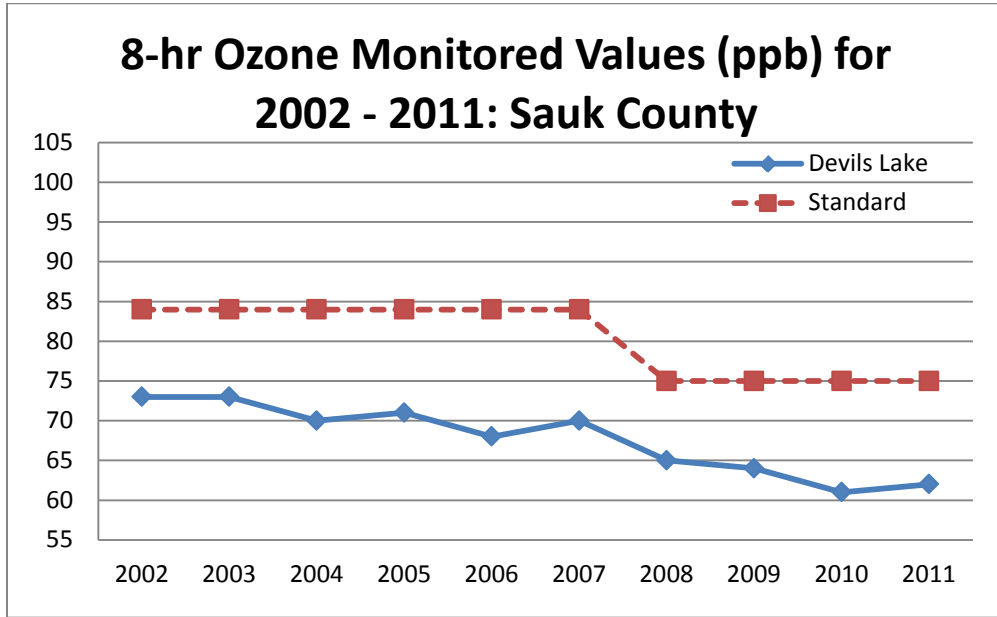
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Sauk County

PM_{2.5} and ozone monitoring in Sauk County are done at Devil's Lake State Park at E12886 Tower Road in Baraboo.

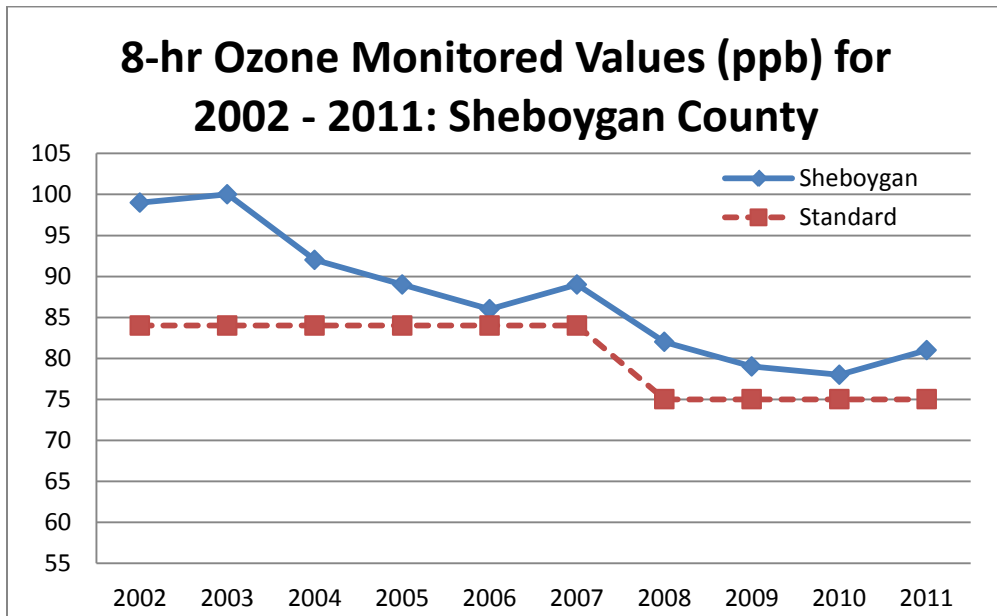


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Sheboygan County

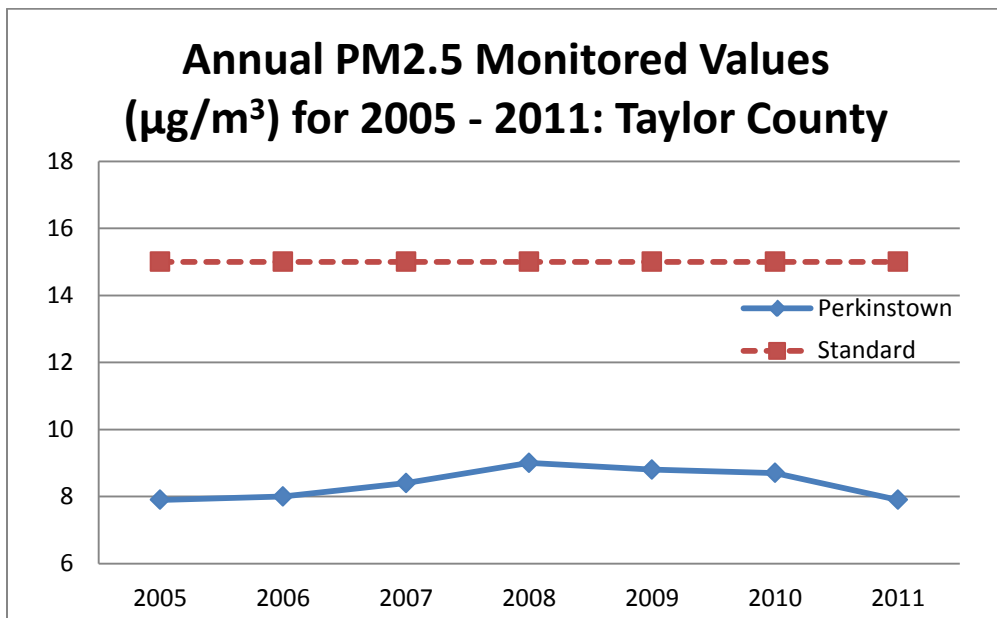
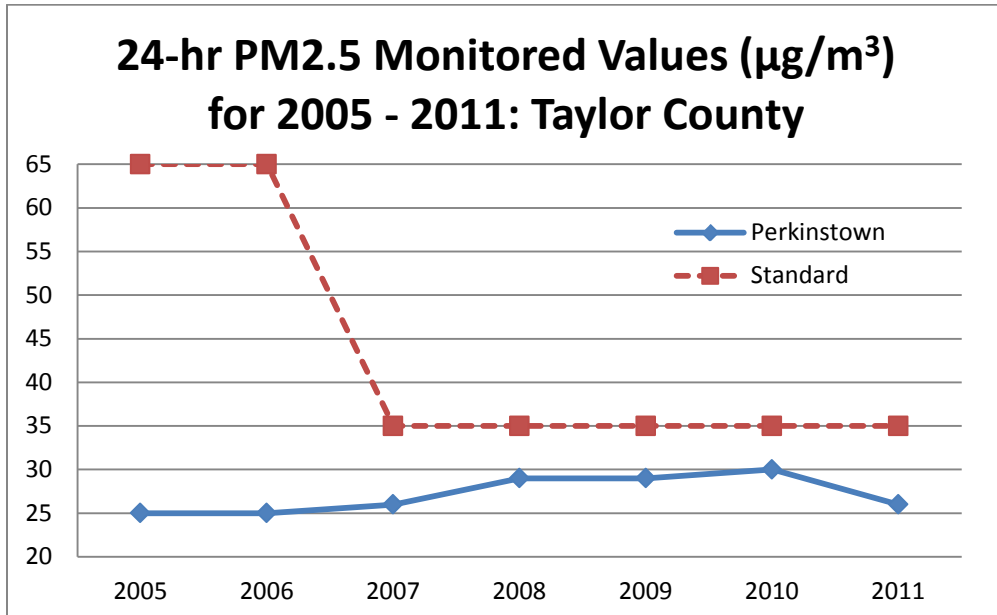
Ozone monitoring in Sheboygan County is done at a site located inside the nature center at Kohler-Andre State Park. This Lake Michigan shoreline site is located at 1520 Beach Park Road.



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Taylor County

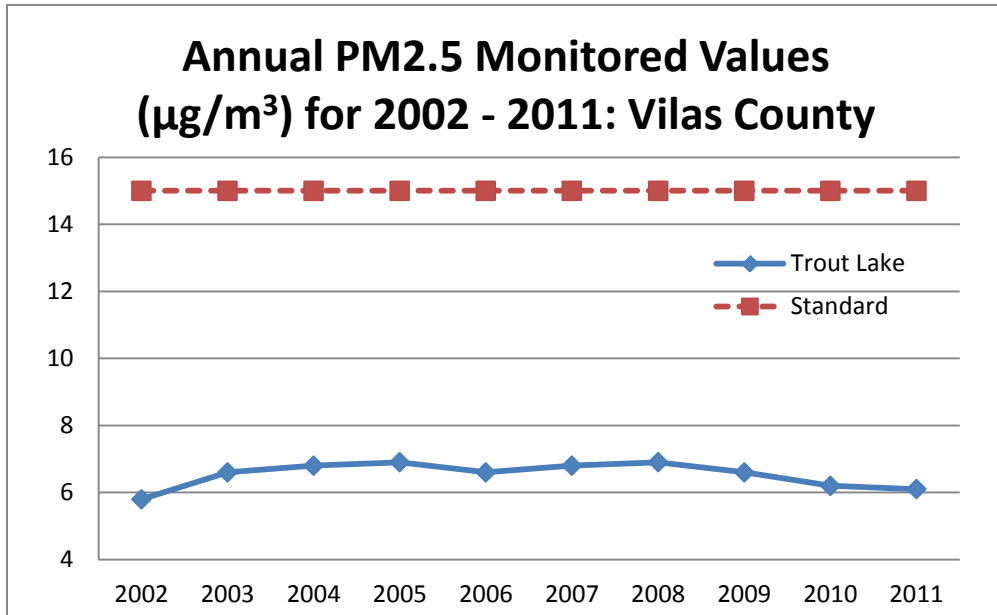
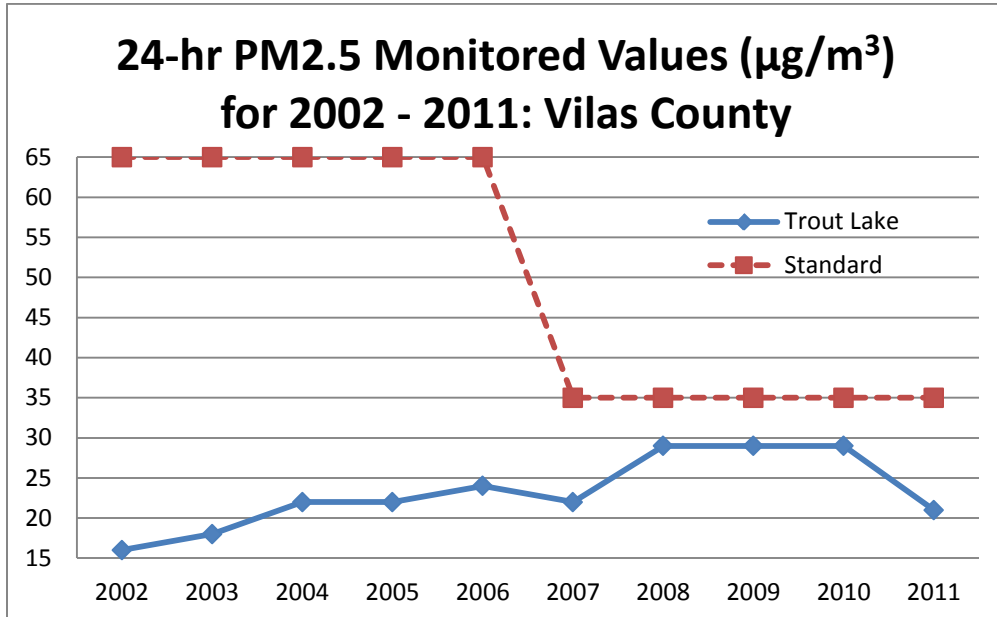
PM_{2.5} monitoring in Taylor County is done at a rural site one mile east of Perkinstown on State Highway M.



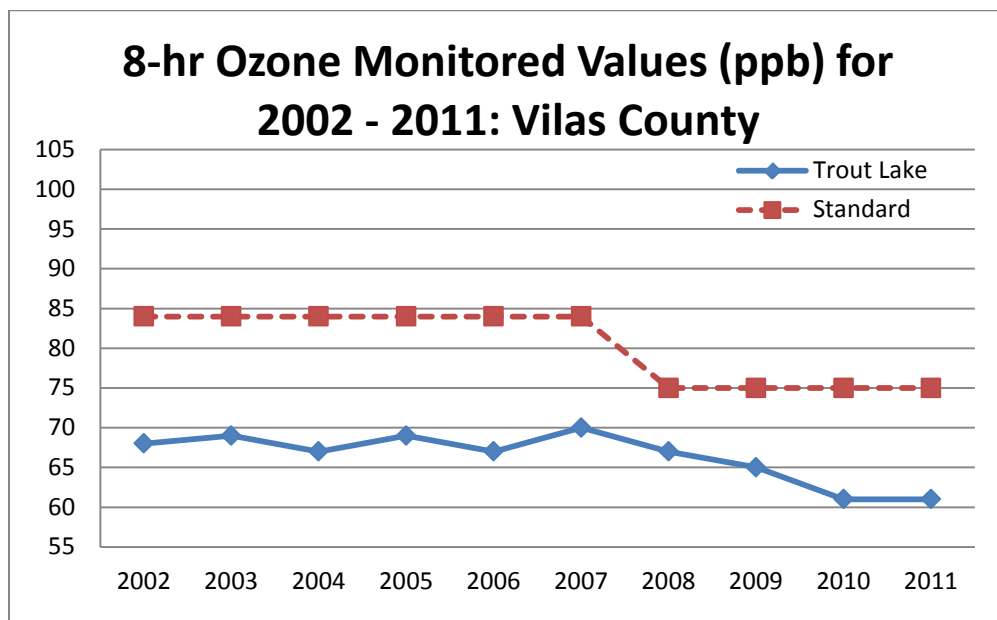
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Vilas County

PM_{2.5} and ozone monitoring in Vilas County is done at a field in the DNR Forestry Site at 10810 County Highway M in Boulder Junction.



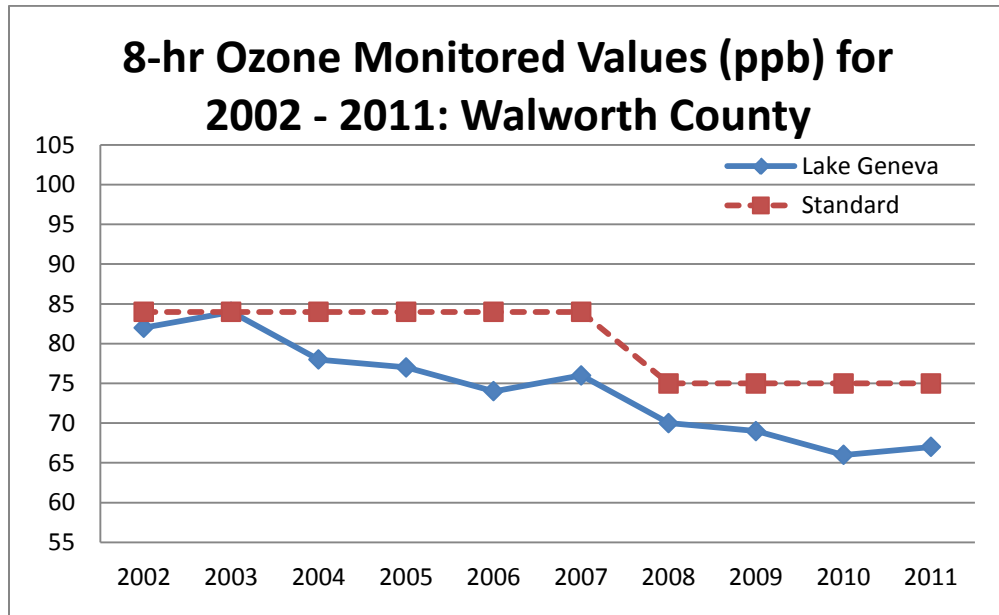
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Walworth County

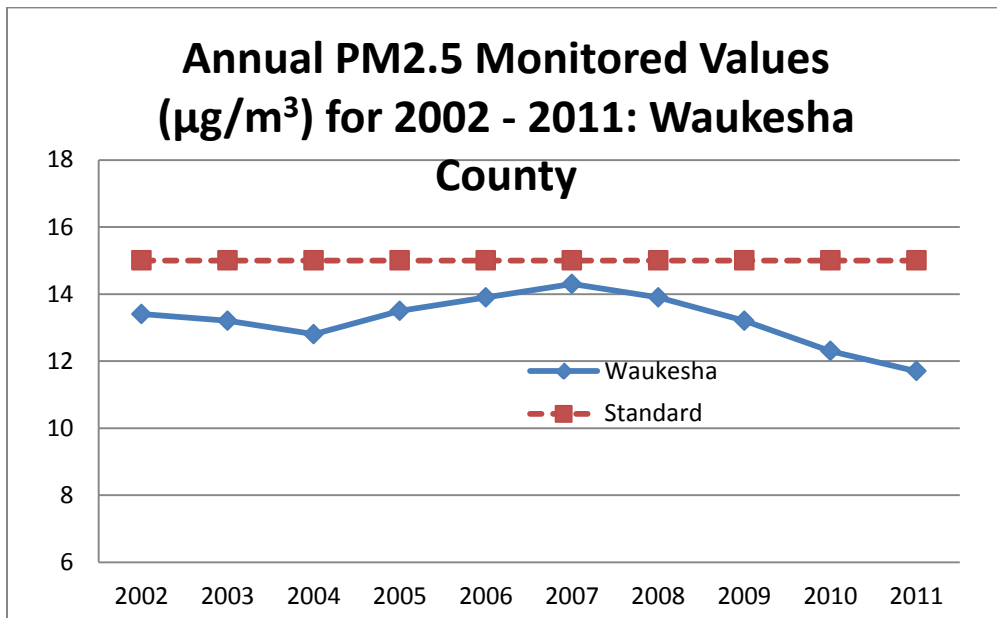
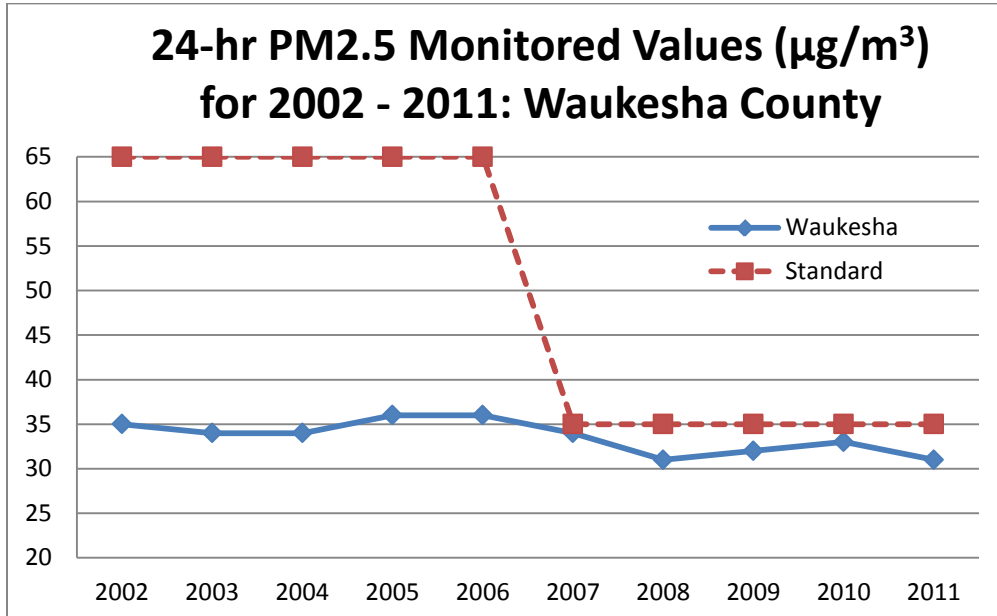
Ozone monitoring in Walworth County is done at a rural site on the outskirts of the City of Lake Geneva. The address for the site is Rural Route 4 Elgin Club Road.



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Waukesha County

PM_{2.5} and ozone monitoring in Waukesha County is done at 1310 Cleveland Avenue in a fenced-in area on a city lot. The Cleveland Ave. site began sampling for daily PM_{2.5} on January 22, 2004 and for ozone on April 29, 2004. Prior to these dates, sampling for ozone in Waukesha County was performed at a Carroll College site.



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