Air Quality in Minnesota: 2014

Data to support the Minnesota Smoke Management Plan

The Minnesota Smoke Management Plan (SMP) is designed to mitigate the nuisance and public safety hazards posed by prescribed fire and managed wildfire activities in the state of Minnesota. The SMP outlines guidance and best practices to limit smoke intrusions into populated areas, prevent deterioration of air quality and National Ambient Air Quality Standards (NAAQS) violations, and address visibility impacts in federal mandatory Class I areas.

This document summarizes air quality conditions across Minnesota for ozone, fine particles, and PM10 in 2014. In addition, this document summarizes days where air pollution levels exceed federal air quality standards. Each of these event days have been qualitatively evaluated to determine whether the exceedance was linked to prescribed or wild-fire events. In the future, to more accurately determine the impacts of fire activity on ambient air quality, the MPCA may perform a more detailed analysis on speciated particulate monitoring results.

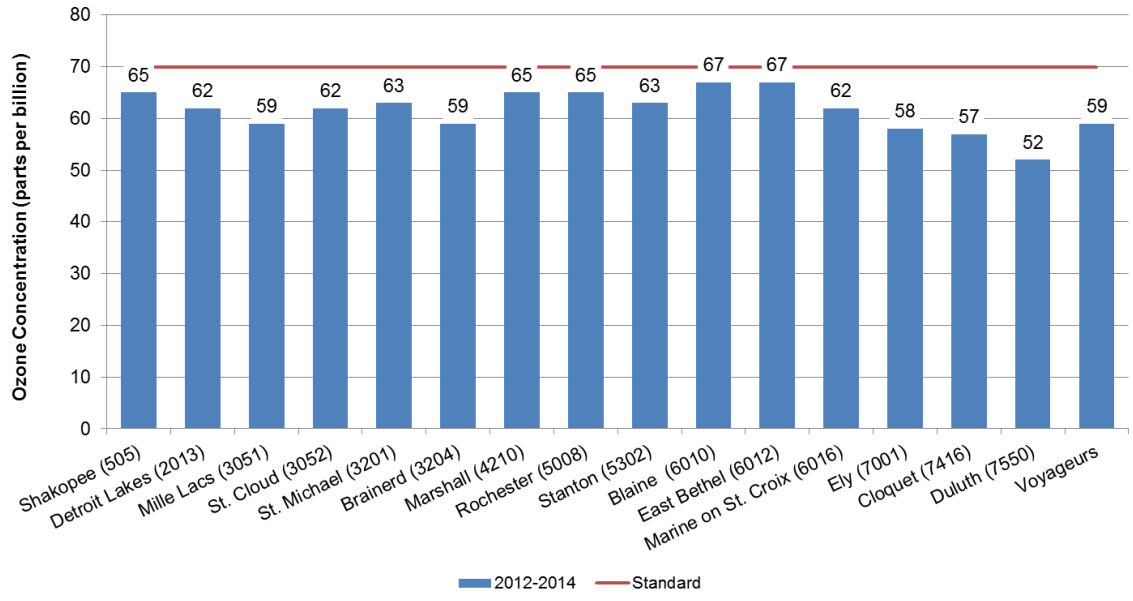
Ozone pollution in Minnesota

Ozone is an odorless, colorless gas composed of three atoms of oxygen. Ground-level ozone is not emitted directly into the air, but is created through a reaction of nitrogen oxides and volatile organic compounds in the presence of sunlight.

8-hour ozone standard

A monitoring site meets the 8-hour ozone standard if the three-year average of the fourth highest daily maximum 8-hour ozone concentration is less than or equal to 70 ppb. All monitoring sites in Minnesota meet the 8-hour ozone standard.

Ozone concentrations compared to the federal standard, 2012-2014



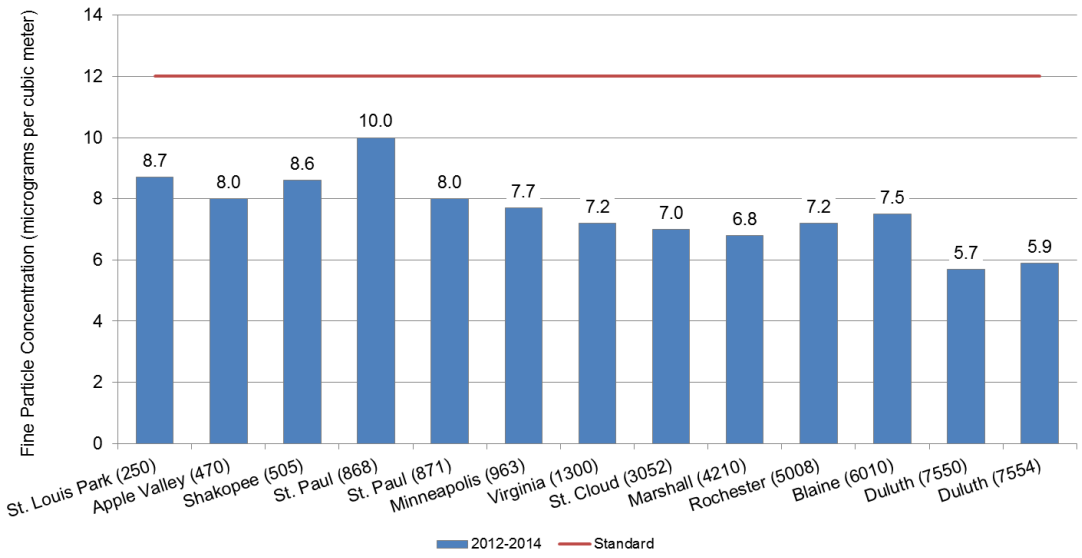
Fine particle ($PM_{2.5}$) pollution in Minnesota

Fine particles ($PM_{2.5}$) are a chemically and physically diverse mixture of different sizes of very small particles. Fine particles contain a complex mixture of chemicals including ammonia sulfate, ammonium nitrate, particle-bound water, elemental carbon, organic compounds, and inorganic material including soil and metals.

Annual fine particle standard

A monitoring site meets the annual fine particle standard if the three-year average of the annual average $PM_{2.5}$ concentration is less than or equal to 12 µg/m^3. All monitoring sites in Minnesota meet the annual fine particle standard.

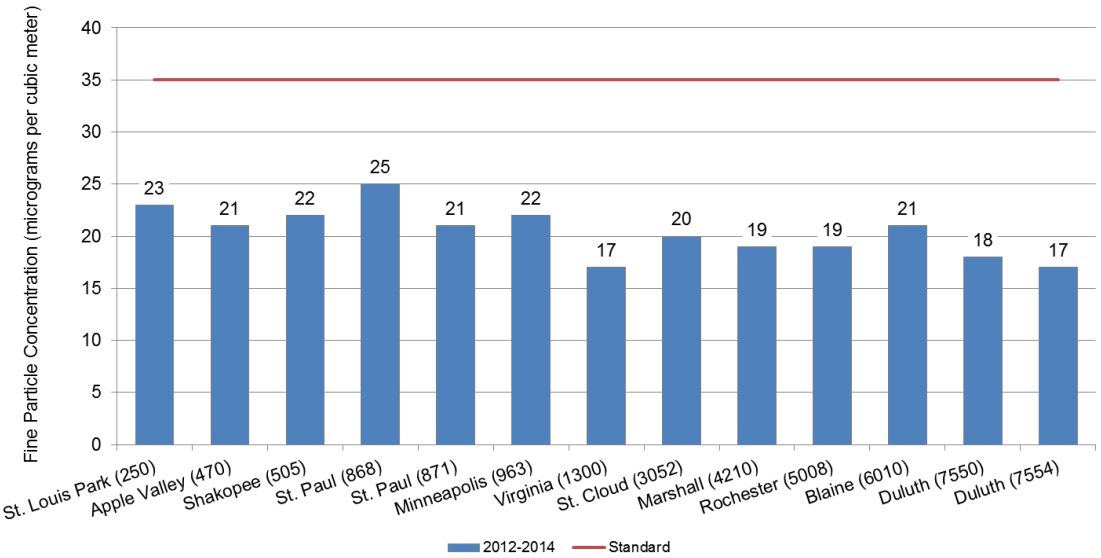
Annual average fine particle concentrations compared to the federal standard, 2012-2014



Daily fine particle standard

A monitoring site meets the daily fine particle standard if the three-year average of the annual 98th-percentile daily PM2.5 concentration is less than or equal to 35 µg/m^3. All monitoring sites in Minnesota meet the daily fine particle standard.

Daily (24-hour) fine particle concentrations compared to the federal standard, 2012-2014



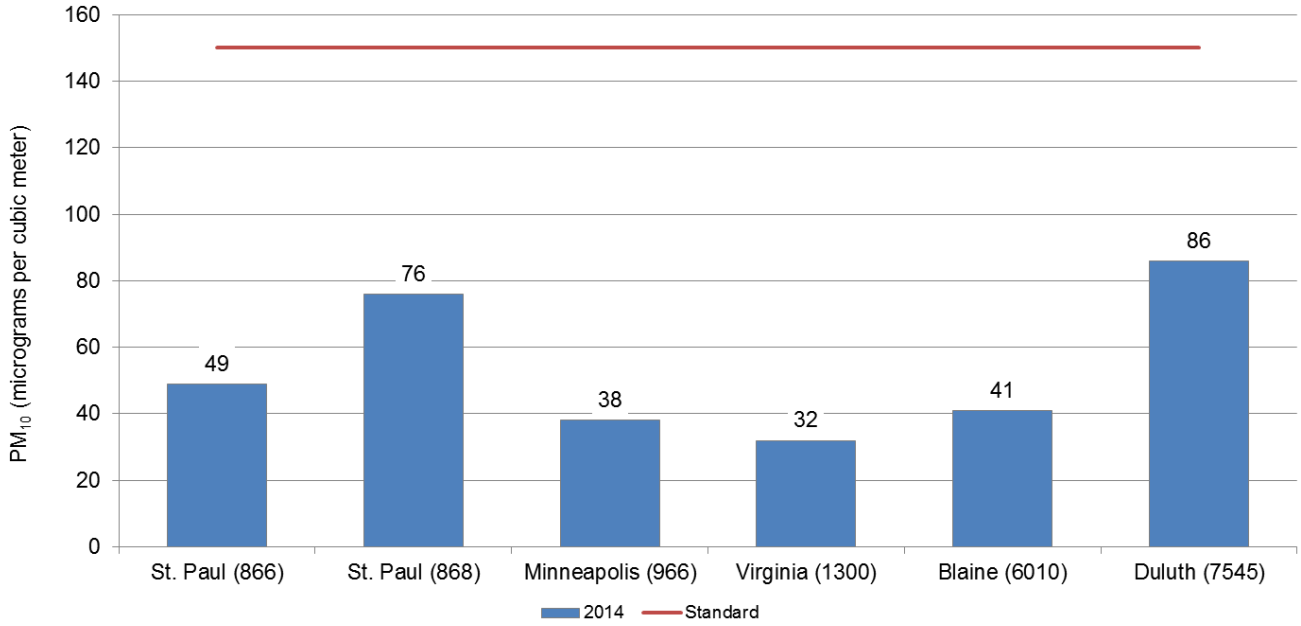
PM_{10} pollution in Minnesota

PM_{10} includes all particles with an aerodynamic diameter less than 10 microns.

Daily PM_{10} standard

A monitoring site meets the 24-hour PM_{10} standard when the average number of daily PM_{10} concentrations greater than 150 ug/m3 over three years is not greater than 1. To compare ambient PM_{10} concentrations to this standard, we compare the 2nd highest PM_{10} concentration measured each year to the level of the standard. Currently, all PM_{10} monitoring site in Minnesota meet the PM_{10} standard.

Annual second high daily (24-hour average) PM10 concentration compared to the level of the federal standard, 2014

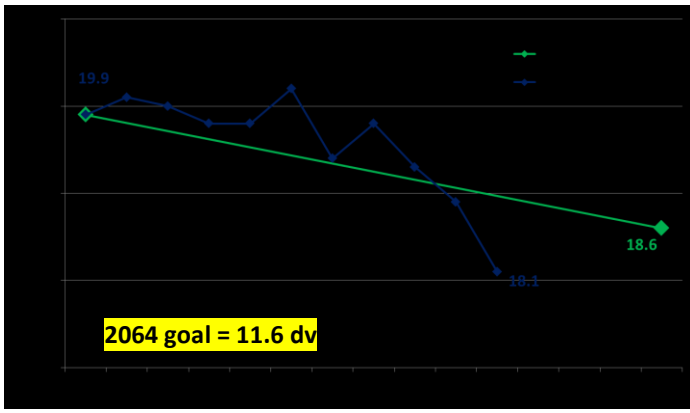


Progress towards meeting regional haze goals

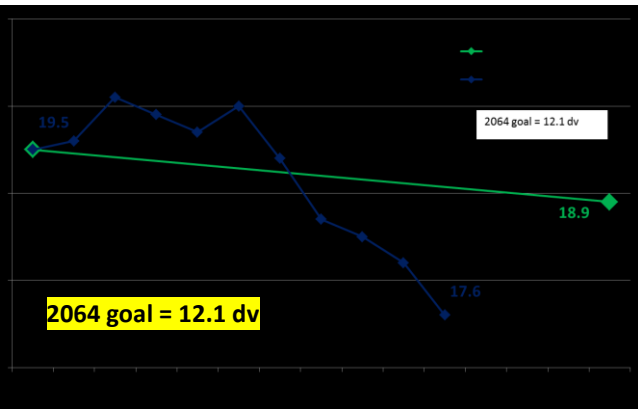
In 1999, EPA established a regulatory program to reduce haze caused by man-made air pollution at national parks and wilderness (Class I) areas. The goal of the regional haze rule is to achieve natural visibility conditions in Class I areas by 2064, with interim progress goals every 10 years. The first interim progress goal is established for 2018.

Both the Boundary Waters Canoe Area Wilderness and Voyageurs National Park are expected to meet the 2018 interim progress goal toward natural visibility conditions. Visibility improvements at the Boundary Waters were hampered in 2011 by the Pagami Creek wildfire, which burned 145 square miles of forest that year.

Boundary Waters Canoe Area Wilderness



Voyageurs National Park



Days with ambient monitoring results above the daily air quality standards

Days with daily maximum 8-hour ozone concentrations above 70 ppb

	Wright	Meteorological Description – Evidence of Fire Activity?
5/30/2014	75	An upper-level ridge of high pressure over Minnesota reduced atmospheric mixing and produced sunny skies and warm temperatures in the Twin Cities. These conditions enhanced ozone formation. In addition, moderate southeasterly winds transported pollutants into the region. The MNICS reported burn notification consolidated dataset has no records of prescribed or private burning upwind of the monitor on this date.

Days with daily average $PM_{2.5}$ concentrations above 35.4 µg/m³

	Lyon	Olmsted	Ramsey	Winona	Meteorological Description – Evidence of Fire Activity?
3/6/2014	39				Moderate southerly winds during the overnight and morning hours transported polluted air into the area, and moisture associated with fog and mist enhanced particle formation. In addition, a strong temperature inversion trapped pollutants near the surface. The MNICS reported burn notification consolidated dataset has no records of prescribed or private burning upwind of the monitor on this date.
3/7/2014		36		39	
12/19/2014			45		Monitor impacted by nearby boiler that malfunctioned. Not representative of ambient air quality. The MNICS reported burn notification consolidated dataset has no records of prescribed or private burning upwind of the monitor on this date.

Days with daily average PM_{10} concentrations above 150 µg/m³

All PM_{10} results in 2014 were below the 24-hour PM_{10} standard of 150 µg/m³.