Nebraska Air Quality 2014

Nebraska Department of Environmental Quality
Air Quality Division

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Acronyms

AQI	Air Quality Index
DCHD	Douglas County Health Department
EPA	United States Environmental Protection Agency
IMPROVE	Interagency Monitoring of PROtected Visual Environments
LLCHD	Lincoln-Lancaster County Health Department
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standard
NADP/NTN	National Atmospheric Deposition Program/National Trends Network
NAMS	National Air Monitoring Station
NCore	National Core Monitoring Network
NDEQ	Nebraska Department of Environmental Quality
NPS	National Park Service
OMB	Office of Management and Budget
OSHA	Occupational Safety & Health Administration
SLAMS	State/Local Air Monitoring Station

Pollutants

CO	Chemical abbreviation and molecular formula for carbon monoxide
NH_3	Chemical abbreviation and molecular formula for ammonia
$NO_{x/y}$	Chemical abbreviation for oxides of nitrogen
O_3	Chemical abbreviation and molecular formula for ozone
HAP	Hazardous Air Pollutant
$PM_{2.5}$	Particulate Matter with a maximum diameter of 2.5 microns
PM_{10}	Particulate Matter with a maximum diameter of 10 microns
SO_2	Chemical abbreviation and molecular formula for sulfur dioxide
TRS	Total Reduced Sulfur
VOC	Volatile Organic Compound

Measurement Units

ppm	Parts per million, a volume/volume concentration unit.
ppb	Parts per billion, a volume/volume concentration unit.
mg/m^3	Micrograms per Cubic Meter, a mass/volume concentration unit, where a milligram is one millionth of a gram.
mg/m^3	Milligrams per Cubic Meter, a mass/volume concentration unit, where a milligram is one thousandth of a gram.

Acknowledgments

Much of the data for this report comes from the sampling results obtained by the Nebraska Department of Environmental Quality, Douglas County Health Department, and the Lincoln-Lancaster County Health Department. All monitoring and analyses were conducted in accordance with U.S Environmental Protection Agency reference methods or equivalent methods. The quality assurance representatives responsible for the data collection in each agency conducting air quality monitoring are:

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Some of the monitors in the State's $PM_{2.5}$ network are operated by trained local contractors who collect the samples and mail them to NDEQ for analysis. Cost savings are realized by NDEQ through these contractors due to reduced travel costs and reduced time spent by department personnel to conduct the monitoring.

Copies of this report are available free of charge through the Public Information Office of the Nebraska Department of Environmental Quality. Contact by phone at (402) 471-4223 or via email at moreinfo@nebraska.gov.

The report is also available online at our website at http://deq.ne,.gov If after reviewing this material you have questions, please contact the Air Quality Division at (402) 471-2189, visit the NDEQ website at the web address above or send an email to ndeq.airquality@nebraska.gov

Purpose of this Report

The purpose of this report is to communicate to the public, in a clear and concise way, the state of the air quality throughout Nebraska. It is designed to communicate a large amount of data in a way that is easily accessible to most readers without including too many technical details. Those seeking a more technical evaluation of Nebraska's air quality and its network should review the State Network plan (see the link on page 8).

Ambient Air Monitoring

What is Ambient Air?

For the purposes of this program, ambient air is defined as that portion of the atmosphere, external to buildings, to which the general public has access. Areas within the fenced or restricted access boundaries of industrial facilities are generally not considered ambient air for the purposes of this program. Workplace (indoor) air pollution exposure is regulated by the Federal Occupational Health and Safety Administration (OSHA).

Who Conducts Ambient Air Monitoring?

Ambient air quality monitoring is performed in Nebraska by the Nebraska Department of Environmental Quality (NDEQ) with routine assistance from two local agencies: the Douglas County Health Department (DCHD) and the Lincoln-Lancaster County Health Department (LLCHD). The City of Omaha Air Quality Program also provides periodic assistance with air monitoring projects. The NDEQ ambient air monitoring program began in 1972.

Why Monitor Ambient Air?

Ambient air monitoring is conducted to evaluate compliance with State and National Ambient Air Standards, and to evaluate potential public health and welfare impacts related to air quality. Ambient air monitoring is required by the Federal Clean Air Act, which was established in 1970. If monitoring finds violations of the standards, ambient monitoring is used to help identify potential pollutant sources and to facilitate the development of control strategies to bring the impacted area back into compliance with the standards. Until an area is brought back into compliance it is said to be a “non-attainment” area.

Nebraska's Ambient Air Monitoring Network

The Network

The NDEQ, DCHD, and LLCHD currently operate eight different types of ambient air monitors at 26 sites throughout Nebraska. Some sites have more than one monitor bringing the total number of monitors operated by the three agencies to 30. Additionally, NDEQ operates additional monitors in concert with the US Forest Service and the Department of the Interior. These include two IMPROVE monitors, two atmospheric deposition monitors and one mercury monitor. The maps that follow indicate the locations and pollutants monitored in Nebraska. For more information on the pollutants see the *Pollutants* section of this report.

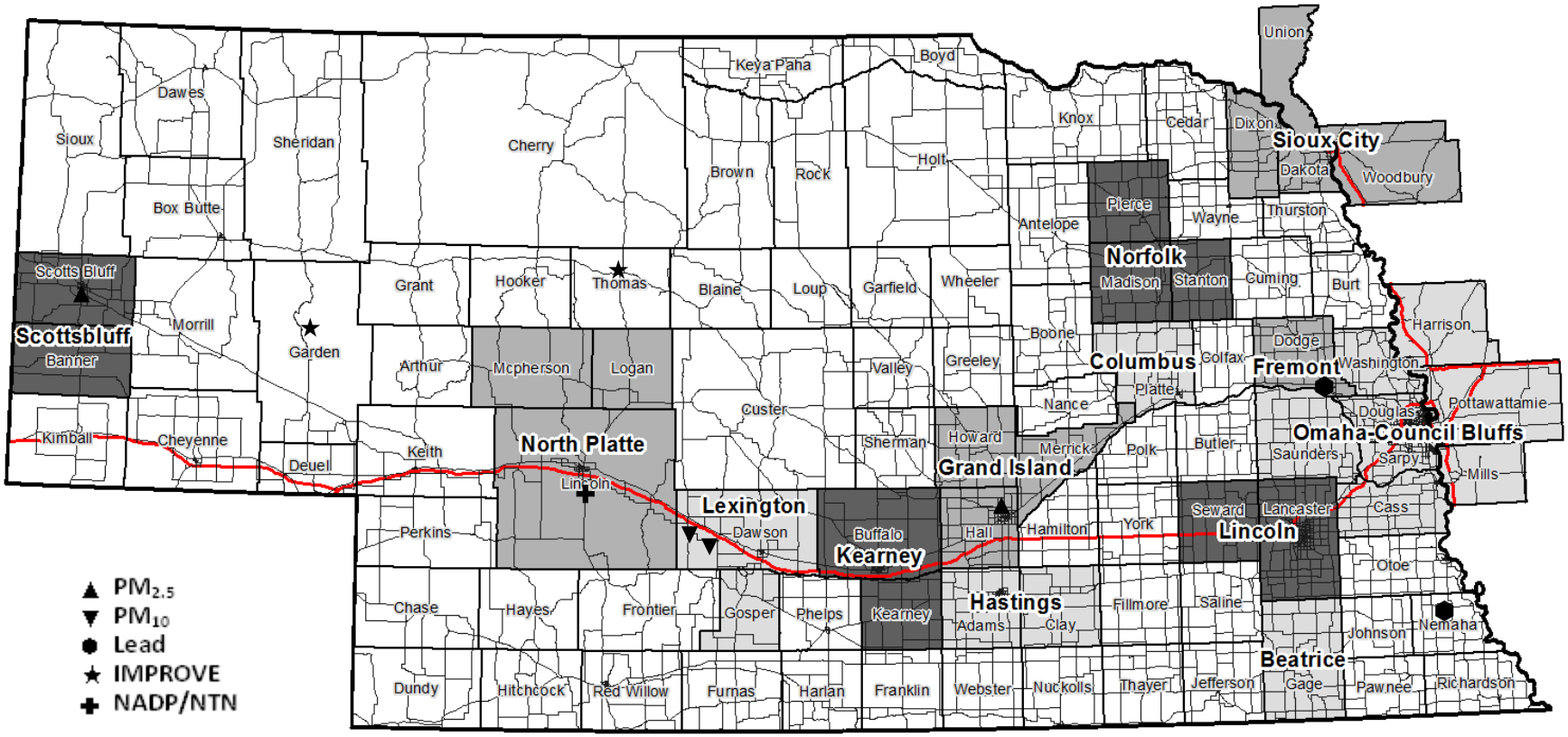
Beginning in 2007, the NDEQ was required to develop and submit an annual Network Plan for EPA review and approval. The annual Network Plan explains the purpose of all existing monitoring sites and proposes modifications to the ambient air monitoring network for the next year. Factors that can require network modifications include new pollutant sources, changing pollutant levels, new and improved monitoring technology, and monitoring-related site-specific factors (e.g., loss of a site lease or activity at a site that interferes with the monitoring equipment). The 2012-2014 Network Plans are available on the NDEQ web site at http://deq.ne.gov. Look for the "Publications & Forms" link, then navigate to "Ambient Air Quality Monitoring Program", then "Annual Reports".

AIRNow Network

In the spring of 2005, Nebraska became a part of the EPA's AIRNow Network. All 50 U.S. States, U.S. territories and Canada are a part of this network. AIRNow is a valuable tool, the primary use of which is to inform the public of the current environmental conditions. AIRNow is also used to predict environmental conditions several hours in the future. The primary pollutants reported to AIRNow are Ozone, $PM_{2.5}$, and PM_{10}. All of Nebraska's Ozone data, meteorological data, and most of the $PM_{2.5}$ and PM_{10} data from the continuous particulate monitors are reported to the AIRNow Network every hour of every day. The AIRNow website can be accessed at www.airnow.gov.

Photo courtesy of Jim Bunstock

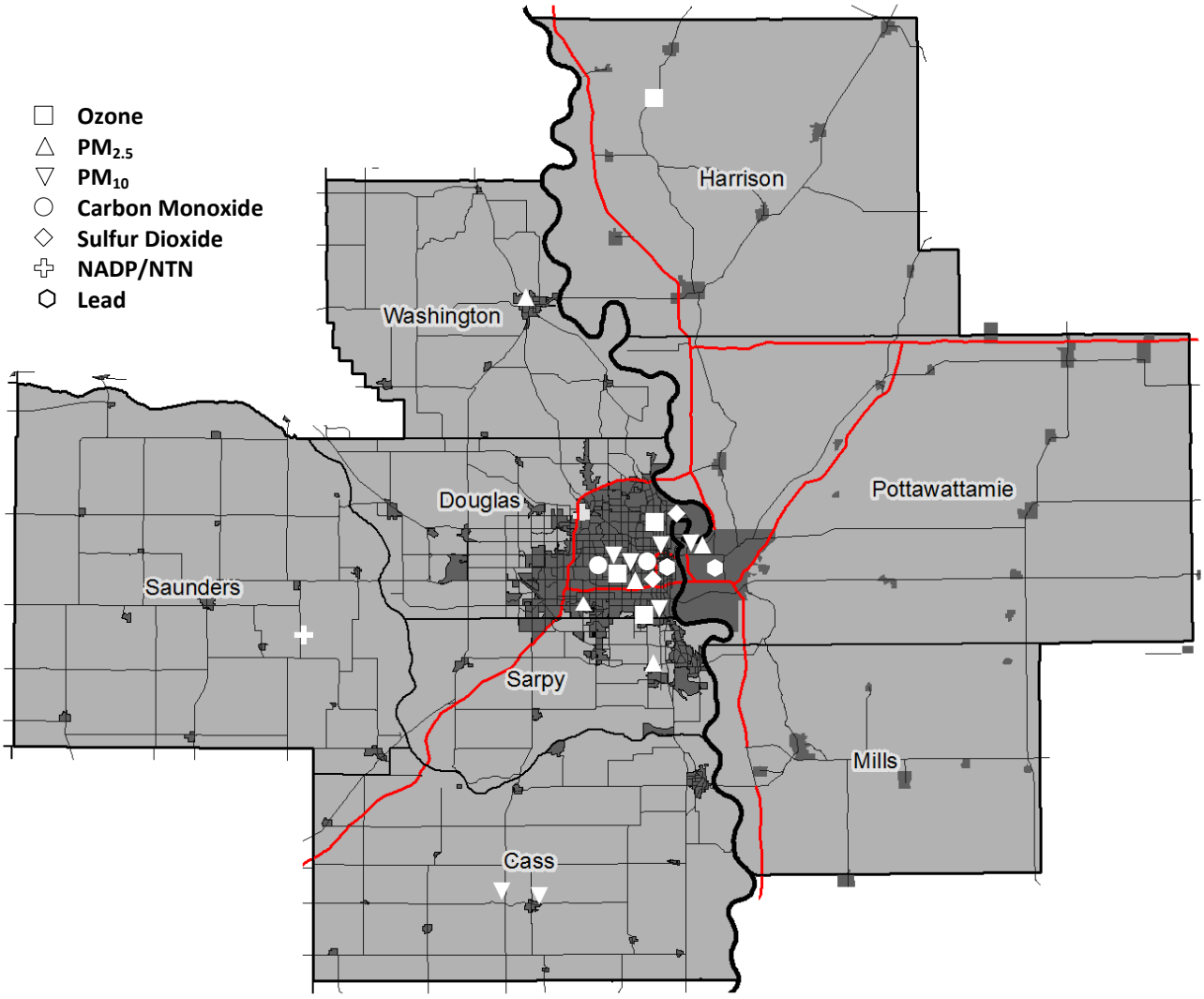
Greater Nebraska Monitor Locations and Metropolitan Statictical Areas



$PM_{2.5}$
Grand Island, 2124 North Lafayette Avenue
Scottsbluff, Highway 26 & 5th Avenue
PM_{10}
Cozad, 215 West 8th Street
Gothenburg, 9th Street
NADP/NTN
Maxwell, North Platte Agricultural Experiment Station

IMPROVE
Garden County, Crescent Lake Wildlife Refuge
Thomas County, Nebraska National Forest
Lead
Fremont
Aubum

Omaha-Council Bluffs Metropolitan Statistical Area Monitor Locations



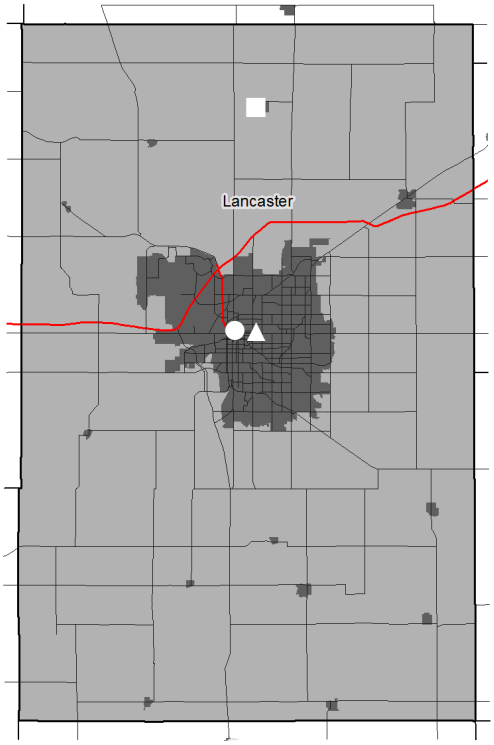
Carbon Monoxide
4102 Woolworth Avenue (NCore Trace Monitor)
7747 Dodge Street, Omaha
Sulfur Dioxide
4102 Woolworth Avenue (NCore Trace Monitor)
1616 Whitmore Street
NADP/NTN
Mead, Saunders County

$PM_{2.5}$
4102 Woolworth Avenue
9225 Berry Street
2912 Coffey Avenue (Bellevue, NE)
2242 Wright Street (Blair, NE)
3130 C Avenue (Council Bluffs, IA)
Ozone
4102 Woolworth Avenue
30th & Fort Streets
2411 O Street
1575 Highway 183 (Harrison County, IA)

PM_{10}
4102 Woolworth Avenue
19th & Burt Streets
46th & Farnam Streets
2411 O Street
102 P Street (Weeping Water, NE)
5102 Highway 2 (Weeping Water, NE)
3130 C Avenue (Council Bluffs, IA)
Lead
4102 Woolworth Avenue
8th Ave. & 27th St. (Council Bluffs, IA)

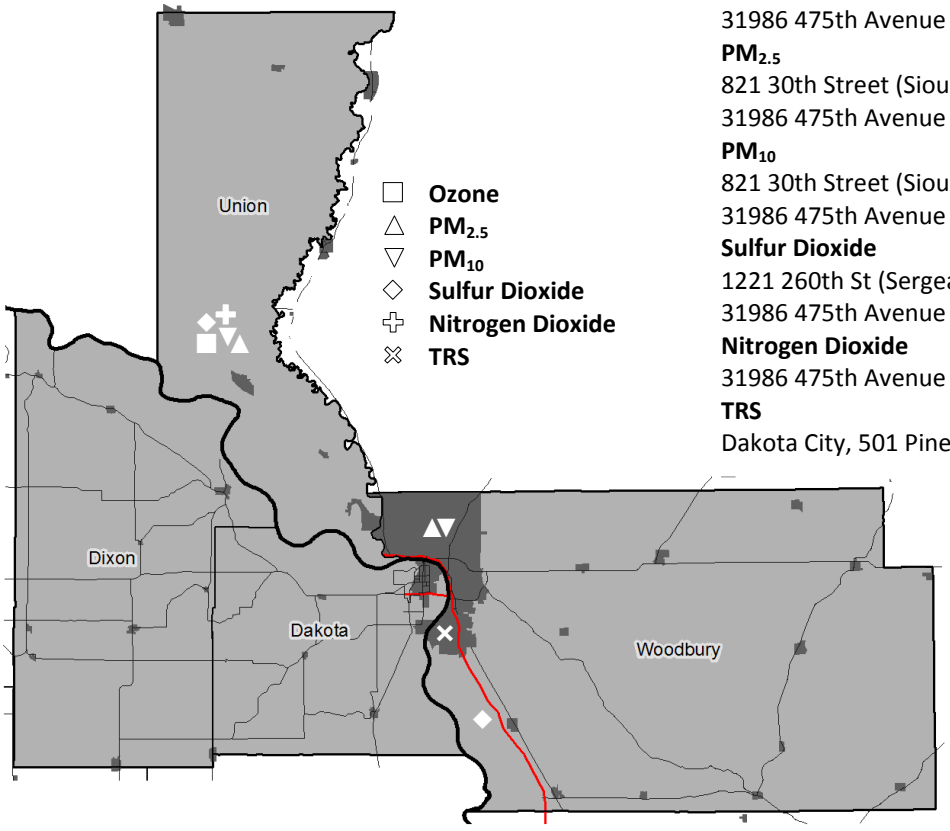
Lancaster County Monitoring Locations

☐ **Ozone**
△ **$PM_{2.5}$**
○ **Carbon Monoxide**



Carbon Monoxide
2620 O Street (discontinued, 2012)
Ozone
1st & Maple Street (Davey)
$PM_{2.5}$
3140 N Street

Sioux City Metropolitan Statistical Area Monitor Locations



☐ **Ozone**
△ **$PM_{2.5}$**
▽ **PM_{10}**
◇ **Sulfur Dioxide**
✚ **Nitrogen Dioxide**
⨯ **TRS**

Ozone
31986 475th Avenue (Union County, SD)
$PM_{2.5}$
821 30th Street (Sioux City, IA)
31986 475th Avenue (Union County, SD)
PM_{10}
821 30th Street (Sioux City, IA)
31986 475th Avenue (Union County, SD)
Sulfur Dioxide
1221 260th St (Sergeant Bluff, IA)
31986 475th Avenue (Union County, SD)
Nitrogen Dioxide
31986 475th Avenue (Union County, SD)
TRS
Dakota City, 501 Pine Street

The Air Quality Index (AQI)

The Air Quality Index (AQI) was developed by the EPA to provide accurate, timely and easily understandable information about daily levels of air pollution. All metropolitan areas with a population greater than 350,000 are required to report the AQI daily. The AQI provides citizens with information on the general health effects associated with different pollution levels. The six AQI categories are described below. Each category has been assigned a specific color to aid citizen recognition (Table 1).

Table 1: Air Quality Index Categories

Index Number	Air Quality Condition	Color
0-50	Good	Green
51-100	Moderate	Yellow
101-150	Unhealthy for sensitive groups	Orange
150-200	Unhealthy	Red
201-300	Very unhealthy	Purple
301-500	Hazardous	Maroon

The AQI level is reported on a scale of 0-500. An AQI level at or below 100 indicates that a pollutant is in a satisfactory health range. AQI levels greater than 100 mean that a pollutant is in an unsatisfactory health range. The AQI is derived from the concentrations of six major pollutants: CO, O_3, SO_2, NO_2, $PM_{2.5}$ and PM_{10}. Each day a sub-index is calculated for each pollutant. The highest sub-index of the five pollutants is reported as the AQI for that day. For example, in Table 2 below, sulfur dioxide had the highest sub-index on 16 days in 2014. Omaha is the only metropolitan area in Nebraska that is required to report AQI information on a daily basis. The current day's AQI and air quality forecast can be found on the Douglas County web site at www.douglascountyhealth.com. Although not required, the City of Lincoln also reports its AQI which can be found at www.lincoln.ne.gov/city/health/environ/pollu/aqi.htm. More information on the AQI is available on the EPA's website at www.airnow.gov/index.cfm?action=aqibasics.aqi.

Table 2: Omaha Metropolitan Area: 2014 Air Quality Index

Number of Days when Air Quality Was:		Pollutant	Number of Days Used as AQI
Good	228	Carbon Monoxide	0
Moderate	134	Ozone	103
Unhealthy for Sensitive Groups	3	Sulfur Dioxide	16
Unhealthy	0	Nitrogen Dioxide	0
Very Unhealthy	0	Particulates ($PM_{2.5}$)	172
Hazardous	0	Particulates (PM_{10})	74
Total	**365**	**Total**	**365**

Omaha Metropolitan Statistical Area

Omaha and its surrounding communities comprise the largest metropolitan area in the State. The Omaha MSA is home to over 885,000 people and consists of five Nebraska counties and three Iowa counties (see map on page 10). It includes the cities of Omaha, Council Buffs, Iowa, and a number of other smaller towns and cities. Throughout 2014, there were 21 monitoring sites located in the Omaha MSA, many with multiple monitors.

Many of these monitors were discontinued in preparation for redistribution to the Omaha NCore site (see page 13) which became operational in January of 2011. Due to its size, Omaha was identified as a candidate city for the NCore network. NCore is a multi-pollutant network that integrates several advanced measurement systems for particles, pollutant gases and meteorology. EPA coordinates with its state and local authorities who operate the NCore sites.

Many of these monitors are maintained and operated by the Douglas County Health Department, but the NDEQ, the University of Iowa Hygienics Laboratory, and the National Atmospheric Deposition Program also operate some monitors outside of Douglas and Sarpy counties. See Table 5 for a list of these monitors and refer to the map on page 10 for site locations.

Table 3: Omaha MSA Monitoring Sites

Pollutant	No. of Sites
O_3	4 (1 in Iowa)
$PM_{2.5}$	5 (1 in Iowa)
PM_{10}	5 (1 in Iowa)
CO	2
SO_2	2
NOx/y	1
Lead	1
NADP/NTN	1

The PM_{10} monitor at 46th & Farnam recorded one exceedance in 2011. This monitor is source-oriented and is located within 150 to 200 ft of the production areas at Omaha Steel Castings Company. In 2012 Omaha Steel announced a plan to relocate their plant to Wahoo, NE. The move was completed in the summer of 2014.

Another area of concern for the Omaha MSA is the new ozone standard that became effective in March 2008. The revision decreased the standard from 0.080 ppm to 0.075 ppm. As with the revised $PM_{2.5}$ standard of 2006, this puts Omaha's ozone measurements much closer to the new standard (see page 18). EPA has since announced plans to further reconsider revisions to the ozone standard. These revisions are expected to be finalized by October 2015.

Photo courtesy of Jim Bunstock

Lincoln

Lincoln is the second largest metropolitan area in the State. The Lincoln MSA, which includes Seward, is home to approximately 300,000 people. There are two monitoring sites located either in or near Lincoln. All of these monitors are maintained and operated by the Lincoln-Lancaster County Health Department. See Table 6 for a list of these monitors and refer to the map on page 11 for site locations. The ozone site is located in Davey, which is approximately 5 miles north of Lincoln. This location was chosen because ozone typically forms in the atmosphere downwind of large cities and industrial areas. For more information on ozone formation see page 30.

Table 4: Lincoln Monitoring Sites

Pollutant	No. of Sites
O_3	1
$PM_{2.5}$	1

The ambient monitoring conducted in 2014 demonstrates that Lincoln's air quality is well within the limits established in the NAAQS. This is consistent with trends over the last several years. Lincoln's CO monitor was discontinued in 2012 for multiple reasons: measured values were well below the standard; the site location changed ownership; other logistical and budgetary reasons. The pollutant-specific sections of this report provide quantitative data on the pollutant levels detected.

Weeping Water

Weeping Water is a community of about 1000 citizens situated in central Cass County. Although contained within the Omaha MSA, its air quality is more heavily influenced by local sources than by those common to large cities. Air quality monitors in the Weeping Water area, which has a high concentration of limestone quarries and trucking operations, have measured high levels of particulate matter several times since the NDEQ started local monitoring in 1985. NDEQ currently operates three PM_{10} monitors and one suite of meteorological instruments in and near Weeping Water. See Table 7 for a list of these monitors and refer to the map on page 10 for site locations.

Weeping Water experienced four exceedances in October and November of 2010 and one in January of 2012. All were recorded at the Lauritzen farm site, just west of highway 50. The source of the problem was suspected to be an unusually large stockpile of fine lime dust that the source was unable to sell. The size of the pile in conjunction with high winds moving in the direction of the monitor is thought to have led to the exceedances. The pile has since been removed, and as of the end of 2013, only one other exceedance was recorded.

Table 5: Weeping Water Monitoring Sites

Pollutant	No. of Sites
PM_{10}	2
Meteorological	1

NDEQ Title 129, Chapter 21 contains regulations that apply to limestone processing facilities in the Weeping Water area that were originally developed to prevent the PM_{10} NAAQS from being exceeded. In addition, NDEQ staff and representatives from industry, local government, and other state agencies have been working to develop and implement a plan to improve the air quality in and around Weeping Water.

Sioux City Metropolitan Statistical Area

The total reduced sulfur (TRS) monitor located in Dakota City indicates a marked reduction in TRS levels since 2000: the 30-minute TRS standard has not been exceeded since 2010. The reduction seen since 2000 is attributed at least in part to the installation of air pollution controls on an anaerobic lagoon in the area. See Table 9 for a list of monitors in this MSA and refer to the map on page 11 for site locations.

Table 6: Sioux City MSA Monitoring Sites

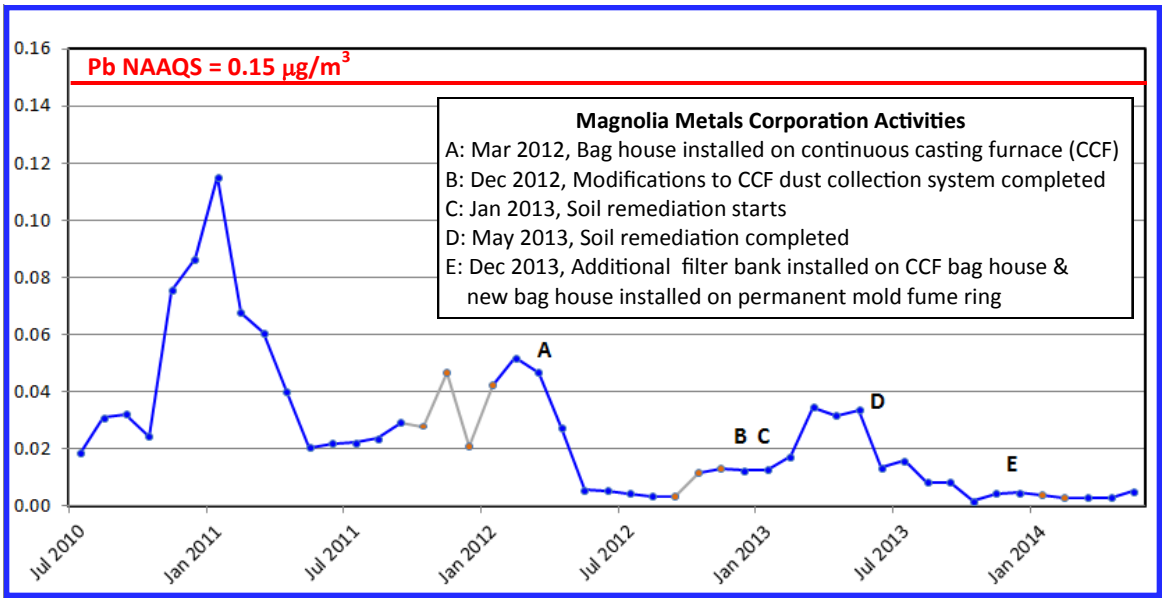
Pollutant	No. of Sites
$PM_{2.5}$	1 (in Iowa)
PM_{10}	1 (in Iowa)
TRS	1

This area of the State has several remaining potential TRS sources including sources on the Iowa side of the Missouri River. Some local governments have initiated hydrogen sulfide monitoring programs (hydrogen sulfide, or H_2S, is a component of TRS). Such programs cannot determine compliance with the State TRS standard, but may provide information helpful in identifying local source contributions. The Dakota City site will remain in place for the foreseeable future due since TRS levels are still near the standard (see page 25).

Fremont and Auburn

In order to meet the new lead standards created by EPA in 2008, two lead monitors were established in Fremont and Auburn in early 2010. These locations were selected due to the existence of industries in those areas whose lead emissions exceeded one ton per year. Auburn hosts one sampler and Fremont hosts two samplers: one primary sampler for official data reporting and one collocated sampler which is used for quality assurance purposes.

It is anticipated that the Auburn sampler may be terminated sometime in 2015 due to a marked reduction in emissions from the nearby Magnolia Metals foundry. As emission controls were added over the years there was a direct correlation to the decline of emissions (see graph below). Monitoring results at Fremont are high enough to justify continued monitoring there (see page 23).



Cozad and Gothenburg

PM_{10} monitors are located in both of these cities to address grain and feed processing sources in the area, including alfalfa processing. The monitors have found that the areas were in compliance with both the 24-hour and annual average standards. Monitoring over the last several years has indicated that the maximum 24-hour readings at both these sites is approaching the annual standard. It is important for local sources to diligently maintain and operate particulate emissions controls.

Evolving Ozone

The federal ozone standard has perhaps changed more than any other national air quality standard over the past decade. Years ago, a one-hour primary standard of 120 ppb was in place. Later, the one-hour standard was dropped in favor of an eight-hour standard averaged over three years. This eight-hour standard was set at 80 ppb and was further reduced to 75 ppb in 2008.

The Clean Air Science Advisory Board (CASAC), who makes recommendations to EPA regarding air quality regulation, has recommended lowering both the primary (protective of human health) and secondary (protective of welfare—in this case plants and crops) ozone standards even further. EPA is reviewing the 2008 standard and may consider lowering both standards to somewhere in the range of 65-70 ppb, although they are seeking comment on a primary standard as low as 60 ppb. EPA is under a court-ordered schedule to issue a final decision by October 1st, 2015.

NDEQ and other partners monitor for ozone from April through October of every year. Monitors are located in the Omaha area and across the border in Iowa. Even if an Iowa monitor that is located in the Omaha MSA (see page 11) records an exceedance, the entire Omaha MSA could be affected and it would become necessary to identify industry and other sources located there that could be contributing to elevated levels.

National Park Service Monitors

As part of the Northern Great Plains Monitoring Program the National Park Service (NPS) operated a portable ozone monitor at the Agate Fossil Bed National Monument in Sioux County from 2007 through 2009. The monitor was moved to the Scottsbluff National Monument in 2010 and remained there through 2012, after which time it was removed and the program ended. The primary focus of this monitor was to evaluate potential impacts on vegetation from ozone exposure and, unlike other urban ozone monitors, the National Park monitors operated year-round.

Ozone (O_3)

What is Ozone?
Ozone is a gas created by chemical reactions in the atmosphere. It is formed in the presence of sunlight from two other airborne pollutants : nitrogen oxides (NO_x) and volatile organic compounds (VOCs).

When is Ozone Data Collected?
In Nebraska, ozone data is collected from April 1st to October 31st. This is the time of year when there is more sunlight each day and higher temperatures, both of which are more conducive to ozone formation.

Health Effects
Ozone irritates mucous membranes in the respiratory system and can cause coughing, choking, impaired lung function, and reduced resistance to colds and diseases such as pneumonia.

What are the Sources of Ozone?
Ozone is not directly emitted by any manmade sources; however, the compounds mentioned above that can form ozone (called ozone precursors) are emitted by vehicles and industrial smokestacks.

O_3 at a glance...

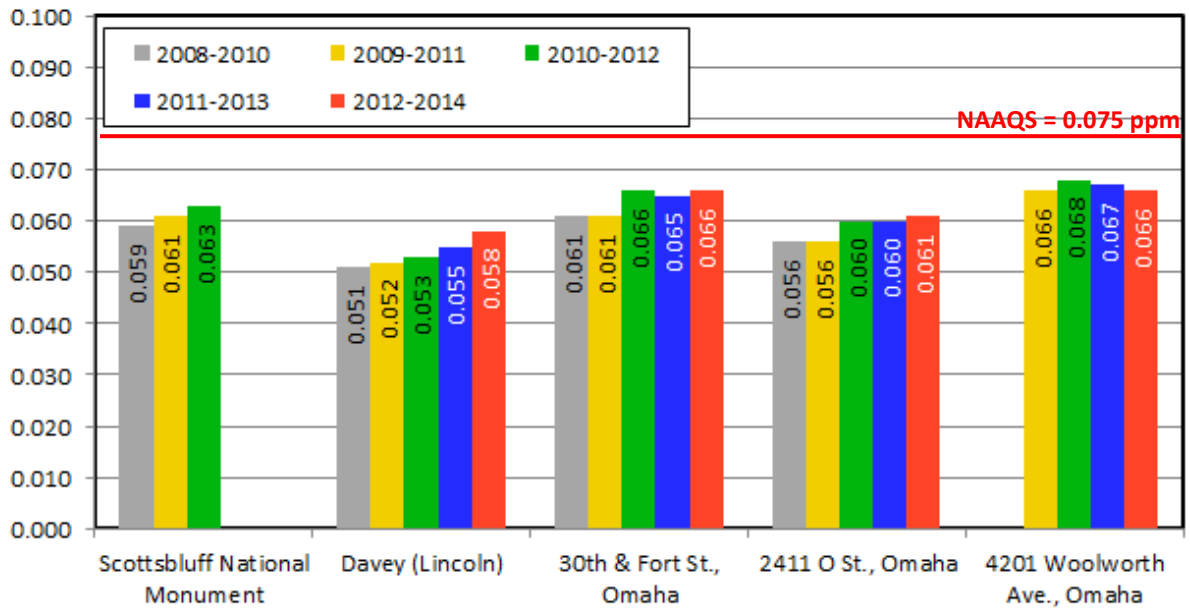
Where is Ozone Data Collected?
- 30th & Fort St., Omaha
- 2411 'O' St., Omaha
- 4102 Woolworth Ave., Omaha
- Davey (5 miles north of Lincoln)
- Highway 183 (Harrison County, IA)*
- Scottsbluff National Monument (discontinued, 2012)

(see maps on pages 11 & 12)

Welfare Effects
Prolonged exposure can damage many varieties of vegetation. It can cause decreased yields for commercial crops, forests, and urban ornamental plants. It can also make sensitive plants more susceptible to disease and harsh weather.

NAAQS
The 3-year average of the 4th highest 8-hour average concentrations must be less than or equal to **0.075 ppm**. For example, to compute the average at a site for 2013, average the 4th highest 8-hour average concentrations from 2011, 2012 and 2013. See page 17 for more information on the changing ozone standard.

Ozone: Three-Year Average of 4th Highest 8-Hour Averages



Source: DCHD, LLCHD, NPS

*Visit www.iowadnr.gov/air/prof/monitor/monitor.html to view Iowa's air quality data.

Particulate Matter Less than 2.5 Microns in Diameter ($PM_{2.5}$)

What is $PM_{2.5}$?
$PM_{2.5}$ is solid matter or liquid droplets that are carried in the ambient air. Due to their small size they can be carried much higher and farther than larger particles such as PM_{10}.

What are the Sources of $PM_{2.5}$?
$PM_{2.5}$ originates as particles from emission sources and it is also formed in the atmosphere from the reaction and coalescence of other pollutants.

$PM_{2.5}$ at a glance...

Welfare Effects
$PM_{2.5}$ can corrode metals, dirty buildings and impair visibility.

Health Effects
Because of its microscopic size, $PM_{2.5}$ can get past the body's natural differences such as the mucous membranes in the nose and throat. $PM_{2.5}$ can carry heavy metals and cancer-causing organic compounds into the deepest, most susceptible parts of the lungs and in some instances even into the bloodstream. $PM_{2.5}$ has been linked to irregular heartbeat, nonfatal heart attacks and premature deaths in people with heart or lung disease. When inhaled in combination with other pollutants $PM_{2.5}$ can increase incidence and severity of respiratory diseases.

Where is $PM_{2.5}$ Data Collected?
- Omaha (2 sites)
- Council Bluffs, IA (2 sites)*
- Sioux City, IA*
- Bellevue
- Blair
- Lincoln
- Grand Island
- Scottsbluff

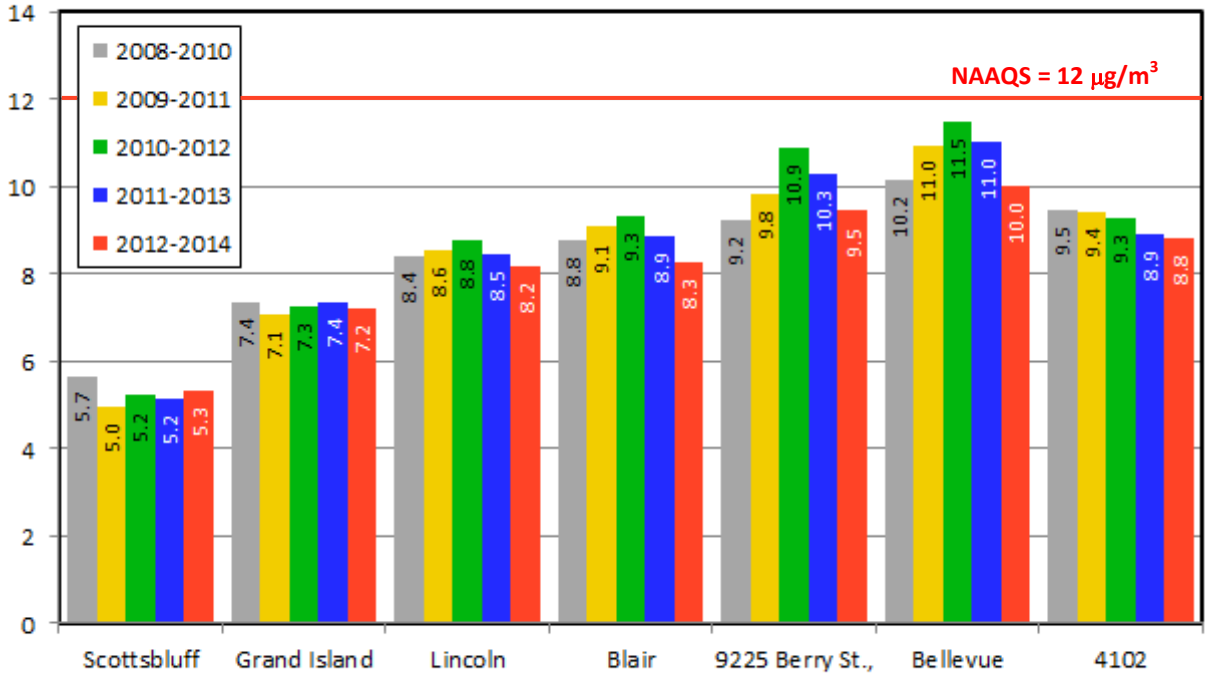
(see maps on pages 10-12)

NAAQS

Annual Standard: The average of three consecutive years must be less than or equal to **12 µg/m^3**.

24-Hour Standard: The 98th percentile 24-hour value must be less than or equal to **35 µg/m^3**. The 98th percentile value is the value below which 98% of the samples fall. In other words, 98% of all samples collected at a monitor must be less than or equal to 35 µg/m^3.

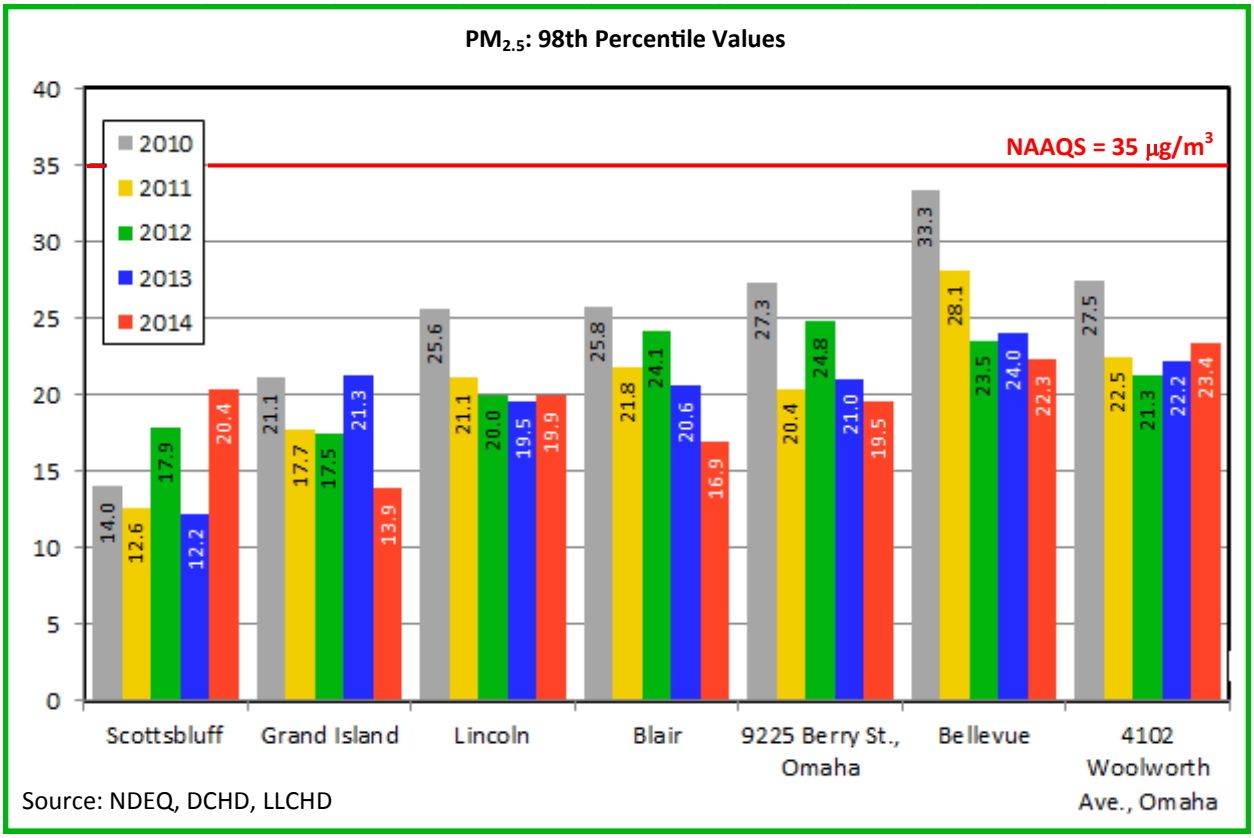
$PM_{2.5}$: Three-Year Average Concentrations



Source: NDEQ, DCHD, LLCHD

*Visit www.iowadnr.gov/air/prof/monitor/monitor.html to view Iowa's air quality data.

$PM_{2.5}$ (continued)



Source: NDEQ, DCHD, LLCHD

Particulate Matter Less than 10 Microns in Diameter (PM_{10})

What is PM_{10}?
PM_{10} is solid matter or liquid droplets that are carried in the ambient air.

PM_{10} at a glance...

Health Effects
PM_{10} can carry heavy metals as well as cancer-causing organic compounds into the deepest, most susceptible parts of the lungs. When inhaled in combination with other pollutants PM_{10} can increase incidence and severity of respiratory diseases.

Welfare Effects
PM_{10} can corrode metals, dirty buildings and impair vision.

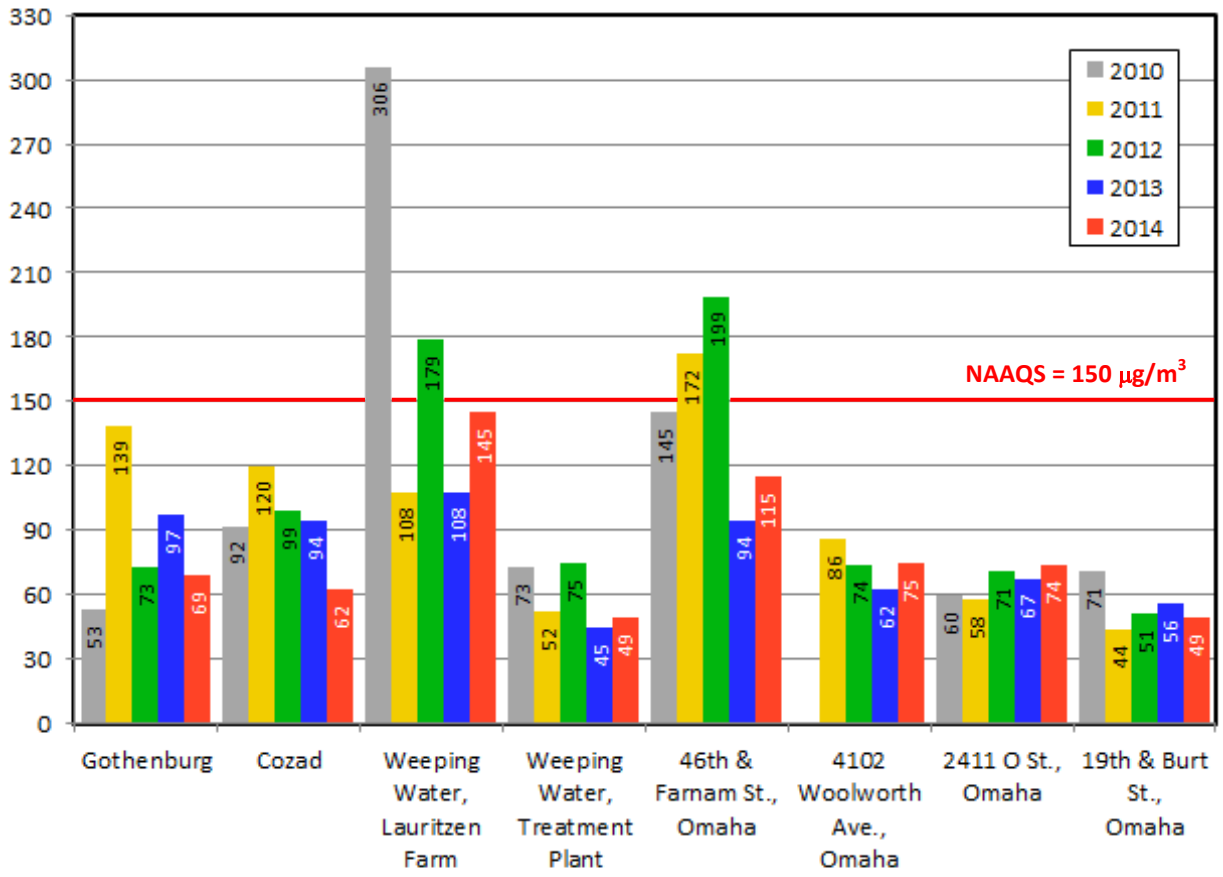
What are the Sources of PM_{10}?
PM_{10} is emitted by natural, largely uncontrollable sources such as wind-blown dust and fires. PM_{10} is also emitted by industrial, agricultural and mobile sources.

Where is PM_{10} Data Collected?
- Omaha (4 sites)
- Council Bluffs, IA*
- Sioux City, IA*
- Weeping Water (2sites)
- Cozad
- Gothenburg

(see map on pages 10-12)

NAAQS
24-hour Standard: Four or more 24-hour averages above **150 µg/m^3** at a site during a 3-year period is an exceedance of the standard.
Note: this means that the three highest values in the chart below are not exceedances even though they are in excess of 150 µg/m^3. They are only singular occurrences at each site.

PM_{10}: Maximum 24-hour Concentrations



Source: NDEQ, DCHD
*Visit www.iowadnr.gov/air/prof/monitor/monitor.html to view Iowa's air quality data.

Carbon Monoxide (CO)

What is Carbon Monoxide?
Carbon monoxide is a colorless, odorless gas formed as a result of the incomplete combustion of petroleum fuels.

Welfare Effects
Carbon monoxide can cause damage to buildings and crops.

CO at a glance...

Where is Carbon Monoxide Data Collected?
- 7747 Dodge Street, Omaha
- 4102 Woolworth Ave., Omaha
- 2620 O St., Lincoln (discontinued, 2012)

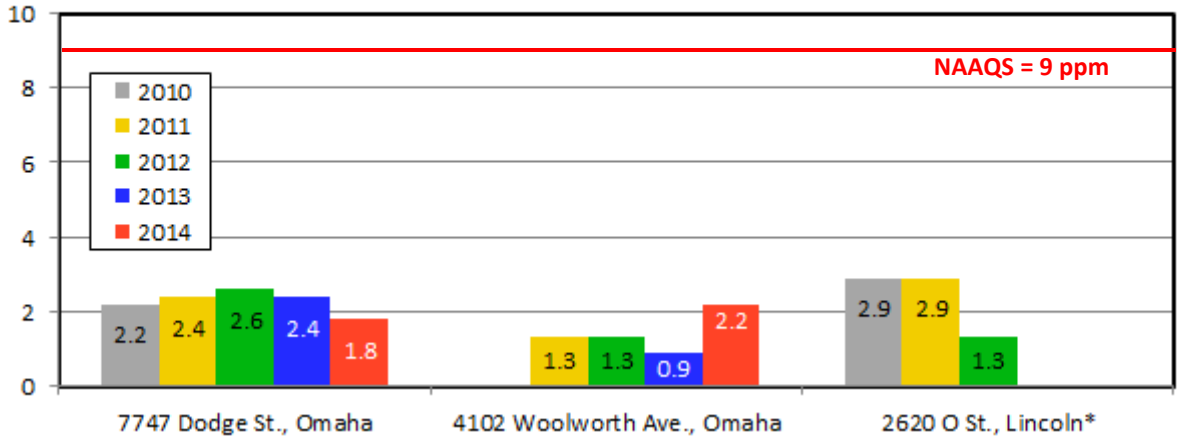
(see maps on pages 11 & 12)

Health Effects
Carbon monoxide interferes with the body's ability to absorb oxygen, thus impairing perception and thinking, slowing reflexes and causing drowsiness. Prolonged exposure to high levels of CO can cause unconsciousness and even death. Long-term exposure is suspected of aggravating arteriosclerosis.

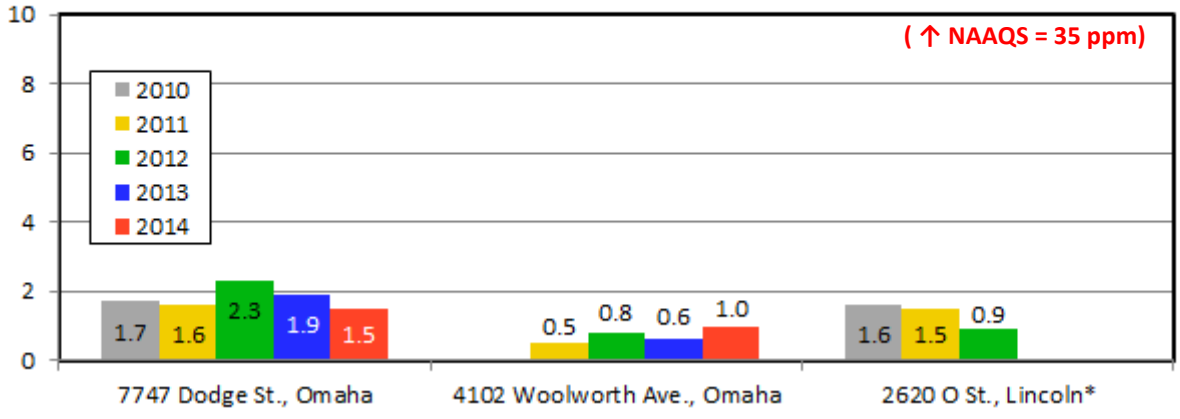
What Are the Sources of CO?
Carbon monoxide is found in motor vehicle exhaust. It is also emitted by industrial processes, power plants, woodstoves, forest fires and kerosene space heaters.

NAAQS
35 ppm (40 mg/m^3) as a maximum 1-hour concentration not to be exceeded more than once per year
9 ppm (10 mg/m^3) as a maximum 8-hour concentration not to be exceeded more than once per year

Carbon Monoxide: Second-Highest 1-Hour Averages



Carbon Monoxide: Second-Highest 8-Hour Averages



Source: DCHD, LLCHD

Sulfur Dioxide (SO_2)

What is Sulfur Dioxide?
Sulfur dioxide is a gas that is generated during the combustion of sulfur-containing fuels such as coal.

What Are the Sources of SO_2?
Sulfur dioxide is emitted primarily by large electrical generating stations, industrial boilers, and other industrial combustion sources.

Welfare Effects
In high concentrations, sulfur dioxide is toxic to plant life. It can destroy paint pigments, erode statues, corrode metals and harm textiles. It also contributes to acid rain.

Health Effects
Sulfur dioxide aggravates heart and lung disease symptoms; and increases incidence of coughs, colds, and acute respiratory diseases such as asthma, bronchitis, and emphysema.

Where is Sulfur Dioxide Data Collected?
- 1616 Whitmore, Omaha
- 4102 Woolworth Ave., Omaha
- Council Bluffs, IA*

(see map on page 11)

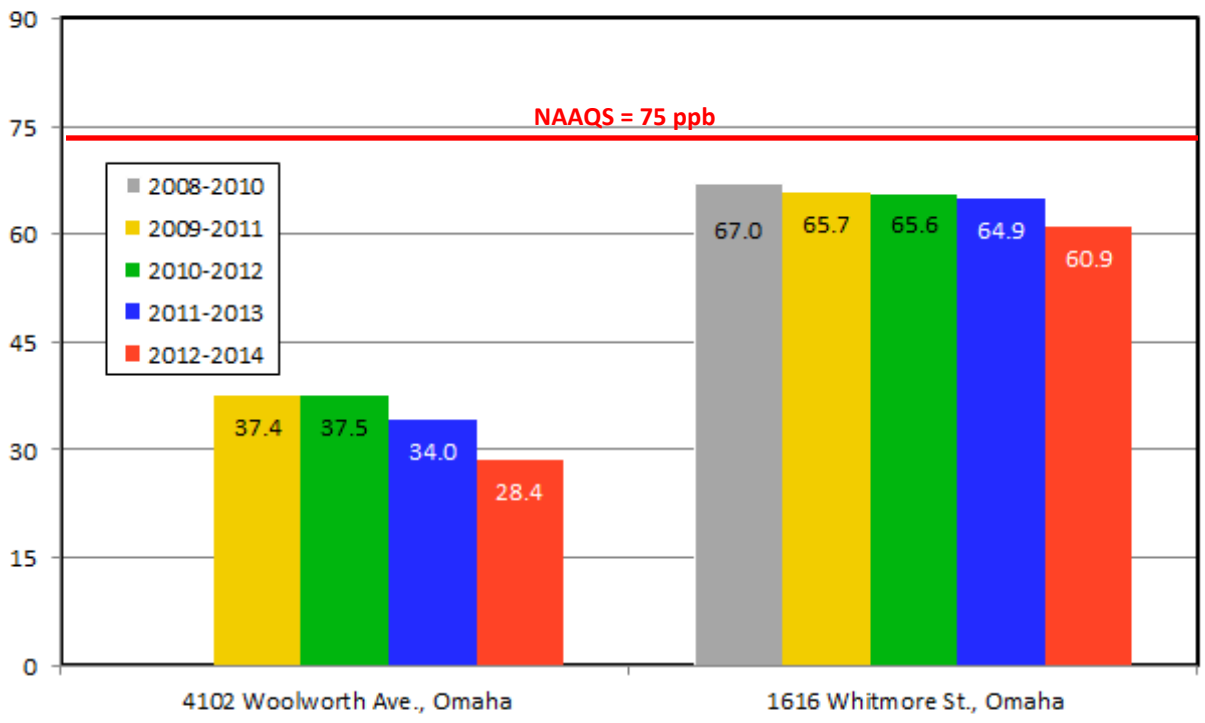
SO_2 at a glance...

NAAQS

1-Hour Standard: The three-year average of the 99th percentile 1-hour averages must be less than or equal to **75 ppb**. The 99th percentile value is the value below which 99% of the 1-hour samples fall. In other words, 99% of all samples collected at a monitor must be less than or equal to 75 ppb .

Due to the change in the SO_2 standard that occurred in mid-2010, data for the annual primary standards and secondary standard is no longer used. Thus, the values indicated for the 2007-2009 averages are not considered exceedances since a different standard was in effect during the time that those values were measured.

Sulfur Dioxide: Three-Year Averages of 99th Percentile Values



Source: DCHD
*Visit www.iowadnr.gov/air/prof/monitor/monitor.html to view Iowa's air quality data.

Lead (Pb)

What is Lead?
Lead is a highly toxic metal that can be found in particulate matter.

Health Effects
Lead affects blood formation, the reproductive system and kidney functions. It can accumulate in bone and other tissues posing a cumulative health hazard long after exposure has ended. Children are particularly susceptible, and behavioral abnormalities and decreased learning ability have been demonstrated.

What Are the Sources of Lead?
Lead can be found in emissions from lead refiners and processing plants as well as in emissions from other industrial processes.

Lead at a glance...

Welfare Effects
No known significant welfare effects.

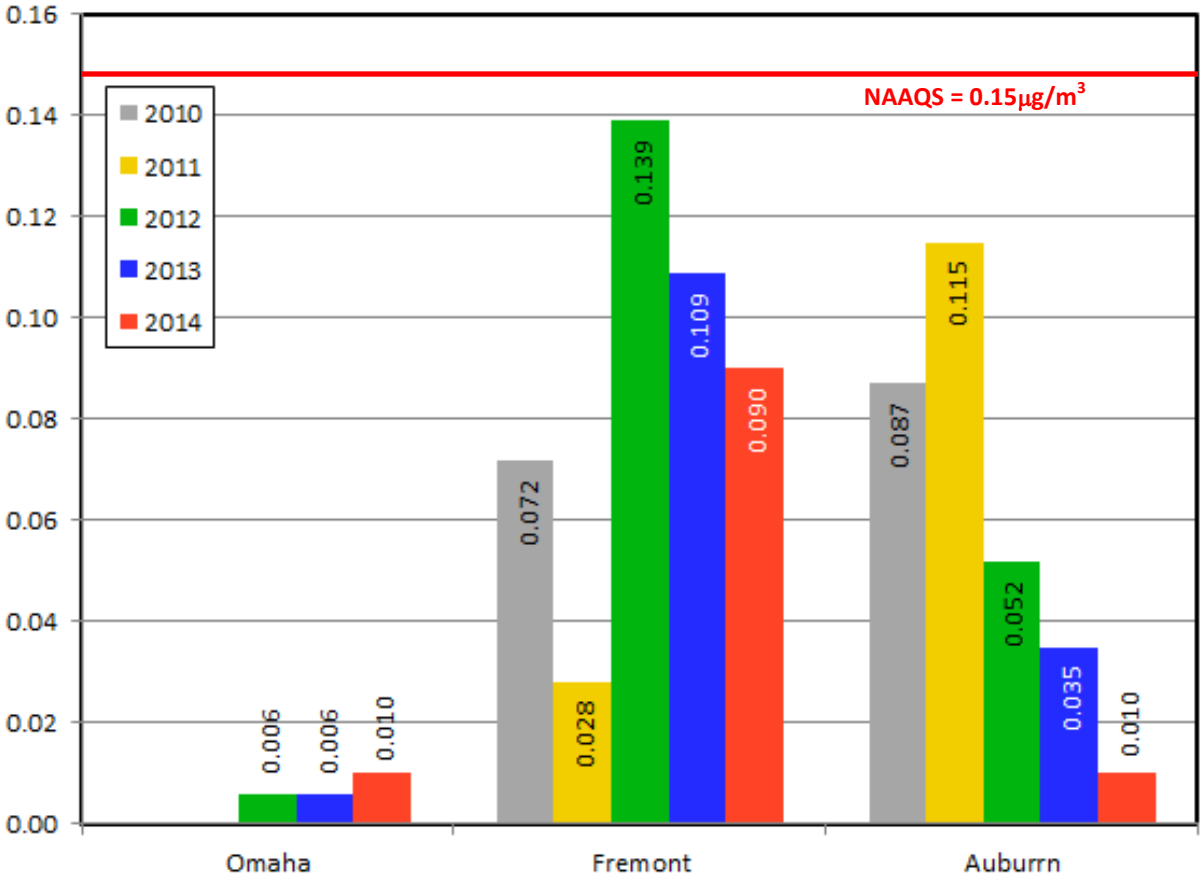
Where is Sulfur Dioxide Data Collected?
- 4102 Woolworth Ave., Omaha
- Fremont
- Auburn

(see maps on pages 10 & 11)

NAAQS
0.15 μg/m^3 as a three-month average

Lead data collection starts with the collection of 24-hour samples, usually one every six days. The samples for any period of three consecutive months are averaged and reported as the last month's average. For example, all the samples from March, April and May are averaged and reported as May's three -month average; all the samples from April, May and June are averaged and reported as June's three-month average. All of the three-month averages must be less than 0.15 μg/m^3.

Highest Three-Month Average Lead Concentrations



Source: NDEQ, DCHD

Total Reduced Sulfur (TRS)

What is TRS?
TRS is a gas composed of hydrogen sulfide, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, and other compounds containing sulfur.

Health Effects
At low levels of exposure TRS can cause headaches, depression, fatigue, and nausea. At higher levels of exposure health effects may include eye and respiratory irritation, olfactory nerve fatigue, and pulmonary edema. At extremely high levels TRS can cause respiratory failure and death.

Welfare Effects
At high levels TRS can have detrimental effects on plant life.

TRS at a glance...

Where is TRS Data Collected?
- Dakota City
- Lexington (discontinued, 2011)
- South Sioux City (discontinued, 2010)

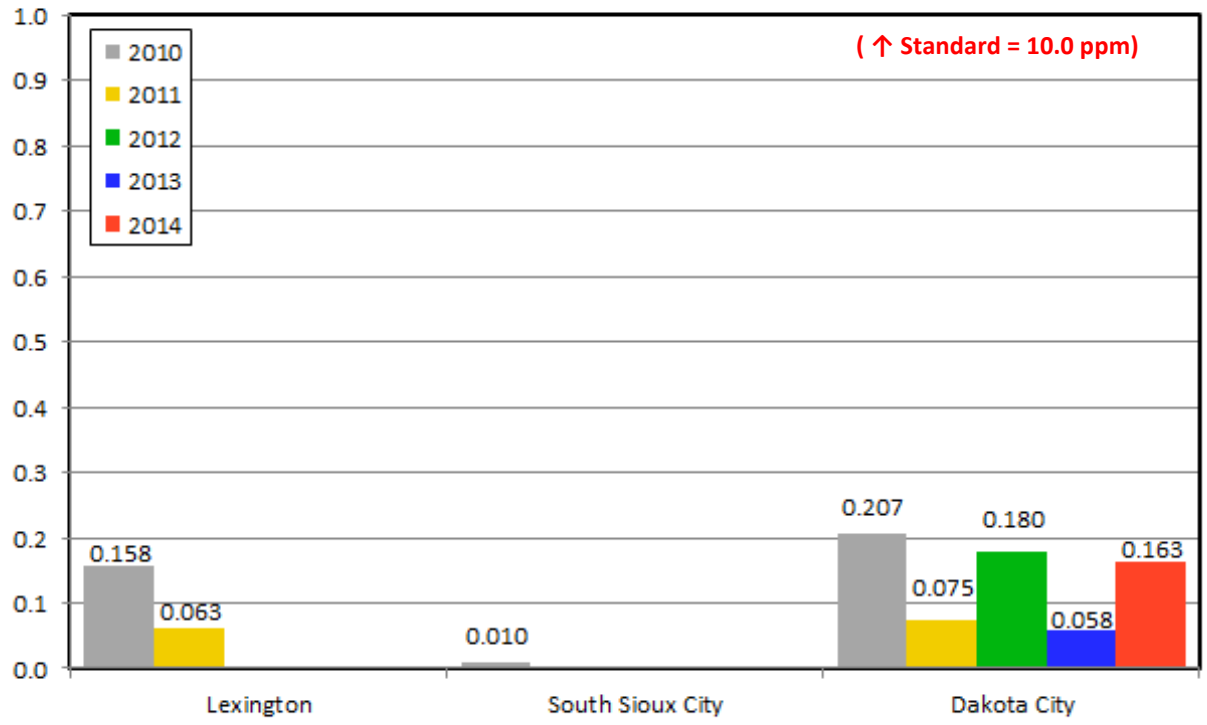
(see map on page 12)

What Are the Sources of TRS?
TRS results from microbial degradation and bacterial decomposition. Typical sources include packing plants, leather tanneries, sewage treatment plants, livestock waste control facilities, animal rendering plants, composting operations, and oil and natural gas extraction sites.

State Ambient Air Quality Standards
10.0 ppm as a 1-minute maximum
0.1 ppm as a 30-minute rolling average

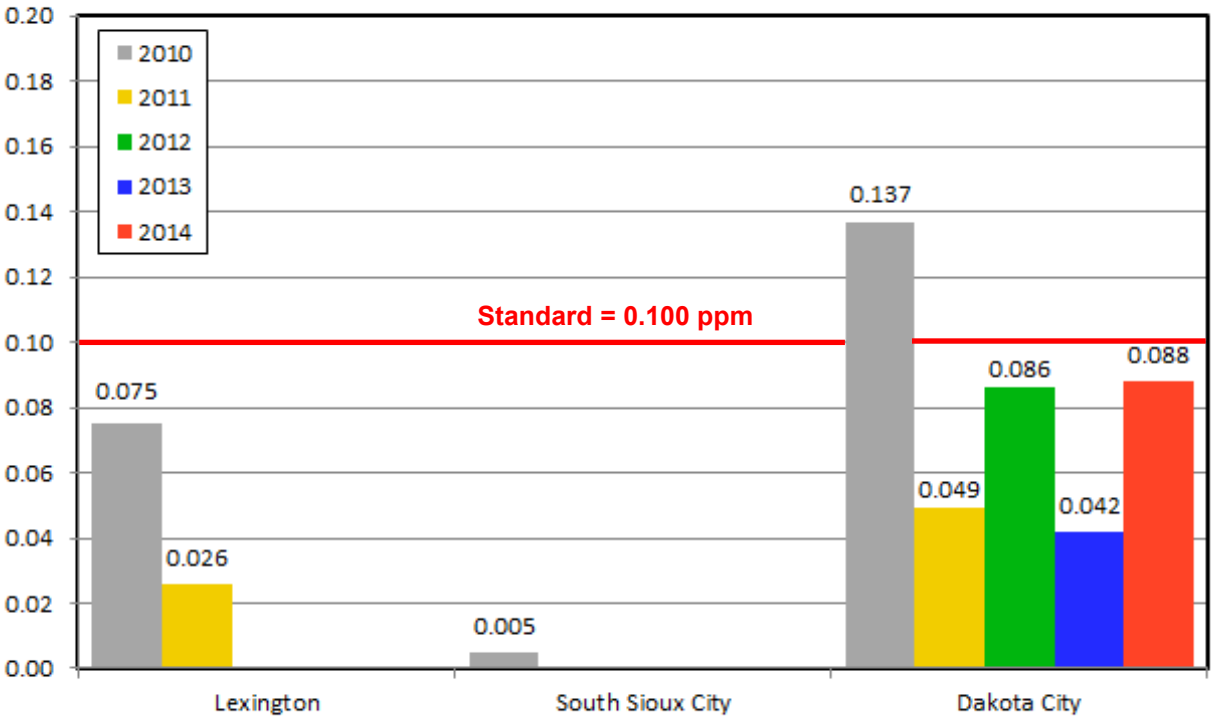
Exceedances of TRS Standard
There is a State Ambient Air Quality Standard for TRS, but a Federal standard, or NAAQS, does not exist. Prior to 2002, NDEQ's TRS monitors recorded levels in excess of 15 times the 30-minute standard. There have been marked reductions in TRS levels since this time in both the Dakota City/South Sioux City and the Lexington areas. These reductions are, at least in part, attributed to air pollution controls being installed at nearby anaerobic lagoons. The exceedances recorded at the Pine Street Monitor (see graph at below) occurred during the spring of each year, usually in the spring. Each year there were from one to three episodes; these episodes typically lasted no longer than one hour.

TRS: Maximum 1-Minute Concentrations



Source: NDEQ

TRS (continued)



Source: NDEQ