# Nebraska Department of Environmental Quality

# Public Inspection Draft

# 2015 Ambient Air Monitoring Network Plan

# and

# 5-Year Assessment

NDEQ Document #15-012

Public Inspection Draft-120715

This document is written to fulfill the requirements of 40 CFR Part 58.10 for an annual monitoring network plan and periodic network assessment as it pertains to the ambient monitoring conducted by the Nebraska Department of Environmental Quality (NDEQ), the Lincoln-Lancaster County Department (LLCHD) and the Douglas County Health Department (DCHD).

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**Attachment F: Justification of Closing the Auburn Lead (Pb) Monitoring Site**



**Attachment G: Douglas County Health Department's Near-Road $NO_2$ Siting Proposal**

The photos and table in this attachment are not numbered



**Attachment H: NDEQ Review and Concurrence: DCHD Near-Road $NO_2$ Site Proposal**

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## Acronyms and Abbreviations

### Agencies/Organizations

CASAC - Clean Air Scientific Advisory Committee [(a)]

DCHD - Douglas County Health Department

EPA - United States Environmental Protection Agency

EPA R7 - United States Environmental Protection Agency Region VII

LLCHD - Lincoln/Lancaster County Health Department

NDEQ - Nebraska Department of Environmental Quality

(a) CASAC was established by the Clean Air Act (CAA) Amendments of 1977, and provides independent advice to the EPA Administrator on the technical bases for EPA's national ambient air quality standards.

### Regulations

CFR - Code of Federal Regulations

NAAQS - National Ambient Air Quality Standards

Title 129 - Nebraska Air Quality Regulations

### Site Types

IMPROVE - Interagency Monitoring of Protected Visual Environments (monitoring performed to evaluate regional haze)

MDN - Mercury Deposition Network (a type of NADP site)

NADP - National Atmospheric Deposition Program (analysis of deposition components in precipitation. May include NTN and MDN sites)

NCore - National Core multi-pollutant monitoring stations. Monitors at these sites are required to measure particles ($PM_{2.5}$, speciated $PM_{2.5}$, $PM_{10–2.5}$), $O_3$, $SO_2$, CO, nitrogen oxides ($NO/NO_y$), Pb, and basic meteorology.

NTN - National Trends Network (a type of NADP site that analyzes for acidity, sulfate, nitrate, ammonium, chloride, and base cations (e.g., CA, Mg, K and Na))

SLAMS - State and Local Air Monitoring Stations

### Monitor Terminology

AQS - Air Quality System, the name for EPA's air monitoring data base

FRM - Federal Reference Method used for determining compliance with the NAAQS

FEM - Federal Equivalent Method used for determining compliance with the NAAQS

PWEI - Population Weighted Emissions Index (a term defined in 40 CFR Part 58 Appendix D that relates to $SO_2$ monitoring requirements)

2014 Network Plan – Nebraska's *2014 Ambient Air Monitoring Network Plan*

2015 Network Plan & 5-Yr Assessment - Nebraska's *2015 Ambient Air Monitoring Network Plan & 5-Year Assessment* (i.e., this document)

### Census Terminology

MSA - Metropolitan Statistical Area

MiSA - Micropolitan Statistical Area

## Acronyms and Abbreviations (Continued)

### Pollutants

CO - Carbon Monoxide

$H_2S$ - Hydrogen sulfide (typically a major component of TRS)

$O_3$ - Ozone

Pb - Lead

TSP-Pb - Lead sampled using a TSP sampler

$PM_{2.5}$ - Particulate matter with a diameter equal to or less than 2.5 micrometers or microns (reported as $\mu g/m^3$ with air volumes measures at local conditions)

$PM_{10}$ - Particulate matter with a diameter equal to or less than 10 micrometers or microns (reported as $\mu g/m^3$ with air volumes measures at standard conditions (25º C, 1 atm))

$PM_{10-2.5}$ - The difference between $PM_{10}$ and $PM_{2.5}$ (Both being calculated at local conditions)

$SO_2$ - Sulfur Dioxide

TRS - Total Reduced Sulfur ($H_2S$ + other reduced sulfur-containing compounds)

TSP - Total Suspended Particulates

### Concentration Units

ppb - Parts per billion (a volume/volume concentration unit)

ppm - Parts per million (a volume/volume concentration unit)

$mg/m^3$ - Milligrams per cubic meter (a mass/volume concentration unit)

$\mu g/m^3$ - Micrograms per cubic meter (a mass/volume concentration unit)

### Definitions

*in situ* - A Latin phrase meaning *in the place*. As used in this report it refers to the formation of pollutants in the atmosphere. For example, ozone is formed *in situ* from the photochemical reaction of pollutant precursors. Ozone is not emitted directly from sources. $PM_{2.5}$ and haze are also formed *in situ*, although they are also emitted by sources. $PM_{10}$ and CO, on the other hand, are largely emitted from sources; *in situ* formation being of minimal importance. NOx and SOx are emitted and then undergo transformations to $NO_2$ and $SO_2$; they also can play a role in the *in situ* formation of ozone and $PM_{2.5}$.

Criteria Pollutants – The six pollutants for which National Ambient Air Quality Standards (NAAQS) have been established: carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, particulates and lead.

## I. Introduction and Purpose

This 2015 Ambient Air Monitoring Network Plan and 5-Year Assessment (hereafter referred to as the "2015 Network Plan & Assessment") was prepared to meet the federal requirements set forth in 40 CFR Part 58.10. It serves several purposes.

- Describes the current ambient air monitoring network in Nebraska including:
  - The purpose of each monitoring site, and
  - Changes made since January 1, 2014.
- Discusses ambient air quality issues as they relate to the monitoring network.
- Reviews the ambient air monitoring network to determine that the requirements of 40 CFR Part 58 Appendixes A, C, D and E are met.
- Describes planned and possible changes to the ambient air monitoring network through 2016, as best they can be determined at the time this review was conducted.

## II. Public Participation

Federal regulations require annual network plans to be made available for public inspection. The NDEQ meets this requirement by posting it on the NDEQ web site (http://deq. ne.gov/) for 30 days. During the 30 day public inspection period, written comments regarding this Network Plan may be submitted to the Nebraska Department of Environmental Quality (NDEQ). Contact information is provided below.

Mail:

Nebraska Department of Environmental Quality
Attn: Jim Yeggy - Air Quality Compliance Section
PO Box 98922
1200 N Street, The Atrium Suite 400
Lincoln, NE 68509

Email:

NDEQ.airquality@nebraska.gov

Informal inquiries may also be directed to Jim Yeggy at 402/471-2142. Non-written comments are not necessarily included or addressed as review comments.

The deadline for written comment submittal can be found on the NDEQ web site.

## III. Overview of Current Ambient Air Monitoring Network

Nebraska's current air monitoring network is summarized in Table III-1 below. The network description tables in Attachment A provide more detailed information on the network, including site locations and monitoring objectives.

The network includes monitoring sites for ozone, carbon monoxide, nitrogen oxides, sulfur dioxide, total reduced sulfur, lead, $PM_{10}$, $PM_{2.5}$, $PM_{10-2.5}$ and regional haze (i.e., IMPROVE monitors). The network is operated by the Nebraska Department of Environmental Quality and two local agencies: the Douglas County Health Department and the Lincoln Lancaster County Health Department.

**Table III-1: Number of Monitoring Sites in the Nebraska Air Monitoring Network [1]**

| Pollutant | Omaha MSA [2] | Lincoln MSA [5] | Sioux City MSA [6] | Other Areas of NE [6] | Total Sites |
|---|---|---|---|---|---|
| Ozone | 3 [3] | 1 [5] | 0 | 0 | 4 |
| Carbon Monoxide | 2 [3] | 0 | 0 | 0 | 2 |
| Nitrogen Oxides | 1 [3] | 0 | 0 | 0 | 1 |
| Sulfur Dioxide | 2 [3] | 0 | 0 | 0 | 2 |
| Total Reduced Sulfur | 0 | 0 | 1 | 0 | 1 |
| $PM_{10}$ | 6 [3][4] | 0 | 0 | 2 | 8 |
| $PM_{2.5}$ | 4 [3] | 1 | 0 | 2 | 7 |
| $PM_{10-2.5}$ | 1 [3] | 0 | 0 | 0 | 1 |
| $PM_{2.5}$ Speciation | 1 [3] | 0 | 0 | 0 | 1 |
| Lead | 1 [3] | 0 | 0 | 2 | 3 |
| NCore [7] | 1 | 0 | 0 | 0 | 1 |
| IMPROVE [8] | 0 | 0 | 0 | 2 | 2 |
| Totals | 11 [2][4][7] | 2 [5] | 1 | 8 | 22 [9] |

Footnotes:

(1) This table summarizes the number of operating sites in the NE SLAMS network as of 9/30/15.

(2) There are 3 multi-pollutant monitoring sites in the Omaha MSA in 2015:

- 1616 Whitmore – $SO_2$ & Ozone
- 24th & O Sts (South Omaha) : Ozone and a $PM_{10}$
- NCore (42nd & Woolworth) - CO, NO/NOy, $O_3$, $SO_2$, PM, lead and meteorological

Thus there are 11 monitoring sites within the Omaha MSA, but if the pollutants are counted separately there are 19 analytical sites.

(3) This footnote means that one (1) monitor in this category is located at the NCore site.

(4) $PM_{10}$ sites in the Omaha MSA include 4 sites operated by DCHD that are located in Douglas County; and 2 sites operated by NDEQ. The NDEQ operated sites are located in the Weeping Water area of Cass County.

(5) LLCHD operates the 2 monitoring sites in the Lincoln MSA: the Davey ozone site and the N Street $PM_{2.5}$ site. In addition, a temporary investigative site for ozone was established at Waverly in May 2015. As a temporary, investigative site, it was not counted as part of the Nebraska SLAMS network.

(6) The NDEQ operates 11 sites: 2 at Weeping Water in the Omaha MSA, 1 in the Sioux City MSA, and 8 in "Other Areas of NE".

(7) The 12 Omaha MSA sites include 10 sites operated by DCHD: 30th & Fort ($O_3$), 24th & O St ($O_3$ & $PM_{10}$), 78th & Dodge (CO), 16th & Whitmore ($SO_2$), 19th & Burt ($PM_{10}$), 46th & Farnam ($PM_{10}$), 92nd & Berry ($PM_{2.5}$), Bellevue ($PM_{2.5}$), Blair ($PM_{2.5}$) & 42nd & Woolworth (NCore); and 2 sites operated by NDEQ: Weeping Water City ($PM_{10}$) & Weeping Water Farm ($PM_{10}$).

(8) IMPROVE – Interagency Monitoring of Protected Visual Environments. These are fine particulate and particulate speciation monitors intended to provide information for studying regional haze that may impact Class I National Park and Wilderness Areas.

(9) The sum total number of individual pollutant sites in the *Total Sites* column exceeds the bottom total sites value because the multi-pollutant NCore site and the ozone/$PM_{10}$ site at 24th & O Sts. were counted as one site each.

## IV. Nebraska Ambient Air Monitoring Network: January 1, 2014 thru September 30, 2015

This section describes Nebraska's Ambient Air Monitoring Network in place from January 1, 2014 thru September 30, 2015, and changes made during that time period. Detailed information on individual monitoring sites, including purpose, scale, monitor details and start dates, is contained in Attachment A.

For the most part, this section is organized around the MSAs and MiSAs in which monitoring is conducted. For population and statistical information about the MSAs and MiSAs see Attachment C.

### A. Omaha MSA Sites Operated by the DCHD

DCHD operates an ambient air network of 9 sites in Douglas, Sarpy and Washington Counties. Multi-pollutant monitoring is currently conducted at three of the sites:

- The NCore site monitors for 9 pollutant parameters (CO, NOy/NOx, $O_3$, $SO_2$, $PM_{2.5}$, $PM_{10}$, $PM_{10-2.5}$, $PM_{2.5}$ speciation & TSP-Pb), meteorological parameters, and atmospheric radiation (RADNET*);
- The South Omaha site has both an ozone and a $PM_{10}$ monitor; and
- The 1616 Whitmore site has both $SO_2$ and ozone monitors.

Thus the Omaha area monitoring network is more extensive than the 9 site total might indicate; if the pollutants are counted separately, there are 19 pollutant monitoring sites.

There were two changes in the Omaha-DCHD monitoring network since January 1, 2014.

1) Starting in October 2014, a collocated 2025 sequential sampler was located at the 9225 Berry Street site to fulfill the collocation requirements of 40 CFR Part 58, Appendix A.
2) The 30th & Fort ozone monitoring site in Omaha was closed due to construction at the site, and relocated to 1616 Whitmore (the existing $SO_2$ site) for the 2015 ozone monitoring season. At this time DCHD anticipates maintaining the 1616 Whitmore monitoring site and not re-establishing the 30th & Fort Street site through 2016. The availability of the former 30th & Fort location is questionable. Also, the Whitmore site recorded the highest ozone levels of all the sites in the Omaha MSA during 2015. See Attachment A for detailed information on sites operated by DCHD.

* Note: RadNet is a nationwide system that monitors the nation's air, drinking water, precipitation, and pasteurized milk to determine levels of radiation in the environment. RadNet sample analyses and monitoring results provide baseline data on background levels of radiation in the environment and can detect increased radiation from radiological incidents. The RadNet monitor is not subject to the network planning process set forth in 40 CFR Part 58.10. It is recognized above for informational purposes only.

### B. Omaha MSA Sites Operated by the NDEQ

The NDEQ operates 2 $PM_{10}$ monitoring sites in the Weeping Water area. One at the city waste water treatment plant (abbr. WW City site) and one approximately 1/3 mile northwest of the Weeping Water spur (State Spur 13K) and Highway 50 intersection (abbr. WW Farm site). There were no network changes in the Weeping Water area from January 1, 2014 to September 30, 2015.

## C. Lincoln MSA Sites Operated by the LLCHD

LLCHD operates two SLAMS monitoring sites:

- A $PM_{2.5}$ site at 3140 N Street in Lincoln, and
- An ozone site in Davey, NE.

The $PM_{2.5}$, N Street site has three monitors: a primary filter-based FRM sampler, a collocated filter-based FRM sampler, and a continuous MetOne BAM monitor. Data from the continuous monitor is reported to AirNow, but not AQS.

LLCHD deployed new ozone monitoring equipment (i.e., analyzer, transfer standards and local primary standard) at the start of the 2014 ozone monitoring season.

In 2015, Lincoln established a temporary, investigative site for ozone in Waverly. At the end of the 2015 ozone monitoring season the data from both the Davey and Waverly site will be compared to determine if Waverly might be a higher concentration site, and thus if changes in the ozone network might be needed.

## D. Sioux City Metropolitan Statistical Area in Dakota and Dixon Counties

The NDEQ operates one TRS monitoring at 501 Pine Street in Dakota City. There were no changes to the Nebraska air monitoring network in the Sioux City MSA from January 1, 2014 thru September 30, 2015.

## E. Grand Island Metropolitan Statistical Area

The NDEQ operates a $PM_{2.5}$ filter-based FRM sampler at Grand Island Senior High. There were no changes to the monitoring network in Grand Island MSA from January 1, 2014 thru September 30, 2015.

## F. Scottsbluff Micropolitan Statistical Area

The NDEQ operates a $PM_{2.5}$ filter-based FRM sampler at the Scottsbluff High School. There were no changes to the monitoring network in the Scottsbluff MiSA from January 1, 2014 thru September 30, 2015.

## G. Fremont Micropolitan Statistical Area

The NDEQ operates a TSP-Pb (lead) monitoring site at 1255 Front Street in Fremont. This site is source-oriented with respect to Magnus-Farley, a brass/bronze foundry. There are two TSP samplers at this site: a primary sampler and a collocated sampler. There were no monitoring network changes in the Fremont MiSA from January 1, 2014 thru September 30, 2015.

## H. Lexington Micropolitan Statistical Area

The NDEQ operates $PM_{10}$ sites in Cozad and Gothenburg. These are source-oriented sites with respect to alfalfa processing and grain handling facilities in these communities. There were no changes to the monitoring network in the Lexington MiSA from January 1, 2014 thru September 30, 2015.

## I. City of Auburn

The NDEQ operates a TSP-Pb (lead) monitoring site in Auburn that is source-oriented with respect to Magnolia Metals, a bronze-casting foundry. The site has a single TSP primary sampler. There were no changes to the monitoring network in Auburn and Nemaha County from January 1, 2014 thru September 30, 2015.

## J. IMPROVE Sites

IMPROVE is the acronym for Interagency Monitoring of Protected Visual Environments. These sites contain fine particulate and particulate speciation monitors intended to provide information for studying regional haze that may impact Class I National Park and Wilderness Areas. There are no Class I National Park and Wilderness Areas in Nebraska; the nearest sites are in Colorado and South Dakota. Data collected at the Nebraska sites facilitate regional haze and pollution transport studies.

The NDEQ provides administrative oversight of the operation of two IMPROVE sites: one at Halsey National Forest in Thomas County and one at Crescent Lake National Wildlife Refuge in Garden County. These sites began operation in 2002. No changes were made at these sites from January 1, 2014 thru September 30, 2015.

## K. National Atmospheric Deposition Program (NADP): National Trends Network (NTN) & Mercury Deposition Network (MDN)

There are two NADP/NTN sites in Nebraska: one near Mead that has operated since 1978 and one near North Platte that has operated since 1985. These sites are operated by the University of Nebraska, with analytical and data development support from the NADP. There were no changes to the NADP/NTN network from January 1, 2014 thru September 30, 2015.

National Atmospheric Deposition Program/National Trends Network (NADP/NTN) is a nationwide network of sites that monitor for deposition constituents in precipitation. The deposition parameters examined include acidity, sulfate, nitrate, ammonium, chloride, and base cations (e.g., calcium, magnesium, potassium and sodium).

Mercury Deposition Network (MDN) monitoring was initiated at the Mead site on June 26, 2007, and is continuing. At the North Platte site, MDN monitoring was conducted from October 2008 thru October 2010.

The operation of NADP sites is not subject to the provisions of 40 CFR Part 58.10. Their inclusion in this Network Plan is for informational purposes only. More information on the NADP/NTN and the NADP/MDN can be found in Attachment A and at the following web addresses: http://nadp.sws.uiuc.edu/ or http://nadp.sws.uiuc.edu/mdn/

## V. Considerations for Network Planning

### A. Compliance with 40 CFR Part 58 Requirements

The Nebraska Ambient Air Quality Network must comply with the requirements set forth in 40 CFR Part 58, including Appendices A, C, D and E. Attachment D of this Network Plan contains a review of the Nebraska ambient air monitoring network with respect to these requirements.

As the review in Attachment D verifies, the Nebraska ambient air monitoring network, operated by the NDEQ, DCHD and LLCHD, is meeting all applicable network requirements set forth in 40 CFR Part 58. Three issues related to Part 58 network monitoring site requirements are discussed below.

1) **$PM_{2.5}$ Collocation**: A collocated $PM_{2.5}$ 2025 sampler was installed at the 9225 Berry Street site at the start of October 2014. This fulfilled the collocation requirements set forth in 40 CFR Part 58 Appendix A as applied to 2025 samplers in the DCHD $PM_{2.5}$ network..

2) **Source-Oriented Lead Monitoring in Norfolk:** On December 14, 2010 EPA promulgated modifications to 40 CFR Part 58 Appendix D Sec 4.5, which lowered the emission threshold for requiring source-oriented lead monitoring to 0.5 tons per year (previously it had been 1 ton of lead emitted per year). This change required lead monitoring near the Nucor Steel-Norfolk facility (a 0.5 tpy source in the 2011 NEI), unless it could be demonstrated that lead levels would not exceed 50% of the NAAQS.

   Nucor Steel provided modeling in 2011 that demonstrated the 50% criteria would be met, and the NDEQ submitted a waiver request in June 2011. EPA approved the model demonstration in April 16, 2014. The waiver is effective for 5 years (i.e., expires April 2019).

3) **Near-Road NOx Monitoring in the Omaha MSA**

   On March 14, 2013, EPA promulgated changes to the near-road NOx monitoring requirements (see 40 CFR Part 58 Appendix D Sec. 4.3.2) that were consistent with the previously-recommended, phased-implementation strategy. The revised regulations require a near-road monitoring site in the Omaha MSA by January 1, 2017.

   Attachment G contains the siting review conducted by the DCHD, in which they propose putting the near-road $NO_2$ site at the current 78$^{th}$ & Dodge CO site. Attachment H contains NDEQ's review of, and concurrence with, the DCHD siting proposal.

   Initiation of near-road $NO_2$ monitoring at 78$^{th}$ & Dodge will be contingent upon EPA approval of the site and commitment of EPA funding to support development of the site (see Section VI.B below).

### B. Attainment with the National Ambient Air Quality Standards (NAAQS)

The monitoring results from all Nebraska monitoring sites, and adjacent state monitoring sites in the Omaha and Sioux City MSAs, for 2012 thru 2014 are in attainment with the NAAQS. See the monitoring data tables in Attachment B for more information on 2012 thru 2014 monitoring results.

Nebraska has never had a declared non-attainment determination. See Attachment E for a historical perspective on pollutant levels in Nebraska.

**$NO_2$ and $SO_2$**: The NAAQS for these two pollutants were revised in 2010 to establish 1-hour standards. EPA has not rendered a final attainment determination with respect to these revised

NAAQS.

- The 1-hour $NO_2$ NAAQS was set at 100 ppb and an "unclassifiable/attainment" classification currently applies. The unclassifiable issue applies to near-road $NO_2$ levels in Omaha. See Sections V.A.3 and VI.B for discussion of near-road $NO_2$ monitoring plans.
- The 1-hour $SO_2$ NAAQS was set at 75 ppb and an "unclassifiable" classification currently applies. The unclassifiable issue relates to additional information requirements in 40 CFR Part 51 Subpart BB that apply to $SO_2$ sources of 2000 tpy or more. See Sections V.C and VI.D for information on how this is being addressed.

**Ozone:** On October 1, 2015, EPA strengthened (lowered) the ozone NAAQS from 0.075 ppm to 0.070 ppm. As shown in Attachment B Table B-1, the 2012-14 Design Values for monitoring sites in Nebraska and adjacent state areas in the Omaha and Sioux City MSAs are less than 70 ppb (i.e., indicate attainment). Ozone levels thru September 2015 are lower than the 2014 levels as shown Table V-1 below. Thus, it is anticipated that 2013-15 DVs will also find attainment with the revised 70 ppb NAAQS. It is noted that Table V-1 contains April thru September 2015 ozone data from the EPA AirNow database, which has not undergone data validation reviews like AQS data, and thus may be subject to changes.

**Table V-1: 8-Hour Ozone: Annual 4th High Values and 3-Year Design Value (DV) Projections: 2013-2015 (1)**

| MSA | Site | 2013 | 2014 | 2015(1) | Projected 2013-15 DV(2) | % NAAQS (3) |
|---|---|---|---|---|---|---|
| Omaha | NCore Omaha | 0.066 | 0.063 | 0.062 | 0.063 | 84% |
| | 2411 O St., Omaha | 0.058 | 0.059 | 0.055 | 0.057 | 76% |
| | 30th & Fort, Omaha | 0.061 | 0.060 | nd | na | na |
| | 16th & Whitmore | nd | nd | 0.064 | na | na |
| | Harrison Co, IA | 0.065 | 0.062 | 0.061 | 0.062 | 83% |
| | Pisgah, IA | 0.065 | 0.063 | 0.061 | 0.063 | 84% |
| Lincoln | First & Maple, Davey | 0.055 | 0.061 | 0.061 | 0.059 | 79% |
| Sioux City | Union Co SD | 0.063 | 0.062 | 0.061 | 0.062 | 83% |
| na | Santee Indian Reservation | 0.067 | 0.063 | 0.063 | 0.064 | 85% |

Footnotes:
(1) The 2015 4th high values were obtained using April thru September 2015 data. October data was not yet available. The 2015 data was obtained from the EPA AirNow database. This is not validated data. The 2013 and 2014 validated data were obtained from the EPA AQS data.
(2) The DV is the truncated 3-year average of the annual 4th high values.
(3) The 8-hour ozone NAAQS is 0.070 ppm effective 10/1/15.

## C. Other EPA Regulations: Existing and Proposed

**Data Requirements for Demonstrating $SO_2$ Attainment:** On August 21, 2015 EPA finalized changes to 40 CFR Part 51 Subpart BB, §51.1200 - §51.1205 that set forth additional data requirements with respect to demonstrating attainment with the 1-hour $SO_2$ NAAQ promulgated in 2010. These regulations defined the requirements for air quality agencies… *in whose jurisdiction is located one or more applicable sources of $SO_2$ emissions that have annual actual $SO_2$ emissions of 2,000 tons or more; or in whose jurisdiction is located one or more sources of $SO_2$ emissions that have been identified by the air agency or by the EPA Regional Administrator as requiring further air quality characterization.* The discussion below is not part of the submittal required to comply with these requirements, but rather a preliminary review of how this might impact Nebraska's monitoring network.

Table V-2 below contains 2014 Nebraska Emission Inventory data for $SO_2$ for the 7 largest coal-fired power plants in Nebraska, and where available air monitoring data. Table V-2 is not the list of facilities required to be submitted under §51-1203(a); it is included here to facilitate discussion.

Table V-2 indicates that Nebraska has 6 facilities with $SO_2$ emissions of 2000 tpy or more. Monitoring has been conducted in the vicinity of one of these: North Omaha Station and that monitoring found $SO_2$ levels to be in compliance with the NAAQS.

**Table V-2: Largest $SO_2$ Emission Sources in Nebraska and 2012-14 1-Hour $SO_2$ DVs [1]**

| Source | Location | $SO_2$ Emissions [2] (tpy) | 2012-14 DV[3][4] (ppm) |
|---|---|---|---|
| NPPD Gerald Gentleman Station | Lincoln County | 24,482 | No data |
| OPPD Nebraska City Station | Otoe County | 16,134 | No data |
| OPPD North Omaha Station | Douglas County (Omaha) | 11,250 | 0.061 |
| NPPD Sheldon Station | Lancaster County | 3,243 | No data |
| Gerald Whelan Energy Center | Adams County (Hastings) | 2,899 | No data |
| Lon D Wright Power Plant | Dodge County (Fremont) | 2,232 | No data |
| Platte Generating Station | Hall County | 1,452 | No data |

Footnotes:
(1) This table is **not** the list of facilities to be submitted pursuant to 40 CFR Part 51.1203(a).
(2) $SO_2$ emission data was obtained from the 2014 Nebraska Emission Inventory.
(3) The 1-hour $SO_2$ DV is the 3-year average of the annual 99$^{th}$ percentile values.
(4) The 1-hour $SO_2$ NAAQS = 0.075 ppm.

Agencies can meet data requirements for demonstrating attainment in 3 ways:
1) Establish ambient monitoring in the vicinity of applicable sources by January 1, 2017;
2) Submit air quality monitoring analyses by January 13, 2017; or
3) Establish enforceable emission limits to hold $SO_2$ emissions below 2000 tpy.

If the monitoring option is pursued and the January 1, 2017 deadline is missed, then a modeling analysis or enforceable limits are required. There are also interim submittal requirements not discussed herein.

The NDEQ is evaluating how to best proceed to comply with the Part 51, Subpart BB requirements. At this time, the agency is not ready to commit to additional $SO_2$ monitoring to meet these requirements, in part due to the uncertainty of what monitoring will be required. Rather, it is anticipated that modeling and/or the establishment of enforceable limits will be used to meet the requirements of Part 51 Subpart BB.

## D. Other Air Quality Issues:

**Wild Fires and Prescribed Burning**: Nebraska's air quality is periodically impacted by smoke from wildfires and prescribed burning. In 2015, Nebraska's air quality was impacted by prescribed burns in the spring and western wildfires from the Pacific Northwest and Canada in the summer. See Figures V-2 thru V-7.

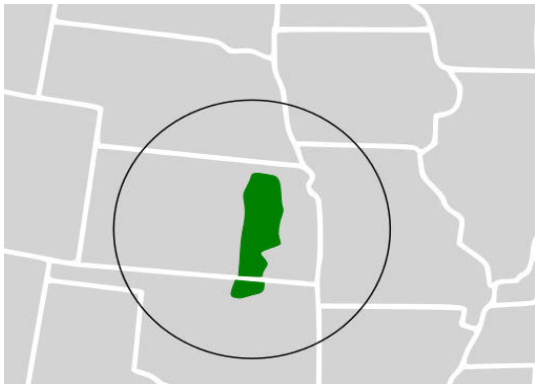
Prescribed burning is a common range and grassland management practice conducted to promote native prairie species, suppress tree growth, and release nutrients back into the soil. It is a conservation/grassland management tool recognized by state and federal agencies, as described at the following web addresses:

- http://www.npwrc.usgs.gov/resource/habitat/burning/
- http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ia/newsroom/features/?cid=stelprdb1077081
- http://outdoornebraska.ne.gov/wildlife/programs/wildnebraska/options.asp

A negative aspect of prescribed burning is that smoke from fires can travel great distances and contribute to air pollution hundreds of miles from the site of the fires.

The Flint Hills of eastern Kansas and northeast Oklahoma (see Figure V-1) contain the densest coverage of intact tall-grass prairie in North America. It is roughly 200 miles N-to-S and 80 miles E-to-W. The northern end of the Flint Hills extends into the southern areas of Washington County and Marshall County KS; approximately 20 miles south of the Nebraska/Kansas boundary. The cattle ranchers within the Flint Hills conduct spring burning to maintain the prairie. Smoke from these burning activities impacts Nebraska.

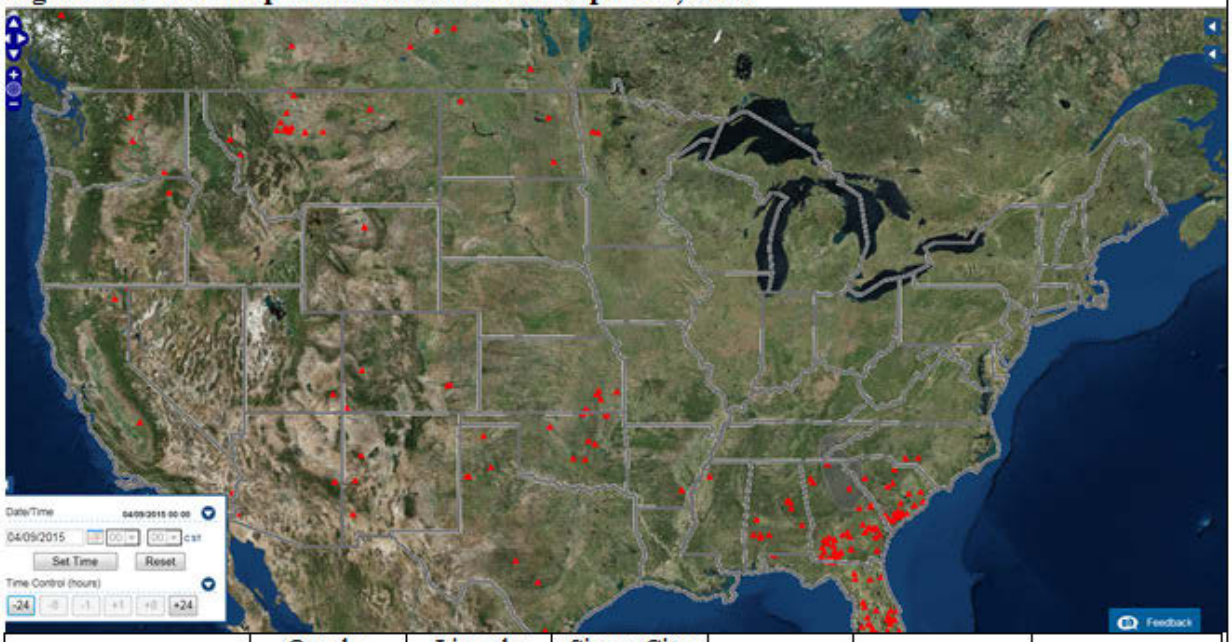
**Figure V-1: Flint Hills Area of Kansas and Oklahoma**



Impacts from Flint Hills burning were particularly significant in the spring of 2014. Drought conditions in 2012 and wet conditions in 2013 reduced the feasibility of burning in those years. There were also impacts in the spring of 2015, but they were not as severe as in 2014. Figures V-2 thru V-6 show the impact of Flint Hills burning on April 10th-11th 2015. Typically, ozone and $PM_{2.5}$ levels peak in Nebraska the day after there is burning in the Flint Hills area, and this was true in April 2015 as shown in Figures V-2 thru V-6.

Nebraska's air quality was also impacted in 2015 by wild fires in the Pacific Northwest, Canada and Alaska. Figure V-7 shows the impact on July 7th, 2015, but this is not the only day when western forest fires impacted air quality in Nebraska.

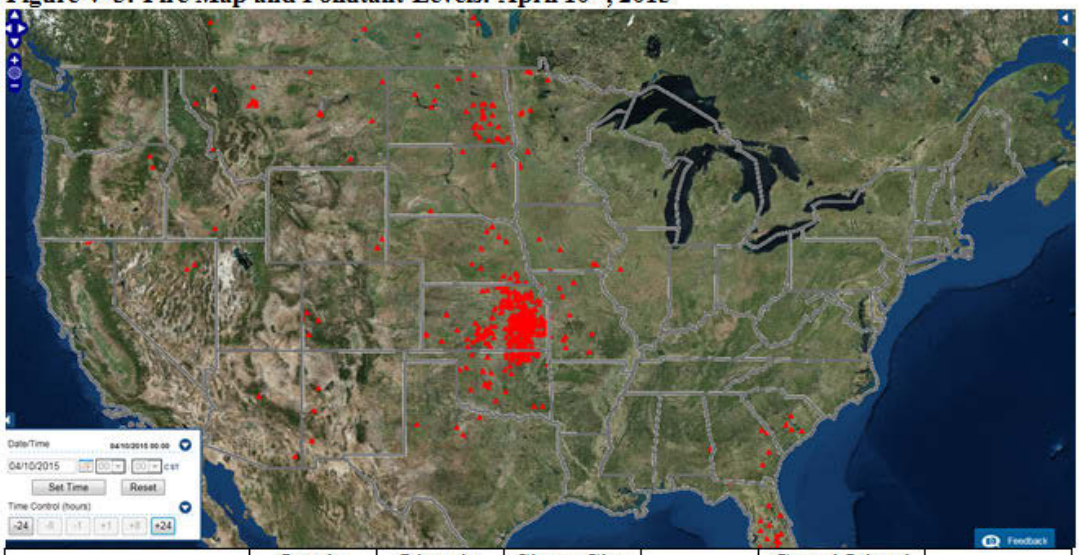
**Figure V-2: Fire Map and Pollutant Levels: April 9th, 2015**




| April 9, 2015 | Omaha MSA | Lincoln MSA | Sioux City MSA | Santee | Grand Island | Scottsbluff |
|---|---|---|---|---|---|---|
| Ozone - Max 8-hr (ppb) | 28 | 27 | 31 | 40 | No Data | No Data |
| $PM_{2.5}$ – Max 24-hr ($ug/m^3$) | 6.7 | 8.1 | 6.0 | No Data | No Data | 1.7 |

Few fires, Nebraska pollutant levels low AQI *Good* at all sites.

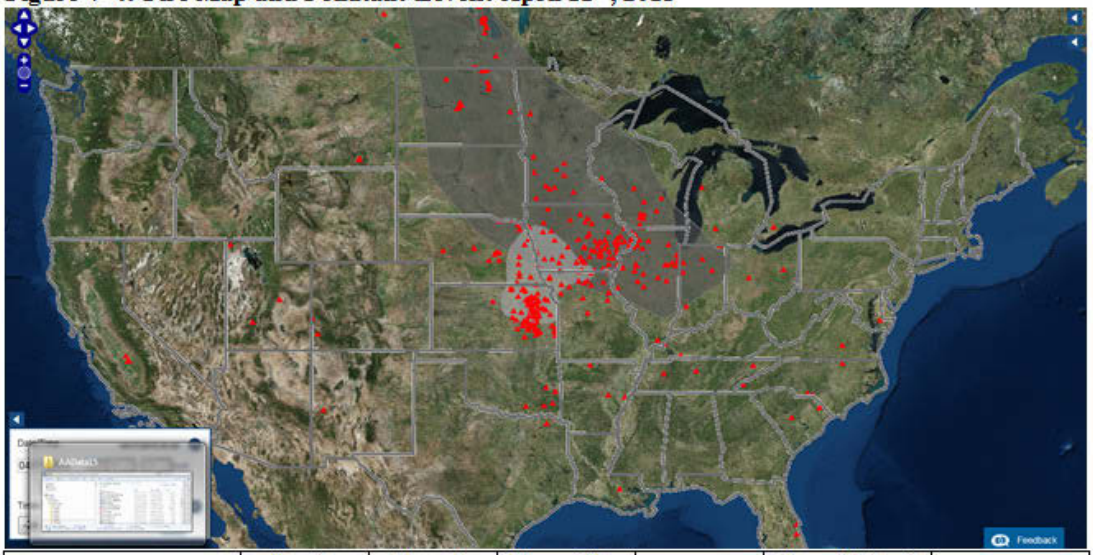
**Figure V-3: Fire Map and Pollutant Levels: April 10th, 2015**



| April 10, 2015 | Omaha MSA | Lincoln MSA | Sioux City MSA | Santee | Grand Island MSA | Scottsbluff |
|---|---|---|---|---|---|---|
| Ozone - Max 8-hr (ppb) | 46 | 42 | 48 | 49 | No Data | No Data |
| $PM_{2.5}$ – Max 24-hr ($ug/m^3$) | 6.7 | 7.2 | 5.5 | No Data | No Data | No Data |

Numerous fires concentrated in Flint Hills. Nebraska pollutant levels low: AQI levels all good.

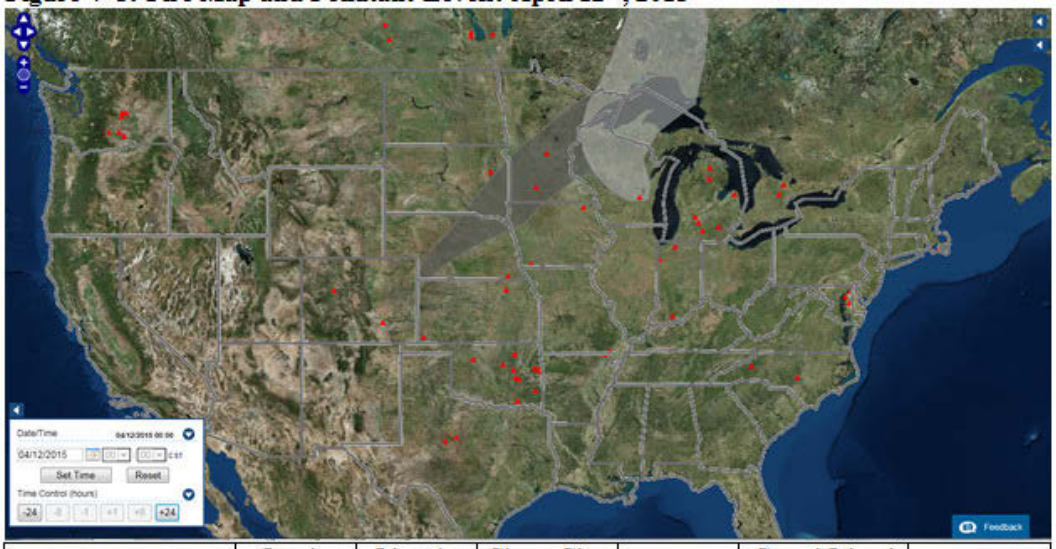
**Figure V-4: Fire Map and Pollutant Levels: April 11th, 2015**



| April 11, 2015 | Omaha MSA | Lincoln MSA | Sioux City MSA | Santee | Grand Island MSA | Scottsbluff |
|---|---|---|---|---|---|---|
| Ozone - Max 8-hr (ppb) | 77 | 63 | 61 | 58 | No Data | No Data |
| $PM_{2.5}$ – Max 24-hr ($ug/m^3$) | 24.9 | 31.9 | 19.9 | No Data | No Data | No Data |

Numerous fires in Flint Hills and other states. Heavy smoke plume over parts of KS, MO, Ne & IA. Total smoke plume extending east to Ohio and north into Canada. Nebraska pollutant levels elevated:
AQI: Omaha *Unhealthy for Sensitive Individuals*, Lincoln & Sioux City MSAs *Moderate*
Ozone (Apr-Sep 2015): Omaha MSA max value, Lincoln & Sioux City MSAs 2nd high, and Santee 9th high
$PM_{2.5}$ (Jan-Sep 2015): Omaha MSA 6th high, Lincoln MSA 3rd high and Sioux City MSA 7th high

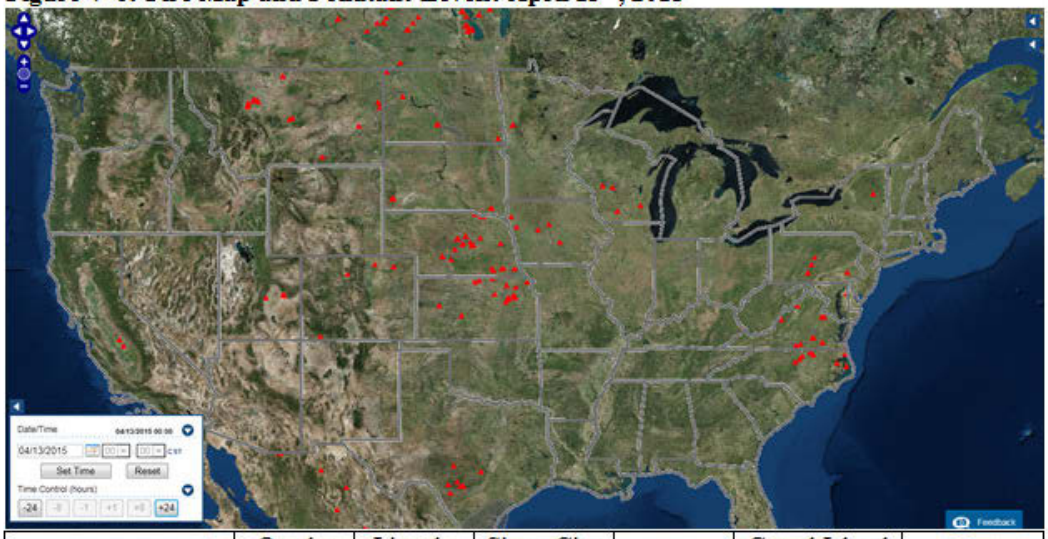
**Figure V-5: Fire Map and Pollutant Levels: April 12th, 2015**



| April 12, 2015 | Omaha MSA | Lincoln MSA | Sioux City MSA | Santee | Grand Island MSA | Scottsbluff |
|---|---|---|---|---|---|---|
| Ozone - Max 8-hr (ppb) | 53 | 46 | 44 | 46 | No Data | No Data |
| $PM_{2.5}$ – Max 24-hr ($ug/m^3$) | 15.2 | 16.5 | 22.4 | No Data | 7.8 | 3.3 |

Few fires. Heavy smoke plume has moved to the northeast with lighter smoke plume over parts of Nebraska. Nebraska ozone levels low, but $PM_{2.5}$ elevated: AQI *Moderate* in Omaha, Lincoln & Sioux City MSAs. $PM_{2.5}$ levels in Sioux City MSA higher than previous day (5th high $PM_{2.5}$ Jan-Sep 2015).

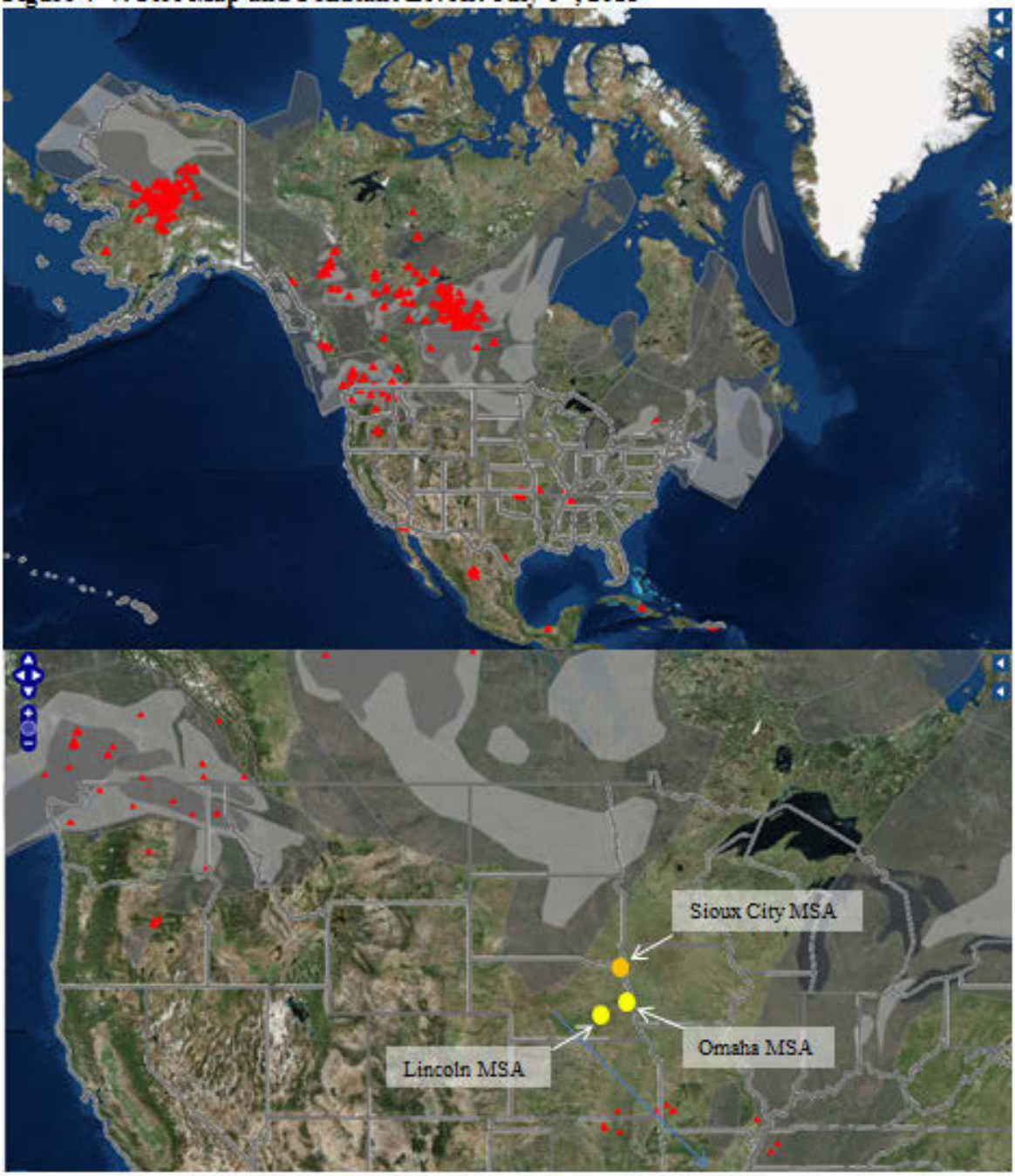
**Figure V-6: Fire Map and Pollutant Levels: April 13th, 2015**



| April 13, 2015 | Omaha MSA | Lincoln MSA | Sioux City MSA | Santee | Grand Island MSA | Scottsbluff |
|---|---|---|---|---|---|---|
| Ozone - Max 8-hr (ppb) | 48 | 46 | 44 | 48 | No Data | No Data |
| $PM_{2.5}$ – Max 24-hr ($ug/m^3$) | 3.0 | 2.7 | 4.5 | No Data | No Data | No Data |

Few fires. No smoke plume, Nebraska pollutant levels low: AQI *Good* at all sites.

**Figure V-7: Fire Map and Pollutant Levels: July 6th, 2015**




Smoke plume from Canadian wild-fires extending into north-central Nebraska.

| | | |
|---|---|---|
| Lincoln MSA | Ozone = 37 ppb & $PM_{2.5}$ = 27 $\mu g/m^3$ | AQI: *Moderate* |
| Omaha MSA | Ozone = 39 ppb & $PM_{2.5}$ = 28 $\mu g/m^3$ | AQI: *Moderate* |
| Sioux City MSA | Ozone = 39 ppb & $PM_{2.5}$ = 39 $\mu g/m^3$ | AQI: *Unhealthy for Sensitive Groups* |

## E. Population Trends and Network Design

Population related data is reviewed as part of the network planning process because:

- Population growth may be associated with pollution source growth;
- High population density generally correlates with high air pollution potential; and
- Some 40 CFR Part 58 requirements are based on population and/or federally defined metropolitan statistical definitions.

Attachment C contains a review of population growth and growth trends in Nebraska. The data in Attachment C is based on 2010 census and 2014 survey estimate data.

Overall growth trends in Nebraska appear basically unchanged from those described in previous annual Network Plans. Most of the population growth is occurring in Nebraska's 3 most populous and densely populated counties: Douglas, Lancaster and Sarpy (i.e., the Omaha and Lincoln MSAs).

The basic design of the Nebraska ambient air monitoring network is consistent with these population trends: 61% of the monitoring sites and 73% of the pollutant monitors are located within the Omaha and Lincoln MSAs. The Omaha MSA network contains 52% of the monitoring sites in Nebraska and 67% of the monitors.

## F. Funding

Air monitoring is supported by a combination of federal, cash, state and local funding sources. Table V-4 below provides a summary of the primary funding sources used for air monitoring.

Federal CAA §103 grant funding for April 2015 through March 2016 was reduced by $10,000. §103 funding is used to operate $PM_{2.5}$ and IMPROVE monitors. This cut was absorbed without reductions in the $PM_{2.5}$ and IMPROVE monitoring network.

EPA is considering site priorities within the IMPROVE monitoring network. There are currently 2 IMPROVE sites managed by NDEQ with §103 funding: one near Halsey in the Nebraska National Forest and one in the Crescent Lake National Wildlife Refuge. If EPA does cut funding for one of these sites, then the NDEQ anticipates that EPA will identify the lower priority site. NDEQ will work with EPA to facilitate closure of either or both IMPROVE sites, if EPA does not fund their continued operation.

Initial indications are that Federal CCA §105 funding for October 2015 thru September 2016 will be maintained at current levels.

Current funding levels are adequate to continue the operation of the existing Nebraska air monitoring network, provided major new equipment purchases are not required. However, equipment used for TRS monitoring and some of the $PM_{2.5}/PM_{10}$ sampling equipment is nearing the end of its useful life and is need of replacement. The need to expand the ozone monitoring network within Nebraska is also under review. Opportunities for network adjustments are discussed in the Network Assessment section below.

| Table V-3: Primary Funding Sources used to Support Air Monitoring in Nebraska | |
|---|---|
| **Nebraska Department of Environmental Quality (NDEQ)** | |
| **Funding Source** | **Comments** |
| State General Funds | At a minimum must be sufficient to meet minimum federal match requirements |
| State Title V Funds | Fees paid by major sources based on the quantity of air pollutants they emit. NDEQ collects Title V fees for sources through-out Nebraska, except those regulated by LLCHD and Omaha Air Quality Control. Title V funds cannot be used for state/local match. |
| CAA §105 Funds | Federal grant funds used for air monitoring activities set forth in a bi-annually negotiated EPQA-NDEQ work plan. Requires a 40% state/local match. A portion of this grant funding is passed on to DCHD and LLCHD. |
| CAA §103 Funds | Federal grant funds used for air monitoring activities set forth in a bi-annually negotiated EPQA-NDEQ work plan. This money is currently limited to funding $PM_{2.5}$ and IMPROVE monitoring, and sometimes for specified equipment purchases and/or special monitoring studies. Requires no state/local match. A portion of this grant funding is passed on to DCHD and LLCHD. |
| **Douglas County Health Department (DCHD)** | |
| Local County Funds | At a minimum must be sufficient to meet minimum federal match requirements |
| City of Omaha Title V funds | See *State Title V Funds* comments above. The Omaha Air Quality Control regulates air emission sources in the City of Omaha, including the collection of Title V fees from major sources. A portion of the Omaha Title V funds are directed to DCHD to support air monitoring. Title V funds can not be used for state/local match. |
| CAA §105 Funds | NDEQ passes-through a portion of the Federal §105 funds to DCHD for activities described in an NDEQ/DCHD work plan. DCHD is required to meet the 40% state/local match requirement. |
| CAA §103 | NDEQ passes-through a portion of the federal §103 funds to DCHD for activities described in an NDEQ/DCHD work plan, primarily $PM_{2.5}$ related monitoring activities. There is no state/local match requirement. |
| Metropolitan Area Planning Assoc. (MAPA) Funds | Typically federal grant funds obtained by MAPA are for specific purposes such as transportation or homeland security related activities. Historically they have been used for equipment purchases and site set-up, not network operating costs. |
| **Lincoln Lancaster County Health Department (LLCHD)** | |
| Local County Funds | At a minimum must be sufficient to meet minimum federal match requirements |
| Lancaster County Title V funds | See *State Title V Funds* comments above. LLCHD regulates air emission sources in Lancaster County, including the collection of Title V fees from major sources. A portion of the Title V funds are used to support air monitoring activities performed by LLCHD. Title V funds cannot be used for state/local match. |
| CAA §105 Funds | NDEQ passes-through a portion of the Federal §105 funds to LLCHD for activities described in an NDEQ/LLCHD work plan. LLCHD is required to meet the 40% state/local match requirement. |
| CAA §103 | NDEQ passes-through a portion of the federal §103 funds to LLCHD for activities described in an NDEQ/LLCHD work plan, primarily $PM_{2.5}$ related monitoring activities. There is no state/local match requirement. |

## VI. Network Assessment

This network assessment was undertaken to comply with 40 CFR Part 58.10 requirements for a 5-year network assessment. In that regard it relies on documentation contained in Section V above and Attachments A thru G. Also Attachment A provides detailed information on each site in the Nebraska SLAMS including: location, monitoring purpose and scale, monitoring initiation dates, and analytical methods.

General observations related to this network assessment are bulleted below. The pollutant-specific subsections that follow contain more detailed analysis and discussion

- Existing monitoring is finding attainment with the NAAQS, including the recently revised 70 ppb 8-hour ozone NAAQS. See Attachment B for annual and design value data. An attainment designation of "unclassified" currently exists with respect to the 1–hour $SO_2$ NAAQS, and an attainment designation of "unclassified/attainment" currently exists with respect to the 1–hour $NO_2$ NAAQS. See $SO_2$ and $NO_2$ related bullets below, and Sections VI-B and VI-D below for more information on these issues.
- Population trends have not changed. The Omaha and Lincoln MSAs continue to be the fastest growing areas of Nebraska. More than half of the monitoring sites (i.e., 13 of 22 or 59%, see Table III-1) in Nebraska's SLAMS are located in these MSAs.
- All the minimum monitoring requirements of 40 CFR Part 58 Appendix D are being met. See Attachment D for the detailed review of these requirements.
- The NDEQ permitting and compliance programs ensure that new sources and facility expansions are installing and utilizing adequate emission controls. A temporal examination of pollutant levels demonstrates long-term declines and improved air quality. See Attachment E for details. Also see Attachment B for current pollutant levels.
- CO levels are well below the NAAQS as a result of mobile and stationary source emission controls. The need for CO monitoring is currently limited. The 2 sites in Omaha are sufficient.
- Ozone concentrations appear to be more uniform across the state than $PM_{2.5}$ levels as shown in Attachment B Table B-1. The Nebraska SLAMS has 3 ozone monitoring sites in the Omaha MSA and 1 site in the Lincoln MSA. Ozone levels in the Omaha MSA are higher than the Lincoln MSA.

  However, the highest concentration site in Nebraska is currently at the EPA CASTNET site near Santee, NE. This CASTNET site is not part of the Nebraska SLAMS, it is not operated by the NDEQ and is not subject to review under this Network Plan.

  Ozone concentrations in Nebraska are not surprising when compared to levels in surrounding states as shown in Attachment E Figure E-13.

  Ozone levels in Nebraska have declined significantly in the last 3 years (see Attachment B Table B-1) and there has been a long-term decline as well (see Attachment E Section 2). Although, significant cyclic patterns also exist in the historical data and recent declines would be consistent with short-term, multi-year declines seen in the past.

  At this point NDEQ does not anticipate deploying additional ozone monitoring sites before 2017. DCHD relocated the 30$^{th}$ & Fort site to 16$^{th}$ & Whitmore in 2015 due to construction activities. This relocation will continue thru 2016 and possibly beyond. See detailed discussions below.

- Current and historical monitoring for $SO_2$ indicates attainment with possible exceptions of areas impacted by $SO_2$ sources of 2000 tpy or more. As discussed in Section VI-D below, this is being addressed using modeling not monitoring.
- Current and historical monitoring for $NO_2$/NOx indicates attainment with the possible exception of near-road locations in Omaha. Attachment G contains DCHD's proposal for a near-road $NO_2$ site at 78th & Dodge in Omaha (i.e., the current CO monitoring site). Attachment H contains NDEQ's review and concurrence with the DCHD proposal. However, the NDEQ also notes that near-road monitoring in larger metro areas is finding attainment (see Attachment E Section 3 Table E-3). Thus, a funding commitment from EPA is expected if the Omaha near-road $NO_2$ site is to be developed.
- $PM_{2.5}$ monitoring is finding all areas of Nebraska in attainment with the both the 12 ug/m3 annual average and the 35 ug/m3 24-hour average NAAQS. The highest $PM_{2.5}$ concentrations are found in the Omaha MSA (see Attachment B Tables B-6a & B-6b), and 4 of the 7 $PM_{2.5}$ monitoring sites in the Nebraska's SLAMS are located in the Omaha MSA. The second highest $PM_{2.5}$ levels are found in Lincoln, and there is one site there. The other 2 $PM_{2.5}$ sites in the Nebraska SLAMS are the background site at Scottsbluff and the transport site at Grand Island. $PM_{2.5}$ concentrations are significantly lower here than in the Lincoln or Omaha sites.
- $PM_{10}$ is primarily a source-oriented pollutant concerns at this time. Based on monitoring results, NDEQ is proposing to shut-down the $PM_{10}$ sites at Cozad and Gothenburg. The replacement of old monitoring equipment at the Weeping Water City site is anticipated. No additional sites or site relocations are planned
- Lead (Pb) is a source-oriented pollutant at this time. The NDEQ operates to source-oriented TSP-Pb monitoring sites: one in Auburn and one in Fremont. DCHD operates a non-source oriented TSP-Pb sampler at the Omaha NCore site pursuant to 40 CFR Part 58 Appendix D requirements. Based on monitoring results and lead emission reductions from Magnolia Metals, the NDEQ is proposing to shut-down the TSP-Pb site at Auburn. No additional sites or site relocations are planned.
- NDEQ currently operates one TRS site in Dakota City. Based on monitoring results, NDEQ is proposing to shut-down this site.

The pollutant-specific subsections below provide detailed analysis and discussion of the subjects summarized above.

## A) Carbon Monoxide (CO):

Carbon monoxide is formed when carbon in fuels is not burned completely. It is a byproduct of highway vehicle exhaust, which contributes about 60 percent of all CO emissions nationwide. In cities, automobile exhaust can cause as much as 95 percent of all CO emissions. These emissions can result in high concentrations of CO, particularly in local areas with heavy traffic congestion. Other sources of CO emissions include industrial processes and fuel combustion in sources such as boilers and incinerators.

See Attachment E for a complete historical review of CO monitoring in Nebraska. Historically CO monitoring in Nebraska has been conducted primarily in Lincoln and Omaha. These are the largest urban areas in Nebraska, and will have the highest ambient CO levels in high traffic, traffic congested, street-canyon areas.

Vehicle and stationary source emission standards have reduced CO emissions to levels well below the NAAQS. Figures E-1 and E-2 (see Attachment E) show 1-hour and 8-hour CO levels in Omaha and Lincoln starting as far back as 1971. Ambient CO levels have decreased significantly since the 1970s, and have been at levels well below 50% of the NAAQS since 2000. This decrease in CO levels resulted from the effectiveness of emission controls installed on mobile and stationary sources.

The last CO monitoring site in Lincoln was shut-down in 2011. It was located at 26th and O Street, a high traffic, traffic congested, street canyon location. The 2009-11 DVs (i.e., the last 3 years the site operated) from the Lincoln site were at 11% and 31% of the 1-hour and 8-hour NAAQS.

Currently there are 2 CO monitoring sites remaining in Nebraska. One is at 78th and Dodge, a high traffic, traffic congested, valley location. The other is at the NCore site at 4102 Woolworth Ave. The NCore site is an urban-scale site designed to provide ambient air quality data typical of the urban core. CO monitoring at this site is required pursuant to 40 CFR Part 58 Appendix D.

Higher CO levels are seen at the 78th & Dodge site than at the NCore site, as anticipated. See Table B-2 in Attachment B for 2012 thru 2014 data including the 2012-14 DV. The CO levels in the Omaha MSA are in attainment with the NAAQS with maximum 2012-14 DVs at 7% of the 1-hour NAAQS and 26% of the 8-hour NAAQS.

South Dakota also ran a background site in Union County prior to 2014, which is in the Sioux City MSA. Maximum CO levels found at this site were below 5% of the 1-hour and 8-hour NAAQS. Table B-2 in Attachment B contains 2012 and 2013 data from this site.

Attachments G & H contain justifications for siting of the near-road $NO_2$ monitor at 78th & West Dodge. The same criteria that make this the optimum near-road site for $NO_2$, also apply to CO.

Thus the current CO monitoring network of two sites in Omaha is adequate, and there are no reasons to seek additional or alternative sites within Nebraska.

B) **Nitrogen Dioxide ($NO_2$):**

Nitrogen Oxides (NOx), which includes $NO_2$, are a family of poisonous, highly reactive gases. These gases form when fuel is burned at high temperatures. NOx pollution is emitted by automobiles, trucks and various non-road vehicles (e.g., construction equipment, boats, etc.) as well as industrial sources such as power plants, industrial boilers, cement kilns, and turbines. NOx often appears as a brownish gas. It is a strong oxidizing agent and plays a major role in the atmospheric reactions with volatile organic compounds (VOC) that produce ground-level ozone (smog) on hot summer days.

Historical $NO_2$ and NOx monitoring results are discussed in Attachment E. Monitoring conducted in the 1970s and 1980s demonstrated attainment with the $NO_2$ NAAQS in place at that time (see Figures E-14 thru E-17 in Attachment E). With attainment for $NO_2$ demonstrated, monitoring for $NO_2$ was discontinued in Nebraska after 1984.

In 2010, EPA promulgated a new 1-hour $NO_2$ NAAQS of 100 ppb. EPA has provided an attainment designation of "unclassified/attainment" with respect to this NAAQS. EPA feels more monitoring information is needed to address the "unclassified" areas at near-road locations in Omaha.

A near-road monitoring site in Omaha is required by January 1, 2017 pursuant to 40 CFR part 58 Appendix D Section 4.3.2. Attachment G is DCHD's proposal to use the existing 78th and Dodge

CO site as the near-road $NO_2$ monitoring. Attachment H is NDEQ's review and concurrence with the DCHD proposal. However, the evidence available indicates that near-road locations in Omaha will be in attainment with the 100 ppb 1-hour $NO_2$ NAAQS.

- The NOy-NO concentrations at the Omaha NCore site are 35% to 43% of the NAAQS. The NOy-NO component of NOx is comprised of $NO_2$ and possibly other NOx components, thus is at least equal to $NO_2$. However, the NCore site is not a near-road location.
- More compelling are the near-road monitoring results from Minneapolis and St. Louis, both larger urban areas than Omaha, that show near-road $NO_2$ levels at 43% and 50% of the NAAQS (see Table E-3 in Attachment E). This is consistent with information gleaned from inter-agency teleconferences; that the near-road sites operating in larger metro areas are finding 1-hour $NO_2$ levels below the 100 ppb NAAQS (i.e., attainment).

Thus although the 78th and West Dodge location is proposed as the best near-road site in Omaha, NE, the actual deployment of said site is dependent upon additional funding from EPA to establish said site. This is also discussed in Section VII below.

**C) Ozone:**

Ground level ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NOx and VOC. It is an air pollutant typically associated with larger urban areas.

Attachment E contains a review of historical ozone monitoring data from the 1970s thru 2014. The most extensive monitoring has been conducted in Lincoln and Omaha. Ozone concentrations have trended downward in both of these MSAs. See Figures E-6 thru E-9.

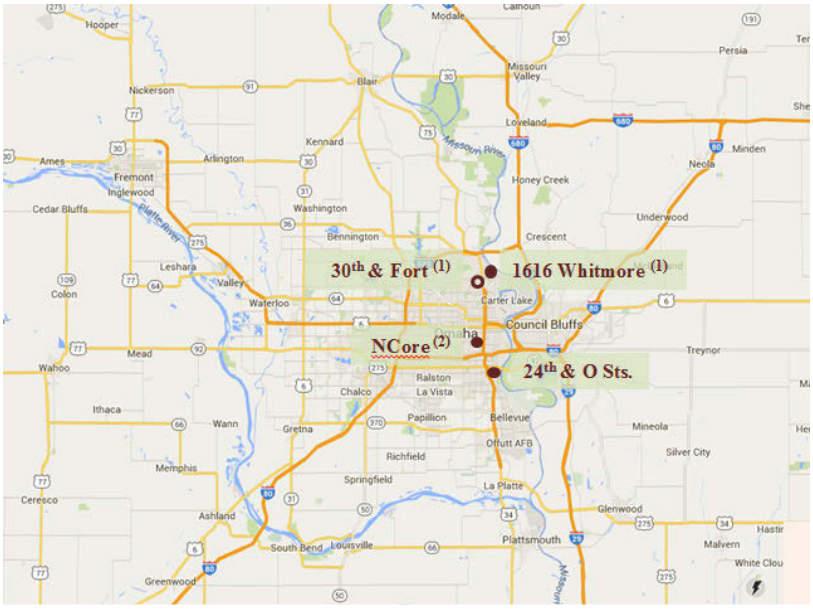
Currently there are ozone monitoring sites in the Omaha MSA (3sites in NE and 2 in IA) , the Lincoln MSA (1 site in Davey), the Sioux City MSA (1 site in Union County, SD) and near Santee, NE (an EPA CASTNET site). Figure E-9 shows how the ozone concentrations from these four locations compare from 2009 thru 2014.

The National Park Service also operated a site at the Scotts Bluff National Monument from 2010 thru 2012, and at the Agate Fossil Beds National Monument from 2007 thru 2009. Figures E-10 and E-11 show how ozone concentrations from these 2 sites compared to the other 4 locations (i.e., Omaha, Lincoln & Sioux City MSAs and Santee).

In recent years, ozone levels at all but one Nebraska location are surprisingly close with DVs in the 60 to 70 ppb range. The Davey site (Lincoln MSA) was the exception with annual 4th high values in the 50's (ppb) until 2014, when ozone levels increased to be very near those found at the other sites.

Figure VI-1 below shows the locations of the ozone monitoring sites in Omaha, NE, while Figure VI-2 shows the location of ozone monitoring sites in the Omaha MSA, as well as those in the adjacent Lincoln MSA. Figure E-5 shows the location of current and historical ozone monitoring sites in Nebraska and neighboring state areas of the Omaha and Sioux City MSAs.

**Figure VI-1: Location of Ozone Monitoring Sites in Omaha, NE**




Footnotes:

(1) The 30th & Fort St site was closed in 2015 due to construction, and relocated to 1616 Whitmore, which is approximately 1.5 miles northeast.

(2) The NCore site is located at 4201 Woolworth Ave.

**Figure VI-2: Location of Ozone Monitoring Sites in the Omaha and Lincoln MSAs**


Footnotes

(1) 30th & Fort site was closed in 2015 due to construction, & relocated to 1616 Whitmore, which is approximately 1.5 miles northeast.

(2) The NCore site is located at 4102 Woolworth Ave.

(3) Waverly site is a temporary investigative site operated in 2015.

(4) The boundaries of the Omaha MSA are not shown.

The 2012-14 DVs for the ozone monitoring sites in Nebraska and in neighboring state areas of the Omaha and Sioux City MSAs are in attainment with the revised ozone NAAQS of 70 ppm (finalized 10/1/15). See Attachment B Table B-1 for detailed information. The highest 2012-14 DV among these sites was 68 ppb at Santee. The Harrison County, IA and Pisgah, IA sites had the highest DV of the Omaha MSA sites, with both having 2012-14 DVs of 67 ppb.

Uncertified 2015 data from the EPA AirNow database, as shown in Table V-1 above, indicates that 2015 ozone levels through 9/30/15 are lower than 2014 levels. Thus it is anticipated that 2013-15 DVs will also be in attainment with the ozone NAAQS.

Figure E-13 in Attachment E shows ozone levels in Nebraska and surrounding states. The ozone concentrations being found in Nebraska are consistent with those being found in surrounding states, with the higher levels found in northeastern Colorado (Denver-Fort Collins), throughout Kansas, and in the Kansas City area likely impacting Nebraska.

Table E-6 in Attachment E provides a long term depiction of maximum ozone values in the Omaha MSA. Overall the data shows a downward trend, but also an irregular cyclic pattern. The last DV in the Omaha MSA above 70 ppb was in 2007, but if the cyclic pattern holds, a future DV above 70 ppb appears possible.

At this time DCHD anticipates maintaining the 1616 Whitmore monitoring site through 2016, and not re-establishing the 30$^{th}$ & Fort Street site. The Whitmore site recorded the highest ozone levels of all the sites in the Omaha MSA during 2015. Also the availability of the former 30$^{th}$ & Fort location is questionable.

NDEQ and LLCHD established an investigative ozone site in Waverly during 2015. The data from the Davey and Waverly site will be compared following the 2015 monitoring year. If the data indicates that ozone concentrations are higher in Waverly than Davey, then monitoring in Waverly may be continued, or the Davey site may be re-located to Waverly.

The NDEQ has been contemplating establishing an ozone site in Grand Island and possibly at other locations within Nebraska. At this time, any such deployment is not anticipated prior to 2017, except possibly a temporary investigative or special purpose site.

### D) Sulfur Dioxide ($SO_2$):

Sulfur dioxide ($SO_2$) is one of a group of highly reactive gases known as "oxides of sulfur." The largest sources of $SO_2$ emissions are from fossil fuel combustion at power plants (73%) and other industrial facilities (20%). Smaller sources of $SO_2$ emissions include industrial processes such as extracting metal from ore, and the burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment. Low sulfur fuel requirements for cars and trucks have greatly reduced $SO_2$ emissions from mobile sources. $SO_2$ is linked with a number of adverse effects on the respiratory system.

Currently there are two $SO_2$ monitoring sites in Nebraska, both are in Omaha

- The NCore site at 4102 Woolworth Ave, and
- The source-oriented site at1616 Whitmore St (i.e, source-oriented with respect to OPPD's North Omaha Station).

Both sites are demonstrating attainment with the NAAQS at 38% and 81% of the 1-hour NAAQS, respectively.

Attachment E Section 4 is a historical review of $SO_2$ monitoring results in Nebraska. Maximum annual average $SO_2$ levels were seen prior to the mid-1980s (see Figures E-20 and E-21). The

source-oriented monitoring site at1616 Whitmore Street in Omaha last recorded an annual 1-hr 99$^{th}$ percentile value above 75 ppb in 2007 (see Figures E-22 and E-23).

EPA promulgated a 1-hour $SO_2$ standard of 75 ppb in 2010. Currently EPA has given Nebraska an attainment designation of "unclassifiable" pending the gathering of additional information. On August 21, 2015, EPA promulgated new requirements in 40 CFR Subpart BB, §51.1200 - §51.1205 that detailed the additional information needed. These requirements apply to state, local and tribal (SLT) air quality authorities that have sources emitting 2000 tons or more per year of $SO_2$. There are 6 Nebraska coal-fired power plants that meet this criteria as shown in Table V-2: NPPD Gerald Gentleman Station (24,500 tpy), OPPD Nebraska City Station (16,100 tpy), OPPD North Omaha Station (11,200 tpy), NPPD Sheldon Station (3,200 tpy), Gerald Whelan Energy Center (2,900 tpy) and Lon D Wright Power Plant (2,200 tpy).

There are three alternatives that SLT authorities may pursue to meet the Part 51 requirements:
1) Install a monitoring network in the vicinity of the sources;
2) Conduct modeling that demonstrates attainment; or
3) Provide enforceable limits for the source that hold $SO_2$ emissions below 2000 tpy.
Nebraska state and local agencies will use modeling and/or enforceable limits to meet the Part 51 requirements. $SO_2$ monitoring will not be used to meet these requirements. The monitoring option would be costly, and there are too many uncertainties associated with the monitoring option to justify pursuing it.

One uncertainty is the January 1, 2017 deadline for having the monitoring network in place. If this deadline is missed then Part 51 requires that one of the other two options must be pursued. Other uncertainties include the number and location of monitors that EPA would deem sufficient, especially if modeling indicated a non-attainment situation might occur.

Summary: Current monitoring sites are indicated attainment with the $SO_2$ NAAQS. Modeling, not monitoring, will be used to evaluate attainment with respect to emission impacts from $SO_2$ sources of 2000 tpy or more. Thus, additional $SO_2$ monitoring sites are neither needed nor planned.

### E) Particulate Matter: $PM_{10}$, $PM_{2.5}$ and $PM_{10-2.5}$

Particulate matter or PM, is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles.

The size of particles is directly linked to their potential for causing health problems. EPA is concerned about particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects.

From a monitoring perspective particulates currently fall in one of three groups:

- $PM_{10}$: Comprised of particulate matter that has an aerodynamic diameter of 10 microns or less. The coarse particulate fraction of $PM_{10}$ (i.e., particulate matter with an aerodynamic diameter between 2.5 and 10 microns) originates from industrial, mining, materials handling facilities as well as dust from natural and anthropogenic origins. In most instances, the coarse fraction typically remains localized to its source of origin. Thus $PM_{10}$ monitoring is typically source-oriented.
- $PM_{2.5}$: Comprised of particulate matter that has an aerodynamic diameter of 2.5 microns or less. $PM_{2.5}$ is a significant component of smoke and haze. It can be directly emitted from

sources such as forest fires, or it can form in situ from other pollutants (e.g., ammonia, sulfur oxides and nitrogen oxides) in the atmosphere. $PM_{2.5}$ monitoring sites are typically located at neighborhood, urban or regional scale sites.

- $PM_{10-2.5}$: Comprised of particulate matter that has an aerodynamic diameter between10 and 2.5 microns. $PM_{10-2.5}$ is not measured directly, but is calculated as the difference between $PM_{10}$ and $PM_{2.5}$ levels. There is currently a single $PM_{10-2.5}$ monitoring site in Nebraska; it is at the Omaha NCore site. $PM_{10-2.5}$ monitoring is required at NCore sites.

Monitoring activities and NAAQS revisions are summarized below.

- PM monitoring was initiated in Nebraska using total suspended particulate (TSP) samplers beginning in 1959.
- EPA promulgated TSP NAAQS in 1971 and rescinded them in 1987.
- TSP monitoring in Nebraska was discontinued in 2000.
- The $PM_{10}$ NAAQS were promulgated in 1987 to replace the TSP NAAQS, and was modified in 2006.
- $PM_{10}$ monitoring was initiated in 1987 and continues to the present time.
- $PM_{2.5}$ NAAQS were promulgated in 1997, and strengthened in 2006 and 2012.
- $PM_{2.5}$ monitoring was initiated in 1999 and continues to the present time.

See Attachment E Table E-4 for a historical summary of the PM NAAQS and Table E-5 for the history of PM monitoring sites. Attachment E also contains a review of historical and current PM levels in Nebraska.

## E-1) $PM_{10}$

Currently $PM_{10}$ monitoring is conducted at 8 sites in or near 4 Nebraska communities: Omaha, Weeping Water, Cozad & Gothenburg. $PM_{10}$ monitoring is also being conducted in the Iowa portion of the Omaha MSA, the Iowa and South Dakota portions of the Sioux City MSA. All of these sites are demonstrating attainment with the $PM_{10}$ NAAQS as shown in Attachment B Table B-5a.

Historically, $PM_{10}$ monitoring has been conducted in 14 Nebraska communities as shown in Attachment E Table E-8. The number of $PM_{10}$ monitoring locations was ultimately reduced to 4 as attainment was demonstrated in the other areas. See Attachment E Section 5 for a more detailed review of $PM_{10}$ monitoring and ambient levels.

### a) Omaha MSA Sites excluding Cass County (Weeping Water area)

There are four sites in Omaha, NE and 1 site in Council Bluffs, IA. The location of these 5 sites is shown in Figure VI-4 below.

Average annual $PM_{10}$ levels in Omaha have been generally decreasing since monitoring was initiated in 1987 as shown in Table E-29.

The four sites in Omaha are operated by DCHD and are discussed in more detail below.

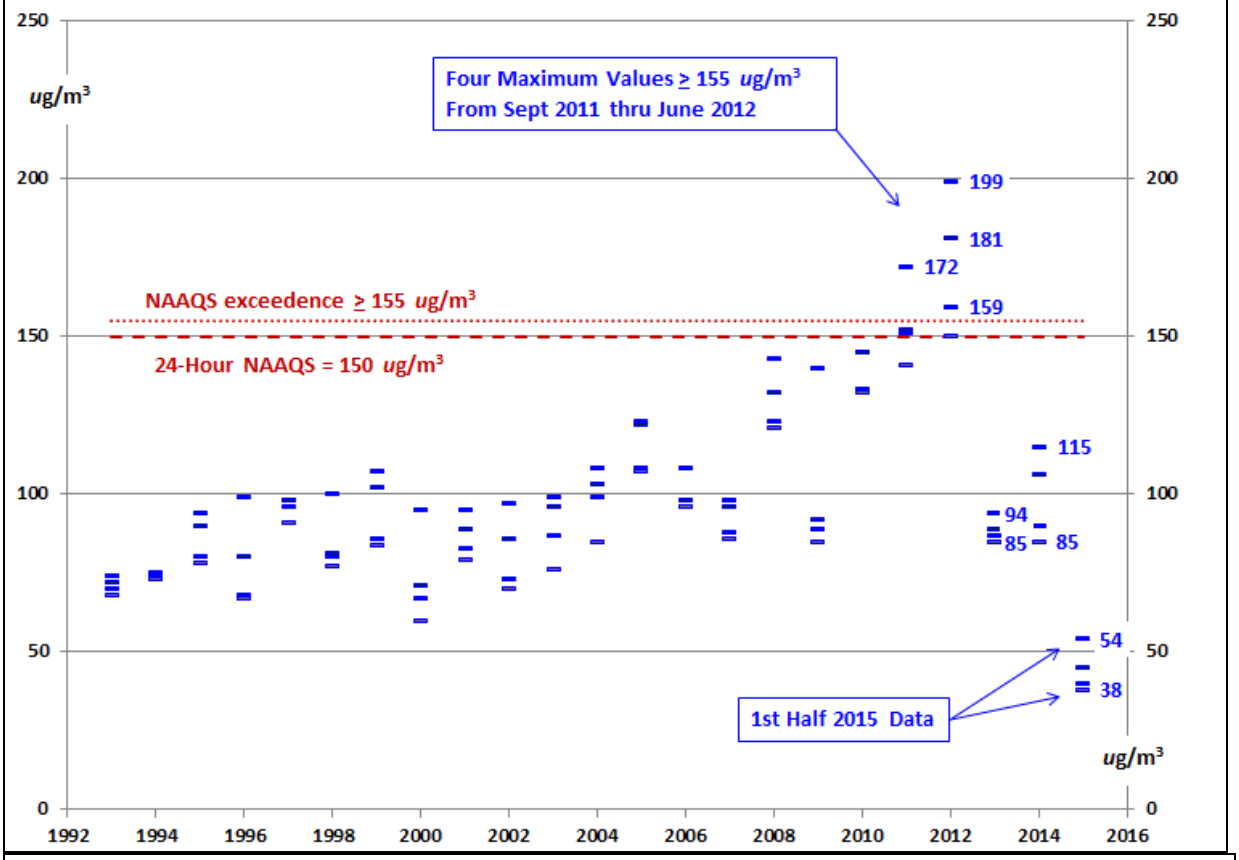
1) **46$^{th}$ & Farnam Site:** Monitoring was initiated at this site in 1993. Initially a hi-vol sampler that sampled once every 6 days was used at this site, then in 2008 a continuous Thermo FH 62 C14 sampler was installed.

   This is a source-oriented site with respect Omaha Steel Casting Company. Beginning in 2012, Omaha Steel began a staged relocation to a new facility in Wahoo, NE. The Omaha Steel facility at 46th & Farnam ceased production in 2014. Demolition of the site was started in the second-half 2015.

Figure VI-3 shows the 4 highest 24-hour $PM_{10}$ values detected from January 1993 thru June 2015. Maximum 24-hour $PM_{10}$ levels generally increased from 1993 thru 2012. From September 2011 thru June 2012, the 46th & Farnam site recorded four (4) 24-hour average $PM_{10}$ values greater than the 150 $\mu g/m^3$ standard. From 2013 to present, $PM_{10}$ values dropped dramatically as Omaha Steel undertook and completed its relocation.

DCHD has no immediate plans to close this monitoring site. Monitoring results and re-development activities will be considered as to when and whether to close this site.

**Figure VI-3: Annual Maximum [(a)] 24-Hour $PM_{10}$ values: January 1993 - June 2015**




Footnote (a): The four highest 24-hour values from each year are shown.

2) **19th & Burt Site:** Monitoring was initiated at this site in 2001. It is a middle scale site located near downtown Omaha. Hi-vol primary and collocated samplers are located at this site. It is a middle scale site located near downtown Omaha.

Monitoring at this site has always demonstrated attainment with maximum annual 24-hour $PM_{10}$ values ranging from 114 $ug/m^3$ in 2003 to 44 $ug/m^3$ in 2011. The maximum 24 hour value detected in 2012 thru 2014 was 56 $ug/m^3$ (see Table B-5a). DCHD intends to keep operating this site for the foreseeable future.

3) **2411 O Street Site:** Monitoring was initiated at this site in 1989 and continued thru 1992. In this 4 year period the highest annual 24-hour values found ranged from 105 $ug/m^3$ in 1990 to 61 $ug/m^3$ in 1991. Monitoring was discontinued after 1992.

Monitoring was re-initiated in 2007 in response to citizen air quality concerns. From

2007 thru 2014, maximum annual 24-hour $PM_{10}$ values ranged from 83 $u g/m^3$ in 2008 to 47 $u g/m^3$ in 2009. The maximum 24-hour value detected in 2012 thru 2014 was 74 $u g/m^3$ (see Table B-5a).

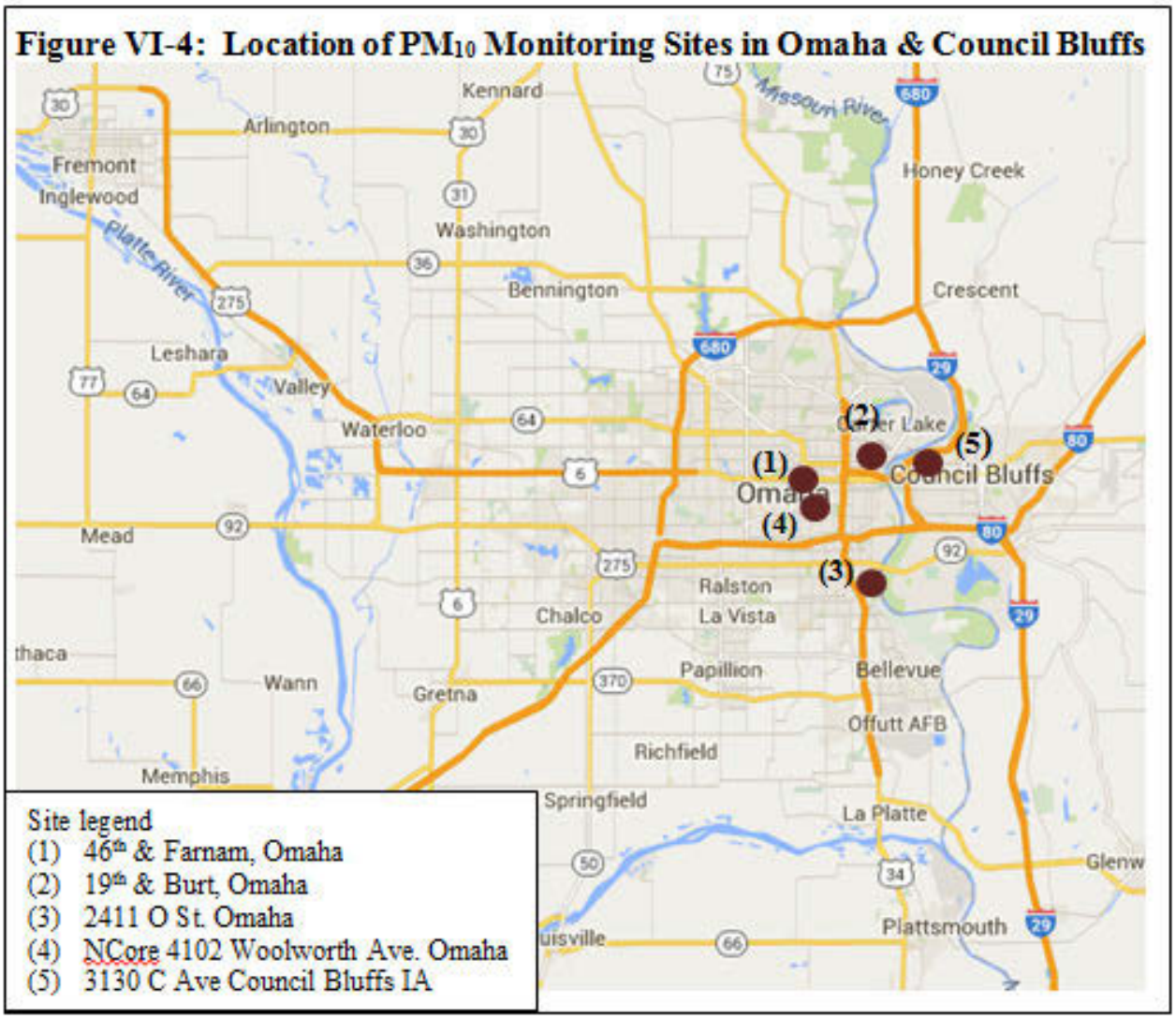
This is a neighborhood scale site. A hi-vol sampler is used on a once every 6 days schedule. There is a seasonally-operated ozone sampler also located at this site, too. DCHD intends to keep operating the $PM_{10}$ sampler (and ozone monitor) at this site for the foreseeable future.

4) **NCore Site At 4102 Woolworth Ave:** $PM_{10-2.5}$ monitoring is required at all NCore sites pursuant to 40 CFR Part 58 Appendix D. To accomplish this DCHD operates two continuous Met One BAM samplers, one configured to sample for $PM_{2.5}$ and the other configured to sample for $PM_{10}$. The NCore site is a neighborhood-scale site.

$PM_{10}$ monitoring was initiated in 2011. The annual maximum 24-hour $PM_{10}$ values found at the NCore site are: 86 $u g/m^3$ in 2011, 74 $u g/m^3$ in 2012, 62 $u g/m^3$ in 2013 and 75 $u g/m^3$ in 2014 (also see Table B-5a).

DCHD has no plans to change the current $PM_{10}$ or $PM_{2.5}$ sampler-types or configurations at the NCore site.

**Figure VI-4: Location of $PM_{10}$ Monitoring Sites in Omaha & Council Bluffs**



**b) Cass County - Weeping Water Area Sites**

The NDEQ began $PM_{10}$ monitoring in the Weeping Water area in 1988, and currently operates 2 sites.

- The WW City site located at the city wastewater treatment facility. This is a neighborhood scale, population and source-oriented site located in the city of Weeping Water. The Potash Corporation fertilizer and feed additive processing facility is located ¼ mile east of this site. Filter based primary and collocated sequential 2025 samplers are used at this site and operate on once every 3 day and once every 6 day schedules, respectively.
- The WW Farm site is located 2 miles west of the city in an agricultural setting. This is a neighborhood scale, source-oriented site. The Kerford Limestone Company mining and Iowa Limestone Company aggregate processing facilities are located 0.3 miles west of this site. A continuous TEOM sampler is used at this site

Annual average concentrations in the Weeping Water area have generally declined from 1988 to 2014 as shown in Figure E-30. In 2008, Martin Marietta moved their mining and processing facility located on the west edge of Weeping Water to a new location approximately 2 miles SW of the city. The new facility has better emission controls than the previous one. $PM_{10}$ concentrations at the city site have dropped dramatically since this move.

As shown in Attachment B Table B-5a, 24-hour $PM_{10}$ levels at both sites are in attainment with the 150 $u$g/m$^3$ NAAQS over the 2012-14 time frame. There was one 24-hour value at the WW Farm site that was over 150 $u$g/ m$^3$: a 179 $u$g/m$^3$ value on 1/5/12. Attainment with the NAAQS is evaluated over a 3-year time-frame, such that no more than 3 exceedences are allowed in the 3-year time-frame.

There was such an event in 2010 when four 24-hour $PM_{10}$ values exceeded 150 $u$g/m$^3$ between October 20$^{th}$ and November 26$^{th}$ at the Weeping Water Farm site (10/20 @ 176, 10/26 @ 249, 10/27 @ 306 & 11/26 @ 209). Sources were notified and a similar episode has not re-occurred.

The NDEQ intends to continue to operate both the WW City and WW Farm sites for the foreseeable future. The NDEQ is anticipating upgrading the WW City site with a continuous MetOne BAM sampler to replace the primary and collocated filter-based samplers currently deplored there. The current samplers are more than 10 years old and in need of replacement.

**c) Dawson County – Cozad and Gothenburg Sites**

Monitoring in Gothenburg was initiated in 1991 and in Cozad in 1994. Monitoring in both communities was initiated in response to citizen concerns over dust or particulate levels. The primary sources in both communities were alfalfa dehy facilities (i.e., facilities that grind, dry and pelletize hay into feed). Both communities also have other grain and feed handling facilities. Both the Cozad and Gothenburg sites are neighborhood scale, population and source-oriented sites (see Attachment A).

The 2012-14 monitoring results are indicating that $PM_{10}$ levels are less than 50% of the NAAQS (see Attachment B Table B-5a) in both communities. Annual average $PM_{10}$ concentrations have generally declined over-time since monitoring was initiated. Both sites saw significant declines beginning in 2006/2007 (see Attachment E Tables E-31 & E-32). Since 2007 the annual 24-hour maximum exceeded 100 $u$g/m$^3$ (67% of the NAAQS) two

times at Cozad ( 119 *u*g/m$^3$ in 2007 & 120 *u*g/m$^3$ in 2011), and one time at Gothenburg (139 *u*g/m$^3$ in 2011. The 24-hour maximums thru the first half of 2015 were 46 *u*g/m$^3$ at Cozad and 45 *u*g/m$^3$ at Gothenburg.

The R&P 2025 samplers deployed at this site are over 10 years old and in need of replacement. Based on monitoring results from the last several years, and barring some unexpected increase in $PM_{10}$ levels in the 2$^{nd}$ half of 2015, the NDEQ does not feel it is justified to upgrade and maintain these sites. Thus it is proposed that the Cozad and Gothenburg $PM_{10}$ sites be closed at the end of 2015.

**E-2) $PM_{2.5}$**

Attachment E Section V.C provides a thorough review of the current and historical $PM_{2.5}$ network in Nebraska. Currently there are 7 $PM_{2.5}$ monitoring sites in the Nebraska SLAMS. Four sites in the Omaha MSA operated by DCHD (Berry St in Omaha, NCore in Omaha, Bellevue and Blair); one site in Lincoln operated by LLCHD, and one site each in Grand Island and Scottsbluff operated by the NDEQ.

In the Omaha MSA there is also a site in Council Bluffs, IA operated by the IA DNR. Figure VI-5 below shows the location of the five $PM_{2.5}$ monitoring sites currently operating the Omaha MSA.

Similarly in the Sioux City MSA, there is one site in Iowa operated by the IA DNR and one site in South Dakota operated by the SD DENR.

The results from all of these sites (i.e., sites in Nebraska and adjacent state areas of the Omaha & Sioux City MSAs) are indicating attainment with the NAAQS. The 2012-14 DVs were less than 70% of the 35 *u*g/m$^3$ 24-hour NAAQS and less than 85% of the 12 *u*g/m$^3$ annual average NAAQS. See Attachment B Tables B-6a and B-6b.

As $PM_{2.5}$ forms in situ, and is a component of smoke and haze. As such it is subject to considerable more transport than $PM_{10}$. $PM_{2.5}$ sites are generally not closely source-oriented.

**Figure VI-5: $PM_{2.5}$ Monitoring Sites in the Omaha MSA**

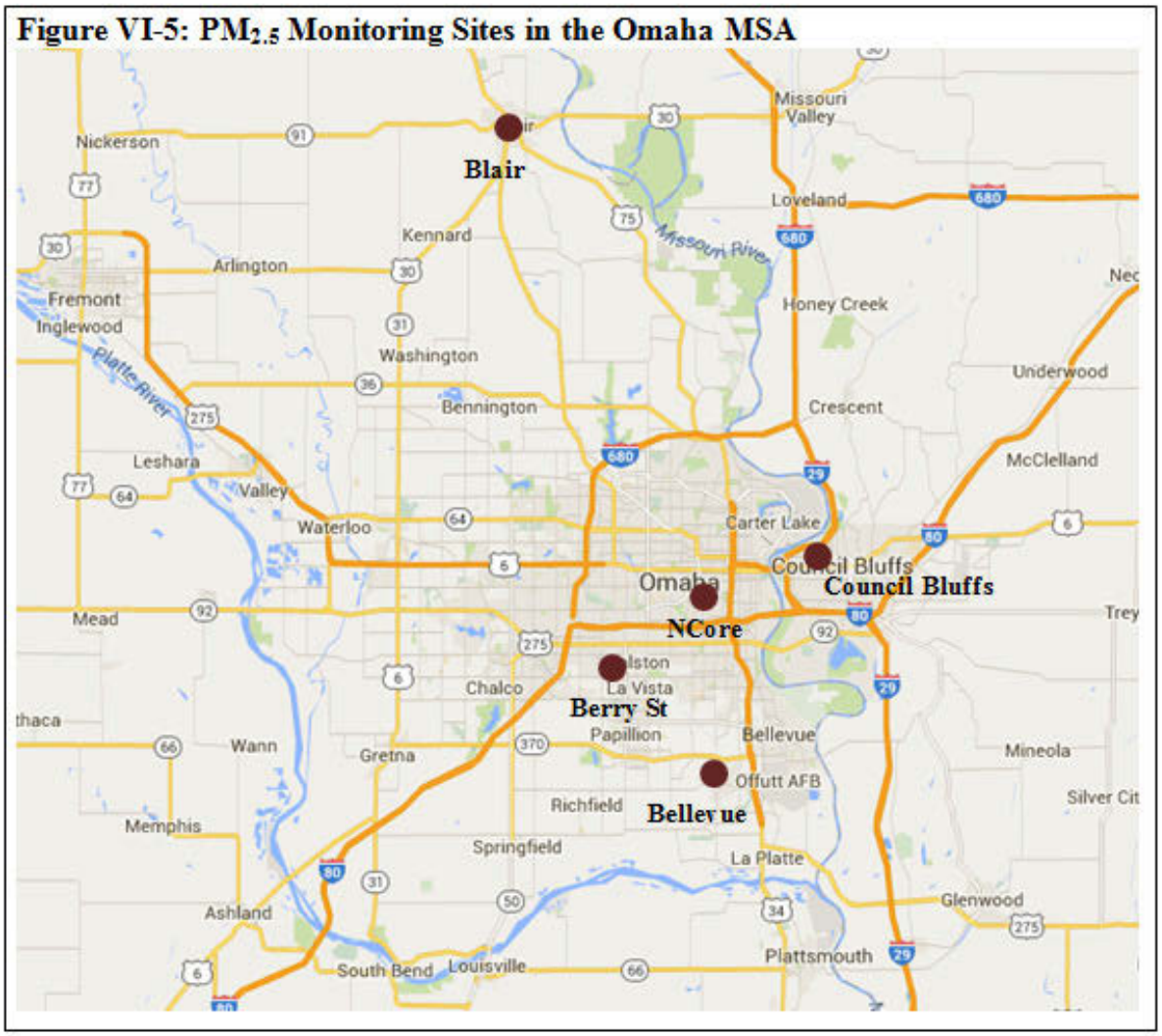
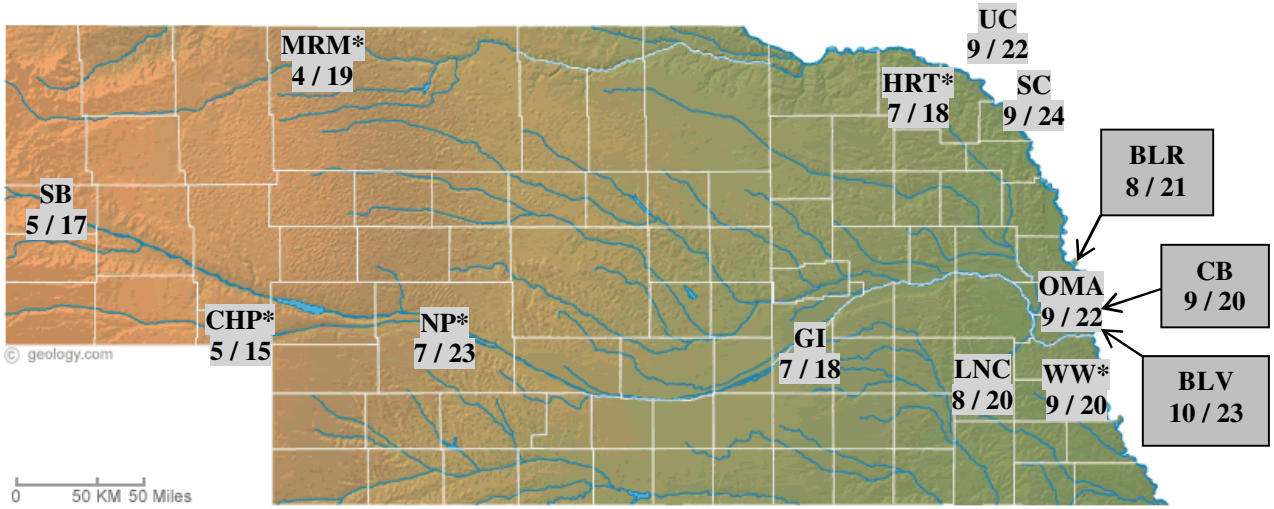


**Figure VI-6: Annual Average & 24-Hour $PM_{2.5}$ Design Values & Extrapolated Design Values for Historical Sites** [(a) (b) (c)]




Footnotes:

(a) The site letter designations are explained in Attachment E, Figure E-33. The first number is the 2012-14 annual average design value (DV), which is the 3 year average of the 2012-14 annual averages. The second number is the 2012-14 99th percentile DV, which is the 3 year average of the 2012-14 99th percentile values.

(b) Sites marked with a * were not operating in 2014. The 2014 DV for these sites were estimated using the data trends from nearby sites. See Attachment E Section V.C and Figure E-33 for details.

(c) Annual Average NAAQS = 12 $\mu g/m^3$ & 99th Percentile NAAQS = 35 $\mu g/m^3$

Figure VI-6 shows the locations of current and historical $PM_{2.5}$ monitoring sites (also see Figure E-33 in Attachment E). Figure VI-6 (Figure E-33) shows the 2012-14 DVs for the current sites and extrapolated 2012-14 DVs for four historical sites. Figures VI-6 and E-33 indicate that $PM_{2.5}$ levels are highest in the Omaha, Lincoln and Sioux City MSAs, and decrease as one travels westward through the state.

This is in contrast to ozone, which is also formed in situ, whose concentrations are more ubiquitously similar through-out the state and in surrounding state areas. See the ozone concentration map in Attachment E Figure E-13.

Also, the Nebraska panhandle appears to be less impacted by transport from Denver/Fort Collins with respect to $PM_{2.5}$ than it is for ozone. Although $PM_{2.5}$ levels in Colorado are also not as high as ozone when expressed as a percent of the NAAQS; i.e., the maximum 2012-14 ozone DV in Denver is 117% of the 70 ppb NAAQS, while the maximum $PM_{2.5}$ DVs are at 83% of the NAAQS.

As shown in Attachment E, Figures E-34 to E-38 ozone levels are decreasing at all 4 of the current monitoring locations in Nebraska: Omaha, Lincoln, Grand Island and Scottsbluff.

As shown in Figures VI-5 and VI-6, the current and historical $PM_{2.5}$ network provides good state-wide coverage. At this time the NDEQ feels the current $PM_{2.5}$ monitoring network is providing adequate coverage of the state. There are no plans to add, close or relocate $PM_{2.5}$ sites at this time.

## F) Lead:

Lead (Pb) is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been from fuels in on-road motor vehicles (i.e., cars and trucks using leaded gasoline), lead mining and processing facilities, and industrial sources. It exists as particulate matter in the atmosphere. It is monitored using total suspended particulate (TSP) samplers, although in certain cases $PM_{10}$ samplers can also be used. All lead sampling in Nebraska is conducted with TSP samplers. Attachment E, Section VI discusses historical lead levels in Nebraska from 1959 thru 2014.

Today in the USA, the highest levels of lead in air are usually found near lead smelters and lead mining areas. Historically, the ASARCO lead refinery in Omaha was Nebraska's largest stationary-source, lead emitter. The ASARCO facility closed in 1997, and Nebraska does not have any lead smelting or mining facilities at this time. Today, Nebraska's largest lead emitters are foundries, as discussed below.

EPA regulations phased-out the use of leaded gasoline from 1975 thru 1986. Lead emissions from the transportation sector dramatically declined by 95 percent between 1980 and 1999, and nation-wide levels of lead in the air decreased by 94 percent between 1980 and 1999. By 1998 all areas o Nebraska were in attainment with the NAAQS that applied at that time. See Figures E-39 and E-40 in Attachment E.

EPA promulgated the first lead NAAQS in 1978. It was set at 1.5 $u$g/m$^3$ based on a calendar quarter average that was not to be exceeded. All areas of Nebraska were in attainment with this NAAQS by 1998 after the closure of the ASARCO facility. Lead monitoring was discontinued after 2002. See Figures E-39 and E-40.

In 2008, EPA strengthened the lead NAAQS to 0.15 $u$g/m$^3$ based on running 3-month averages that were not to be exceeded. Monitoring was required by 2010 near sources that emitted 1 ton per year or more of lead, and by 2012 near sources emitting 0.5 tpy or more. Also in 2012, lead monitoring was required at the Omaha NCore site.

As explained in Attachment E Section VI, Nebraska had two sites that met the 1 tpy threshold: Magnolia Metals in Auburn and Magnus In Fremont. Monitoring was initiated in 2010 near these facilities. Lead monitoring was initiated in 2012 at the Omaha NCore site.

There is one additional site, Nucor Steel in Norfolk, that met the 0.5 tpy threshold. Nucor Steel submitted modeling showing lead levels around the facility would not exceed 50% of the NAAQS. NDEQ and EPA concurred with the modeling results. In accordance with 40 CFR Part 58 Appendix D, the requirement for monitoring near Nucor was waived. See Attachment E Section VI for additional details.

Lead monitoring is currently conducted at 3 locations in Nebraska: Auburn, Fremont and Omaha. The monitoring is showing attainment at all 3 sites; see Figures E-42.

As described in Attachment F, Magnolia Metals in Auburn has installed emission controls since 2010. Lead emissions from this facility have been reduced to 0.1 tpy (20% of the monitoring requirement threshold) and ambient lead levels monitored at the site have dropped to less than 5% of the NAAQS. Thus, the NDEQ is proposing to close this site as described and justified in Attachment F.

No other changes or additions to the lead monitoring network are planned or anticipated.

### G) Total Reduced Sulfur (TRS)

The NDEQ operates a TRS site to monitor compliance with the Nebraska TRS standard set forth in Chapter 4 of NDEQ Title 129: Nebraska Air Quality Regulations. The 30-minute average TRS standard is 0.1 ppm.

As discussed in Attachment E Section 7, this site, along with other sites in South Sioux City and Lexington were established to monitor TRS levels in the vicinity of anaerobic lagoons operated by IBP in those communities. Those lagoons were covered in 2000 and ambient TRS levels dropped precipitously thereafter. See Figures E-43 and E-44.

The last excursion of the NE TRS standard was in May 2010, an excursion of 40 minutes with a maximum 30-minute average of 0.137 ppm. The maximum 30-minute average recorded in the 1st half of 2015 was 0.035 ppm.

The analyzer and calibration available for TRS is more than 10 years old and in need of replacement. With the standard being met continuously for the last 5 years, the NDEQ feels it prudent to close this site at the end of 2015, unless there are significant increases in the TRS levels in the 2nd half of 2015.

## VII. Anticipated Nebraska Air Monitoring Network Modifications

This section contains a bulleted summary of the Nebraska SLAMS and TRS monitoring network modifications discussed in Section VI. Discussion of the impact of the changes on the NDEQ monitoring program are also included.

### A) Omaha MSA: Sites Operated by DCHD

- NCore site: No changes.
- Carbon monoxide (CO): Two sites operating: 78th & Dodge and NCore sites. No changes anticipated.
- Ozone: Three sites operating: 1616 Whitmore, 2411 O St. and NCore sites.
  - The 30th & Fort site was relocated to 1616 Whitmore St (an existing $SO_2$ site) in 2015 due to construction activity. The 1616 Whitmore site will be retained thru 2016 and possibly beyond. The 30th & Fort site will not be re-established in 2016, and possibly never.
  - No other changes in the DCHD ozone network are anticipated.
- Nitrogen Dioxide ($NO_2$): No sites currently operating.
  - Near-road $NO_2$ monitoring is currently required by January 1, 2017 as set forth in 40 CFR Part 58 Appendix D. Attachments G & H identify 78th & West Dodge as the best site for the near-road $NO_2$ site. NDEQ notes that monitoring results from larger metropolitan areas are demonstrating attainment at their near-road sites. Thus the commitment to establish this site is contingent upon EPA committing funding to establish this site.
  - The NCore site monitors for NO and NOy. The NO-NOy parameter will be equal to or greater than $NO_2$. Attainment is indicated by the NO-NOy results.
- Sulfur Dioxide ($SO_2$): Two sites operating: 1616 Whitmore and NCore sites. No changes anticipated.
- NDEQ will utilize modeling to evaluate attainment in areas potentially impacted by sources emitting 2000 tons per year or more of $SO_2$.

- $PM_{10}$: Four sites operating: 2411 O St, 46th & Farnam, 19th & Burt and NCore sites. One possible change, a closure.
  - The 46th & Farnam site is source oriented with respect to Omaha Steel, which discontinued operations at this site at the end of 2014. Site demolition is ongoing in the second half of 2015. DCHD will evaluate the need for this site after demolition is completed, taking into consideration redevelopment plans and $PM_{10}$ levels. DCHD anticipates operating the site through 2016 and possibly beyond at this time, but closure in 2016 is not precluded.
- $PM_{2.5}$: Four sites operating: Berry St, Bellevue, Blair and NCore sites. No changes anticipated.
- TSP-Pb: One site operating: NCore site. No changes anticipated.

**B) Omaha MSA- Cass County: Weeping Water Sites operated by NDEQ**

- $PM_{10}$: Two sites operating: Weeping Water City and Weeping Water Farm sites. No site changes. Replacement of older R&P 2025 primary and collocated samplers with a continuous MetOne BAM sampler is anticipated in 2016.

**C) Lincoln MSA: Sites Operated by LLCHD**

- Ozone: One SLAMS site operated at Davey and one temporary investigative site operated at Waverly during 2015. Ozone levels from both sites will be reviewed at the end of the 2015 monitoring year to determine which has higher ozone levels. If ozone levels in Waverly are higher, then re-location of the ozone monitor could be undertaken.
- $PM_{2.5}$: One site operating: 3140 N Street site. No changes anticipated.

**D) Sioux City MSA: One TRS Site Operated by NDEQ**

Propose closing th Pine Stree site at the end of 2015. Consistent compliance has been demonstrated for the last 5 years. Equipment will need to be replaced if this site is not closed.

**E) Grand Island MSA: One $PM_{2.5}$ Site Operated by NDEQ**

- $PM_{2.5}$: The Nebraska transport site is located at the Grand Island Senior High. No changes.
- Ozone: No sites operating or required. NDEQ was considering opening an ozone site in the Grand Island MSA in 2016. Based on the low ozone levels found in the current 2012-14 design period, a deployment determination is being deferred at this time.

**F) Scottsbluff MiSA: One $PM_{2.5}$ Site Operated by NDEQ**

This is Nebraska's background $PM_{2.5}$ site. it is located at the Scottsbluff High School. No changes are anticipated.

**G) Dawson County: Cozad and Gothenburg $PM_{10}$ Site Operated by NDEQ**

NDEQ is proposing closing both of these sites at the end of 2015. $PM_{10}$ levels at both sites are in attainment with the NAAQS by a significant margin, and have been for several years. Annual average PM10 values are decreasing at both sites.

## H) Closure of the NDEQ $PM_{10}$ Lab

After the closure of the Cozad and Gothenburg sites, and deployment of a continuous sampler at the Weeping Water city site, the NDEQ will no longer need to operate the $PM_{10}$ lab for processing and weighing filters. This will provide a significant savings in FTE resources that can be deployed elsewhere.

## I) IMPROVE Network:

EPA is evaluating siting priorities within the IMPROVE network. If EPA determines that either or both of Nebraska's IMPROVE sites are low priority such that §103 funding for their continued operation is cut, then NDEQ will work with EPA to facilitate their closure.

## J) Other Considerations

The NDEQ is proposing 3 site closures and one site upgrade. Both site closures and upgrades require resources and time (i.e., FTEs) to complete.

## Omaha NCore Site Operated by DCHD

| | |
|---|---|
| **Site Name: Omaha NCore** [1]<br>**Location: 4102 Woolworth St., Omaha** | AIRS ID: 31-055-0019 [1]<br>Latitude: 41.246792º Longitude: -95.973964º |
| Operating Agency: Douglas County Health Department | |
| Purpose: NCore | Scale: Neighborhood |
| **Monitor/Pollutant: Carbon Monoxide (CO) - Trace Level** | |
| Type/POC: Primary / POC 001 | Monitoring Frequency: Continuous |
| Analyzer/Sampler: Thermo 48i-TLE | EPA Method: RFCA-0981-054 (AQS 554) |
| Start-Up Date: 1/20/11 | Closure Date: Currently operating |
| **Monitor/Pollutant: Ozone ($O_3$)** | |
| Type/POC: Primary / POC 001 | Monitoring Frequency: Continuous |
| Analyzer/Sampler: Thermo 49i | EPA Method: EQOA-0880-047 |
| Start-Up Date: 4/1/11 | Closure Date: Currently operating |
| **Monitor/Pollutant: Nitrogen Oxides ($NO/NO_y$)** | |
| Type/POC: Primary / POC 001 | Monitoring Frequency: Continuous |
| Analyzer/Sampler: Thermo 42i NO/NO2/NOx | EPA Method: RFNA-1289-074 |
| Start-Up Date: 1/20/11 | Closure Date: Currently operating |
| **Monitor/Pollutant: Sulfur Dioxide ($SO_2$) – Trace Level** | |
| Type/POC: Primary / POC 001 | Monitoring Frequency: Continuous |
| Analyzer/Sampler: Thermo 43i-TLE | EPA Method: EQSA-0486-060 (AQS 560) |
| Start-Up Date: 1/20/11 | Closure Date: Currently operating |
| **Monitor/Pollutant: $PM_{2.5}$** | |
| Type/POC: Primary Continuous / POC 001 | Monitoring Frequency: Continuous |
| Analyzer/Sampler: Met One BAM-1020 [3] [4] | EPA Method: EQPM-0308-170 |
| Start-Up Date: 2/1/04 [3] | Closure Date: Currently operating |
| **Monitor/Pollutant: $PM_{2.5}$** | |
| Type/POC: Collocated [2] / POC 002 | Monitoring Frequency: Once every 6 days [2] |
| Analyzer/Sampler: 2025 Sequential | EPA Method: RFPS-0498-118 |
| Start-Up Date: 1/1/99 | Closure Date: Currently operating |
| **Monitor/Pollutant: $PM_{2.5}$ Speciation** | |
| Type/POC: Speciation / POC 005 [6] | Monitoring Frequency: Once every 3 days |
| Analyzer/Sampler: $PM_{2.5}$ Speciation | Sampler Type: SASS and a 3000 URG |
| Start-Up Date: 5/25/01 | Closure Date: Currently operating |
| **Monitor/Pollutant: $PM_{10}$ – STP & Local Conditions** | |
| Type/POC: Continuous [3] / POC 001 | Monitoring Frequency: Continuous |
| Analyzer/Sampler: Met One BAM-1020 [4] | EPA Method: EQPM-0798-122 |
| Start-Up Date: 1/1/11 [4] | Closure Date: Currently operating |
| **Monitor/Pollutant: $PM_{10-2.5}$ – Local Conditions** | |
| Type/POC: Continuous [3] / POC 001 | Monitoring Frequency: Continuous |
| Analyzer/Sampler: Met One BAM-1020 [4] | EPA Method: EQPM-0709-185 |
| Start-Up Date: 1/1/11 [4] | Closure Date: Currently operating |
| Continued on next page | |

## Omaha NCore Site Operated by DCHD

**Site Name: Omaha NCore** AIRS ID: 31-055-0019 (See Comment 1)
**Location: 4102 Woolworth St., Omaha** Latitude: 41.246792º Longitude: -95.973964º
Operating Agency: Douglas County Health Department (continued from previous page)

**Monitor Information – Lead (Pb)**

Type/POC: Primary / POC 1
Analyzer/Sampler: Hi-Vol TSP-Pb (ICP-MS)
Start-Up Date: 12/1/12
Monitoring Frequency: Once every 6 days
EPA Method: EQL-0310-189
Closure Date: Currently operating

**Meteorological Parameters – Manufacturer & Model – Start Date**

Wind Direction & Velocity – MetOne 50.5 Sonic - 5/13/11
Temperature - MetOne Model 083D – 4/12/11
Barometric Pressure – MetOne Model 090D – 4/12/11
Relative Humidity – MetOne 083D – 4/12/11
Solar Radiation – MetOne Model 096-1 – 4/12/11
Closure Date: Currently operating

**Atmospheric Radiation – RadNet Air Monitor**

RadNet is a nationwide system that monitors the nation's air, drinking water, precipitation, and pasteurized milk to determine levels of radiation in the environment. RadNet sample analyses and monitoring results provide baseline data on background levels of radiation in the environment and can detect increased radiation from radiological incidents. The RadNet monitor is not subject to the network planning process set forth in 40 CFR Part 58.10. It is recognized in this Network Plan for informational purposes only. The RadNet monitor began operating at the Woolworth site in June 2006.

Comments:

1. Site History: Site 31-055-0019 was referred to as the "Woolworth site" through 12/31/10. The Woolworth site was a PM monitoring site with $PM_{2.5}$ filter-based, continuous and speciation monitors located on the roof of Douglas County Hospital. To accommodate NCore monitoring more space was required and the site was moved approximately 550 ft north to the roof of an adjacent/attached building. The move was initiated in December 2010 with the moving of the $PM_{2.5}$ monitors.
2. The POC 1 filter-based sequential monitor was used as the primary site monitor for NAAQS attainment evaluation through September 2009. At that point, it was converted to the collocated sampler with the POC 3 continuous monitor becoming the primary monitor. The POC 2 collocated sampler was shut down after taking the 9/22/09 sample.
3. The POC 3 continuous $PM_{2.5}$ monitor operated from 2/1/04 thru 1/5/09 using an R&P TEOM continuous $PM_{2.5}$ monitor. The TEOM monitor is not an FRM/FEM. On 1/6/09 a Met One BAM monitor was brought on line. The Met One BAM monitor is an FEM. Through September 2009 the BAM unit was run as an auxiliary monitor for AirNow and AQI reporting purposes. A review found good correlation between the POC 1 and POC 3 data. On October 1, 2009 the POC 3 monitor was designated the primary monitor for evaluating NAAQS attainment status. On January 1, 2011 the continuous monitor was re-designated as POC 1, to facilitate AQS data analysis issues.
4. Between 10/28/10 and 1/3/11, the $PM_{2.5}$ Met One BAM-1020 was temporarily removed from service so that it could be reconfigured to operate as the $PM_{2.5}$ portion of a dichotomous $PM_{10-2.5}$ monitoring system. The other part of the dichotomous $PM_{10-2.5}$ monitoring system is a $PM_{10}$ Met One BAM-1020, which is configured to report $PM_{10}$ data in local and STP conditions. The dichotomously-configured $PM_{2.5}$ and $PM_{10}$ BAM units, which comprise the $PM_{10-2.5}$ monitoring system, were put on-line on 1/1/11.
5. The POC 5 speciation monitor is comprised two speciation samplers: a SASS and a 3000 URG. The speciation data derived from both samplers are reported as POC 005 results.

## Carbon Monoxide Sites in the Omaha MSA that are Operated by DCHD

| | |
|---|---|
| **Site Name: 78th & Dodge – Omaha**<br>**Location: 78th St and W Dodge Rd, Omaha** | AIRS ID: 31-055-0056<br>Latitude: 41.259175º Longitude: -96.028628º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: Thermo 48c<br>Purpose: Highest Concentration<br>Start-Up Date: 10/01/07 | **Pollutant: Carbon Monoxide (CO)**<br>Monitoring Frequency: Continuous<br>EPA Method:<br>Scale: Microscale<br>Closure Date: Currently operating |
| Comments: None | |

## Sulfur Dioxide Sites in the Omaha MSA that are Operated by DCHD

| | |
|---|---|
| **Site Name: Whitmore – Omaha**<br>**Location: 1616 Whitmore St, Omaha** | AIRS ID: 31-055-0053<br>Latitude: 41.297778º Longitude: -95.937500º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: Thermo 43c-tle<br>Purpose: High Conc. & Population Oriented<br>Start-Up Date: 7/1/99 | **Pollutant: Sulfur Dioxide ($SO_2$)**<br>Monitoring Frequency: Continuous<br>EPA Method: EQSA-0486-060<br>Scale: Neighborhood<br>Closure Date: Currently operating* |
| Comments: In 2015, an ozone monitor was also located at this site. | |

## Ozone Sites in the Omaha MSA that are Operated by DCHD

| | |
|---|---|
| **Site Name: South Omaha – Ozone**<br>**Location: 2411 O Street, Omaha** | AIRS ID: 31-055-0028<br>Latitude: 41.207500º Longitude: -95.947500º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: Thermo 49C<br>Purpose: Population Oriented<br>Start-Up Date: 7/1/78 | **Pollutant: Ozone ($O_3$)**<br>Monitoring Frequency: Continuous<br>EPA Method: EQOA-0880-047<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments: There is also a $PM_{10}$ monitor located at this site. | |

| | |
|---|---|
| **Site Name: Whitmore – Omaha**<br>**Location: 1616 Whitmore St, Omaha** | AIRS ID: 31-055-0053<br>Latitude: 41.297778º Longitude: -95.937500º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: Thermo 49C<br>Purpose: Population Oriented<br>Start-Up Date: 5/1/81 | **Pollutant: Ozone ($O_3$)**<br>Monitoring Frequency: Continuous<br>EPA Method: EQOA-0880-047<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comment: The ozone monitor from the 30th & Fort St. site was re-located to this site in 2015, due to construction activities. | |

| | |
|---|---|
| **Site Name: 30th & Fort - Omaha**<br>**Location: 30th & Fort Sts., Omaha** | AIRS ID: 31-055-0035<br>Latitude: 41.306111º Longitude: -95.960278º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: Thermo 49C<br>Purpose: Population Oriented<br>Start-Up Date: 5/1/81 | **Pollutant: Ozone ($O_3$)**<br>Monitoring Frequency: Continuous<br>EPA Method: EQOA-0880-047<br>Scale: Neighborhood<br>Closure Date: 11/1/14 (may be temporary) |
| Comments: Re-located to 1616 Whitmore St at the end of the 2014 monitoring season due to construction activity. | |

## $PM_{2.5}$ Sites in the Omaha MSA that are Operated by DCHD (Continued)

| | |
|---|---|
| **Site Name: Berry Street Omaha**<br>**Location: 9225 Berry Street, Omaha** | AIRS ID: 31-055-0052<br>Latitude: 41.333056º Longitude: -96.099722º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: 2025 Sequential<br>Purpose: Population & Source Oriented<br>Start-Up Date: 1/1/99 | **Pollutant: $PM_{2.5}$**<br>Monitoring Frequency: Once every 3 days<br>EPA Method: RFPS-0498-118<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| **Monitor Information**<br>Type/POC: Collocated / POC 002<br>Analyzer/Sampler: 2025 Sequential<br>Purpose: Population & Source Oriented<br>Start-Up Date: 10/1/14 | **Pollutant: $PM_{2.5}$**<br>Monitoring Frequency: Once every 6 days<br>EPA Method: RFPS-0498-118<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments: None | |

| | |
|---|---|
| **Site Name: Bellevue**<br>**Location: 2912 Coffey Ave., Bellevue** | AIRS ID: 31-153-0007<br>Latitude: 41.166944º Longitude: -95.923889º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary Continuous / POC 001<br>Analyzer/Sampler: Met One BAM-1020 (1)<br>Purpose: Population & Source Oriented<br>Start-Up Date: 3/1/99 | **Pollutant: $PM_{2.5}$**<br>Monitoring Frequency: Continuous<br>EPA Method: EQPM-0308-170<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments:<br>(1) This site was operated with a 2025 sequential sampler from 3/1/99 thru 6/30/10 (RFPS-0498-118). On 7/1/10 a Met One BAM monitor began operating. | |

| | |
|---|---|
| **Site Name: Blair**<br>**Location: 2242 Wright St., Blair** | AIRS ID: 31-177-0002<br>Latitude: 41.551136º Longitude: -96.146753 |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: 2025 Sequential<br>Purpose: Population & Source Oriented<br>Start-Up Date: 4/6/09 | **Pollutant: $PM_{2.5}$**<br>Monitoring Frequency: Once every 3 days<br>EPA Method: RFPS-0498-118<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments: None | |

## $PM_{10}$ Sites in the Omaha MSA that are Operated by DCHD

| | |
|---|---|
| **Site Name: 19th & Burt, Omaha**<br>**Location: 19th & Burt Sts., Omaha** | AIRS ID: 31-055-0054<br>Latitude: 41.267770º Longitude: -95.940830º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: Hi-Vol Filter<br>Purpose: Population & Source Oriented<br>Start-Up Date: 6/1/01 | **Pollutant: $PM_{10}$**<br>Monitoring Frequency: Once every 6 days<br>EPA Method: RFPS 1287-063<br>Scale: Middle<br>Closure Date: Currently operating |
| **Monitor Information**<br>Type/POC: Collocated / POC 002<br>Analyzer/Sampler: Hi-Vol Filter<br>Purpose: Population & Source Oriented<br>Start-Up Date: 6/1/01 | **Pollutant: $PM_{10}$**<br>Monitoring Frequency: Once every 6 days (1)<br>EPA Method: RFPS 1287-063<br>Scale: Middle<br>Closure Date: Currently operating |
| Comments: None | |

| | |
|---|---|
| **Site Name: 46th & Farnam, Omaha**<br>**Location: 46th & Farnam Sts, Omaha** | AIRS ID: 31-055-0045<br>Latitude: 41.257500º Longitude: -95.976111º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary Continuous / POC 001<br>Analyzer/Sampler: Thermo FH 62 C14<br>Purpose: Source Oriented<br>Start-Up Date: 1/1/93 (See Comments) | **Pollutant: $PM_{10}$**<br>Monitoring Frequency: Continuous<br>EPA Method: EQPM-1102-150<br>Scale: Middle<br>Closure Date: Currently operating |
| Comments: This site utilized a Hi-Vol sampler on a once every 6 day sampling schedule until 1/1/08, when a continuous sampler was installed. | |

| | |
|---|---|
| **Site Name: South Omaha - $PM_{10}$**<br>**Location: 2411 O Street, Omaha** | AIRS ID: 31-055-0028<br>Latitude: 41.207500º Longitude: -95.947500º |
| Operating Agency: Douglas County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: Hi-Vol Filter<br>Purpose: Population & Source Oriented<br>Start-Up Date: 6/1/06 (See Comments) | **Pollutant: $PM_{10}$**<br>Monitoring Frequency: Once every 6 days<br>EPA Method: RFPS 1287-063<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments:<br>• This site was originally established for ozone monitoring on 2/1/78.<br>• The $PM_{10}$ sampler was initially set-up at 25th & L Sts and then moved to 2411 O St on 8/22/07. | |

## $PM_{10}$ Sites in the Weeping Water Area* that are Operated by NDEQ

| | |
|---|---|
| **Site Name: Weeping Water City** (at WWTF)<br>**Location: 102 P Street, Weeping Water** | AIRS ID: 31-025-0002<br>Latitude: 40.866228 Longitude: -96.137678 |
| Operating Agency: Nebraska Department of Environmental Quality | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: 2025 Sequential<br>Purpose: Population & Source Oriented<br>Start-Up Date: 1/1/85 | **Pollutant: $PM_{10}$**<br>Monitoring Frequency: Once per 3 days<br>EPA Method: RFPS-1298-127<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| **Monitor Information**<br>Type/POC: Collocated / POC 001<br>Analyzer/Sampler: 2025 Sequential<br>Purpose: Population & Source Oriented<br>Start-Up Date: 1/1/85 | **Pollutant: $PM_{10}$**<br>Monitoring Frequency: Once per 6 days<br>EPA Method: RFPS-1298-127<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments: Located at the city waste water treatment facility. | |

| | |
|---|---|
| **Site Name: Weeping Water Farm**<br>**Location: 5102 Hwy 50, Cass Co.** | AIRS ID: 31-025-0009<br>Latitude: 40.873309º Longitude: -96.183359º |
| Operating Agency: Nebraska Department of Environmental Quality | |
| **Monitor Information**<br>Type/POC: Primary Continuous / POC 001<br>Analyzer/Sampler: R&P TEOM<br>Purpose: Source Oriented<br>Start-Up Date: 4/8/05 | **Pollutant: $PM_{10}$**<br>Monitoring Frequency: Continuous<br>EPA Method: RFPS 1090-079<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments: None | |

* The Weeping Water Area is in Cass County, which is part of the Omaha MSA. This is a relatively non-urbanized area of the county with limestone mining and processing activities. The $PM_{10}$ monitoring conducted here is for evaluation of air quality in the vicinity of Weeping Water, and not the Omaha MSA as a whole.

## Sites in the Lincoln MSA that are Operated by LLCHD

| | |
|---|---|
| **Site Name: Davey**<br>**Location: 1st & Maple Sts., Davey** | AIRS ID: 31-109-0016<br>Latitude: 40.984722º Longitude: -96.677222º |
| Operating Agency: Lincoln Lancaster County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: Teledyne API 400E<br>Purpose: Population Oriented<br>Start-Up Date: 1/1/85 | **Pollutant: Ozone**<br>Monitoring Frequency: Continuous<br>EPA Method: EQOA-0992-087<br>Scale: Urban<br>Closure Date: Currently operating |
| Comments: This site was upgraded at the beginning of the 2014 ozone season with the Teledyne API 400E analyzer replacing the Dasibi 1003 AH analyzer. | |

| | |
|---|---|
| **Site Name: LLCHD Building**<br>**Location: 3140 N St., Lincoln** | AIRS ID: 31-109-0022<br>Latitude: 40.812590º Longitude: -96.683020º |
| Operating Agency: Lincoln Lancaster County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: R&P 2025 Seq. Filter<br>Purpose: Population Oriented<br>Start-Up Date: 1/1/99 | **Pollutant: $PM_{2.5}$**<br>Monitoring Frequency: Once every 3 days<br>EPA Method: RFPS 0498-118<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| **Monitor Information**<br>Type/POC: Collocated / POC 002<br>Analyzer/Sampler: R&P 2025 Seq. Filter<br>Purpose: Population Oriented<br>Start-Up Date: 1/1/99 | **Pollutant: $PM_{2.5}$**<br>Monitoring Frequency: Once every 6 days<br>EPA Method: RFPS 0498-118<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| **Monitor Information**<br>Type/POC: Continuous / POC 003(1)<br>Analyzer/Sampler: Met One BAM-1020<br>Purpose: Population Oriented<br>Start-Up Date: 7/1/06 | **Pollutant: $PM_{2.5}$**<br>Monitoring Frequency: Continuous<br>EPA Method: EQPM-0308-170<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comment:<br>(1) The MetOne BAM monitor reports to AirNow, but not AQS. | |

| | |
|---|---|
| **Site Name: Waverly**<br>**Location: 141st & Oldfield Sts. Waverly** | AIRS ID: Temporary Investigative<br>Latitude: 40.92181º Longitude: -96.53011º |
| Operating Agency: Lincoln Lancaster County Health Department | |
| **Monitor Information**<br>Type/POC: Primary / POC 001<br>Analyzer/Sampler: Thermo 49c<br>Purpose: Investigative<br>Start-Up Date: on or about 6/1/15 | **Pollutant: Ozone**<br>Monitoring Frequency: Continuous<br>EPA Method: EQOA-0880-047<br>Scale: Urban<br>Closure Date: On or before 11/1/15 |
| Comments: Results from this site to be compared to those from the Davey site. | |

## $PM_{2.5}$ Sites Operated by NDEQ

| | |
|---|---|
| **Site Name: Grand Island Senior High**<br>**Location: 2124 N Lafayette Ave, Grand Island** | AIRS ID: 31-079-0004<br>Latitude: 40.942099º Longitude: -98.364967º |
| Operating Agency: Nebraska Department of Environmental Quality | |
| **Monitor Information**<br>Type/POC: Primary FRM/ POC 1<br>Analyzer/Sampler: 2025 Sequential<br>Purpose: Transport & Population Oriented<br>Start-Up Date: 5/7/04 | **Pollutant: $PM_{2.5}$**<br>Monitoring Frequency: Once every 3 days<br>EPA Method: RFPS-0498-118<br>Scale: Regional & Neighborhood<br>Closure Date: Currently operating |
| Comments: None | |

| | |
|---|---|
| **Site Name: Scottsbluff Senior High School**<br>**Location: Hwy 26 & 5th Ave, Scottsbluff** | AIRS ID: 31-157-0004<br>Latitude: 41.876853º Longitude: -103.656561º |
| Operating Agency: Nebraska Department of Environmental Quality | |
| **Monitor Information**<br>Type/POC: Primary FRM/ POC 1<br>Analyzer/Sampler: 2025 Sequential<br>Purpose: Background & Population Oriented<br>Start-Up Date: 5/13/09 | **Pollutant: $PM_{2.5}$**<br>Monitoring Frequency: Once every 3 days<br>EPA Method: RFPS-0498-118<br>Scale: Regional & Neighborhood<br>Closure Date: Currently operating |
| Comments: Electric power is supplied to this site by wind and solar generating units. | |

## $PM_{10}$ Sites Operated by NDEQ (Outside of the Omaha MSA/Weeping Water Area)

| | |
|---|---|
| **Site Name: Cozad**<br>**Location: 215 W 8th Street, Cozad** | AIRS ID: 31-047-0001<br>Latitude: 40.859444º Longitude: -99.987778º |
| Operating Agency: Nebraska Department of Environmental Quality | |
| **Monitor Information**<br>Type/POC: Primary FRM/ POC 1<br>Analyzer/Sampler: 2025 Sequential<br>Purpose: Source and Population Oriented<br>Start-Up Date: 10/1/94 | **Pollutant: $PM_{10}$**<br>Monitoring Frequency: Once every 6 days<br>EPA Method: RFPS-1298-127<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments: None | |

| | |
|---|---|
| **Site Name: Gothenburg**<br>**Location: 409 9th Street, Gothenburg** | AIRS ID: 31-047-0003<br>Latitude: 40.927500º Longitude: -100.162778º |
| Operating Agency: Nebraska Department of Environmental Quality | |
| **Monitor Information**<br>Type/POC: Primary FRM/ POC 1<br>Analyzer/Sampler: 2025 Sequential<br>Purpose: Source and Population Oriented<br>Start-Up Date: 9/1/91 | **Pollutant: $PM_{10}$**<br>Monitoring Frequency: Once every 6 days<br>EPA Method: RFPS-1298-127<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments: None | |

## Lead (Pb) Sites Operated by NDEQ

| | |
|---|---|
| **Site Name: Fremont** | AIRS ID: 31-053-0005 |
| **Location: 1255 Front St., Fremont, NE** | Latitude: 41.90583º Longitude: -97.31583º |
| Operating Agency: Nebraska Department of Environmental Quality | |
| **Monitor Information** | **Pollutant: Lead (Pb)** |
| Type/POC: Primary / POC 1 | Monitoring Frequency: Once every 6 days |
| Analyzer/Sampler: Hi-Vol TSP-Pb (ICP-MS) | EPA Method: EQL-0310-189 |
| Purpose: Source Oriented | Scale: Micro-scale |
| Start-Up Date: 3/9/10 | Closure Date: Currently operating |
| **Monitor Information** | **Pollutant: Lead (Pb)** |
| Type/POC: Collocated / POC 2 | Monitoring Frequency: Once every 6 days |
| Analyzer/Sampler: Hi-Vol TSP-Pb (ICP-MS) | EPA Method: EQL-0310-189 |
| Purpose: Source Oriented | Scale: Micro-scale |
| Start-Up Date: 3/9/10 | Closure Date: Currently operating |
| Comments: Highest concentration site | |

| | |
|---|---|
| **Site Name: Auburn** | AIRS ID: 31-127-0002 |
| **Location: RR2, Auburn, NE** | Latitude: 40.40254º Longitude: -95.84164º |
| Operating Agency: Nebraska Department of Environmental Quality | |
| **Monitor Information** | **Pollutant: Lead (Pb)** |
| Type/POC: Primary / POC 1 | Monitoring Frequency: Once every 6 days |
| Analyzer/Sampler: Hi-Vol TSP-Pb (ICP-MS) | EPA Method: EQL-0310-189 |
| Purpose: Source Oriented | Scale: Micro-scale |
| Start-Up Date: 5/8/10 | Closure Date: Currently operating |
| Comments: Highest concentration site | |

## Total Reduced Sulfur (TRS) Sites operated by NDEQ

| | |
|---|---|
| **Site Name: Pine Street – Dakota City**<br>**Location: 501 Pine St, Dakota City** | AIRS ID: State SPM, AIRS ID not assigned<br>Latitude: 42.421867º Longitude: -96.403031º |
| Operating Agency: Nebraska Department of Environmental Quality | |
| **Monitor Information**<br>Type/POC: State TRS monitor<br>Analyzer/Sampler: API 102A w TOX<br>Purpose: Source Oriented<br>Start-Up Date: 9/15/97 | **Pollutant: Total Reduced Sulfur (TRS)**<br>Monitoring Frequency: Continuous<br>Method: NDEQ T129 Chap 4.007<br>Scale: Neighborhood<br>Closure Date: Currently operating |
| Comments: None | |

## Interagency Monitoring of Protected Visual Environments (IMPROVE) Sites *

| | |
|---|---|
| **Site Name: Crescent Lake IMPROVE**<br>**Location: Crescent Lake WRA, Gosper Co.** | AIRS ID: Not applicable, See Comments<br>Latitude: 41.7627º Longitude: -102.4336º |
| Operating Agency: Nebraska Department of Environmental Quality / US Fish & Wildlife Service | |
| **Monitor Information**<br>Type/POC: IMPROVE<br>Method Description: : IMPROVE<br>Purpose: Background & Transport<br>Start-Up Date: 2002 | **Pollutant: IMPROVE** (See Comments)<br>Monitoring Frequency: Continuous<br>EPA Method: Not applicable<br>Scale: Regional<br>Closure Date: Currently operating |
| Comments: None | |

| | |
|---|---|
| **Site Name: NE National Forest IMPROVE**<br>**Location: Nebraska National Forest, Thomas Co.** | AIRS ID: Not applicable, See Comments<br>Latitude: 41.8888º Longitude: -100.3387º |
| Operating Agency: Nebraska Department of Environmental Quality / US Forest Service | |
| **Monitor Information**<br>Type/POC: IMPROVE<br>Method Description: : IMPROVE<br>Purpose: Background & Transport<br>Start-Up Date: 2002 | **Pollutant: IMPROVE** (See Comments)<br>Monitoring Frequency: Continuous<br>EPA Method: Not applicable<br>Scale: Regional<br>Closure Date: Currently operating |
| Comments: None | |

* Interagency Monitoring of Protected Visual Environments (IMPROVE) monitors are operated to evaluate regional haze that may impact Federal Class I areas in National Parks and Wilderness Areas. Fine particulate and particulate speciation monitoring is conducted at these sites. They do not have an AIRS ID.

## Monitoring Sites not subject to the Network Plan Review Process**

** The NADP site information below is included in the Network Plan for informational purposes only.

| | |
|---|---|
| **Site Name: Mead NADP**<br>**Location: U of Ne Field Lab, Saunders Co.**<br>Operating Agency: University of Nebraska | AIRS ID: Not applicable, See Comments<br>Latitude: 41.1528º Longitude: -96.4912 |
| **Monitor Information**<br>Type/POC: NTN/MDN<br>Method Description: NTN/MDN<br>Purpose: Background & Transport<br>Start-Up Date: 7/25/78 | **Pollutant: TNT/MDN**<br>Monitoring Frequency: Continuous<br>EPA Method: Not applicable<br>Scale: Regional<br>Closure Date: Currently operating |

Comments: The Mead and North Platte National Atmospheric Deposition Program (NADP) sites are operated by the University of Nebraska with analytical and data processing support from the NADP. NADP sites are not subject to review under the provisions of 40 CFR Part 58.10, and thus are not subject to review under this Network Plan. They are included herein for informational purposes only.

- Monitoring methods are specific to this program and are not Federal Reference or Equivalent Methods (FRM/FEM).
- The National Trends Network (NTN) sites collect deposition data on acidity, sulfate, nitrate, ammonium, chloride, and base cations (e.g., calcium, magnesium, potassium and sodium).
- Mercury Deposition Network (MDN) sites collect mercury deposition data.
- The NADP oversees both NTN and MDN sites, and provides analytical and data processing support.
- The Mead site initiated operation as an NTN site in 1978 and began MDN operations in June 2007.

| | |
|---|---|
| **Site Name: North Platte NADP**<br>**Location: U of Ne Ag Station, Lincoln, Co.**<br>Operating Agency: University of Nebraska | AIRS ID: Not applicable, See Comments<br>Latitude: 41.0592º Longitude: -100.7464º |
| **Monitor Information**<br>Type/POC: NTN<br>Method Description: NTN<br>Purpose: Background & Transport<br>Start-Up Date: 9/24/85 | **Pollutant:** NTN<br>Monitoring Frequency: Continuous<br>EPA Method: Not applicable<br>Scale: Regional<br>Closure Date: Currently operating |

Comments: The Mead and North Platte National Atmospheric Deposition Program (NADP) sites are operated by the University of Nebraska with analytical and data processing support from the NADP. NADP sites are not subject to review under the provisions of 40 CFR Part 58.10, and thus are not subject to review under this Network Plan. . They are included herein for informational purposes only.

- Monitoring methods are specific to this program and are not Federal Reference or Equivalent Methods (FRM/FEM).
- The National Trends Network (NTN) sites collect deposition data on acidity, sulfate, nitrate, ammonium, chloride, and base cations (e.g., calcium, magnesium, potassium and sodium).
- Mercury Deposition Network (MDN) data was collected at this site from October 2009 thru October 2011 using Nebraska Environmental Trust funding.
- The NADP oversees both NTN and MDN sites, and provides analytical and data processing support.

## Draft Nebraska 2015 Ambient Air Monitoring Network Plan & 5-Year Assessment
## Attachment B: Comparison of Ambient Air Monitoring Data to NAAQS

This attachment compares ambient air quality data from 2012 thru 2014 to the NAAQS, or in the case of Total Reduced Sulfur to Nebraska's state standard. The annual data presented below was retrieved from the EPA AQS data-base. The 2013 data was not yet certified and could be subject to change. The values compared to the NAAQS were calculated as set forth in 40 CFR Part 58.

The NDEQ operates an ambient air monitoring program in Nebraska, and provides oversight for the DCHD and LLCHD monitoring programs. Data from sites outside Nebraska and from sites within Nebraska not operated by the NDEQ, DCHD and LLCHD (collectively abbreviated "non-NDEQ sites") are included below. The NAAQS comparisons for these non-NDEQ sites are not official, and are included for comparison purposes only.

**Table B-1: Ozone Data**

| **Comparison of 3-Year Design Values for 8-hour Ozone to NAAQS (1)** | | | | | |
|---|---|---|---|---|---|
| **Site** | **2012** | **2013** | **2014** | **DV (1)** | **% NAAQS** |
| **Omaha MSA and Near-By Montgomery Co., IA (4)** | | | | | |
| **Omaha NCore (2)** | 0.071 | 0.066 | 0.063 | 0.066 | 88% |
| **2411 O St., Omaha** | 0.066 | 0.058 | 0.059 | 0.061 | 81% |
| **30th & Fort, Omaha** | 0.077 | 0.061 | 0.060 | 0.066 | 88% |
| **Harrison Co, IA** (orig. Pisgah site) (3) | 0.076 | 0.065 | 0.062 | 0.067 | 89% |
| **Pisgah, IA** (new in 2009) (3) | 0.075 | 0.065 | 0.063 | 0.067 | 89% |
| **Montgomery County, IA (3) (4)** | 0.071 | 0.060 | 0.059 | 0.063 | 84% |
| **Lincoln MSA** | | | | | |
| **First & Maple, Davey** | 0.058 | 0.055 | 0.061 | 0.058 | 77% |
| **Sioux City MSA and Surrounding Area (6)** | | | | | |
| **31102 471st Ave, Union Co, SD (5)** | 0.068 | nd | 0.062 | 0.064 Combined | 85% |
| **31986 475th Ave, Union Co, SD (5)** | nd | 0.063 | nd | | |
| **Emmetsburg, IA (6)** | 0.070 | 0.064 | 0.063 | 0.065 | 87% |
| **Sioux Falls, SD (6)** | 0.072 | 0.072 | 0.066 | 0.070 | 93% |
| **Nebraska Non-MSA** | | | | | |
| **Santee Indian Reservation (7)** | 0.075 | 0.067 | 0.063 | 0.068 | 91% |
| **Scotts Bluff National Monument (8)** | 0.067 | nd | nd | 0.065 | 87% |

Notes and Explanations: (EPA AQS data retrieval 5/20/15)

(1) Concentrations are in units of ppm.. The Design Value (DV) is the truncated 3-year average of the 4th highest max for each year. The NAAQS = 0.075 ppm (promulgated 3/27/2008).

(2) Omaha NCore is a multi-pollutant monitoring site located at 4102 Woolworth Street.

(3) The following sites are operated by the IA DNR: Harrison Co, IA, Pisgah, IA, Montgomery Co, IA and Emmetsburg, IA.

(4) The Montgomery County, IA site is located outside the Omaha MSA at Viking Lake State Park;~18 miles east of the Mills-Montgomery County line and ~ 45 miles SE of the I-29/I-80 intersection.

(5) The Union Co., SD site is in the Sioux City MSA & operated by the SD Dept. of Environment & Natural Resources

(6) The Emmetsburg, IA and Sioux Falls, SD sites are located outside the Sioux City MSA.

(7) Santee Indian Reservation site is 76 mi WNW of Sioux City & is operated by EPA as part of CASTNET.

(8) The Scotts Bluff NM site was operated by the National Park Service; using a method that is not an EPA reference or equivalent method (FRM/FEM). It was not operated in 2011 & 2012, but not in 2013

## Table B-2: Carbon Monoxide Data

| **Comparison of 3-Year Maximum Value for 1-Hour Carbon Monoxide to NAAQS** (1) (2) | | | | | |
|---|---|---|---|---|---|
| **Site** | **2012** | **2013** | **2014** | **Design Value** (2) | **% NAAQS** |
| **Omaha MSA** | | | | | |
| **78th & Dodge Sts, Omaha** | 2.6 | 2.4 | 1.8 | 2.6 | 7% |
| **Omaha NCore** (4) | 1.3 | 0.9 | 2.2 | 2.2 | 6% |
| **Sioux City MSA** | | | | | |
| **31986 475th Ave, Union Co, SD** (5) | 0.6 | 0.5 | nd | 0.6 | 2% |

| **Comparison of 3-Year Maximum Value for 8-Hour Carbon Monoxide to NAAQS** (1) (3) | | | | | |
|---|---|---|---|---|---|
| **Site** | **2012** | **2013** | **2014** | **Design Value** (3) | **% NAAQS** |
| **Omaha MSA** | | | | | |
| **78th & Dodge Sts., Omaha** | 2.3 | 1.9 | 1.5 | 2.3 | 26% |
| **Omaha NCore** (4) | 0.8 | 0.6 | 1.0 | 1.0 | 11% |
| **Sioux City MSA** | | | | | |
| **31986 475th Ave, Union Co, SD** (5) | 0.3 | 0.3 | nd | 0.3 | 3% |

Notes and Explanations:

(1) The CO NAAQS were last revised in 1984. The latest review was concluded in August 2011 when EPA determined no changes in the CO NAAQS were warranted.

(2) The 1-hour NAAQS = 35 ppm. The Design Value is the highest annual 2nd highest maximum value over the last 3 years. The annual values shown are the annual 2nd highest maximum values. Concentrations are in units of ppm.

(3) The 8-hour NAAQS = 9 ppm. The Design Value is the highest annual 2nd highest maximum value over the last 3 years. The annual values shown are the 2nd highest 8-hour maximum values. Concentrations are in units of ppm.

(4) Omaha NCore is a multi-pollutant monitoring site located at 4102 Woolworth Street.

(5) The Union Co., SD site is operated by the South Dakota Department of Environment & Natural Resources. CO data was not collected in 2014.

## Table B-3: Sulfur Dioxide Data

**Comparison of 1-Hour Sulfur Dioxide Levels to the Primary NAAQS** (1)

| Site | 2012 | 2013 | 2014 | Design Value (1) | % NAAQS |
|---|---|---|---|---|---|
| **Omaha MSA** | | | | | |
| **1616 Whitmore St., Omaha** | 0.073 | 0.056 | 0.054 | 0.061 | 81% |
| **Omaha NCore** (3) | 0.038 | 0.027 | 0.021 | 0.028 | 38% |
| **Sioux City MSA Sites** | | | | | |
| **1221 260th St. Sergeant Bluff, IA** (4) | 0.039 | 0.021 | 0.010 | 0.023 | 31% |
| **31986 475th Ave, Union Co, SD** (5) | 0.009 | 0.006 | 0.005 | 0.006 | 8% |
| **31307 473rd Ave, Union Co, SD** (5) | 0.007 | 0.005 | nd | 0.006 | 8% |

**Comparison of 3-Hour Sulfur Dioxide Levels to the Secondary NAAQS** (2)

| Site | 2012 | 2013 | 2014 | Design Value (2) | % NAAQS |
|---|---|---|---|---|---|
| **Omaha MSA** | | | | | |
| **1616 Whitmore St., Omaha** | 0.076 | 0.052 | 0.047 | 0.076 | 15% |
| **Omaha NCore** (3) | 0.026 | 0.027 | 0.018 | 0.027 | 5% |
| **Sioux City MSA** | | | | | |
| **1221 260th St. Sergeant Bluff, IA** (4) | 0.015 | 0.014 | 0.014 | 0.015 | 3% |
| **31986 475th Ave, Union Co, SD** (5) | 0.007 | 0.005 | 0. 004 | 0.007 | 1% |
| **31307 473rd Ave, Union Co, SD** (5) | 0.005 | 0.003 | nd | 0.006 | 1% |

Notes and Explanations: (EPA AQS data retrieval 5/21/15)

(1) The 1-hour NAAQS is 75 ppb or 0.075 ppm. The Design Value is the three-year average of the annual 99th percentile values. This NAAQS was promulgated on June 22, 2010. The annual values shown are annual 99th percentile values in ppm units.

(2) The 3-hour NAAQS is 0.5 ppm not to be exceeded more than once per year. It is a secondary standard promulgated in 1971, and retained without change in 1996. The Design Value is the highest annual 2nd highest maximum 3-hour reading over the last three years. The annual values shown are 2nd highest maximum values. All concentrations expressed in units of ppm.

(3) Omaha NCore is a multi-pollutant monitoring site located at 4102 Woolworth Street.

(4) The Sergeant Bluff IA site began operation 7/1/12 and is operated by the IA DNR.

(5) The Union Co., SD sites are operated by the South Dakota Department of Environment & Natural Resources.

## Table B-3: Sulfur Dioxide Data (continued)

| Comparison of 24-Hour Sulfur Dioxide Levels to the Pre-2010 NAAQS (6) (7) | | | | | |
|---|---|---|---|---|---|
| **Site** | **2012** | **2013** | **2014** | **Design Value (1)** | **% NAAQS** |
| **Omaha MSA** | | | | | |
| **1616 Whitmore St., Omaha** | 0.025 | 0.019 | 0.016 | 0.025 | 18% |
| **Omaha NCore (3)** | 0.006 | 0.006 | 0.006 | 0.006 | 4% |
| **Sioux City MSA** | | | | | |
| **1221 260th St. Sergeant Bluff, IA (5)** | 0.003 | 0.003 | 0.006 | 0.006 | 4% |
| **31986 475th Ave, Union Co, SD (6)** | 0.002 | 0.002 | 0.001 | 0.002 | 2% |
| **31307 473rd Ave, Union Co, SD (6)** | 0.002 | 0.002 | nd | 0.002 | 1% |

| Comparison of Annual Average Sulfur Dioxide Levels to the Pre-2010 NAAQS (8) (9) | | | | | |
|---|---|---|---|---|---|
| **Site** | **2012** | **2013** | **2014** | **Design Value (1)** | **% NAAQS** |
| **Omaha MSA** | | | | | |
| **1616 Whitmore St., Omaha** | 0.0023 | 0.0021 | 0.0017 | 0.0023 | 8% |
| **Omaha NCore (3)** | 0.0009 | 0.0007 | 0.0006 | 0.0009 | 3% |
| **Sioux City MSA** | | | | | |
| **1221 260th St. Sergeant Bluff, IA (4)** | 0.0003 | 0.0003 | 0.0002 | 0.0003 | 1% |
| **31986 475th Ave, Union Co, SD (5)** | 0.0004 | 0.0003 | 0.0003 | 0.0004 | 1% |
| **31307 473rd Ave, Union Co, SD (5)** | 0.0003 | 0.0004 | nd | 0.0004 | 1% |

Notes and Explanations:

(3) Omaha NCore is a multi-pollutant monitoring site located at 4102 Woolworth Street.

(4) The Sergeant Bluff IA site began operation 7/1/12 and is operated by the IA DNR.

(5) The Union Co., SD sites are operated by the South Dakota Department of Environment & Natural Resources

(6) The 24-hour NAAQS is a primary standard promulgated in 1971 and retained without change in 1996. It will no longer apply once the attainment status to the 1-hour NAAQS is determined per regulations changes in 2010.

(7) The 24-hour NAAQS is 0.14 ppm not to be exceeded more than once per year. The Design Value is the highest annual 2nd highest maximum 24-hour reading over the last three years. The annual values shown are 2nd highest maximum values. The 24-hour NAAQS is a primary standard. All concentrations expressed in units of ppm.

(8) The Annual Average NAAQS is a primary standard promulgated in 1971 and retained without change in 1996. It will no longer apply once the attainment status to the 1-hour NAAQS is determined per regulations changes in 2010.

(9) The Annual Average NAAQS is 0.03 ppm not to be exceeded in a calendar year. The Design Value is the highest annual average over the last 3 years. The Annual Average NAAQS is a primary standard. All concentrations expressed in units of ppm.

## Table B-4a: Nitrogen Dioxide Data

| Comparison of 1-Hour Maximum Levels of Nitrogen Dioxide to NAAQS | | | | | |
|---|---|---|---|---|---|
| **Site** | **2012** | **2013** | **2014** | **Design Value [1]** | **% NAAQS** |
| **Sioux City MSA** | | | | | |
| **31986 475th Ave, Union Co, SD [3]** | 0.016 | 0.018 | 0.021 | 0.018 | 18% |
| **31307 473rd Ave, Union Co, SD [3]** | 0.057 | 0.040 | nd | 0.049 | 49% |
| | | | | | |
| **Comparison of 3-Year Maximum Annual Average Value for Nitrogen Dioxide to NAAQS** | | | | | |
| **Site** | **2012** | **2013** | **2014** | **Design Value [2]** | **% NAAQS** |
| **Sioux City MSA** | | | | | |
| **31986 475th Ave, Union Co, SD [3]** | 0.003 | 0.003 | 0.003 | 0.003 | 6% |
| **31307 473rd Ave, Union Co, SD [3]** | 0.006 | 0.004 | nd | 0.005 | 9% |

Notes and Explanations:
(1) The Union Co., SD sites are operated by the South Dakota Department of Environment & Natural Resources

## Table B-4b: 2011-2013 Nitrogen Oxide Data from the Omaha NCore Site [1][2]

| Parameter | 2012 | 2013 | 2014 | Approx. DV [3][4][8] | % NAAQS |
|---|---|---|---|---|---|
| **1-Hour Data: Annual Maximum** | | | | | |
| **NOy [6]** | 0.158 | 0.104 | 0.110 | na | na |
| **NO [7]** | 0.133 | 0.084 | 0.076 | na | na |
| **NOy-NO [8]** | 0.051 | 0.040 | 0.042 | na | na |
| **1-Hour Data: 98th Percentile [5]** | | | | | |
| **NOy [6]** | 0.113 | 0.078 | 0.087 | na | na |
| **NO [7]** | 0.103 | 0.051 | 0.056 | na | na |
| **NOy-NO [8]** | 0.045 | 0.035 | 0.039 | 0.040 | 40% |
| **1-Hour Data: Annual Average** | | | | | |
| **NOy [6]** | 0.010 | 0.009 | 0.008 | na | na |
| **NO [7]** | 0.002 | 0.002 | 0.002 | na | na |
| **NOy-NO [8]** | 0.008 | 0.007 | 0.007 | 0.008 | 16% |

Footnotes:
(1) Omaha NCore is a multi-pollutant monitoring site located at 4102 Woolworth Street.
(2) All concentrations expressed in ppm units.
(3) The 1-hour $NO_2$ NAAQS is 0.100 ppm (promulgated Feb. 2010). NAAQS attainment is achieved if the 3-year average of the annual 98th percentile of the daily maximum 1-hour values does not exceed 0.100 ppm.
(4) The Annual Average $NO_2$ NAAQS is 0.053 ppm not to be exceeded in a calendar year. It was promulgated 1971, and retained in the 1996 and 2010 reviews. The Design Value is the highest annual average over the 3-year comparison period.
(5) Percentile determination: (Days $\geq$ 75% complete data): 2011 331 d => 7th high value, 2012 356 d => 8th high value & 2013 341 d => 7th high value.
(6) NOy – Reactive oxides of nitrogen, which includes NO, $NO_2$ and other nitrogen oxides, including organic nitrogen oxide compounds.
(7) NO – Nitrogen oxide
(8) NOy-NO provides an approximation of nitrogen dioxide ($NO_2$), with some possibility of over-estimating the true $NO_2$ concentration. For this reason, the NOy-NO parameter can be used to demonstrate attainment, but not non-attainment.

## Table B-5a: $PM_{10}$ - Maximum 24-Hour Data [(1) (2)]

| Site | 2012 | 2013 | 2014 | Design Value [(1)] | % NAAQS |
|---|---|---|---|---|---|
| **Omaha MSA & Montgomery Co., IA [(6)]** | | | | | |
| **Omaha NCore** [(3)] | 74 | 62 | 75 | 68 | 45% |
| **2411 O St, Omaha** | 71 | 67 | 74 | 62 | 41% |
| **46th & Farnam Sts, Omaha** [(4)] | 199 | 94 | 115 | 150 | 100% |
| **19th & Burt Sts, Omaha** | 51 | 56 | 49 | 49 | 33% |
| **3130 C Ave, Council Bluffs, IA** [(5)] | 64 | 65 | 53 | 60 | 40% |
| **Montgomery Co., IA** (outside Omaha MSA) [(5) (6)] | 65 | 45 | 50 | 50 | 33% |
| **Weeping Water WWTF** [(7)] | 75 | 45 | 49 | 49 | 33% |
| **Weeping Water Lauritzen Farm** [(7)(8)] | 179 | 108 | 148 | 129 | 86% |
| **Sioux City MSA Sites** | | | | | |
| **821 30th St, Sioux City, IA** [(5)] | 78 | 57 | 51 | 58 | 39% |
| **31986 475th Ave, Union Co, SD** [(9)] | 101 | 103 | 77 | 82 | 55% |
| **31307 473rd Ave, Union Co, SD** [(9)] | 82 | 49 | nd | 67 | 45% |
| **Other Nebraska Sites** | | | | | |
| **Cozad** | 99 | 94 | 62 | 74 | 49% |
| **Gothenburg** | 73 | 97 | 69 | 69 | 46% |

Notes and Explanations:

(1) NAAQS = 150 $u$g/m$^3$, not to be exceeded more than once per year on average over 3 years, where exceedence is defined as a value of 155 $u$g/m$^3$ or more. The Design Value is the 4th highest 24-hour value found in the 3-year design period. Concentrations are in units of µg/m$^3$ at standard temperature (25º C) and pressure (760 mm Hg) conditions.

(2) NAAQS History: The primary 24-hour NAAQS was initially set at 150 $u$g/m$^3$ in 1987, and was retained at this level in the 1997, 2006 and 2012 PM NAAQS reviews.

(3) Omaha NCore is a multi-pollutant monitoring site located at 4102 Woolworth Street.

(4) The 46th & Farnam site recorded three $PM_{10}$ values above 150 in 2012: 199 $u$g/m$^3$ on 5/14/12, 181 $u$g/m$^3$ on 6/5/12, and 159 $u$g/m$^3$ on 1/5/12. The primary PM source in the area relocated and ceased operations in the area in 2014.

(5) The Council Bluffs, Montgomery Co., Emmetsburg and Sioux City IA sites are operated by the IA DNR

(6) The Montgomery County, IA site is located outside the Omaha MSA at Viking Lake State Park;~18 miles east of the Mills-Montgomery County line and ~ 45 miles SE of the I-29/I-80 intersection.

(7) Weeping Water is a limestone mining and processing area in Cass County, which is located 15 to 20 miles south of the main urbanized area within the Omaha MSA.

(8) The Weeping Water Lauritzen Farm site recorded one 24-hour $PM_{10}$ value above 150 $u$g/m$^3$ in 2010: 179 on 1/5/12.

(9) The Union Co., SD sites are operated by the South Dakota Department of Environment & Natural Resources

## Table B-5b: $PM_{10}$ - Annual Average Data [(1)]

| Site | 2012 | 2013 | 2014 | 3-Year Average | % Old Std |
|---|---|---|---|---|---|
| **Omaha MSA and Montgomery Co., IA [(4)]** | | | | | |
| **Omaha NCore** [(2)] | 24.6 | 20.8 | 21.8 | 22.4 | 45% |
| **2411 O St, Omaha** | 30.1 | 24.0 | 25.1 | 26.4 | 53% |
| **46th & Farnam Sts, Omaha** | 52.4 | 32.0 | 24.4 | 36.3 | 73% |
| **19th & Burt Sts, Omaha** | 25.0 | 21.4 | 20.8 | 22.4 | 45% |
| **3130 C Ave, Council Bluffs, IA** [(3)] | 28.4 | 23.8 | 22.1 | 24.8 | 50% |
| **Montgomery Co., IA** (outside Omaha MSA) [(3) (4)] | 21.7 | 16.8 | 17.3 | 18.6 | 37% |
| **Weeping Water WWTF** [(5)] | 25.1 | 19.0 | 19.6 | 21.2 | 42% |
| **Weeping Water Lauritzen Farm** [(5)] | 34.7 | 27.7 | 28.3 | 30.2 | 60% |
| **Sioux City MSA** | | | | | |
| **821 30th St, Sioux City, IA** [(3)] | 22.8 | 18.3 | 17.6 | 19.6 | 39% |
| **31986 475th Ave, Union Co, SD** [(6)] | 22.4 | 18.5 | 18.1 | 19.7 | 39% |
| **31307 473rd Ave, Union Co, SD** [(6)] | 19.2 | 14.1 | nd | 16.7 | 33% |
| **Other Nebraska Sites** | | | | | |
| **Cozad** | 29.4 | 25.4 | 21.1 | 25.3 | 51% |
| **Gothenburg** | 29.5 | 27.2 | 22.7 | 26.5 | 53% |

Notes and Explanations:

(1) There is currently no NAAQS for the annual average $PM_{10}$ concentration. An annual average NAAQS of 50 $\mu g/m^3$ was established in 1987, and then rescinded on December 18, 2006. Comparison to the rescinded NAAQS is provided for informational purposes only. Concentrations are in units of $\mu g/m^3$.

(2) Omaha NCore is a multi-pollutant monitoring site located at 4102 Woolworth Street.

(3) The Council Bluffs, Montgomery Co., Emmetsburg and Sioux City IA sites are operated by the IA DNR

(4) The Montgomery County, IA site is located outside the Omaha MSA at Viking Lake State Park;~18 miles east of the Mills-Montgomery County line and ~ 45 miles SE of the I-29/I-80 intersection.

(5) Weeping Water is a limestone mining and processing area in Cass County, which is located 15 to 20 miles south of the main urbanized area within the Omaha MSA.

(6) The Union Co., SD sites are operated by the South Dakota Department of Environment & Natural Resources.

## Table B-6a: $PM_{2.5}$ - 98th Percentile, 24-Hour Data (1) (2)

| Site | 2012 | 2013 | 2014 | Design Value (1) | % NAAQS |
|---|---|---|---|---|---|
| **Omaha MSA & Montgomery Co., IA (5)** | | | | | |
| **Omaha NCore (3)** | 21.3 | 22.2 | 23.1 | 22 | 63% |
| **9225 Berry St.; Omaha** | 24.8 | 21.0 | 19.5 | 22 | 62% |
| **2912 Coffey Ave., Bellevue** | 23.5 | 24.0 | 22.3 | 23 | 66% |
| **2242 Wright St., Blair** | 24.1 | 20.6 | 16.9 | 21 | 59% |
| **3130 C Ave., Council Bluffs, IA** (4) | 28.5 | 22.4 | 19.6 | 24 | 67% |
| **Montgomery Co., IA** (outside Omaha MSA) (4) (5) | 20.5 | 21.0 | 18.4 | 20 | 57% |
| **Lincoln MSA** | | | | | |
| **3140 N Street, Lincoln** | 20.0 | 19.5 | 19.9 | 20 | 57% |
| **Sioux City MSA & Emmetsburg, IA (7)** | | | | | |
| **821 30th St, Sioux City, IA** (4) | 24.9 | 21.5 | 24.5 | 24 | 68% |
| **31986 475th Ave, Union Co, SD** (6) | 19.7 | 22.8 | 23.1 | 22 | 62% |
| **31307 473rd Ave, Union Co, SD** (6) | 20.8 | 23.5 | nd | 22 | 63% |
| **Emmetsburg, IA** (outside Sioux City MSA) (4)(7) | 22.4 | 20.9 | 20.4 | 21 | 61% |
| **Other Nebraska Sites** | | | | | |
| **Grand Island Senior High** | 17.5 | 21.3 | 13.9 | 18 | 50% |
| **Scottsbluff** (8) | 17.9 | 12.2 | 20.4 | 17 | 48% |

Notes and Explanations:

(1) The Design Values are the 3-year average of the annual 98th percentile values. To determine attainment status, the Design Values are compared to the 35 µg/m$^3$ NAAQS. Concentrations are in units of µg/m$^3$.

(2) NAAQS History: The 24-hour $PM_{2.5}$ NAAQS was initially established at 65$\mu$g/m$^3$ in 1997. It was lowered to 35 $m$g/m$^3$ in 2006 and retained at the 35 $\mu$g/m$^3$ level in 2012.

(3) Omaha NCore is a multi-pollutant monitoring site located at 4102 Woolworth Street.

(4) The Council Bluffs, Montgomery Co., Emmetsburg and Sioux City IA sites are operated by the IA DNR

(5) The Montgomery County, IA site is located outside the Omaha MSA at Viking Lake State Park;~18 miles east of the Mills-Montgomery County line and ~ 45 miles SE of the I-29/I-80 intersection.

(6) The Union Co., SD sites are operated by the South Dakota Department of Environment & Natural Resources

(7) Emmetsburg is located outside the Sioux City located approximately 97 miles northeast of Sioux City. Data from this site is included here for comparison purposes only.

(8) Data completeness fell to 71% in the 4th quarter of 2014 and was 80% for the entire year. Data loss issues were associated with power losses and monitor malfunctions.

## Table B-6b: $PM_{2.5}$ - Annual Average Data [1] [2]

| Site | 2012 | 2013 | 2014 | Design Value [1] | % NAAQS |
|---|---|---|---|---|---|
| **Omaha MSA & Montgomery Co., IA [4]** | | | | | |
| **Omaha NCore [3]** | 8.4 | 9.2 | 8.8 | 8.8 | 74% |
| **9225 Berry St.; Omaha** | 11.7 | 8.6 | 8.1 | 9.4 | 79% |
| **2912 Coffey Ave., Bellevue** | 10.4 | 11.0 | 8.7 | 10.0 | 83% |
| **2242 Wright St., Blair** | 9.2 | 8.3 | 7.4 | 8.3 | 69% |
| **3130 C Ave., Council Bluffs, IA** [3] | 10.8 | 9.6 | 9.0 | 9.8 | 82% |
| **Montgomery Co., IA** (outside Omaha MSA) [3] [4] | 8.8 | 8.3 | 7.7 | 8.3 | 69% |
| **Lincoln MSA Site** | | | | | |
| **3140 N Street, Lincoln** | 8.7 | 8.2 | 7.7 | 8.2 | 68% |
| **Sioux City MSA & Emmetsburg, IA [6]** | | | | | |
| **821 30th St, Sioux City, IA** [3] | 9.7 | 9.3 | 8.4 | 9.1 | 76% |
| **31986 475th Ave, Union Co, SD** [5] | 9.9 | 8.9 | 8.6 | 9.1 | 76% |
| **31307 473rd Ave, Union Co, SD** [5] | 7.5 | 10.5 | nd | 9.0 | 75% |
| **Emmetsburg, IA** (outside Sioux City MSA) [6] | 8.7 | 8.1 | 7.8 | 8.2 | 68% |
| **Other Nebraska Sites** | | | | | |
| **Grand Island Senior High** | 7.6 | 7.6 | 6.5 | 7.2 | 60% |
| **Scottsbluff** [8] | 5.6 | 5.1 | 5.2 | 5.3 | 44% |

Notes and Explanations:

(1) The Design Values are the 3 year average of the annual average values. To determine attainment status, the Design Values compared to the 12 µg/m$^3$ NAAQS. Concentrations are in units of µg/m$^3$.

(2) NAAQS History: The annual average $PM_{2.5}$ NAAQS was initially established in 1997 at 15 $\mu$g/m$^3$. It was retained at this level in the 2006 review and then lowered to 12 $\mu$g/m$^3$ in December 2012.

(2) The Omaha NCore site is located at 4102 Woolworth Street. It is a multi-pollutant monitoring site.

(3) The Council Bluffs, Montgomery Co., Emmetsburg and Sioux City IA sites are operated by the IA DNR

(4) The Montgomery County, IA site is located outside the Omaha MSA at Viking Lake State Park;~18 miles east of the Mills-Montgomery County line and ~ 45 miles SE of the I-29/I-80 intersection.

(5) The Union Co., SD sites are operated by the South Dakota Department of Environment & Natural Resources

(6) Emmetsburg is located well outside the Sioux City located approximately 97 miles northeast of Sioux City. Data from this site is included here for comparison purposes only.

## Table B-7: Lead in Total Suspended Particulate (TSP-Pb)

| Comparison of 3-Year Maximum Values of 3-Month Average Values (1) (2) | | | | | |
|---|---|---|---|---|---|
| **Site** | **2012** | **2013** | **2014** | **DV (1)** | **% NAAQS** |
| **Sioux City MSA** | | | | | |
| **Auburn** | 0.05 | 0.03 | 0.008 | 0.05 | 35% |
| **Fremont** | 0.14 | 0.11 | 0.09 | 0.14 | 93% |
| **Omaha NCore** | 0.006 | 0.006 | 0.01 | 0.01 | 7% |

Notes and Explanations:

(1) Concentrations are in units of $\mu g/m^3$. The 3-month average NAAQS = 0.15 $\mu g/m^3$. The DV or Design Value is the highest 3 month average in the last 3 years.

(2) NAAQS History: The initial NAAQS was promulgated in 1978 and was set at 1.5 $\mu g/m^3$ calendart quarter average. In 2008, it was modified to 0.15 $\mu g/m^3$ 3-month running average.

Abbreviation: nd – no data, site not operating

## Table B-8: Total Reduced Sulfur (TRS) Data

| Comparison of 3-Year Maximum Value for 1-Minute TRS to the State Standard (1) (2) | | | | | |
|---|---|---|---|---|---|
| **Site** | **2012** | **2013** | **2014** | **Maximum Value** | **% NE Std** |
| **Sioux City MSA** | | | | | |
| **501 Pine St. Dakota City** | 0.180 | 0.058 | 0.163 | 0.180 | 1.8% |

| Comparison of 3-Year Maximum Value for 30-Minute TRS to the State Standard (1) (3) | | | | | |
|---|---|---|---|---|---|
| **Site** | **2012** | **2013** | **2014** | **Maximum Value** | **% NE Std** |
| **Sioux City MSA** | | | | | |
| **501 Pine St. Dakota City** | 0.086 | 0.042 | 0.088 | 0.088 | 88.0% |

Notes and Explanations:

(1) Concentrations are in units of ppm.

(2) The 1-minute Nebraska Air Quality Standard is 10 ppm.

(3) The 30-minute Nebraska Air Quality Standard is 0.10 ppm.

Population related data is reviewed as part of the network planning process because:

- Population growth may be associated with pollution source growth;
- High population density generally correlates with high air pollution potential; and
- Some 40 CFR Part 58 requirements are based on population and/or Federally defined metropolitan statistical definitions.

**US Census Bureau & US Office of Management and Budget Basics:**

The US Census Bureau conducts a comprehensive population census every 10 years referred to as a decennial census. The last decennial census was completed in 2010. In addition, the US Census Bureau conducts annual surveys to provide annual population estimates for each interim year.

The U.S. Office of Management and Budget (OMB) uses the decennial census data to categorize urbanized areas by population and business inter-connections. These urban categories are used to define some Federal program applications, including, in some instances, air monitoring requirements. Four such categories are:

- Metropolitan Statistical Areas (MSAs), which contain an *urbanized area,* where an *urbanized area* is a densely settled territory delineated by the US Census Bureau that contains 50,000 or more people;
- Micropolitan Statistical Areas (MiSAs), which contain an *urban cluster* with a population of 10,000 to 49,999, where an *urban cluster* is a densely settled territory delineated by the US Census Bureau that contains at least 2,500 people, but fewer than 50,000 people.
- Combined Statistical Areas (CSAs), which are adjacent MSAs and MiSAs with social and economic ties.
- Core-Based Statistical Areas (CBSA) is a geographic area defined by the Office of Management and Budget (OMB) that centers on an urban center of at least 10,000 people and adjacent areas that are socioeconomically tied to the urban center by commuting. Both MSAs and MiSAs are CBSAs.

These designations are important from an ambient monitoring perspective because:

- They are sometimes used in defining minimum monitoring requirements, and
- They are often used as the default boundary when defining non-attainment areas.

Figure C-1 (above) shows the location and boundaries of MSAs and MiSAs in Nebraska as delineated following the 2010 decennial census. There are also two CSAs within NE:

- Omaha-Council Bluffs-Fremont NE-IA CSA, which is the Omaha MSA plus Dodge County, NE; and
- Sioux City-Vermillion IA-NE-SD CSA, which is the Sioux City MSA plus Clay County, SD.

**Population Demographics and Growth Trends:**

Most of the area of Nebraska is rural and used for agricultural production (farming and ranching). Conversely, most of the population of Nebraska (59%) resides in the Omaha and Lincoln MSAs, and 82% of the population resides within the boundaries of designated MSAs and MiSAs (see Table C-1). Even within the MSAs and MiSAs, agricultural usage is the predominant land use except for the two most densely populated counties of Douglas and Sarpy.

**Figure C-1: Nebraska Metropolitan Statistical Areas (MSAs) and Micropolitan Statistical Areas (MiSAs)**

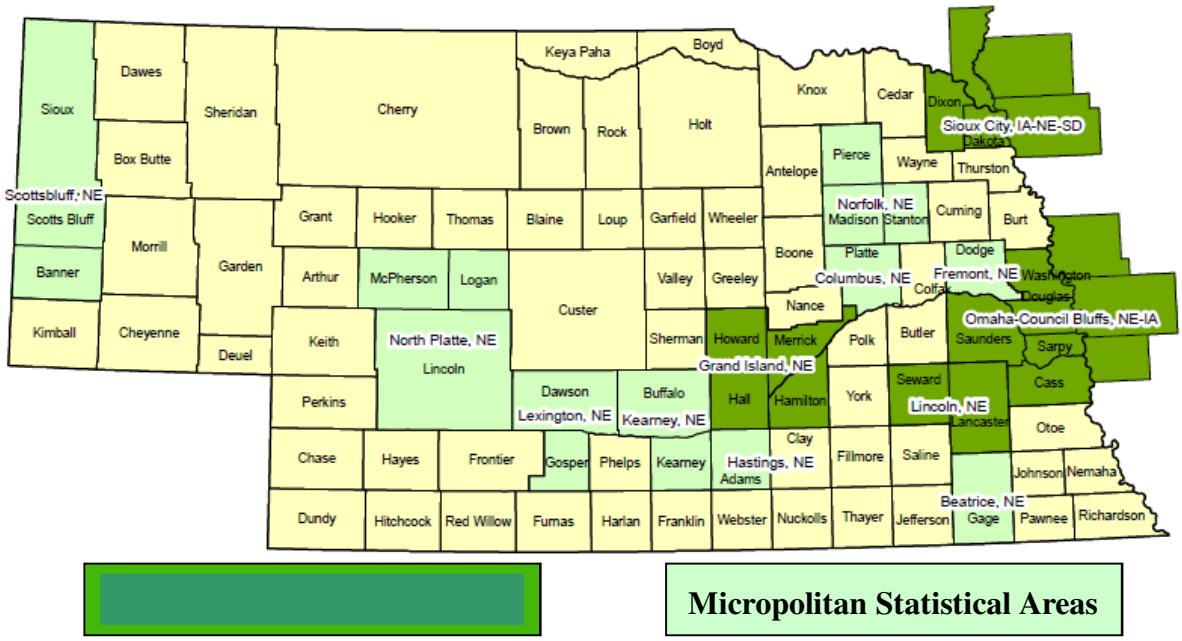



**Table C-1: Population within Nebraska's MSAs and MiSAs**

| Area | Population | % NE (b) | Cum % NE (c) |
|---|---|---|---|
| Nebraska | 1,881,503 | 100% | na |
| Omaha MSA (a) | 782,138 | 42% | 42% |
| Lincoln MSA | 318,945 | 17% | 59% |
| Grand Island MSA | 84,755 | 5% | 63% |
| Sioux City MSA (a) | 26,632 | 1% | 64% |
| Kearney MiSA | 54,868 | 3% | 67% |
| Norfolk MiSA | 48,445 | 3% | 70% |
| Hastings MiSA | 37,772 | 2% | 72% |
| Scottsbluff MiSA | 37,229 | 2% | 74% |
| North Platte MiSA | 37,063 | 2% | 76% |
| Fremont MiSA | 36,744 | 2% | 78% |
| Columbus MiSA | 32,666 | 2% | 80% |
| Lexington MiSA | 26,066 | 1% | 81% |
| Beatrice MiSA | 21,663 | 1% | 82% |

(a) Only Nebraska residents within the Omaha and Sioux City MSAs were used in the population counts shown in this table.
(b) ***% NE*** refers to the percent of Nebraska residents residing in each MSA or MiSA.
(c) ***Cum % NE*** refers to the cumulative sum of the ***% NE*** column. Thus 59% of Nebraska's residents live in the Omaha and Lincoln MSAs, while 82% live in an MSA or MiSA.

Table C-2 lists the top 10 Nebraska counties with respect to 2014 population, 2010 to 2014 population growth, and 2010 to 2014 percent population growth rate. As shown in Table C-2, the 5 most populated counties (Douglas, Lancaster, Sarpy, Hall and Buffalo counties) also have the fastest growth rate, and they are also among the top 8 counties for percent population growth. The population of these 5 counties accounts for 60% of Nebraska's population and their 2010 to 2014 population growth exceeds the population growth of the entire state by 1,466 people (because 62 of Nebraska's 93 counties lost population, see Table C-6).

Also shown in Table C-2, the 3 most populated and fastest growing counties (Douglas, Lancaster and Sarpy Counties) dominate within these categories with 54% of Nebraska's residents living in these 3 counties and a combined annual population growth rate of 13,209. The 2010-14 population growth in these 3 counties exceeds the population growth of the entire state by 1192 people (because 62 of Nebraska's 93 counties lost population, see Table C-6).

Douglas and Sarpy Counties are in the Omaha MSA and have a combined population of approximately 715,400. This is 79% of the population in the entire MSA (including the IA counties) and 91% of the population within the Nebraska portion of the Omaha MSA. Both of these counties are highly urbanized, and along with Council Bluffs, IA form the urban core of the Omaha MSA. See Figure C-2 for additional information on the Omaha MSA.

Lancaster County is in the Lincoln MSA and 95% of the Lincoln MSA population lives in it. The City of Lincoln is the urbanized core of the Lincoln MSA with a population of approximately 273,000 or 86% of the MSA population. See Figure C-3 for additional information on the Lincoln MSA.

Table C-3 contains population and growth data pertaining to Nebraska's 16 most populated counties in 2000, 2010 and 2014. The counties listed for 2000, 2010 & 2014 did not change and there were only minor ranking changes during the 2000 thru 2014 time frame. These 16 counties include the highest populated counties from each of the 4 MSAs and the 9 MiSAs. This illustrates that the population of Nebraska is located predominantly in the urbanized cores and this has not changed since 2000.

Additional population and population growth data on the Omaha, Lincoln, Sioux City and Grand Island MSA's can be found in Figures C-2 thru C-5.

Table C-4 provides population and population growth information on Nebraska's MiSAs.

Table C-5 provides population and population growth information on 9 additional counties that are outside of the designated MSAs and MiSAs with populations greater than 10,000.

Table C-6 provides 2010 thru 2014 population and population growth data on all 93 Nebraska counties. The counties are ranked using their 2010 thru 2014 population growth with the fastest growing counties at the top of the table.

Table C-6 also has a column for population density which ranges from a high of 1641 persons per square mile in Douglas County to $\leq 1$ person per square mile in 11 counties. There are also 49 counties (53% of Nebraska's 93 counties) with a population density of $\leq 10$ persons per square mile. This is indicative of the rural nature of most of Nebraska.

**Table C-2: Top Ten Nebraska Counties for Population and Population Growth: 2010 to 2014**

| 2014 Population | | | | Population Growth: 2010 - 2014 | | | | | Annualized Percent Population Growth | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | County or State | 2014 Population | % State Pop. | Rank | County | 2014 Population | Pop. Growth per Year | Annual % Pop. Growth | Rank | County | 2014 Population | Annual % Pop. Growth | Pop. Growth per Year |
| 1 | **Douglas** | 543,244 | 29% | 1 | **Douglas** | 543,244 | 6163 | 1.2% | 1 | Banner | 764 | 2.3% | 17 |
| 2 | **Lancaster** | 301,795 | 16% | 2 | **Lancaster** | 301,795 | 3915 | 1.3% | 2 | **Sarpy** | 172,193 | 1.9% | 3111 |
| 3 | **Sarpy** | 172,193 | 9% | 3 | **Sarpy** | 172,193 | 3111 | 1.9% | 3 | Blaine | 504 | 1.6% | 8 |
| 4 | **Hall** | 61,492 | 3% | 4 | **Hall** | 61,492 | 674 | 1.1% | 4 | Thomas | 687 | 1.4% | 9 |
| 5 | **Buffalo** | 48,224 | 3% | 5 | **Buffalo** | 48,224 | 513 | 1.1% | 5 | **Lancaster** | 301,795 | 1.3% | 3915 |
| 6 | Dodge | 36,744 | 2% | 6 | Platte | 32,666 | 100 | 0.3% | 6 | **Douglas** | 543,244 | 1.2% | 6163 |
| 7 | Scotts Bluff | 36,465 | 2% | 7 | Seward | 17,150 | 91 | 0.5% | 7 | **Hall** | 61,492 | 1.1% | 674 |
| 8 | Lincoln | 35,815 | 2% | 8 | York | 13,917 | 68 | 0.5% | 8 | **Buffalo** | 48,224 | 1.1% | 513 |
| 9 | Madison | 35,174 | 2% | 9 | Cass | 25,524 | 68 | 0.3% | 9 | Kearney | 6,644 | 0.6% | 37 |
| 10 | Platte | 32,666 | 2% | 10 | Madison | 35,174 | 56 | 0.2% | 10 | Seward | 17,150 | 0.5% | 91 |
| na | Nebraska | 1,881,503 | 100% | na | Nebraska | 1,881,503 | 12,910 | 0.7% | na | Nebraska | 1,881,503 | 0.7% | 12,910 |

**Observations** from data above and from additional data in Table C-3:

**(1)** The five counties identified with **Bold-Font** & green highlight appeared in all 3 lists: top 10 for population, population growth and % annualized growth. They are **Buffalo, Douglas, Hall, Lancaster,** and **Sarpy** Counties.

**(2)** The five counties with the highest populations are **Buffalo, Douglas, Hall, Lancaster,** and **Sarpy** Counties and 60% of Nebraska's population lives within these counties.

**(3)** The five counties with the highest population growth are also **Buffalo, Douglas, Hall, Lancaster,** and **Sarpy** Counties. The total population growth in these 5 counties was 57,501 or 111% of Nebraska's total population gain from 2010 thru 2014 (more than 100% because 62 of Nebraska's 93 counties lost population, a total of 1945 people). These 5 counties also accounted for nearly 96% of the population growth in the 31 counties that had population gains.

**(4)** The population gain in Nebraska's 3 most populated counties, Douglas, Lancaster & Sarpy, 54% of the state's population and 102 % of the state's population growth. Also 89% of the population growth in Nebraska's 10 fastest growing counties.

**(5)** Seward County, which is in the Lincoln MSA with Lancaster County, is Nebraska's 18$^{th}$ most populated county, and exhibited the 7$^{th}$ highest population growth from 2010 thru 2014.

**(6)** Banner, Blaine and Thomas Counties had the high percent growth rate between 2010 and 2014. These are very rural counties with low populations and low population densities (i.e., 0.7 to 1 person/square mile). The population gains in these counties does not appear to be of importance from an air quality perspective (i.e., does not relate to a significant increase in air pollution emissions).

The population data used in this table was obtained from the US Census Bureau. Population estimate data was used for both 2010 and 2014.

**Table C-3: Sixteen Most Populated Nebraska Counties: 2000, 2010 & 2014** [(a) (b) (c)]

| 2000 | | | 2010 | | | 2014 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | County | Population Estimate 7/1/00 | Rank | County | Population Estimate 7/1/10 | Rank | County | Population Estimate 7/1/14 | % State Pop. | Cum. % State Pop. | MSA or *MiSA* |
| 1 | Douglas | 464,829 | 1 | Douglas | 518,594 | 1 | Douglas | 543,244 | 29% | 29% | Omaha |
| 2 | Lancaster | 251,549 | 2 | Lancaster | 286,134 | 2 | Lancaster | 301,795 | 16% | 45% | L:incoln |
| 3 | Sarpy | 123,248 | 3 | Sarpy | 159,748 | 3 | Sarpy | 172,193 | 9% | 54% | Omaha |
| 4 | Hall | 53,559 | 4 | Hall | 58,797 | 4 | Hall | 61,492 | 3% | 57% | Grand Island |
| 5 | Buffalo | 42,336 | 5 | Buffalo | 46,174 | 5 | Buffalo | 48,224 | 3% | 60% | *Kearney* |
| 6 | Scotts Bluff | 37,021 | 6 | Scotts Bluff | 37,060 | 6 | Dodge | 36,744 | 2% | 62% | *Fremont* |
| 7 | Dodge | 36,214 | 7 | Dodge | 36,701 | 7 | Scotts Bluff | 36,465 | 2% | 64% | *Scottsbluff* |
| 8 | Madison | 35,233 | 8 | Lincoln | 36,267 | 8 | Lincoln | 35,815 | 2% | 66% | *North Platte* |
| 9 | Lincoln | 34,649 | 9 | Madison | 34,950 | 9 | Madison | 35,174 | 2% | 68% | *Norfolk* |
| 10 | Platte | 31,547 | 10 | Platte | 32,268 | 10 | Platte | 32,666 | 2% | 69% | *Columbus* |
| 11 | Adams | 31,180 | 11 | Adams | 31,333 | 11 | Adams | 31,457 | 2% | 71% | *Hastings* |
| 12 | Dawson | 24,439 | 12 | Cass | 25,254 | 12 | Cass | 25,524 | 1% | 72% | Omaha |
| 13 | Cass | 24,374 | 13 | Dawson | 24,354 | 13 | Dawson | 24,096 | 1% | 74% | *Lexington* |
| 14 | Gage | 22,945 | 14 | Gage | 22,286 | 14 | Gage | 21,663 | 1% | 75% | *Beatrice* |
| 15 | Dakota | 20,313 | 15 | Dakota | 21,029 | 15 | Saunders | 20,919 | 1% | 76% | Omaha |
| 16 | Saunders | 19,811 | 16 | Saunders | 20,858 | 16 | Dakota | 20,850 | 1% | 77% | Sioux City, IA |
| NA | Nebraska | 1,713,279 | NA | Nebraska | 1,829,865 | NA | Nebraska | 1,881,503 | 100 % | NA | NA |

Footnotes:

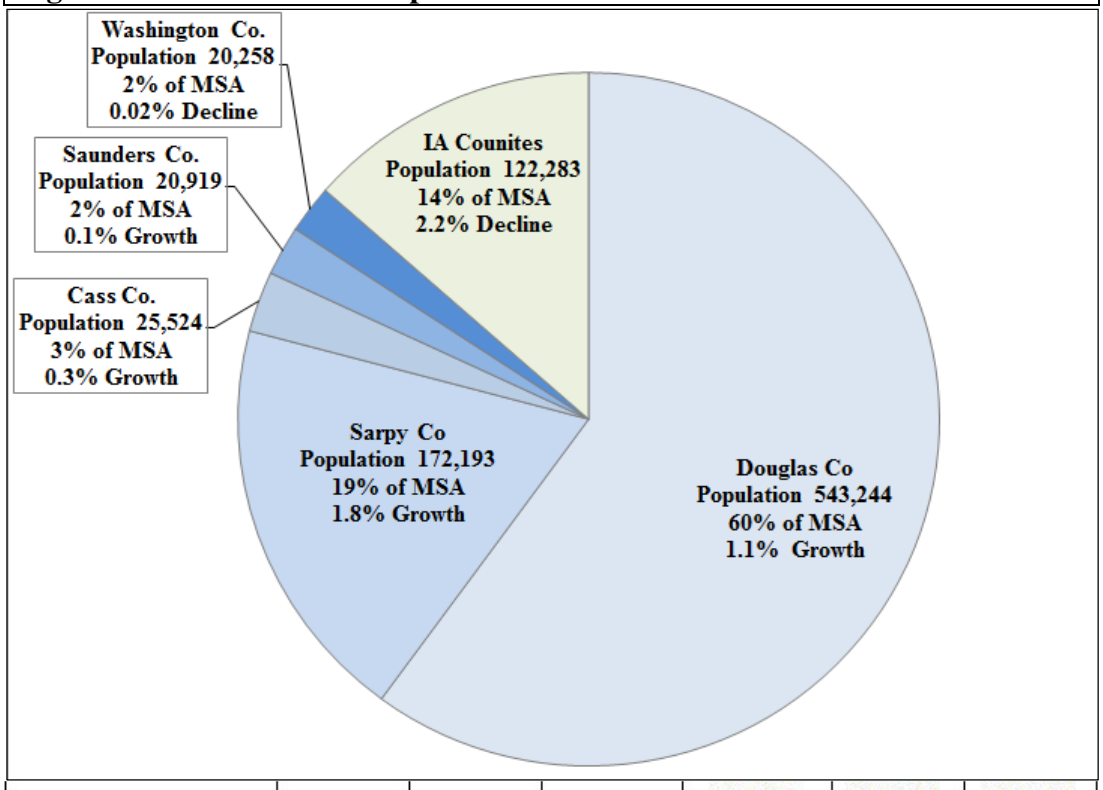
(a) The 16 most populated counties shown in this table are within Metropolitan and Micropolitan Statistical Areas (MSAs/MiSAs) that exist partially or wholly within Nebraska . Counties within all 13 of Nebraska's MSAs/MiSAs are represented in this table, although not all of the counties within the MSAs/MiSAs are in this table.

(b) The **absence of green highlight** indicates a ranking switch in the subsequent time period.

Observations:

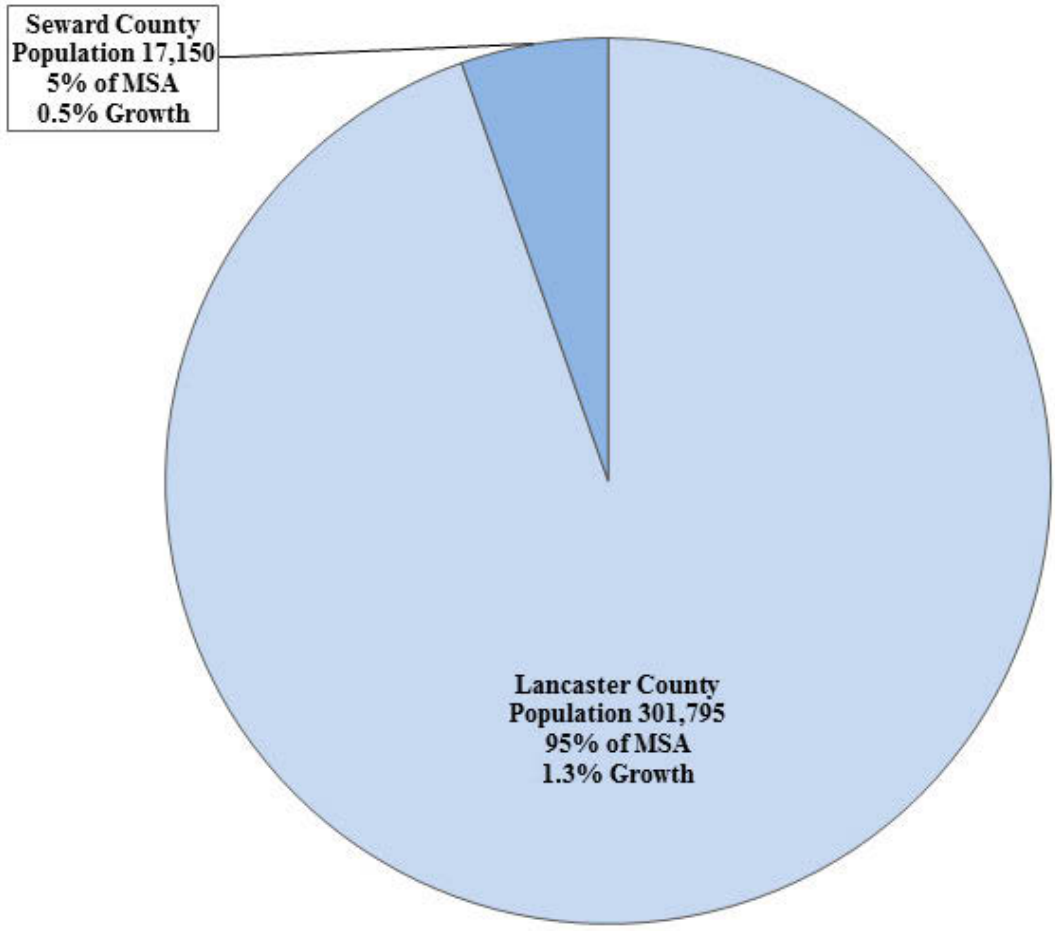
- Over half (54%) of the people in Nebraska live in its 3 most populated counties, 60% live in the 5 most populated counties, and over 75% live in the 16 most populated counties.
- The 16 most populated counties were the same in 2014 as they were in 2010 and 2000.
- There have been only minor ranking changes within this group of 16 counties from 2000 thru 2014.

**Figure C-2: Omaha MSA Population Distribution Chart & Table**




| | 2000 Population | 2010 Population | 2014 Population | % MSA Population in 2014 | 2010-14 Avg. Ann. Growth | 2010-14 Avg. Ann. % Growth |
|---|---|---|---|---|---|---|
| **Omaha MSA** | **769,117** | **868,113** | **904,421** | **100%** | **9077** | **1.0%** |
| **NE Counties** | **650,905** | **744,730** | **782,138** | **86%** | **9352** | **1.2%** |
| Douglas Co. | 464,712 | 518,594 | 543,244 | 60% | 6163 | 1.1% |
| Omaha (city) | 390,007 | 424,687 | 446,599 | 49% | 5478 | 1.2% |
| Sarpy Co. | 123,157 | 159,748 | 172,193 | 19% | 3111 | 1.8% |
| Bellevue (city) | 44,382 | 51,381 | 53,936 | 6.0% | 639 | 1.2% |
| Papillion (city) | 16,363 | 19,398 | 23,270 | 2.6% | 968 | 4.2% |
| LaVista (city) | 11,699 | 16,087 | 17,636 | 1.9% | 387 | 2.2% |
| Cass Co. | 24,394 | 25,254 | 25,524 | 2.8% | 68 | 0.3% |
| Plattsmouth (city) | 6887 | 6,500 | 6,495 | 0.7% | -1 | -0.02% |
| Saunders Co. | 19,852 | 20,858 | 20,919 | 2.3% | 15 | 0.07% |
| Wahoo (city) | 3,942 | 4,524 | 4,485 | 0.5% | -10 | -0.2% |
| Washington Co. | 18,790 | 20,276 | 20,258 | 2.2% | -5 | -0.02% |
| Blair (city) | 7512 | 8,005 | 7,986 | 0.9% | -5 | -0.06% |
| **IA Counties** | **118,212** | **123,383** | **122,283** | **14%** | **-275** | **-0.2%** |
| Pottawatamie Co. | 87,966 | 93,384 | 93,128 | 10.3% | -64 | -0.07% |
| Council Bluffs (city) | 58,268 | 62,386 | 62,245 | 6.9% | -35 | -0.06% |
| Carter Lake (city) | 3248 | 3,793 | 3,766 | 0.4% | -7 | -0.2% |
| Mills Co. | 14,555 | 15,074 | 14,831 | 1.6% | -61 | -0.4% |
| Glenwood (city) | 5358 | 5,276 | 5,242 | 0.6% | -9 | -0.2% |
| Harrisson Co. | 15,691 | 14,925 | 14,324 | 1.6% | -150 | -1.0% |
| Missouri Valley (city) | 2992 | 2,832 | 2,692 | 0.3% | -35 | -1.3% |
| Observation: Most of the population growth is in Douglas and Sarpy Counties | | | | | | |

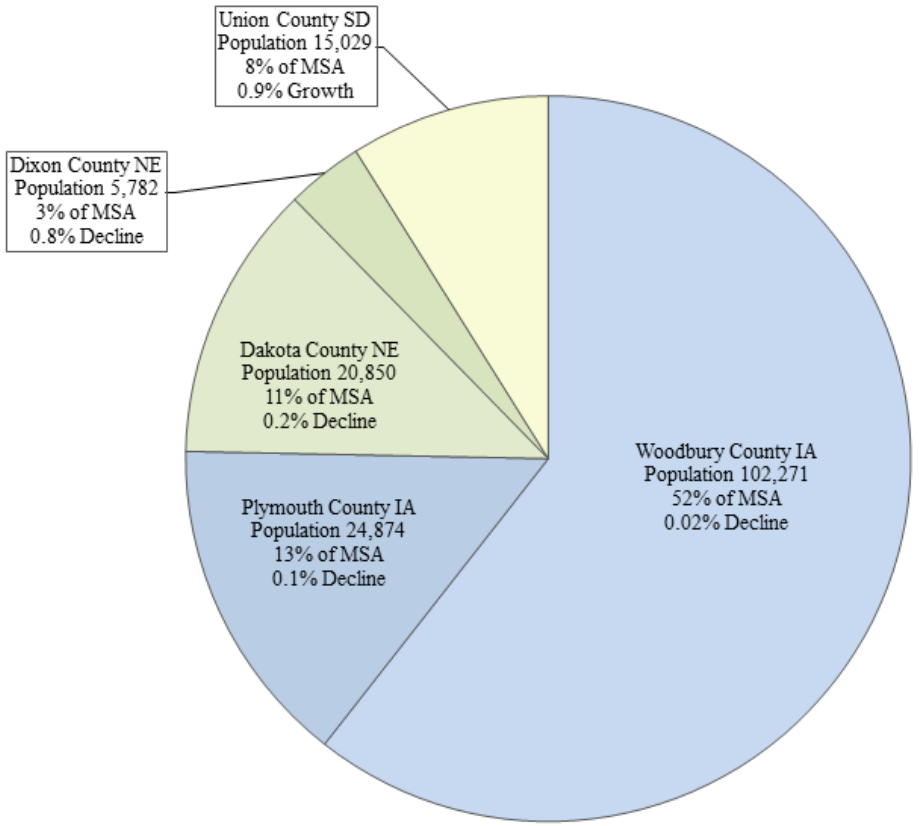
**Figure C-3: Lincoln MSA Population Distribution Chart & Table**




| | 2000 Population | 2010 Population | 2014 Population | % MSA Population in 2014 | 2010-14 Avg. Ann. Growth | 2010-14 Annual % Growth |
|---|---|---|---|---|---|---|
| Lincoln MSA[(a)] | 267,955 | 302,922 | 318,945 | 100% | 4006 | 1.3% |
| Lancaster County | 251,425 | 286,134 | 301,795 | 95% | 3915 | 1.3% |
| Lincoln (city) | 225,581 | 259,102 | 272,996 | 86% | 3474 | 1.3% |
| Waverly (city) | 2,448 | 3,291 | 3,709 | 1% | 104 | 2.8% |
| Seward County | 16,530 | 16,788 | 17,150 | 5% | 90 | 0.5% |
| Seward (city) | 6,319 | 6,982 | 7,128 | 2% | 36 | 0.5% |

Observation: Most of the population and growth is in Lancaster County and the City of Lincoln.

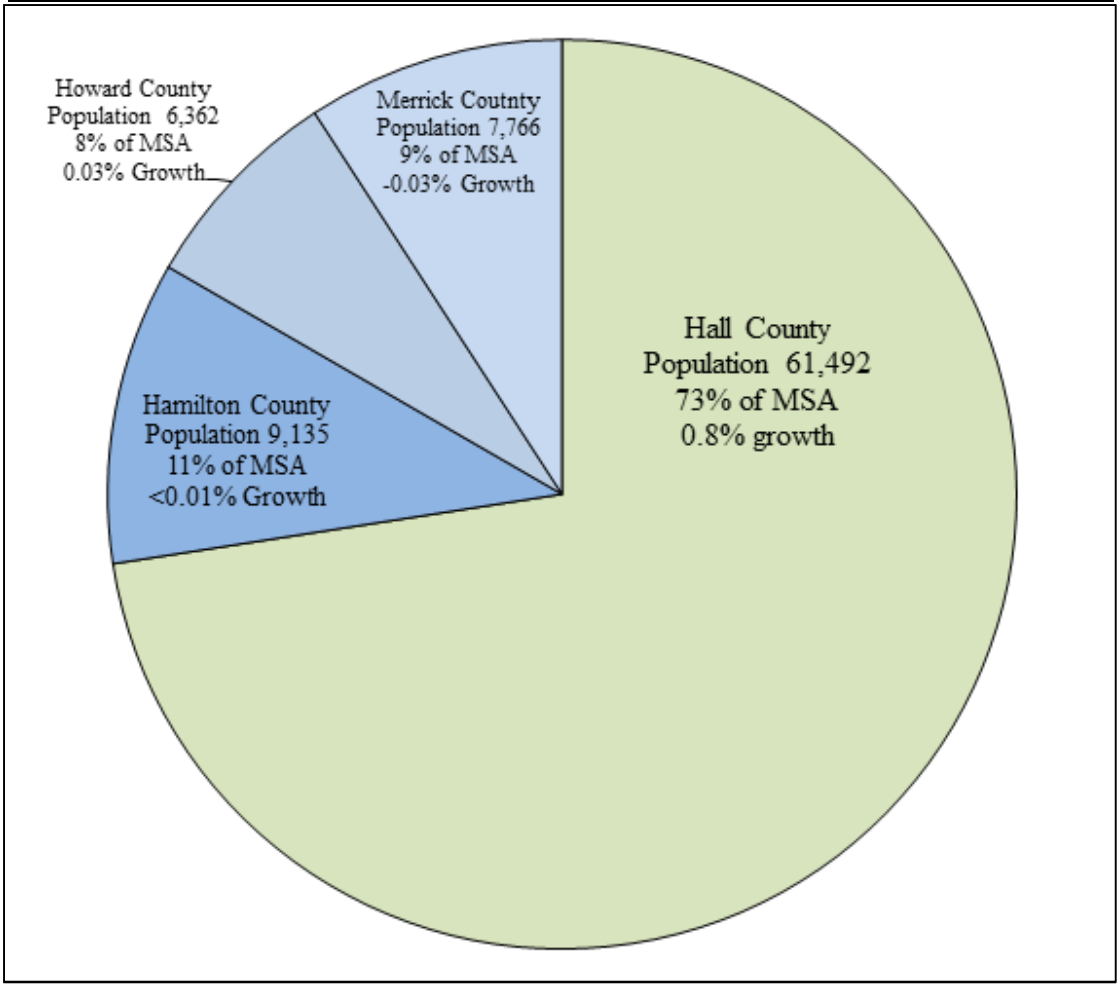
**Figure C-4: Sioux City MSA Population Distribution Chart & Table**




| | 2000 Population | 2010 Population | 2014 Population | % MSA Population in 2014 | 2010-14 Avg. Ann. Growth | 2010-14 Avg. Ann. % Growth |
|---|---|---|---|---|---|---|
| **Sioux City MSA** | **167,771** | **168,793** | **168,806** | **100%** | **-3** | **-0.00%** |
| **IA Counties & Cities** | **128,771** | **127,314** | **127,145** | **75%** | **-42** | **-0.03%** |
| Woodbury Co | 103,786 | 102,337 | 102,271 | 61% | -17 | -0.02% |
| Sioux City | 85,000 | 82,802 | 82,511 | 49% | -73 | -0.1% |
| Sargent Bluff (city) | 3,411 | 4,234 | 4,417 | 3% | 46 | 1% |
| Plymouth Co | 24,879 | 24,977 | 24,874 | 15% | -26 | -0.1% |
| Lemars (city) | 9,258 | 9,820 | 9,764 | 6% | -14 | -0.1% |
| **NE Counties & Cities** | **26,542** | **26,999** | **26,632** | **16%** | **-92** | **-0.3%** |
| Dakota Co. | 20,296 | 21,029 | 20,850 | 12% | -45 | -0.2% |
| South Sioux City | 12,004 | 13,374 | 13,360 | 8% | -4 | -0.03% |
| Dakota City | 1,820 | 1921 | 1904 | 1% | -4 | -0.2% |
| **Dixon Co.** | **6,246** | **5,970** | **5,782** | **3%** | **-47** | **-0.8%** |
| Wakefield (city) | 1,150 | 1445 | 1408 | 1% | -9 | -0.6% |
| **SD Counties & Cities** | **12,564** | **14,480** | **15,029** | **9%** | **137** | **0.9%** |
| Union Co. | 12,564 | 14,480 | 15,029 | 9% | 137 | 0.9% |
| North Sioux City | 2,237 | 2,535 | 2,636 | 2% | 25 | 1% |
| Elk Point (city) | 1,701 | 1,975 | 1,940 | 1% | -9 | -0.4% |
| Beresford (city) | 1,566 | 1,651 | 1,634 | 1% | -4 | -0.3% |

Observations:
- Most of the population is in Woodbury County, IA and Sioux City, IA.
- There was minimal overall population growth in the Sioux City MSA in the 2010-2014 time frame. Growth did occur in Union County, SD, North Sioux City, SD & Sargent Bluff, IA.

**Figure C-5: Grand Island MSA Population Distribution Chart & Table**




| | 2000 Population | 2010 Population | 2014 Population | % MSA Population in 2014 | 2010-14 Avg. Ann. Growth | 2010-14 Avg. Ann. % Growth |
|---|---|---|---|---|---|---|
| Grand Island MSA[a] | 77708 [b] | 82,043 | 84,755 | 100% | 678 | 0.8% |
| Hall County | 53,534 | 58,797 | 61,492 | 73% | 674 | 0.8% |
| Grand Island (city) | 42,940 | 48,809 | 51,236 | 60% | 607 | 0.7% |
| Hamilton County | 9,403 | 9,127 | 9,135 | 11% | 2 | 0.002% |
| Aurora (city) | 4,225 | 4,487 | 4,472 | 5% | -4 | -0.004% |
| Howard County | 6,567 | 6,265 | 6,362 | 8% | 24 | 0.03% |
| St. Paul (city) | 2,218 | 2,302 | 2,335 | 3% | 8 | 0.01% |
| Merrick County | 8,204 | 7,854 | 7,766 | 9% | -22 | -0.03% |
| Central City | 2,998 | 2,936 | 2,890 | 3% | -12 | -0.01% |

Footnotes:
(a) In 2000, Grand Island was a micropolitan statistical area (MiSA) encompassing 3 counties: Hall Howard & Merrick.
(b) The 2000 population of the "Grand Island MSA" includes Hamilton County, although it was not part of the Grand Island MiSA in 2000

Observations: Most of the population of the Grand Island MSA is in Hall County and the City of Grand Island. Population growth is also fastest within these areas.

**Table C-4: Micropolitan Statistical Area (MiSA) Population Data: 2010 thru 2014**

| MiSA | Counties & Cities | 2010 Population | 2014 Population | Avg. Ann. Population Growth | Annual Percent Growth | Percent of MiSA |
|---|---|---|---|---|---|---|
| Kearney MiSA | | 52,671 | 54,868 | 549 | 1.0% | 100% |
| | Buffalo County | 46,174 | 48,224 | 513 | 1.1% | 88% |
| | Kearney (city) | 30,858 | 32,469 | 403 | 1.3% | 59% |
| | Kearney County | 6,497 | 6,644 | 37 | 0.6% | 12% |
| Norfolk MSA | | 48,339 | 48,445 | 27 | 0.1% | 100% |
| | Madison County | 34,950 | 35,174 | 56 | 0.2% | 73% |
| | Norfolk (city) | 24,263 | 24,444 | 45 | 0.2% | 50% |
| | Pierce County | 7,261 | 7,202 | -15 | -0.2% | 15% |
| | Stanton County | 6,128 | 6,069 | -15 | -0.2% | 13% |
| Hastings MiSA | | 37,875 | 37,772 | -26 | -0.1% | 100% |
| | Adams County | 31,333 | 31,457 | 31 | 0.1% | 83% |
| | Hastings (city) | 25,182 | 24,915 | -67 | -0.3% | 66% |
| | Clay County | 6,542 | 6,315 | -57 | -0.9% | 17% |
| Scottsbluff MiSA | | 37,758 | 37,229 | -132 | -0.4% | 100% |
| | Scotts Bluff County | 37,060 | 36,465 | -149 | -0.4% | 98% |
| | Scottsbluff (city) | 15,077 | 14,875 | -51 | -0.3% | 40% |
| | Gering (city) | 8,520 | 8,372 | -37 | -0.4% | 22% |
| | Banner County | 698 | 764 | 17 | 2.3% | 2% |
| North Platte MiSA | | 37,573 | 37,063 | -128 | -0.3% | 100% |
| | Lincoln County | 36,267 | 35,815 | -113 | -0.3% | 97% |
| | North Platte (city) | 24,715 | 24,327 | -97 | -0.4% | 66% |
| | Logan County | 768 | 750 | -5 | -0.6% | 2% |
| | McPherson County | 538 | 498 | -10 | -1.9% | 1% |
| Fremont MiSA | | 36,701 | 36,744 | 11 | 0.0% | 100% |
| Part of Omaha CSA | Dodge County | 36,701 | 36,744 | 11 | 0.0% | 100% |
| | Fremont (city) | 26,419 | 26,500 | 20 | 0.1% | 72% |
| Columbus MiSA | | 32,268 | 32,666 | 100 | 0.3% | 100% |
| | Platte County | 32,268 | 32,666 | 100 | 0.3% | 100% |
| | Columbus (city) | 22,216 | 22,630 | 104 | 0.5% | 69% |
| Lexington MiSA | | 26,402 | 26,066 | -84 | -0.3% | 100% |
| | Dawson County | 24,354 | 24,096 | -65 | -0.3% | 92% |
| | Lexington (city) | 10,241 | 10,146 | -24 | -0.2% | 39% |
| | Cozad (city) | 3,993 | 3,912 | -20 | -0.5% | 15% |
| | Gothenburg (city) | 3,574 | 3,542 | -8 | -0.2% | 14% |
| | Gosper County | 2,048 | 1,970 | -20 | -1.0% | 8% |
| Beatrice MiSA | | 22,286 | 21,663 | -156 | -0.7% | 100% |
| | Gage County | 22,286 | 21,663 | -156 | -0.7% | 100% |
| | Beatrice (city) | 12,421 | 12,055 | -92 | -0.7% | 56% |

Observation: Four of these 9 MiSAs experienced population growth from 2010 to 2014: Kearney, Norfolk, Fremont & Columbus. Only the Kearney MiSA had an annual population gain $\geq$ 1%.

**Table C-5: Nebraska Counties Outside of MSAs and MiSAs that have Populations Greater Than 10,000**

| Counties & Cities | 2010 Population | 2014 Population | Avg. Ann. Population Growth | Annual Percent Growth | Percent of MiSA |
|---|---|---|---|---|---|
| Otoe Co | 15,758 | 15,797 | 10 | 0.1% | 100% |
| Nebraska City | 7,299 | 7,265 | -9 | -0.1% | 46% |
| Otoe County is adjacent to the Omaha and Lincoln MSAs. | | | | | |
| Saline Co | 14,231 | 14,252 | 5 | 0.0% | 100% |
| Crete (city) | 6,992 | 7,034 | 11 | 0.1% | 49% |
| Saline County lies SW and is adjacent to the Lincoln MSA | | | | | |
| York Co | 13,645 | 13,917 | 68 | 0.5% | 100% |
| York (city) | 7,758 | 7,957 | 50 | 0.6% | 57% |
| York County. lies between and abuts the Lincoln and Grand Island MSAs | | | | | |
| Box Butte Co | 11,293 | 11,340 | 12 | 0.1% | 100% |
| Alliance (city) | 8,480 | 8,519 | 10 | 0.1% | 75% |
| Alliance is the largest Nebraska city outside of an MSA or MiSA. Box Butte County is adjacent to the Scottsbluff MiSA. | | | | | |
| Red Willow Co | 11,052 | 10,867 | -46 | -0.4% | 100% |
| McCook (city) | 7,695 | 7,611 | -21 | -0.3% | 70% |
| | | | | | |
| Custer Co | 10,913 | 10,728 | -46 | -0.4% | 100% |
| Broken Bow (city) | 3,553 | 3,482 | -18 | -0.5% | 32% |
| Custer County is adjacent to the North Platte, Lexington & Kearney MiSAs. | | | | | |
| Colfax Co | 10,539 | 10,504 | -9 | -0.1% | 100% |
| Schuyler (city) | 6,228 | 6,169 | -15 | -0.2% | 59% |
| Colfax County lies between and abuts the Columbus, Fremont & Norfolk MiSAs. | | | | | |
| Holt Co | 10,451 | 10,403 | -12 | -0.1% | 100% |
| O'Neill (city) | 3,710 | 3,663 | -12 | -0.3% | 35% |
| Atkinson (city) | 1,247 | 1,257 | 3 | 0.2% | 12% |
| | | | | | |
| Cheyenne Co | 9,961 | 10,148 | 47 | 0.5% | 100% |
| Sidney (city) | 6,732 | 6,914 | 46 | 0.7% | 68% |
| Cheyenne Co. is adjacent to the southeast corner of the Scottsbluff MiSA. | | | | | |

Observations:

- Five of these 9 counties experienced population growth between 2010 and 2014: Otoe, Saline, York, Box Butte & Cheyenne. Population growth rates were < 1% per year.
- Micropolitan Statistical Areas (MiSAs) have a core urban area with a population of 10,000 to 49,999. None of these counties appear to be approaching this threshold.
- Colfax, Otoe, Saline and York Counties are adjacent to other MSAs and or MiSAs.

**Table C-6: Population and Population Growth Data for Nebraska & Nebraska Counties Sorted by 2010 to 2014 Population Growth [(a)]**



| Rank | County | Population Estimate 7/1/10 | Population Estimate 7/1/10 | Pop. Density (b) | 2010-14 Population Growth | 2010-14 Ann. % Growth | 2013-14 Population Growth | 2013-14 Percent Growth |
|---|---|---|---|---|---|---|---|---|
| | Nebraska | 1,829,865 | 1,881,503 | 24.5 | 51,638 | 0.69% | 12,534 | 0.67% |
| 1 | Douglas | 518,594 | 543,244 | 1641.3 | 24,650 | 1.13% | 5,715 | 1.05% |
| 2 | Lancaster | 286,134 | 301,795 | 359.8 | 15,661 | 1.30% | 4,510 | 1.49% |
| 3 | Sarpy | 159,748 | 172,193 | 715.9 | 12,445 | 1.81% | 2,835 | 1.65% |
| 4 | Hall | 58,797 | 61,492 | 112.5 | 2,695 | 1.10% | 569 | 0.93% |
| 5 | Buffalo | 46,174 | 48,224 | 49.8 | 2,050 | 1.06% | 166 | 0.34% |
| 6 | Platte | 32,268 | 32,666 | 48.2 | 398 | 0.30% | 153 | 0.47% |
| 7 | Seward | 16,788 | 17,150 | 29.8 | 362 | 0.53% | 86 | 0.50% |
| 8 | York | 13,645 | 13,917 | 24.2 | 272 | 0.49% | 54 | 0.39% |
| 9 | Cass | 25,254 | 25,524 | 45.6 | 270 | 0.26% | 143 | 0.56% |
| 10 | Madison | 34,950 | 35,174 | 40.9 | 224 | 0.16% | -77 | -0.22% |
| 11 | Cheyenne | 9,961 | 10,148 | 8.5 | 187 | 0.46% | 69 | 0.68% |
| 12 | Kearney | 6,497 | 6,644 | 12.9 | 147 | 0.55% | 91 | 1.37% |
| 13 | Adams | 31,333 | 31,457 | 55.8 | 124 | 0.10% | -124 | -0.39% |
| 14 | Howard | 6,265 | 6,362 | 11.2 | 97 | 0.38% | 21 | 0.33% |
| 15 | Banner | 698 | 764 | 1.0 | 66 | 2.16% | -13 | -1.70% |
| 16 | Harlan | 3,427 | 3,492 | 6.3 | 65 | 0.47% | -21 | -0.60% |
| 17 | Saunders | 20,858 | 20,919 | 27.7 | 61 | 0.07% | 38 | 0.18% |
| 18 | Box Butte | 11,293 | 11,340 | 10.5 | 47 | 0.10% | 30 | 0.26% |
| 19 | Cherry | 5,715 | 5,762 | 1.0 | 47 | 0.20% | -17 | -0.30% |
| 20 | Dodge | 36,701 | 36,744 | 68.8 | 43 | 0.03% | 127 | 0.35% |
| 21 | Otoe | 15,758 | 15,797 | 25.7 | 39 | 0.06% | 80 | 0.51% |
| 22 | Thomas | 650 | 687 | 1.0 | 37 | 1.35% | -9 | -1.31% |
| 23 | Blaine | 472 | 504 | 0.7 | 32 | 1.59% | 23 | 4.56% |
| 24 | Saline | 14,231 | 14,252 | 24.8 | 21 | 0.04% | -46 | -0.32% |
| 25 | Chase | 3,963 | 3,978 | 4.4 | 15 | 0.09% | 1 | 0.03% |
| 26 | Thayer | 5,218 | 5,230 | 9.1 | 12 | 0.06% | 34 | 0.65% |
| 27 | Hamilton | 9,127 | 9,135 | 16.8 | 8 | 0.02% | 13 | 0.14% |
| 28 | Hitchcock | 2,893 | 2,901 | 4.1 | 8 | 0.07% | 28 | 0.97% |
| 29 | Grant | 612 | 619 | 0.8 | 7 | 0.28% | -6 | -0.97% |
| 30 | Deuel | 1,937 | 1,940 | 4.4 | 3 | 0.04% | 6 | 0.31% |
| 31 | Phelps | 9,185 | 9,187 | 17.0 | 2 | 0.01% | -10 | -0.11% |

Footnote:
(a) This table contains population estimates for 7/1/10 and 7/1/14 published by the US Census Bureau.
(b) ***Pop. Density*** is the population of the county divided by its surface area in square miles (people/sq. mile).

**Table C-6: Population and Population Growth Data for Nebraska & Nebraska Counties Sorted by 2010 to 2014 Population Growth [(a)]**



| Rank | County | Population Estimate 7/1/10 | Population Estimate 7/1/10 | Pop. Density (b) | 2010-14 Population Growth | 2010-14 Annual Percent Growth | 2013-14 Population Growth | 2013-14 Percent Growth |
|---|---|---|---|---|---|---|---|---|
| 32 | Thurston | 6,973 | 6,969 | 17.7 | -4 | -0.01% | 72 | 1.03% |
| 33 | Hooker | 734 | 728 | 1.0 | -6 | -0.21% | -4 | -0.55% |
| 34 | Sioux | 1,312 | 1,303 | 0.6 | -9 | -0.17% | -16 | -1.23% |
| 35 | Arthur | 464 | 453 | 0.6 | -11 | -0.61% | 2 | 0.44% |
| 36 | Keya Paha | 821 | 810 | 1.0 | -11 | -0.34% | 13 | 1.60% |
| 37 | Logan | 768 | 750 | 1.3 | -18 | -0.60% | -14 | -1.87% |
| 38 | Washington | 20,276 | 20,258 | 51.9 | -18 | -0.02% | 27 | 0.13% |
| 39 | Hayes | 960 | 933 | 1.3 | -27 | -0.72% | -40 | -4.29% |
| 40 | Johnson | 5,216 | 5,185 | 13.8 | -31 | -0.15% | 56 | 1.08% |
| 41 | Colfax | 10,539 | 10,504 | 25.4 | -35 | -0.08% | 98 | 0.93% |
| 42 | Garfield | 2,041 | 2,003 | 3.5 | -38 | -0.47% | -30 | -1.50% |
| 43 | Loup | 626 | 588 | 1.0 | -38 | -1.62% | 7 | 1.19% |
| 44 | McPherson | 538 | 498 | 0.9 | -40 | -2.01% | -25 | -5.02% |
| 45 | Frontier | 2,753 | 2,705 | 2.8 | -48 | -0.44% | -7 | -0.26% |
| 46 | Holt | 10,451 | 10,403 | 4.3 | -48 | -0.12% | -35 | -0.34% |
| 47 | Valley | 4,258 | 4,204 | 7.4 | -54 | -0.32% | 7 | 0.17% |
| 48 | Wheeler | 821 | 766 | 1.3 | -55 | -1.80% | 8 | 1.04% |
| 49 | Pierce | 7,261 | 7,202 | 12.5 | -59 | -0.20% | 38 | 0.53% |
| 50 | Stanton | 6,128 | 6,069 | 14.1 | -59 | -0.24% | -15 | -0.25% |
| 51 | Greeley | 2,544 | 2,482 | 4.4 | -62 | -0.62% | -1 | -0.04% |
| 52 | Furnas | 4,954 | 4,888 | 6.8 | -66 | -0.34% | 32 | 0.65% |
| 53 | Boyd | 2,100 | 2,033 | 3.8 | -67 | -0.82% | 14 | 0.69% |
| 54 | Nemaha | 7,247 | 7,175 | 17.5 | -72 | -0.25% | -3 | -0.04% |
| 55 | Pawnee | 2,775 | 2,702 | 6.3 | -73 | -0.68% | -24 | -0.89% |
| 56 | Sherman | 3,149 | 3,074 | 5.4 | -75 | -0.61% | -36 | -1.17% |
| 57 | Gosper | 2,048 | 1,970 | 4.3 | -78 | -0.99% | -4 | -0.20% |
| 58 | Rock | 1,524 | 1,443 | 1.4 | -81 | -1.40% | 26 | 1.80% |
| 59 | Merrick | 7,854 | 7,766 | 16.0 | -88 | -0.28% | -35 | -0.45% |
| 60 | Perkins | 2,987 | 2,891 | 3.3 | -96 | -0.83% | -19 | -0.66% |
| 61 | Kimball | 3,827 | 3,713 | 3.9 | -114 | -0.77% | 26 | 0.70% |
| 62 | Cuming | 9,144 | 9,027 | 15.8 | -117 | -0.32% | 22 | 0.24% |
| 63 | Polk | 5,389 | 5,271 | 12.0 | -118 | -0.56% | 21 | 0.40% |

Footnote:
(a) This table contains population estimates for 7/1/10 and 7/1/14 published by the US Census Bureau.
(b) ***Pop. Density*** is the population of the county divided by its surface area in square miles (people/sq. mile).

**Table C-6: Population and Population Growth Data for Nebraska & Nebraska Counties Sorted by 2010 to 2014 Population Growth [(a)]**



| Rank | County | Population Estimate 7/1/10 | Population Estimate 7/1/14 | Pop. Density (b) | 2010-14 Population Growth | 2010-14 Annual Percent Growth | 2013-14 Population Growth | 2013-14 Percent Growth |
|---|---|---|---|---|---|---|---|---|
| 64 | Butler | 8,370 | 8,249 | 14.1 | -121 | -0.37% | -75 | -0.91% |
| 65 | Dundy | 2,008 | 1,886 | 2.1 | -122 | -1.62% | -83 | -4.40% |
| 66 | Dawes | 9,172 | 9,042 | 6.5 | -130 | -0.36% | -51 | -0.56% |
| 67 | Nuckolls | 4,507 | 4,369 | 7.6 | -138 | -0.79% | -26 | -0.60% |
| 68 | Boone | 5,496 | 5,353 | 7.8 | -143 | -0.67% | -22 | -0.41% |
| 69 | Franklin | 3,231 | 3,076 | 5.3 | -155 | -1.26% | -15 | -0.49% |
| 70 | Webster | 3,814 | 3,658 | 6.4 | -156 | -1.07% | -17 | -0.46% |
| 71 | Nance | 3,729 | 3,570 | 8.1 | -159 | -1.11% | -30 | -0.84% |
| 72 | Garden | 2,078 | 1,911 | 1.1 | -167 | -2.18% | 7 | 0.37% |
| 73 | Wayne | 9,600 | 9,431 | 21.3 | -169 | -0.45% | -6 | -0.06% |
| 74 | Morrill | 5,040 | 4,862 | 3.4 | -178 | -0.92% | -20 | -0.41% |
| 75 | Dakota | 21,029 | 20,850 | 79.0 | -179 | -0.21% | -94 | -0.45% |
| 76 | Custer | 10,913 | 10,728 | 4.2 | -185 | -0.43% | -68 | -0.63% |
| 77 | Red Willow | 11,052 | 10,867 | 15.2 | -185 | -0.43% | -156 | -1.44% |
| 78 | Knox | 8,668 | 8,482 | 7.7 | -186 | -0.55% | -75 | -0.88% |
| 79 | Dixon | 5,970 | 5,782 | 12.1 | -188 | -0.81% | -53 | -0.92% |
| 80 | Sheridan | 5,457 | 5,259 | 2.2 | -198 | -0.94% | 7 | 0.13% |
| 81 | Jefferson | 7,534 | 7,335 | 12.8 | -199 | -0.68% | -212 | -2.89% |
| 82 | Brown | 3,144 | 2,941 | 2.4 | -203 | -1.73% | 17 | 0.58% |
| 83 | Richardson | 8,343 | 8,128 | 14.7 | -215 | -0.66% | 3 | 0.04% |
| 84 | Cedar | 8,829 | 8,610 | 11.6 | -219 | -0.64% | -76 | -0.88% |
| 85 | Clay | 6,542 | 6,315 | 11.0 | -227 | -0.90% | -68 | -1.08% |
| 86 | Fillmore | 5,889 | 5,661 | 9.8 | -228 | -1.01% | -24 | -0.42% |
| 87 | Keith | 8,359 | 8,121 | 7.7 | -238 | -0.73% | 0 | 0.00% |
| 88 | Dawson | 24,354 | 24,096 | 23.8 | -258 | -0.27% | -56 | -0.23% |
| 89 | Antelope | 6,658 | 6,398 | 7.5 | -260 | -1.02% | -58 | -0.91% |
| 90 | Burt | 6,838 | 6,573 | 13.3 | -265 | -1.01% | -10 | -0.15% |
| 91 | Lincoln | 36,267 | 35,815 | 14.0 | -452 | -0.32% | -277 | -0.77% |
| 92 | Scotts Bluff | 37,060 | 36,465 | 49.3 | -595 | -0.41% | -405 | -1.11% |
| 93 | Gage | 22,286 | 21,663 | 25.3 | -623 | -0.72% | -153 | -0.71% |

Footnote:

(a) This table contains population estimates for 7/1/10 and 7/1/14 published by the US Census Bureau.

(b) ***Pop. Density*** is the population of the county divided by its surface area in square miles (people/sq. mile).

This attachment reviews compliance with 40 CFR Part 58 Appendixes A, C, D and F as set forth on July 1, 2015. The review found the Nebraska Ambient Monitoring Network to be in compliance with these requirements.

## I. Appendix A Review

40 CFR Part 58 Appendix A sets forth quality assurance requirements for the collection, calculation and reporting of air monitoring data. To ensure compliance with these requirements, the NDEQ has a *Quality Assurance Project Plan (QAPP) for the Nebraska Ambient Air Monitoring Program for Criteria Pollutants, NCore Parameters, PM2.5 Speciation, and Total reduced Sulfur.* EPA Region 7 reviewed and approved this QAPP in November 2014. Actual procedures for operating monitors, as well as for collecting, reviewing and submitting data are set forth in Standard Operating Procedures (SOPs). The SOPs ensures that support the Measurement Quality Objectives set forth in the QAPP.

40 CFR Part 58 Appendix A also sets forth requirements specifying the number of collocated monitors required for $PM_{2.5,}$ $PM_{10,}$ $PM_{10\text{-}2.5}$ and Lead (Pb) monitors. Table D-1 summarizes the collocated sites in Nebraska. Nebraska is meeting collocation requirements.

## II. Appendix C Review

Appendix C contains requirements for approved ambient air monitoring methodologies. Any monitor that is used to evaluate NAAQS compliance must be a Federal Reference Method (FRM) or a Federal Equivalent Method (FEM) or an alternatively approved method as defined in Appendix C. The network description tables in Attachment A of the network plan identify the monitoring method used by each monitor in the Nebraska ambient air monitoring network. All monitors used to evaluate compliance with the NAAQS are FRM or FEM certified. The only monitors that are not FRM/FEM certified are the TRS monitors used to evaluate compliance with Nebraska's TRS standard.

**Table D-1: Compliance Summary: Collocation Requirements of Appendix A[1]**

| Parameter | Method | Percent Collocation Required | NDEQ/LLCHD [2] | | | DCHD [2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | # of Sites | # Collocated | % Collocated | # of Sites | # Collocated | % Collocated |
| $PM_{10}$ | Hi-Vol Sampler | 15% | 0 | 0 | na | 2 | 1 | 50% |
| $PM_{10}$ | Sequential 2025 Sampler | 15% | 3 | 1 | 33% | 0 | 0 | na |
| $PM_{10}$ | Continuous Monitor | None | 1 | 0 | (3) | 1 | 0 | (3) |
| $PM_{2.5}$ | Sequential 2025 Sampler | 15% | 3 | 1 | 33% | 2 | 1 | 50% |
| $PM_{2.5}$ | Met One BAM Method [5] | 15% | 1 | 1 | 100% [4] | 2 | 1 | 50% |
| $PM_{10-2.5}$ | Met One BAM Method | None | 0 | 0 | na | 1 | 0 | (5) |
| TSP-Lead | Hi-Vol Sampler | 15% except NCore | 2 | 1 | 50% | 1 | 0 | (6) |

Footnotes:

(1) Collocation Requirements: Appendix A requires 15% of the sites in each parameter/method category to have collocated monitors with certain exceptions and additional requirements.

(2) Collocation requirements apply to each Primary Quality Assurance Organization (PQAO) separately. There are two PQAO's in Nebraska: DCHD and NDEQ/LLCHD.

(3) Collocated monitors are not required for continuous $PM_{10}$ monitors.

(4) LLCHD operates a MetOne BAM $PM_{2.5}$ sampler for AirNow and AQI reporting. It is collocated with the primary and collocated sequential samplers at the site.

(5) DCHD operates 2 MetOne BAM samplers at the NCore site. One is set-up to sample $PM_{2.5}$ and the other samples $PM_{10}$. $PM_{10-2.5}$ is calculated using the results from these 2 samplers. There is a sequential $PM_{2.5}$ collocated sampler at the NCore site, but not a collocated $PM_{10}$ sampler. Collocated $PM_{10}$ samplers are not required in Appendix A for continuous $PM_{10}$ samplers. EPA has designated some NCore sites to have collocated samplers for $PM_{10-2.5}$; the Omaha NCore site is not one of them.

(5) Collocated TSP-Lead monitoring is not required at NCore sites unless specifically required by EPA; and EPA has not designated the Omaha NCore site to have a collocated TSP-Lead sampler.

| Network Descriptions | |
|---|---|
| NDEQ Sequential 2025 $PM_{10}$: Weeping Water (collocated), Cozad & Gothenburg | DCHD Hi-Vol $PM_{10}$: 19& Burt (collocated) and South Omaha |
| NDEQ Continuous $PM_{10}$: Weeping Water Farm (collocation not required) | DCHD Continuous $PM_{10}$: 46th & Farnam (collocation not required) |
| NDEQ TSP-Lead: Fremont (collocated) & Auburn | DCHD Sequential 2025 $PM_{2.5}$: Berry St & Blair (collocation at NCore) |
| NDEQ & LLCHD Sequential 2025 $PM_{2.5}$: Lincoln (collocated), Grand island & Scottsbluff | DCHD MetOne BAM $PM_{2.5}$: NCore (collocated) & Bellevue |
| | DCHD Met MetOne BAM $PM_{10-2.5}$: NCore (collocation not required) |
| | DCHD TSP-Lead: NCore (collocation not required) |

## III. Appendix D Review

Appendix D sets forth monitoring objectives and minimum monitoring site requirements that must be met. The review that follows demonstrates that the Nebraska ambient air monitoring network meets the Appendix D requirements in effect on February 28, 2013.

EPA periodically re-evaluates the NAAQS and monitoring requirements. Regulatory modifications may impact the minimum monitoring requirements in one of two ways:

- Appendix D minimum monitoring requirements may be changed (i.e., more or less monitoring could be required); or
- Monitoring needs may change as a result of a NAAQS modification (e.g., when the annual average $PM_{2.5}$ NAAQS was lowered from 15 □g/m$^3$ to 12 □g/m$^3$, the 85% of NAAQS threshold set forth in 40 CFR Part 58 Appendix D Sec. 4.7 Table D.5 was crossed, and the minimum number of $PM_{2.5}$ monitoring sites for the Omaha MSA increased from 1 to 2).

## III.A: Appendix D - Objectives Review

Appendix D Section 1.1 sets forth 3 objectives that ambient air monitoring networks must be designed to meet:

- Provide air pollution data to the general public in a timely manner.
- Support compliance with ambient air quality standards and emissions strategy development.
- Support for air pollution research studies.

Each of these objectives is discussed below.

### 1. Timely Dissemination of Data - Met

Air monitoring data is made available to the public and other parties in several ways.

a. Ambient air monitoring data is reviewed quarterly and entered into the national EPA-operated AQS database. The AQS database is available to federal, state and local monitoring agency personnel, as well as some other public agencies and researchers. AQS data cannot be directly accessed by the general public, but the NDEQ does respond to data requests.

b. Air Quality Index reporting is performed by DCHD and LLCHD for their respective jurisdictions. The AQI information is made available on their respective city websites.

c. Monitoring data from continuous particulate, ozone and CO monitors in the Omaha and Lincoln MSAs report directly to the EPA AirNow system. The general public can access air quality index information on-line at www.airnow.gov

d. Daily maximum TRS monitoring data is available to the public on the NDEQ web site. This data is typically entered on a monthly basis. The NDEQ also responds to telephone or email requests for more timely or detailed information.

e. The NDEQ publishes an annual Air Quality Report. This report is available on-line and upon request. Similarly the annual Network Plan reports are also available to the public on-line or upon request.

**2. Support compliance with ambient air quality standards and emissions strategy development – Met**

In the first quarter of each year, the NDEQ reviews all of the data collected by DCHD, LLCHD and NDEQ during the previous year as part of the data certification process. At this time design values are calculated and compared with the NAAQS. This design value information is then incorporated into the annual Network Plan. The annual Network Plans discuss attainment/non-attainment status and monitoring strategies that may be related.

The NDEQ, DCHD and LLCHD also perform data validation reviews at least once each quarter and in many instances monthly. Any potential non-attainment or near non-attainment circumstances will be recognized during these reviews. If such conditions are identified, efforts are made to ascertain the cause and to the extent possible bring about corrective action through regulatory and/or voluntary mechanisms.

An Air Now summary report for ozone is emailed daily to an NDEQ staffer and, starting in 2015, a similar email report is being established for $PM_{2.5}$. When elevated ozone or $PM_{2.5}$ levels are reported, this information is passed on to air quality managers at DCHD, LLCHD and NDEQ.

The examples below illustrate how state and local air quality programs have recognized air quality issues and reacted to them.

a. In the fall of 2011, the 3-month average lead concentration at the Fremont site exceeded the NAAQS. EPA and the one known source were notified. The data was discussed and presented to EPA for review. NDEQ and the source conducted an on-site review of the facility and potential emission sources (see Section V.B.2 in this network plan for additional information).

   In 2012, NDEQ continued to calculate daily and 3-month average lead monitoring data as the data became available; and to disseminate this information to the primary known source. High daily lead levels in May thru early July brought the 3-month average within 93% of the NAAQS, and these lead levels were discussed with the primary known source. Lower lead levels were seen beginning in July and continuing thereafter. The impact of this information exchange with the source is difficult to evaluate, but it may have played an important role in facilitating the source in remaining diligent with their control efforts.

b. From September 2011 thru June 2012, the 46$^{th}$ & Farnam site recorded four (4) 24-hour average $PM_{10}$ values greater than the 150 $u$g/m$^3$ standard. The 46$^{th}$ & Farnam site is source-oriented with respect to Omaha Steel Castings Company, and the company had initiated a move to a new location in Wahoo, NE.

   Douglas County Health Department made Omaha Air Quality and Omaha Steel aware of the high values in a timely manner. Omaha Air Quality met with Omaha Steel to discuss potential $PM_{10}$ sources and controls. Omaha Steel proceeded with process-handling and housekeeping changes intended to reduce $PM_{10}$ emissions. These efforts were effective in reducing $PM_{10}$ levels. Omaha Steel completed their move to their new facility in 2014 and closed the 46$^{th}$ & Farnam site.

**c.** In the summer of 2012, Nebraska monitoring sites began reporting ozone levels above those seen in recent years. The NDEQ began using Air Now data to track the current 4th highest values for sites in and around Nebraska as the ozone season progressed. Although the 4th high values at 2 sites in the Omaha MSA exceeded 0.075 ppm 8-hour ozone NAAQS, the 3-year average design values did not exceed the NAAQS (i.e., the maximum unofficial 2010-2012 DVs = 0.069 ppm).

**d.** In the spring of 2014, smoke from controlled grassland fires in the Flint Hills area of Kansas was impacting Nebraska. AirNow data was used to track the degree and extent of the impact on ambient ozone and $PM_{2.5}$. At times, the impact from these controlled burns raised ozone and $PM_{2.5}$ levels in Nebraska. Both DCHD and LLCHD issued air quality alerts related to these burns.

**3. Support for air pollution research studies – Met**

The NDEQ, DCHD and LLCHD operate the Nebraska SLAMS network in accordance with the monitor specifications, site placement and QA requirements set forth in 40 CFR Part 50 and 58. EPA R7 provides oversight to ensure that regulatory requirements are met with respect to methodology and QA.

Data is reviewed quarterly before being submitted to EPA's AQS database. Once in AQS, the data is available for pollution research studies.

Near real-time data is also reported to the EPA AirNow data from the continuous PM, CO and ozone monitors operating in the Omaha and Lincoln MSA. This data is also available for research purposes.

## III.B: Appendix D – Minimum Monitoring Site Requirements

Nebraska has the minimum number of monitoring sites required by Appendix D. The minimum monitoring site requirements for each of the four MSAs are examined separately and documented in Tables D-2.a thru D-2.d below.

The review for non-MSA areas of the state was performed on a pollutant specific basis. This review is documented in narrative form in Section III.C below.

It should be noted that the number of monitoring sites required in a network generally needs to be greater than the minimum number required by Appendix D. This is stated in Appendix D Section 1.1.2: "… total number of monitoring sites that will serve the variety of data needs will be substantially higher than these minimum requirements provide…"

## III.C: Appendix D Minimum Monitoring Requirements for non-MSAs

**NCore** – (40 CFR Part 58 App. D Sec. 3) None required or operated.

At this time there is no requirement or plan to develop an NCore site in Nebraska, other than the current site in Omaha.

**Ozone ($O_3$)** – (40 CFR Part 58 App. D Sec. 4.1) No sites required or operated.

At this time there is no requirement to deploy ozone monitoring sites outside of the MSAs.

In 2010, EPA proposed regulations requiring 1 to 3 rural ozone monitoring sites in Nebraska. These regulations were withdrawn pending further review of the ozone NAAQS. In November 2014, EPA proposed a revision to the ozone NAAQS, which is scheduled to be finalized in November 2015. The current proposal does not require rural ozone monitoring. However, although not required, ozone monitoring in some rural areas of Nebraska may need to be conducted to evaluate attainment with the new NAAQS, as well as transport issues.

**Carbon Monoxide (CO)** – (40 CFR Part 58 App. D Sec. 4.2) No sites required or operated.

At this time there is no requirement or plan to conduct CO monitoring outside the MSAs. Elevated CO levels are primarily associated with vehicle emissions and congested traffic areas. Highest levels would be anticipated in the Omaha and Lincoln MSAs. Highest concentration site monitoring in Lincoln and Omaha has consistently found CO levels well below the NAAQS. Thus, there is not a need for additional monitoring sites in less populated communities.

**Nitrogen Dioxide ($NO_2$)** – (40 CFR Part 58 App. D Sec. 4.3) No sites required or operated.

At this time there is no requirement or plan to conduct $NO_2$ monitoring outside the MSAs.

**Sulfur Dioxide ($SO_2$)** – (40 CFR Part 58 App. D Sec. 4.4) No sites required or operated.

At this time there is no requirement or plan to conduct $SO_2$ monitoring outside the Omaha MSA. However, source-oriented monitoring near one or more power plants may be required in the future. In 2010, EPA established a new 1-hour $SO_2$ NAAQS at 75 ppb. In 2013, EPA deferred making an attainment determination relative to this NAAQS due to lack of monitoring and/or modeling data to support an attainment determination. EPA is still considering this issue and has not proposed any additional monitoring requirements (i.e., changes in Appendix D monitoring requirements for $SO_2$ have not been proposed or finalized; no has the Regional Administrator required any additional monitoring in NE).

**Lead (Pb)** – (40 CFR Part 58 App. D Sec. 4.5) Two required and 2 sites operated.

In 2008, EPA finalized changes to Appendix D that required source-oriented monitoring near sources with lead emissions of 1 tpy or more. This included two sources: Magnus Farley in Fremont and Magnolia Metals in Auburn. These sites were established in 2010.

Since monitoring was initiated in 2010, Magnolia Metals in Auburn, NE has installed air emission control technology such that their 2014 emission inventory now indicates their lead emissions to be 0.1 tpy. The 2015 Network Plan is proposing that the Auburn lead monitoring site be closed.

In 2010, EPA finalized additional monitoring requirements that lowered the threshold for source-oriented monitoring to $\geq$ 0.5 tpy. Emission estimates for Nucor Steel in Norfolk exceeded the 0.5 tpy threshold. In Appendix D Section 4.5(a)(ii) there is an allowance for not conducting monitoring if it can be shown that ambient lead concentrations will not exceed 50% of the NAAQS. Nucor Steel submitted a modeling study showing that ambient lead concentrations would not exceed 50% of the NAAQS. This waiver was approved in 2014 and must be renewed every 5 years (i.e., in 2019).

**$PM_{10}$ Particulate Matter** (40 CFR Part 58 App. D Sec. 4.6) No sites required. Two sites operated.

There are no minimum $PM_{10}$ monitoring requirements for areas outside of MSAs. Both of the Nebraska $PM_{10}$ sites located outside of the Omaha MSA are source and population oriented. One is deployed in downtown Cozad; the other one is in downtown Gothenburg. These sites were established to monitor for possible impacts from agricultural processing facilities, primarily alfalfa processing facilities in these two communities. The PM10 levels in these communities are currently well below the NAAQS. The 2015 Network Plan is proposing that the $PM_{10}$ monitoring sites in Cozad and Gothenburg be closed.

**Fine Particulate Matter: $PM_{2.5}$** (40 CFR Part 58 Appendix D Section 4.7 & 4.7.3) Two (2) sites required and 2 operated.

States are required to operate a background site and a transport site for $PM_{2.5}$. Nebraska's background site is in Scottsbluff, and the transport site is in Grand Island.

**Coarse Particulate Matter: $PM_{10-2.5}$** (40 CFR Part 58 App D Sec 4.8) No sites required or operated.

**Photochemical Assessment Monitoring Stations (PAMS)** (40 CFR Part 58 Appendix D Section 5) No sites required or deployed.

PAMS are only required in areas classified as serious, severe, or extreme non-attainment for $O_3$. No such areas exist in Nebraska at this time.

## IV: Appendix E Review

This appendix sets forth requirements for probe and monitoring path placement, including: horizontal and vertical placement, spacing from minor sources, spacing from obstructions, spacing from trees, spacing from roadways, cumulative interferences on a monitoring path, maximum monitoring path length, and probe material and sample residence time. Compliance with these criteria is verified when the site is set-up and periodically thereafter. Compliance is evaluated using review sheets developed for that purpose.

## Tables D-2.a thru D-2.c: Minimum Monitoring Reviews for Each Nebraska MSA

**Table D-2.a: 40 CFR Part 58 Appendix D Review: Omaha MSA (MSA Population ~ 904,000) ***

| Pollutant | App. D Citation | Review Criteria & *Comments* | Sites Required | Sites Operated | Criteria Met? |
|---|---|---|---|---|---|
| **Ozone** | Sec. 4.1 Table D-2 | The Omaha MSA population is between 350K to 4M and $O_3$ levels are ≥ 85% of NAAQS (*See Design Values in Attachment B).* | 2 | 3 Includes NCore | Y |
| **CO** | Sec. 4.2 | The population threshold for requiring a near-road CO monitoring site in a CBSA is 1 million. The population of the Omaha MSA is below this threshold. | 0 | 2 Includes NCore | Y |
| **$NO_2$** | Sec. 4.3.2 | The Omaha MSA has a populations of 500K to 1M and is currently required to have a near-road NOx site by 1/1/2017, as set forth in 40 CFR Part 58.10. | 0 | 0 | Y |
| | Sec.4.3.3 | Area-Wide monitoring only required if CBSA ≥ 1M (Omaha MSA population < 1 M) | 0 | 1 @ NCore | Y |
| | Sec. 4.3.4 | Regional Administrator required monitoring: None at this time. | 0 | 0 | Y |
| **$SO_2$** | Sec. 4.4 | The need for $SO_2$ sites is based on the *Population Weighted Emissions Index* (PWEI). Omaha's PWEI = 27,747, which falls within the 5000 to 100000 range requiring 1 site. *The current network of one highest concentration site and one NCore site exceeds the minimum requirements. No changes are proposed.* | 1 | 2 Includes NCore | Y |
| | | Regional Administrator required monitoring: None at this time. | 0 | 0 | Y |
| **Lead** | Sec. 4.5 (a) | There are no sources emitting ≥ 0.5 tpy of lead in the Nebraska portion of the Omaha MSA. | 0 | 0 | Y |
| | Sec. 4.5 (b) | One community-based site required at NCore site. EPA has been considering rescinding this requirement, but has not proposed or promulgated regulations. | 1 | 1 | Y |
| | Sec. 4.5 (c) | Regional Administrator required monitoring: None at this time. | 0 | 0 | Y |
| **$PM_{10}$** | Sec. 4.6 Table D-4 | The Omaha MSA has a population between 500K – 1M. and a high $PM_{10}$ concentration range with 1 max value > 120% of NAAQS at 46th & Farnam St Site in 2012. With the closing of the Omaha Steel facility at 46th & Farnam, the only sites with $PM_{10}$ exceeding 80% of NAAQS may be in the Weeping Water area (sites operated by NDEQ). See Attachment B for $PM_{10}$ data. | 4-8 | 6 Includes NCore & 2 sites @ Weeping Water | Y |
| **$PM_{2.5}$** | Sec 4.7 Table D-5 | The Omaha MSA has a population between 500K – 1M. and $PM_{2.5}$ levels ≥ 85% of NAAQS range (*See Design Values in Attachment B).* | 2 | 4 Includes NCore | Y |
| | Sec 4.7.2 | Continuous monitor required. | 1 | 1 @ NCore | Y |
| | Sec. 4.7.4 | $PM_{2.5}$ Speciation Trends Network monitoring required (included SASS and URG samplers as one) | 1 | 1 @ NCore | Y |
| **PAMS** | Sec. 5 | Only required for areas classified as serious, severe, or extreme non-attainment for $O_3$. | 0 | 0 | NA |
| **NCore** | Sec. 3 | Omaha has been designated to operate an NCore site with lead and NOx/NOy monitoring. | 1 | 1 | Y |

* Unless noted otherwise, this analysis does not count monitors located in IA toward meeting the minimum monitoring requirements. It does consider pollutant levels measured at IA sites, when determining minimum monitoring needs for ozone and $PM_{2.5}$.

| **Table D-2.b: 40 CFR Part 58 Appendix D Review: Lincoln MSA (Population ~ 319,000)** | | | | | |
|---|---|---|---|---|---|
| **Pollutant** | App. D Citation | **Review Criteria & *Comments*** | Sites Required | Sites Operated | Criteria Met? |
| **Ozone** | Sec. 4.1 Table D-2 | The Lincoln MSA population is between 50K to 350K and $O_3$ levels < 85% of NAAQS (*See Design Values in Attachment B).* | 0 | 1 | Y |
| **CO** | Sec. 4.2 | No minimum requirement | 0 | 0 | Y |
| **$NO_2$** | Sec. 4.3.2 | Near-road monitoring: No requirement for CBSA < 500K. | 0 | 0 | Y |
| | Sec.4.3.3 | Area-Wide monitoring only required if CBSA $\geq$ 1M (Lincoln MSA population < 1 M). | 0 | 0 | Y |
| | Sec. 4.3.4 | Regional Administrator required monitoring: none. | 0 | 0 | Y |
| **$SO_2$** | Sec. 4.4 | The number of $SO_2$ sites required is based on the *Population Weighted Emissions Index* (PWEI). Lincoln's PWEI = 1,371, which falls below 5000. Thus no sites are required. | 0 | 0 | Y |
| | | Regional Administrator required monitoring: none. | 0 | 0 | Y |
| **Lead** | Sec. 4.5 (a) | There are no sources emitting $\geq$ 0.5 tpy of lead. | 0 | 0 | Y |
| | Sec. 4.5 (b) | Community-based monitor only required if CBSA population $\geq$ 500K. | 0 | 0 | Y |
| | Sec. 4.5 (c) | Regional Administrator required monitoring: none. | 0 | 0 | Y |
| **$PM_{10}$** | Sec. 4.6 Table D-4 | The Lincoln MSA population is between 250K – 500K. Monitoring is only required if current monitoring indicates $PM_{10}$ $\geq$ 85% of NAAQS. *Also the highest 24-hr value found from 1988-98 was 102 $\mu g/m^3$* or 68% of the NAAQS. | 0-1 | 0 | Y |
| **$PM_{2.5}$** | Sec 4.7 Table D-5 | The Lincoln MSA population is between 50K – 500K and $PM_{2.5}$ levels < 85% of NAAQS (*See Design Values in Attachment B).* | 0 | 1 | Y |
| | Sec 4.7.2 | Continuous monitor not required. | 0 | 1 | Y |
| | Sec. 4.7.4 | $PM_{2.5}$ Speciation Trends Network monitoring not required. | 0 | 0 | Y |
| **PAMS** | Sec. 5 | Only required for areas classified as serious, severe, or extreme non-attainment for $O_3$. | 0 | 0 | Y |
| **NCore** | Sec. 3 | Lincoln has not been designated to operate an NCore site. | 0 | 0 | Y |

**Table D-2.c: 40 CFR Part 58 Appendix D Review: Sioux City MSA (Population ~ 169,000) ****

| Pollutant | App. D Citation | Review Criteria & *Comments* | Sites Required | Sites Operated | Criteria Met? |
|---|---|---|---|---|---|
| **Ozone** | Sec. 4.1 Table D-2 | Sioux City MSA population is between 50K -350K. There is one ozone monitor in the MSA and it is located in a rural area of Union County, SD. It operated at 471st Ave in 2012 & 2014 and at 475st Ave in 2013. The 3-year average from these sites was 64 ppb or 85% of the NAAQS, but this is not a Design Value (DV), since it uses data from 2 different sites.<br>Appendix D Sec. 4.1, Table D-2 says that for MSAs of this size 1 ozone site is required if the DV ≥ 85% of the NAAQS, but an ozone site is not required in the absence of a DV.<br>Thus an ozone site in Nebraska is not required, and SD operates an ozone site in union County. | 0 | 0 | Y |
| **CO** | Sec. 4.2 | No minimum requirement. | 0 | 0 | Y |
| **$NO_2$** | Sec. 4.3.2 | Near-road monitoring: No requirement for CBSA < 500K. | 0 | 0 | Y |
| | Sec.4.3.3 | Area-Wide monitoring only required if CBSA ≥ 1M (Sioux City MSA population < 1 M) | 0 | 0 | Y |
| | Sec. 4.3.4 | Regional Administrator required monitoring; none. | 0 | 0 | Y |
| **$SO_2$** | Sec. 4.4 | The number of $SO_2$ sites required is based on the *Population Weighted Emissions Index* (PWEI). Sioux City MSA's PWEI = 5033, which falls within the 5000 to 100000 range requiring 1 site. *Two sites exist in the MSA: one in Union County, SD & one near Sergeant Bluff, IA.* | 1 | 0 | Y<br>See comment |
| | | Regional Administrator required monitoring: none | 0 | 0 | Y |
| **Lead** | Sec. 4.5 (a) | There are no sources emitting ≥ 0.5 tpy of lead in the Nebraska portion of the Sioux City MSA. | 0 | 0 | Y |
| | Sec. 4.5 (b) | Community-based lead monitoring is only required when CBSA population ≥ 500K. | 0 | 0 | Y |
| | Sec. 4.5 (c) | Regional Administrator required monitoring: none. | 0 | 0 | Y |
| **$PM_{10}$** | Sec. 4.6 Table D-4 | The Sioux City MSA population is between 100K – 250K and $PM_{10}$ levels are < 80% of NAAQS (*See Design Values in Attachment B).* | 0 | 0 | Y |
| **$PM_{2.5}$** | Sec 4.7 Table D-5 | The Sioux City MSA population is between 50K – 500K and $PM_{2.5}$ levels are < 85% of NAAQS (*See Design Values in Attachment B).* | 0 | 0 | Y |
| | Sec 4.7.2 | Continuous monitor not required | 0 | 0 | Y |
| | Sec. 4.7.4 | $PM_{2.5}$ Speciation Trends Network monitoring not required | 0 | 0 | Y |
| **PAMS** | Sec. 5 | Only required for areas classified as serious, severe, or extreme non-attainment for $O_3$ | 0 | 0 | Y |
| **NCore** | Sec. 3 | The Nebraska portion of the Sioux City MSA has not been designated to operate an NCore site. | 0 | 0 | Y |

* Unless noted otherwise, this analysis does not count monitors located in IA and SD toward meeting the minimum monitoring requirements. It does use pollutant levels measured at IA and SD monitoring sites, when determining minimum monitoring needs for ozone and PM.

| **Table D-2.d: 40 CFR Part 58 Appendix D Review: Grand Island MSA (Population ~ 84,800)** ** | | | | | |
|---|---|---|---|---|---|
| **Pollutant** | App. D Citation | **Review Criteria & *Comments*** | Sites Required | Sites Operated | Criteria Met? |
| **Ozone** | Sec. 4.1 Table D-2 | Grand Island MSA population is between 50K -350K. Monitoring is only required if current monitoring indicates $O_3$ > 85% of NAAQS as set forth in Table D-2. See Section V.F.2 in this Network Plan for further discussion. | 0 | 0 | Y |
| **CO** | Sec. 4.2 | No minimum requirement. | 0 | 0 | Y |
| **$NO_2$** | Sec. 4.3.2 | Near-road monitoring: No requirement for CBSA < 500K. | 0 | 0 | Y |
| | Sec.4.3.3 | Area-Wide monitoring only required if CBSA ≥ 1M (Grand Island MSA population < 1 M) | 0 | 0 | Y |
| | Sec. 4.3.4 | Regional Administrator required monitoring: none | 0 | 0 | Y |
| **$SO_2$** | Sec. 4.4 | *Population Weighted Emissions Index* (PWEI) = 210, which falls below 5000. No minimum number of sites required. See Table D-3 below for PWEI calculation data. | 0 | 0 | Y |
| | | Regional Administrator required monitoring | 0 | 0 | Y |
| **Lead** | Sec. 4.5 (a) | There are no sources emitting ≥ 0.5 tpy of lead | 0 | 0 | Y |
| | Sec. 4.5 (b) | Community-based lead monitoring is only required when CBSA population ≥ 500K. | 0 | 0 | Y |
| | Sec. 4.5 (c) | Regional Administrator required monitoring: none | 0 | 0 | Y |
| **$PM_{10}$** | Sec. 4.6 Table D-4 | $PM_{10}$ monitoring is not required if MSA population < 100,000 | 0 | 0 | Y |
| **$PM_{2.5}$** | Sec 4.7 Table D-5 | Grand Islands's CBSA population is between 50K – 500K and $PM_{2.5}$ levels are < 85% of NAAQS (*See Design Values in Attachment B)* | 0 | 0 | Y |
| | Sec 4.7.2 | Continuous monitoring is not required | 0 | 0 | Y |
| | Sec. 4.7.4 | $PM_{2.5}$ Speciation Trends Network monitoring is not required | 0 | 0 | Y |
| **PAMS** | Sec. 5 | Only required for areas classified as serious, severe, or extreme non-attainment for $O_3$ | 0 | 0 | Y |
| **NCore** | Sec. 3 | The Grand Island MSA has not been designated to operate a NCore site | 0 | 0 | Y |

**Table D-3: Population Weighted Emissions Index (PWEI) Data for Nebraska Core Based Statistical Areas (CBSAs ) [(a) (b) (c)]** Page 1 of 3

| CBSA | County | Population 7/1/14 [(c)] | $SO_2$ Emissions (tons/year) | | $SO_2$ Emissions (% Change) | PWEI [(a) (b)] | |
|---|---|---|---|---|---|---|---|
| | | | 2008 EI | 2011 EI | | 2008 EI | 2011 EI |
| Omaha MSA | Douglas Co., NE | 543,244 | 15,288 | 14,311 | -6% | 37,159 | **27,747** |
| | Sarpy Co., NE | 172,193 | 58 | 29 | -50% | | |
| | Cass Co., NE | 25,524 | 1,226 | 1,094 | -11% | | |
| | Saunders Co. NE | 20,919 | 179 | 20 | -89% | | |
| | Washington Co., NE | 20,258 | 25 | 60 | 140% | | |
| | Pottawattamie Co., IA | 93,128 | 22,243 | 15,101 | -32% | | |
| | Mills Co., IA | 14,831 | 27 | 22 | -19% | | |
| | Harrison Co., IA | 14,324 | 41 | 43 | 5% | | |
| | **Totals** | **904,421** | **41,086** | **30,679** | **-25%** | | |
| Lincoln MSA | Lancaster Co., NE | 301,795 | 5,027 | 4,254 | -15% | 1,616 | **1,371** |
| | Seward Co., NE | 17,150 | 40 | 43 | 8% | | |
| | **Totals** | **318,945** | **5,067** | **4,297** | **-15%** | | |
| Sioux City MSA | Woodbury Co., IA | 102,271 | 35698 | 29,693 | -17% | 6,045 | **5,033** |
| | Plymouth Co., IA | 24,874 | 35 | 18 | -49% | | |
| | Dakota Co., NE | 20,850 | 17 | 14 | -18% | | |
| | Dixon Co., NE | 5,782 | 25 | 13 | -48% | | |
| | Union Co., SD | 15,029 | 17 | 74 | 335% | | |
| | Totals | **168,806** | **35,808** | **29,813** | **-17%** | | |

Observation: The EPA's emission inventory data indicates that $SO_2$ emissions from all 4 of Nebraska's MSA decreased 15% to 25% from 2008 to 2011. See Grand Island MSA data on next page.

Footnotes at bottom of page 3 of this table.

**Table D-3: Population Weighted Emissions Index (PWEI) Data for Nebraska Core Based Statistical Areas (CBSAs ) [(a) (b) (c)]** Page 2 of 3

| CBSA | County | Population 7/1/14 [(c)] | $SO_2$ Emissions (tons/year) | | $SO_2$ Emissions (% Change) | PWEI [(a) (b)] | |
|---|---|---|---|---|---|---|---|
| | | | 2008 EI | 2011 EI | | 2008 EI | 2011 EI |
| Grand Island MSA | Hall Co. | 61,492 | 3,146 | 2,378 | -24% | 275 | **210** |
| | Hamilton Co. | 9,135 | 33 | 29 | -12% | | |
| | Howard Co. | 6,362 | 18 | 40 | 122% | | |
| | Merrick Co. | 7,766 | 44 | 33 | -25% | | |
| | Total | **84,755** | **3,241** | **2480** | **-23%** | | |
| Kearney MiSA | Buffalo Co. | 48,224 | 87 | 89 | 2% | 6 | **6** |
| | Kearney Co. | 6,644 | 17 | 15 | -12% | | |
| | Totals | **54,868** | **104** | **104** | **0%** | | |
| Norfolk MiSA | Madison Co. | 35,174 | 25 | 24 | -4% | 16 | **13** |
| | Pierce Co. | 7,202 | 35 | 30 | -14% | | |
| | Stanton Co. | 6,069 | 264 | 206 | -22% | | |
| | Totals | **48,445** | **325** | **260** | **-20%** | | |
| Hastings MiSA | Adams Co. | 31457 | 2547 | 3324 | 31% | 97 | **126** |
| | Clay Co. | 6315 | 25 | 17 | -32% | | |
| | Totals | **37772** | **2572** | **3341** | **30%** | | |
| Scottsbluff MiSA | Banner Co. | 764 | 3 | 1 | -67% | 8 | **8** |
| | Scotts Bluff Co. | 36465 | 205 | 203 | -1% | | |
| | **Totals** | **37229** | **208** | **204** | **-2%** | | |

Footnotes at bottom of page 3 of this table.

**Table D-3: Population Weighted Emissions Index (PWEI) Data for Nebraska Core Based Statistical Areas (CBSAs ) [(a) (b) (c)]** Page 3 of 3

| CBSA | County | Population 7/1/14 [()] | $SO_2$ Emissions (tons/year) | | $SO_2$ Emissions (% Change) | PWEI [(a) (b) (d)] | |
|---|---|---|---|---|---|---|---|
| | | | 2008 EI | 2011 EI | | 2008 EI | 2011 EI |
| North Platte MiSA | Lincoln Co. | 35,815 | 31,470 | 29,246 | -7% | 1166 | **1085** |
| | Logan Co. | 750 | 2 | 37 | 1750% | | |
| | McPherson Co. | 498 | 1 | 2 | 100% | | |
| | Totals | **37,063** | **31,473** | **29,285** | **-7%** | | |
| Fremont MiSA | Dodge Co. | **36,744** | **1,999** | **1426** | **-29%** | 73 | **52** |
| Columbus MiSA | Platte Co. | **32,666** | **42** | **330** | **686%** | 1 | **11** |
| Lexington MiSA | Dawson Co. | 24,096 | 78 | 64 | -18% | 2 | **2** |
| | Gosper Co. | 1970 | 5 | 14 | 180% | | |
| | Totals | **26,066** | **83** | **78** | **-6%** | | |
| Beatrice MiSA | Gage Co. | **21,663** | **49** | **87** | **78%** | 1 | **2** |

Footnotes:
(a) Population Weighted Emission Index (PWEI) = (CBSA Population) x (SO2 Emissions (tpy))/1,000,000
(b) SO2 Emission data was obtained from the EPA Emission Inventory database for 2008 and 2011. The 2011 EI data is the most recent data available from EPA at the time this table was created (July 2015).
(c) US Census population estimate data for 7/1/2014 was used in this table and the PWEI calculations.
(d) The PWEI was calculated using 2008 and 2011 Emission Inventory (EI) data. The PWEI calculated with 2011 EI data is currently applicable. The PWEI was also calculated with 2008 EI data to document any change that might have occurred.

This attachment contains information on historical ambient monitoring activities in Nebraska and temporal & geographic criteria pollutant concentration variation.

The earliest monitoring in Nebraska was initiated in 1957 for total suspended particulate matter (TSP). Monitoring for other pollutants followed. Table E-1 contains the ambient air monitoring start date for various particulate and gaseous pollutant parameters.

**Table E-1:**

| Pollutant | Location of Initial Monitoring | Year |
|---|---|---|
| Particulate – TSP | Lincoln and Omaha | 1957 |
| Lead | Halsey National Forest | 1965 |
| Sulfur Dioxide | Omaha | 1967 |
| Carbon Monoxide | Omaha | 1971 |
| Nitrogen Dioxide | Omaha | 1972 |
| Ozone | Omaha | 1972 |
| Particulate – $PM_{10}$ | Hastings, Louisville, Omaha, Weeping Water | 1987 |
| Total Reduced Sulfur | Dakota City, South Sioux City and Lexington | 1997 |
| Particulate – $PM_{2.5}$ | Bellevue, Blair, Chappell, Grand Island, Hartington, Lincoln, Merriman, North Platte, Omaha, Scottsbluff & Weeping Water | 1999 |

The Federal Clean Air Act (CAA) of 1970 and subsequent modifications in 1977 and 1990, set forth:

- National Ambient Air Pollutant Standards for 6 criteria pollutants;
- Requirements for ambient air monitoring;
- Requirements for air emission permits;
- Requirements for air emission standards for mobile and stationary sources; and
- Requirements for an air emission source compliance and enforcement system.

These CAA mandated emission control and compliance programs have been generally effective in reducing ambient air pollutant concentrations of the 6 criteria pollutants as can be seen in the pollutant-specific subsections of this attachment.

The EPA web site below provides summary information on the history of the CAA and its implementation: www2.epa.gov/laws-regulations/summary-clean-air-act

## 1) Carbon Monoxide (CO)

Carbon monoxide pollution is associated primarily with mobile sources. CAA mandated vehicle tail-pipe emissions were initiated in 1975 and have been strengthened periodically since then. The EPA website below contains a brief history of mobile source emission standards:
www.epa.gov/otaq/consumer/milestones.htm

Highest concentration CO areas are typically located in high-traffic, traffic-congestion, street canyon areas. Historically CO monitoring in Nebraska has been conducted in Omaha and Lincoln at the following sites.

Lincoln Sites

- 27th & O St. area: 1973 to Feb 2012
- 51st & Colby Sts.: 1975 to 1985
- 20th & P Sts.: 1984 to 1986
- 28th & C Sts.: 1986 to 1988
- 3040 Arlington St: 1988 to 1997

Omaha Sites

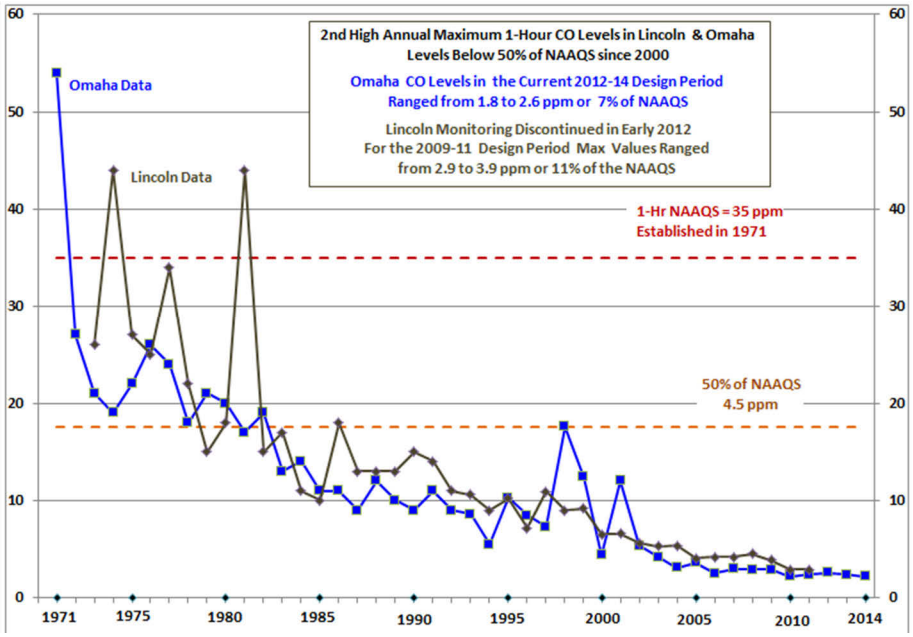
- 11th & Douglas: 1971 to 1980
- North 30th St.: 1975 to 2007
- 74th & Dodge: 1981 to 2006
- 78th & Dodge (current highest concentration site): 2007 to present
- 41st & Woolworth (NCore site): 2011 to present

Figures E-1 and E-2 show the annual 2nd maximums found in Lincoln and Omaha since monitoring was initiated to present. As the figures demonstrate, ambient CO levels have been reduced significantly since the 1970s, with CO levels below 50% of the NAAQS since 2000. This is largely contributable to the Federal tailpipe emission standards for automobiles and trucks.

CO monitoring was also conducted in the Comstock in 1980, and Homer in 1981. Second high maximum 1-hour and 8-hour concentrations were less than 25% of the NAAQS.

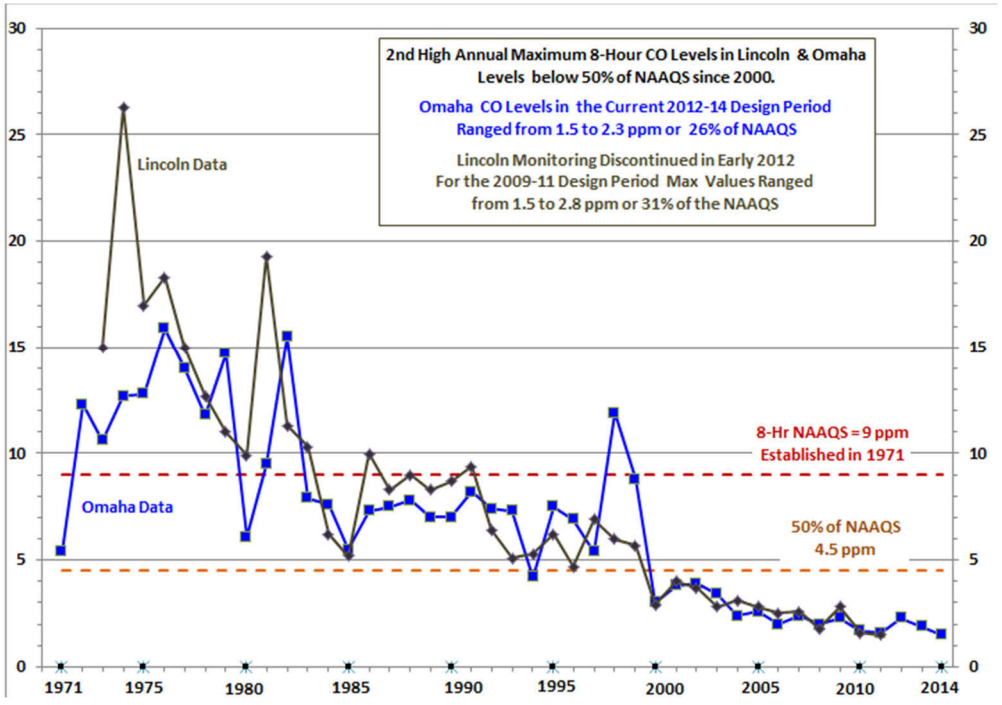
Figures E-3 and E-4 show the approximate location of the current and historical CO monitoring sites in Nebraska.

**Figure E-1: Historical Ambient Air 1-Hour Carbon Monoxide (CO) Concentrations in Lincoln & Omaha [(a)]**




Footnote (a): The values used in this figure are the highest 2nd maximums recorded within

**Figure E-2: Historical Ambient Air 8-Hour Carbon Monoxide (CO) Concentrations in Lincoln & Omaha [(a)]**




Footnote (a): The values used in this figure are the highest 2nd maximums recorded within

**Figure E-3: Location of Current ● and Historical ○ CO Monitoring sites in Nebraska**

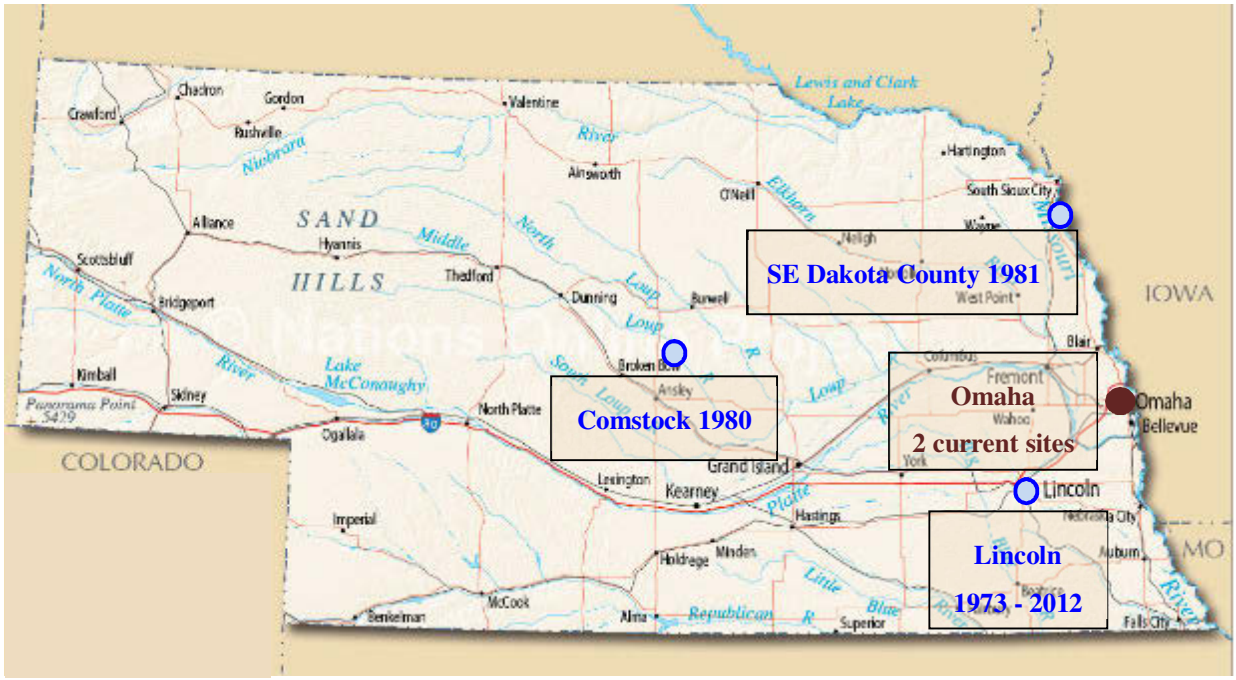
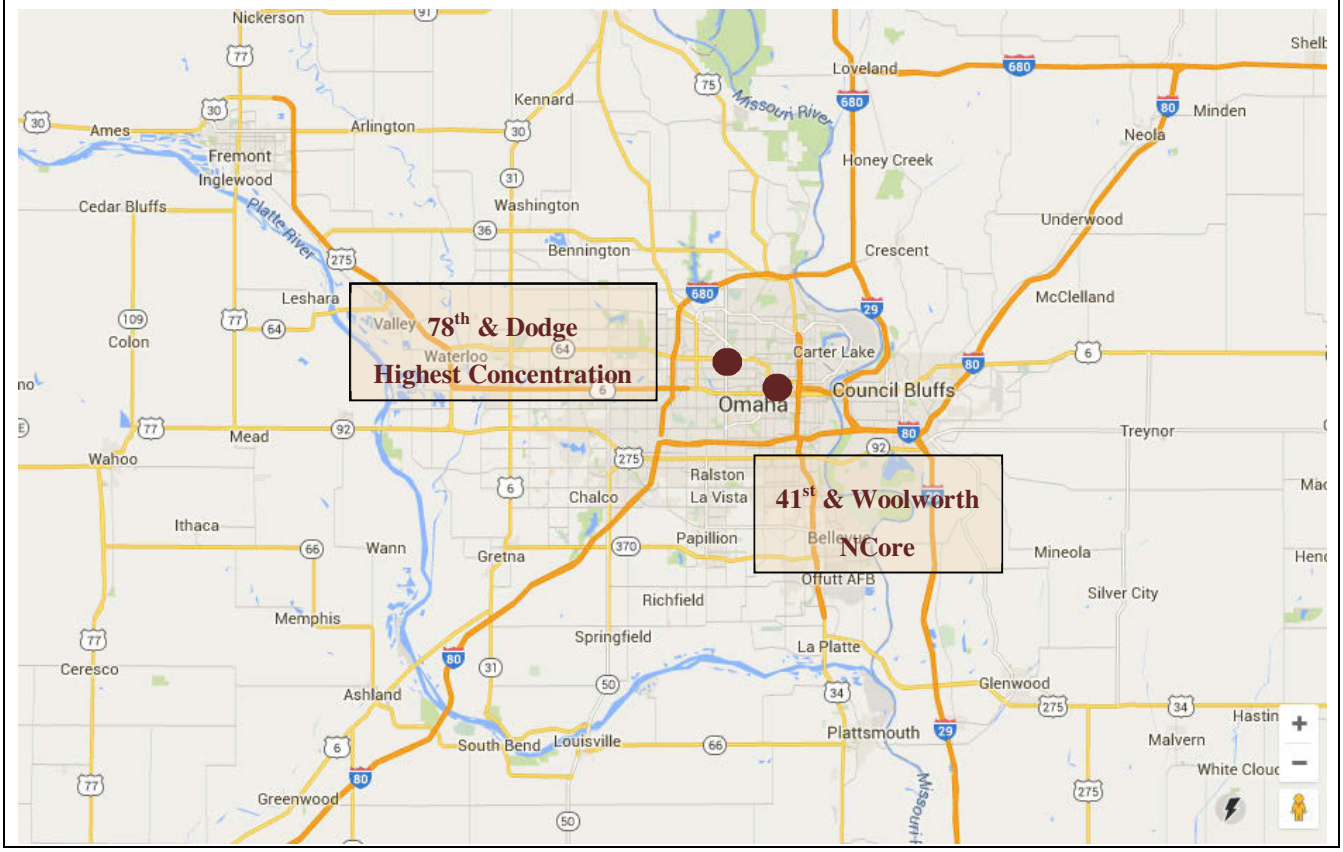


**Figure E-4: Location of Current CO Monitoring Sites in Omaha**




## 2) Ozone

### 2.A. Ozone Formation and Monitoring Season

Ground-level ozone (O3) is formed in the atmosphere (*in situ*) as a result of the reaction of sunlight and other pollutants; primarily volatile organic chemicals (VOCs) and nitrogen oxides (NOx). Maximum ground-level concentrations are typically found downwind from pollutant source areas, such as larger metropolitan areas, oil & gas wells and processing facilities, industrial parks, etc.

For example, the highest ozone concentrations measured within the Omaha MSA are often in Harrison County, IA near or in the town of Pisgah, population ~250 people.

Ground-level ozone concentrations peak in the summer months. Thus ozone monitoring is conducted in Nebraska from April thru October. The proposed ozone NAAQS public noticed by EPA on November 25, 2014 would extend the ozone monitoring "season" in Nebraska to be march thru October.

### 2.B. Ozone NAAQS

Table E-2 below summarizes history of the ozone NAAQS. Note that there were significant changes in the form of the standards established 1971 and 1979; and the averaging time for the NAAQS went from 1-hour in the 1979 NAAQS to 8-hours in the 1997 NAAQS.

The current NAAQS for 8-hour ozone is 0.075 ppm. Attainment with this NAAQS is determined using a Design Value (DV) that is not to be exceeded. The DV is the truncated average of the annual 4th high values monitored at any given site.

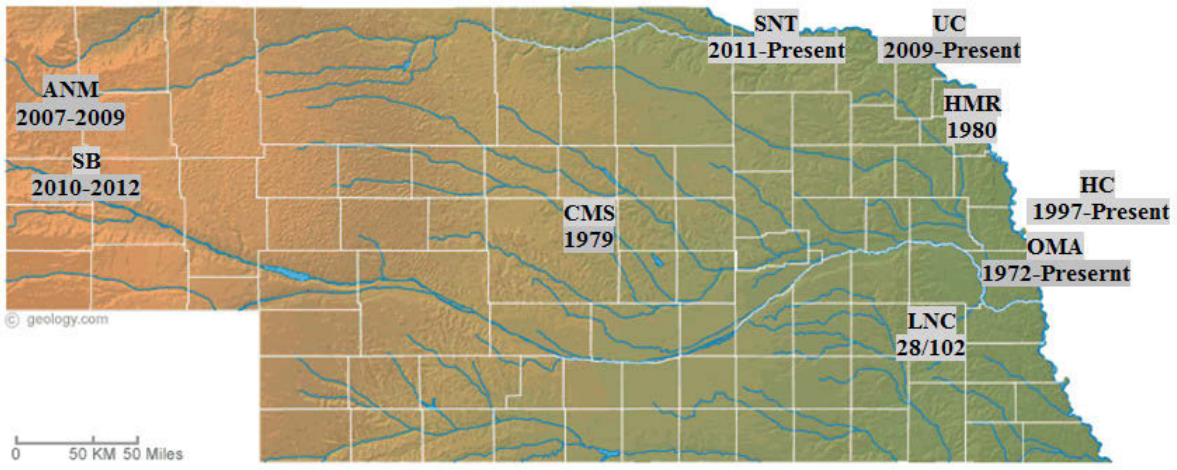
For example, if the 4$^{th}$ high values from the Example Site were 0.074 ppm for 2012, 0.075 ppm for 2013 and 0.078 ppm for 2014, the 3-year average would be 0.0757 ppm, which truncates to 0.075 ppm. Thus, the Example Site would be in attainment with the NAAQS.

USEPA has proposed lowering the ozone NAAQS to be in the range of 0.065 ppm to 0.070 ppm, and also solicited comments about lower levels down to 0.060 ppm. EPA is under court order to finalize the ozone NAAQS regulation by October 1, 2015.

**Table E-2: History of Ozone NAAQS**

| Status / Date | Pollutant Indicator | Averaging Time | NAAQS Level | NAAQS Evaluation Criteria |
|---|---|---|---|---|
| Final Apr 30, 1971 | Total Photochemical Oxidants | 1-hour | 0.08 ppm | Not to be exceeded more than 1 hour per year |
| Final Feb 8, 1979 | Ozone | 1-hour | 0.12 ppm | Expected number of days when 1-hr ozone exceeds 0.12 ppm $\leq$ 1 |
| Final Jul 18, 1997 | Ozone | 8-hour | 0.08 ppm | Truncated 3-year average of annual 4$^{th}$ high values $\leq$ 0.08 ppm |
| Final Mar 27, 2008 | Ozone | 8-hour | 0.075 ppm | Truncated 3-year average of annual 4$^{th}$ high values $\leq$ 0.075 ppm |
| Final Oct 1, 2015 | Ozone | 8-hour | 0.070 ppm | Truncated 3-year average of annual 4$^{th}$ high values $\leq$ 0.070 ppm |

**Figure E-5: Summary of Ozone Monitoring Activities in Nebraska**




Legend: The legend table below explains the 2-3 letter abbreviations shown on the map. Shown below the abbreviations are the years sites were operated at these locations.

| Abbr. | Location | Operator (a) | Years Sampled | # of Years | Annual 4th High Range (ppb) (b) |
|---|---|---|---|---|---|
| ANM | Agate Fossil Bed National Monument | NPS | 2007-2009 | 3 | 59 - 67 |
| CMS | Custer County near Comstock | NDEQ | 1979 | 1 | 70 |
| SB | Scottsbluff National Monument | NPS | 2010-2012 | 10 | 59 - 67 |
| SNT | Santee Sioux Reservation | EPA | 2011-present | 4+ | 63 - 75 |
| Omaha MSA Sites | | | | | |
| HC | Harrison County, IA | IA DNR | 1997 - present | 18+ | 59 - 80 |
| | Pisgah, IA | IA DNR | 2009-present | 6+ | 63 - 75 |
| OMA | 30th & Fort Sts., Omaha | DCHD | 1972-1977 | 5 | 56 - 96 |
| | | | 1981-2014(b) | 24 | 47 - 80 |
| | 11414 N 72nd St., Omaha | DCHD | 1979-2010 | 32 | 49 - 120 |
| | 24th & O Sts., Omaha | DCHD | 1975-present | 40+ | 37 - 96 |
| | 42nd & Woolworth Sts,. Omaha | DCHD | 1972 | 1 | 38 |
| | | | 2011-present | 4+ | 63 - 71 |
| | 16th & Whitmore Sts., Omaha | DCHD | 2015(c) | (c) | (b) |
| Lincoln MSA Sites | | | | | |
| LNC | 14th & Superior Sts., Lincoln | LLCHD | 1979-1984 | 6 | 53 - 69 |
| | 1st & Maple Sts., Davey | LLCHD | 1985-present | 30+ | 49 - 69 |
| Sioux City MSA | | | | | |
| HMR | Dakota County near Homer | NDEQ | 1980 | 1 | 66 |
| UC | 31102 471st Ave Union Co, SD | SD DENR | 2009-2012 | 4 | 60 - 68 |
| | 31986 475th Ave, Union Co, SD | SD DENR | 2013-present | 2+ | 62 - 63 |

Footnotes:

(a) Agency abbreviations: DCHD – Douglas County Health Department EPA – US Environmental Protection Agency IA DNR – Iowa Dept. of Natural Resources LLCHD – Lincoln Lancaster County Health Dept. NDEQ – NE Dept. of Environmental Quality SD DENR – SD Dept. of Environment & Natural Resources NPS – National Park Service

(b) The range of annual 4th high values was determined from historical data thru 2014. Data from 2015 was not included in the range.

(c) The Omaha 30th & Fort site was temporarily closed for 2015 due to construction activity at the site and re-located to 16th & Whitmore (existing $SO_2$ site). A decision to retain the site at 16th & Whitmore or move it back to 30th & Fort will be made following the 2015 monitoring year.

## 2.C. Ozone Monitoring in Nebraska

Figure E-5 and its accompanying legend table (above) provide an overview of ozone monitoring in Nebraska, and in adjacent state areas within the Omaha and Sioux City MSAs. Currently ozone monitoring is being conducted at 3 locations in Nebraska:

- the Omaha MSA (3 sites in Nebraska and two sites in Iowa),
- the Lincoln MSA (SLAMS site in Davey and temporary investigative site in Waverly), and
- the Santee Sioux Reservation (a CASTNET site operated by EPA).

Also there is a site within the Sioux City MSA. It is in Union County, SD and is operated by South Dakota.

The subsections below provide more detail about ozone levels and trends in and around Nebraska

**Omaha MSA:** Ozone monitoring was initiated in Nebraska in Omaha in 1972 and continues through the current time. The sites have changed over the years. Currently there are 3 sites operated by DCHD in Omaha , NE.

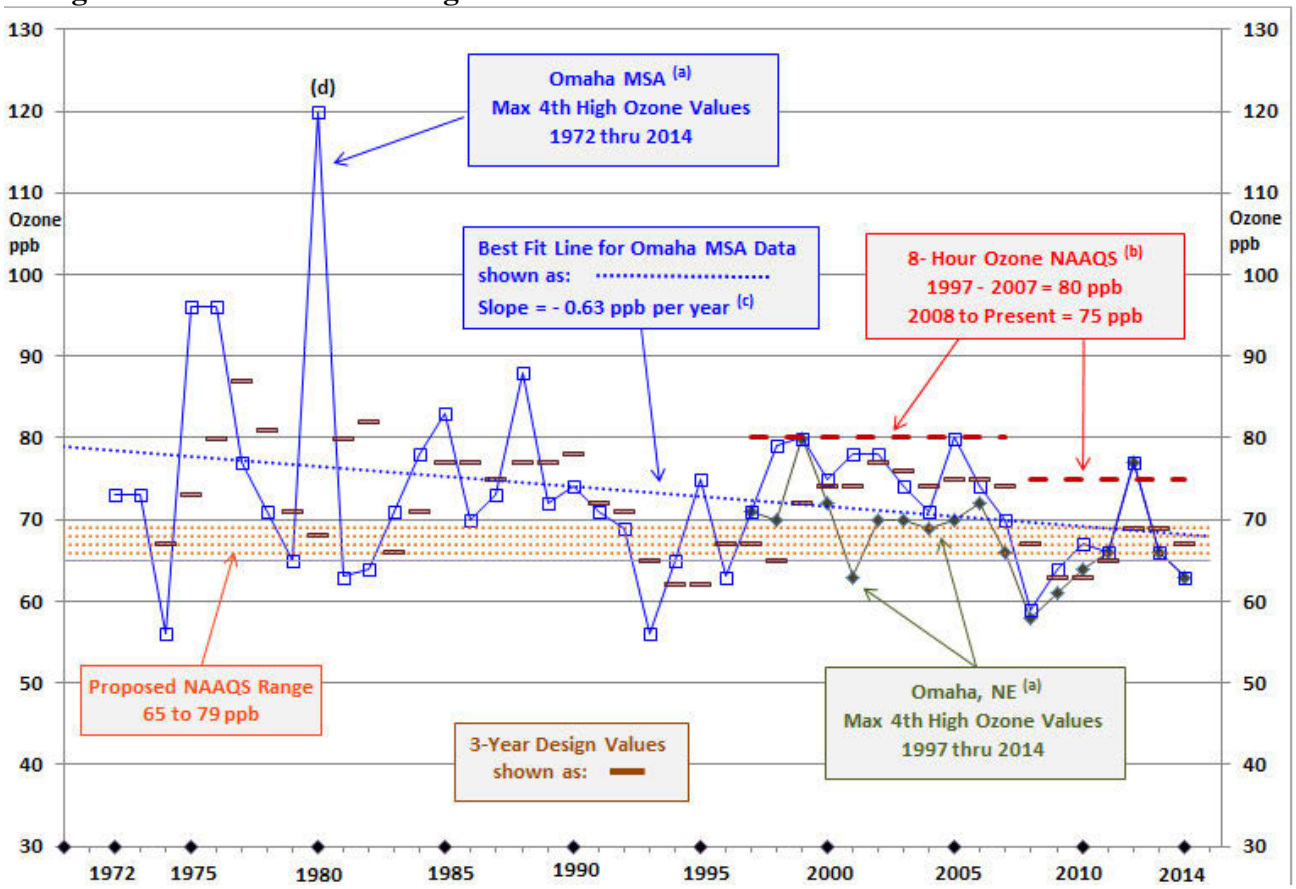
- A year-round site at the NCore site at 4201 Woolworth Ave., which began operation in April 2010.
- A seasonal site at 24$^{th}$ and O St that has operated in 1975, 1978 thru 1982, and 1985 to present day.
- A seasonal site at 19$^{th}$ & Whitmore that began operation in April 2015 as a temporary replacement for the 30$^{th}$ and Fort site due to construction activity. The 30$^{th}$ & Fort Street site operated from 1981 thru 2014. A decision as to whether to move back to 30$^{th}$ & Fort or remain at 19$^{th}$ & Whitmore will be made after the completion of the 2015 monitoring season.

There are also 2 sites in Harrison County, IA, which is in the Omaha MSA:

- The Hwy 183 site approximately 4 miles S-SW of Pisgah, IA (~30 north of the urbanized edge of the Omaha-Council Bluffs urbanized area), which began operation in 1997; and
- The Forest Service Office site in Pisgah, IA, which began operation in 2009.

Figure E-6 (below) provides a historical view of the maximum ozone levels found in Omaha, NE and the Omaha MSA. The trend line for the complete data set shows ozone levels to be decreasing from 1972 thru 2014 at a rate of 0.25 ppb per year. However, visual examination of the plot appears to indicate that this downward trend may have ended in the 1990's. This is in part related to the initiation of monitoring in Harrison County, IA in 1997, as this site has been the highest concentration site for the Omaha MSA.

**Figure E-6: Maximum 4th High 8-Hour Ozone Levels in the Omaha MSA: 1972 thru 2014**




Footnotes:

(a) The maximum values shown for the Omaha MSA from 1972 thru 1996 are from monitoring sites in Omaha, NE. In 1997, was initiated in Harrison County, IA. The maximum values recorded by Harrison County sites have at or above the maximum values recorded at Omaha, NE sites.

(b) The first ozone NAAQS was established in 1971 as a 1-hour standard of 80 ppb for *Total Photochemical Oxidants*. This was changed in 1979 to be a 1-hour standard of 120 ppb for ozone. These earlier NAAQS are not shown in the plot because they were based on a different averaging time and cannot be compared to the 8-hour values in this figure.

(c) Historical trend line influenced by high values in 1970s and 1980s. See Figure E-6 for trend analysis of more recent 2006 thru 2014 data.

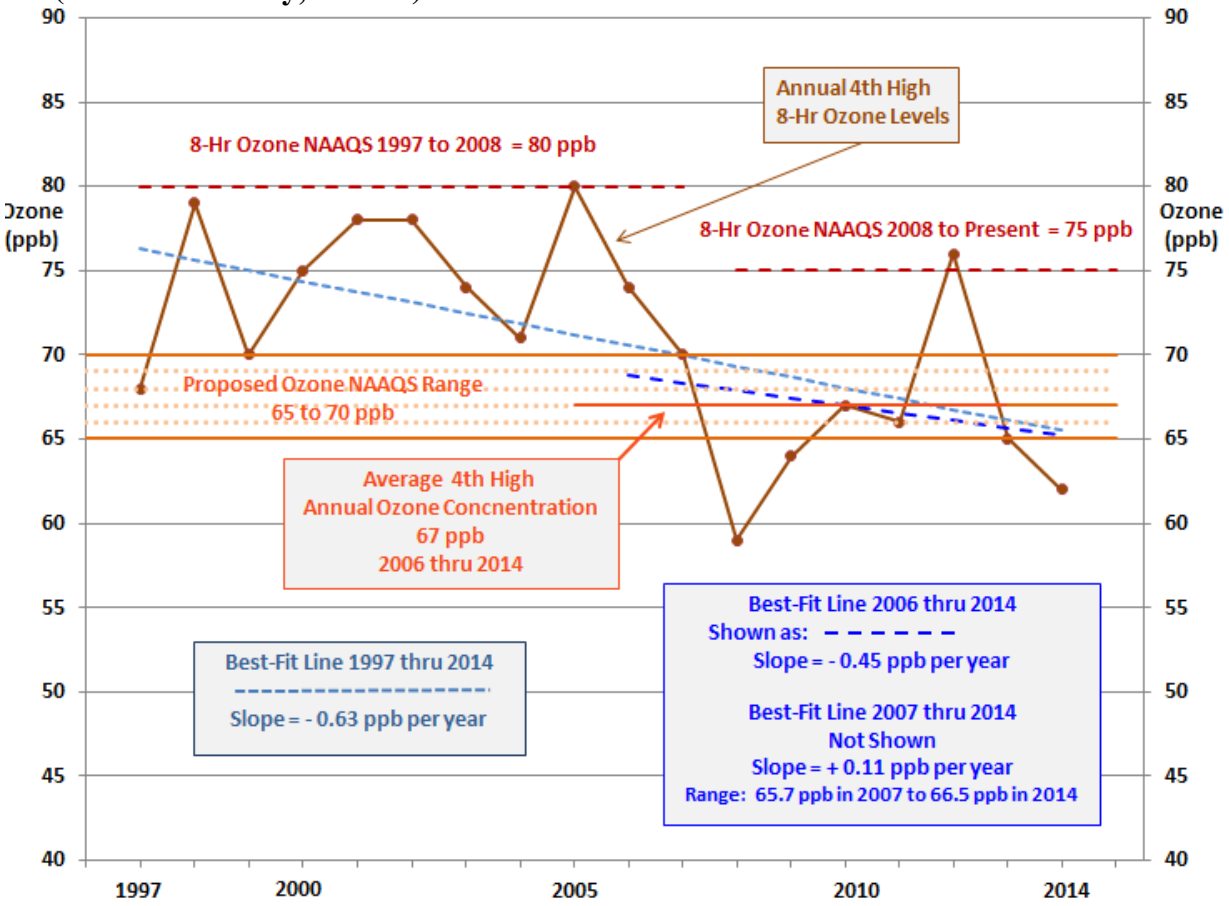
(d) The highest 4th high ozone value ever detected in Nebraska was 120 ppb at the North 72nd St. site in 1980. There was not a 1978-80 DV for this site because monitoring was initiated in 1979.

Figure E-7 (below) contains trend analyses of Harrison, IA ozone levels from 1997 to 2014 (i.e., data from the highest reporting site in the Omaha MSA). The 1997 thru 2014 data indicates a downward trend of -0.63 ppb year. However, visual examination indicates that this downward trend may not have continued after 2006 or 2007. The 2006 thru 2014 data shows a downward trend of -0.45 ppb per year with an average of 67 ppb and a range of 69 ppb in 2006 to 65 ppb in 2014. While the 2007 thru 2014 data shows a slight upward trend of +0.11 ppb per year with an average of 66 ppb and a range of 65.7 ppb in 2007 to 66.5 ppb in 2014.

Although the 2015 ozone monitoring season is not complete, the results through August are finding 4th high values in the low 60s with only one day above 65 ppb. Thus, there is a good possibility that:

1) the 4th high value within the Omaha MSA will be near or possibly below the levels seen in 2013 and 2014, and
2) the 2013-2015 DV will not exceed 65 ppb.

**Figure E-7: Trend Analysis of Maximum 8-Hour Ozone Levels in the Omaha MSA (Harrison County, IA site) from 1997 thru 2014**




Trend Analysis Observations:

(a) From 1997 thru 2014 there is an overall downward trend of - 0.63 ppb per year.
(b) From 2006 thru 2014, the downward trend lessons to - 0.45 ppb per year with an average concentration of 67 ppb and a range of 69 ppb in 2006 to 65 ppb in 2014.
(c) From 2007 thru 2014, the data indicates a slight upward trend of + 0.11 ppb per year with an average concentration of 66 ppb and a range of 65.7 ppb in 2007 to 66.5 ppb in 2014.
(d) The 2006 thru 2014 and the 2007 thru 2014 average 4th high ozone values are very similar; 67 ppb and 66 ppb, respectively.

Regardless, due to the variability of 4th high ozone data, the uncertainty of any continued downward trend, and the 8 year and 9 year average ozone concentrations of 66 to 67 ppb, there is significant uncertainty as to whether ozone DVs will remain in attainment with a lower ozone NAAQS in the proposed 65 to 70 ppb range. The uncertainty obviously increases if the NAAQS is set at the lower end of this range.

**Lincoln MSA:** Monitoring was initiated at 14th & Superior in Lincoln in 1979. After the 1984 ozone monitoring season, the 14th & Superior site was closed. Monitoring at Davey, NE was initiated in 1985 and conducted there to the present. Davey is approximately 7 miles north of the urbanized edge of Lincoln. It is in Lancaster County and within the Lincoln MSA.

In 2015 a temporary investigative site was established in Waverly to compare with the results from Davey. Following the 2015 monitoring season, the results from the 2 sites will be compared to determine which site has the higher ozone concentrations.

**Figure E-8: Maximum 4th High 8-Hour Ozone Levels in the Omaha MSA: 1979 thru 2014**

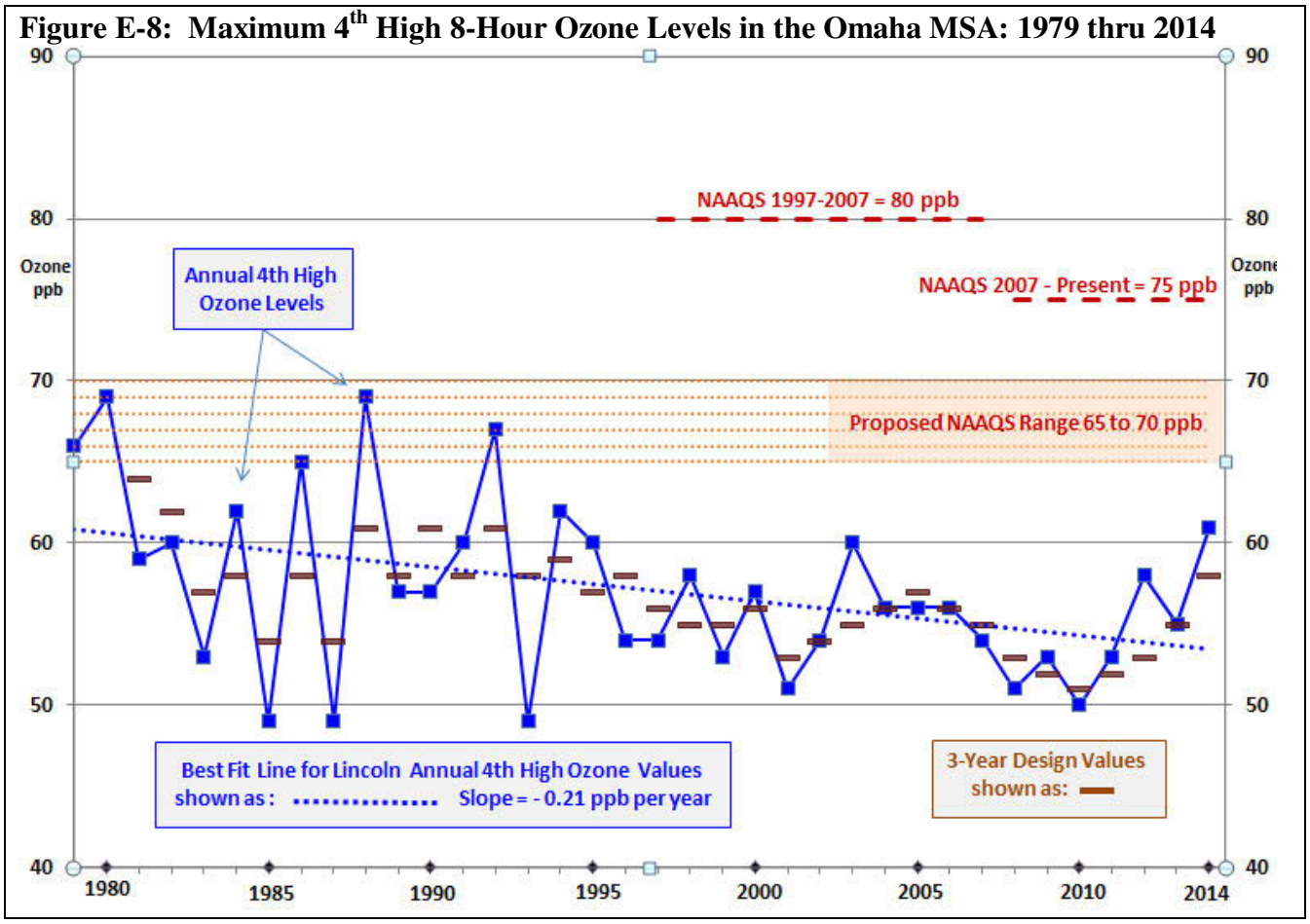



Figure E-8 (above) is a plot of historical 4th high ozone levels in the Lincoln MSA. Overall, the data demonstrates a downward of -0.21 ppb per year. On the other hand, since 2010 the data indicates an upward trend of + 2.4 ppb per year.

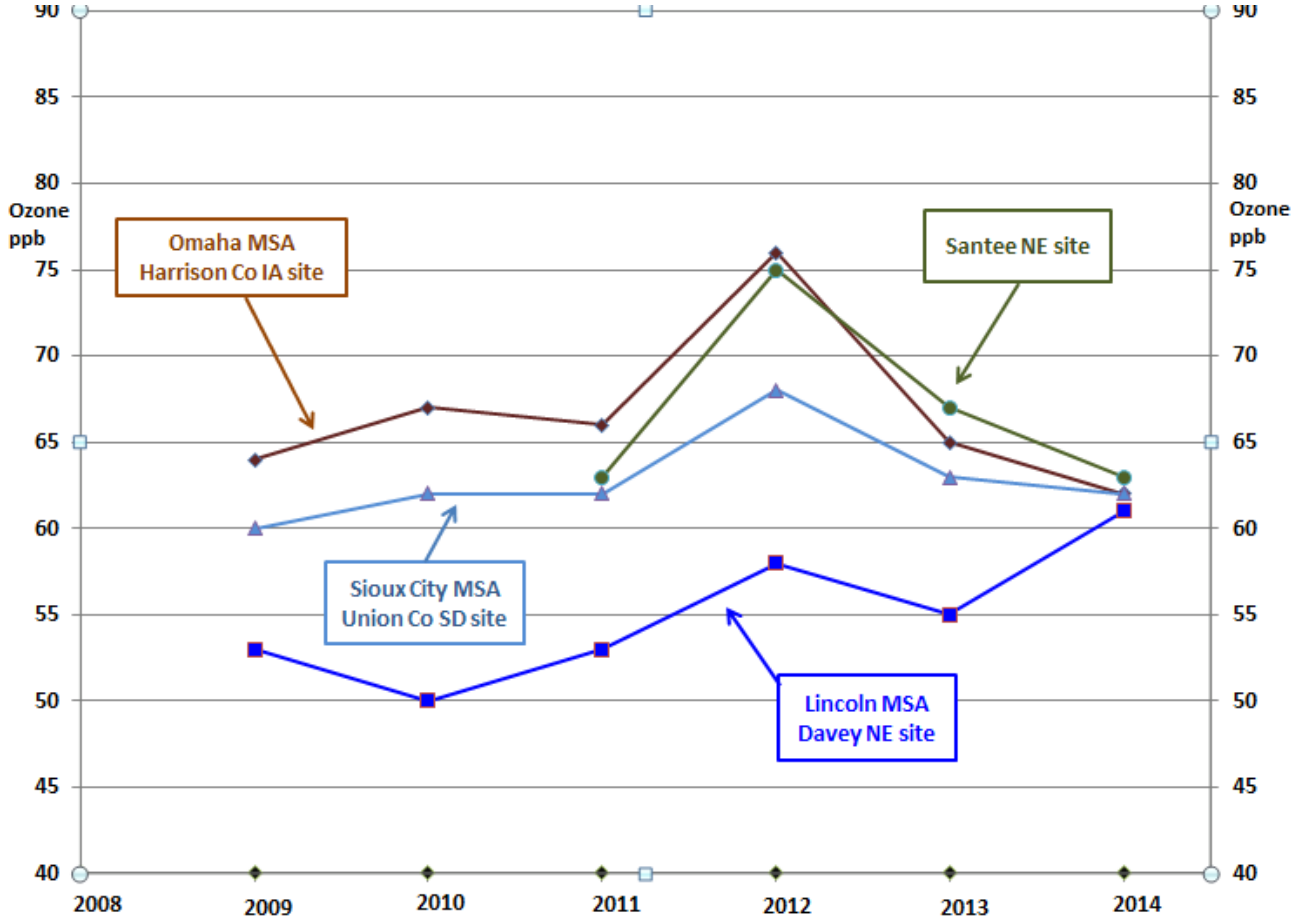
Figure E-9 (below) is a plot of 4th high ozone levels from 2009 thru 2014 at four locations: Omaha MSA, Lincoln MSA, Sioux City MSA and Santee Sioux Reservation. Note four things in this figure with respect to ozone in the Lincoln MSA.

1) Ozone levels at Davey (Lincoln MSA) are lower than the other 3 sites;
2) The basic pattern or trend in year-to-year ozone concentrations is the same for all 4 sites, except the 2010 and 2014 ozone levels at the Lincoln MSA, Davey NE site;
3) Ozone concentrations increased from 2013 to 2014 at Lincoln, but decreased at the other 3 sites; and
4) All four sites had very similar 4th high values in 2014.

At this time, it is not apparent whether the 2014 4th high value found at Davey is related to an upward trend in ozone levels at that site, or some other factor. There are no known significant new sources of NOx or VOCs that might account for the increase. New monitoring equipment was installed at the Davey site (i.e., analyzer and transfer standards). However, biweekly zero/span checks and audits indicated proper operation in the years preceding 2014.

A review of the historical data shown in Figure E-7 shows that the last time the DV at Davey exceeded 60 ppb was in 1992. The 2015 maximum and 4th high values thru July were 64 ppb and 61 ppb, respectively. At this point, it does not appear that a DV above 65 ppb is likely thru 2015.

**Figure E-9: Ozone Levels at Monitoring Locations in or near Nebraska: 2009 – 2014**




## Sioux City MSA (Union County SD sites)

The South Dakota Department of Environment and Natural Resources began operating monitoring sites in rural Union County, SD in 2009. Union County is in the Sioux City MSA. Ozone monitoring was conducted at 31102 471st Avenue (~26 mi NW of North Sioux City)from 2009 thru 2012, and at 31986 475th Avenue (~17 mi NW of North Sioux City) from 2013 thru present. The data from these sites is shown in Figure E-9 (above). Ozone concentrations at the Union County site were lower than those found in the Omaha MSA and at Santee, but followed a similar year-to-year pattern.

### Santee, NE:

EPA operates a Clean Air Status and Trends Network (CASTNET) site near Santee, NE. The site is located in the Santee Sioux Reservation in Knox County. It is not part of the monitoring network operated or overseen by the State of Nebraska.

In 2011, EPA began operating an ozone monitor at this site. The annual 4th high values found at the Santee site ranged from 63 to 75 ppb from 2011 thru 2014, as shown in Figure E-9. The ozone levels found at the Santee site were very similar to those found in the highest sites in the Omaha MSA. The 2012-14 Design Value (DV) was 68 ppb, which was the highest ozone DV found in Nebraska. The levels of ozone detected at Santee were somewhat surprising, although as discussed in the next 2 subsections they may not be that unique.

### Nebraska Panhandle

The National Park Service (NPS) conducted monitoring in the Nebraska panhandle:

- From 2007 thru 2009, at the Agate Fossil Beds in Sioux County, NE; and
- From 2010 thru 2012, at the Scotts Bluff National Monument in Scotts Bluff County, NE.

In response to NDEQ inquiry in 2008, the NPS communicated that the monitoring was being conducted to follow-up on modeling conducted by the NPS that indicated possible elevated ozone concentrations originating from metropolitan areas in Colorado. Also the NPS was not using an EPA FRM/FEM monitor, although they had conducted studies to verify its accuracy.

Figures E-10 and E-11 show how ozone levels at these 2 sites compare with other sites in Nebraska from 2007 to 2012. As can be seen, ozone levels in the panhandle were similar to those in the Omaha MSA.

**Figure E-10: Ozone Levels at Sites in and near Nebraska: 2007 - 2009**

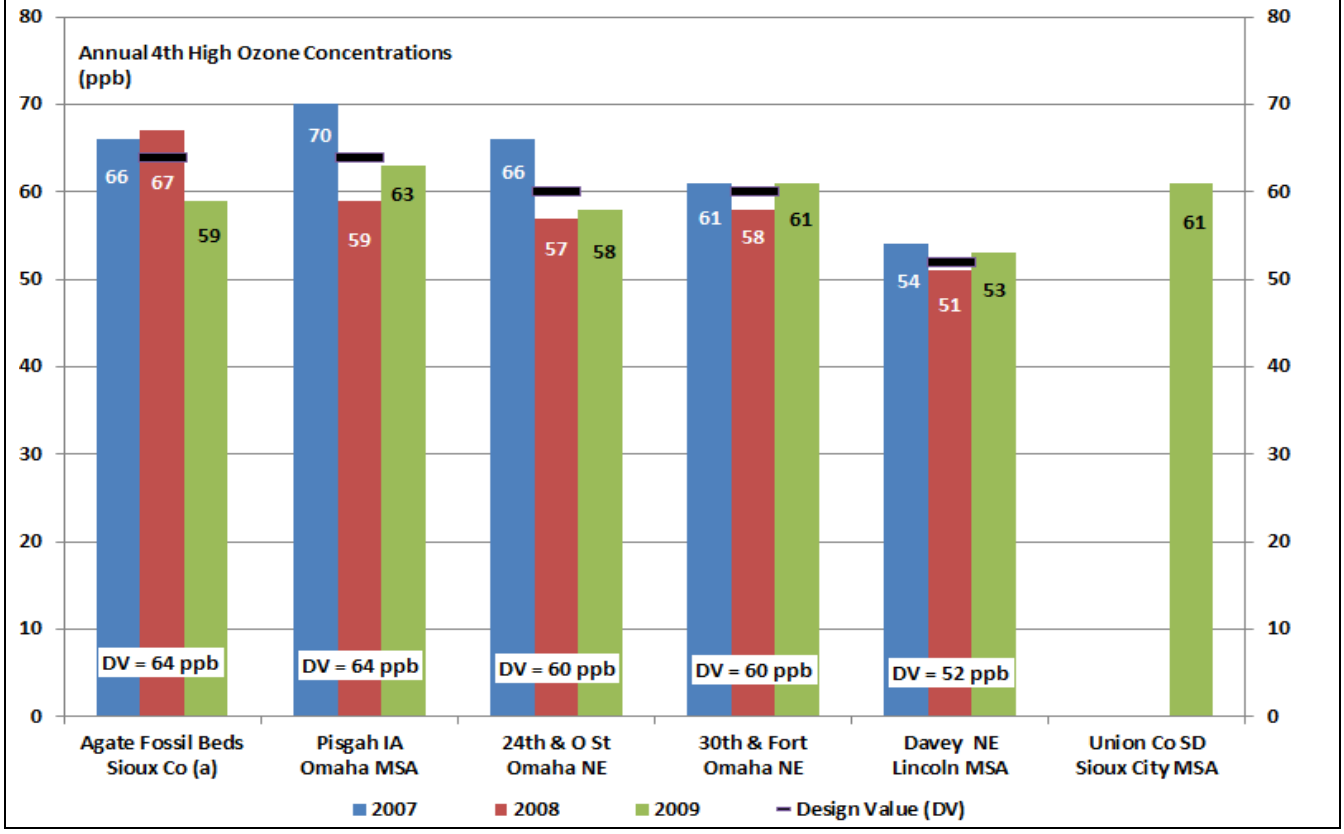


**Figure E-11: Ozone Levels at Sites in and near Nebraska: 2010-2012**

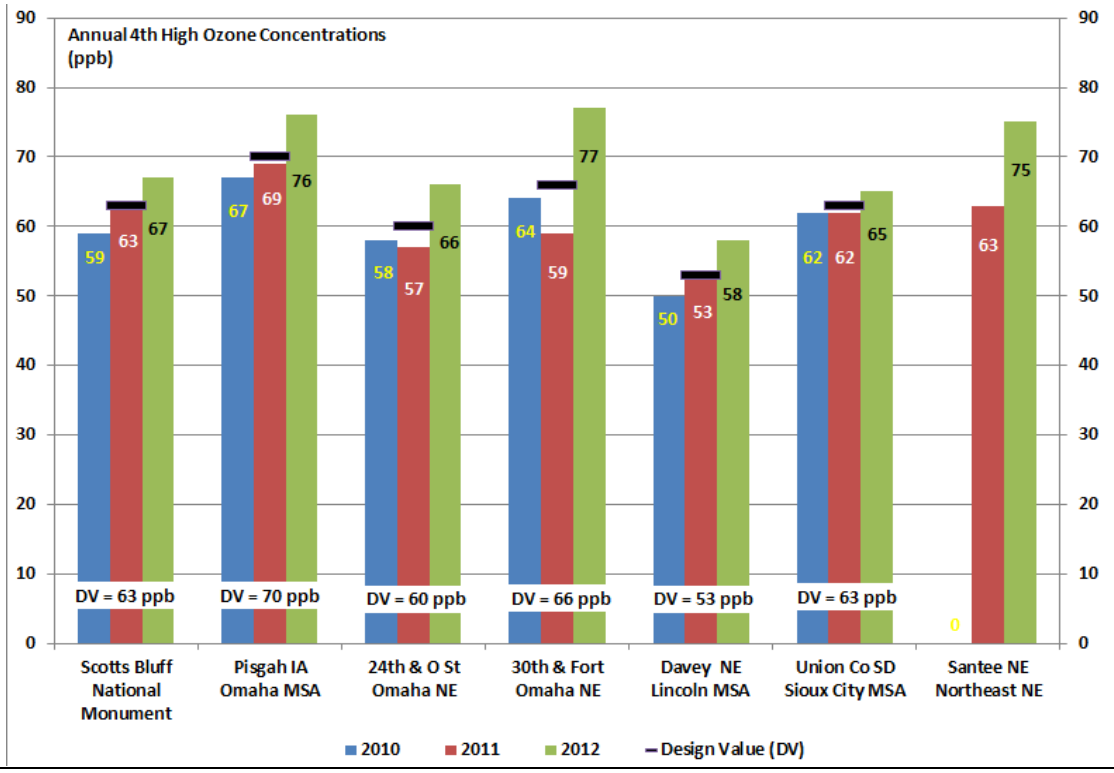
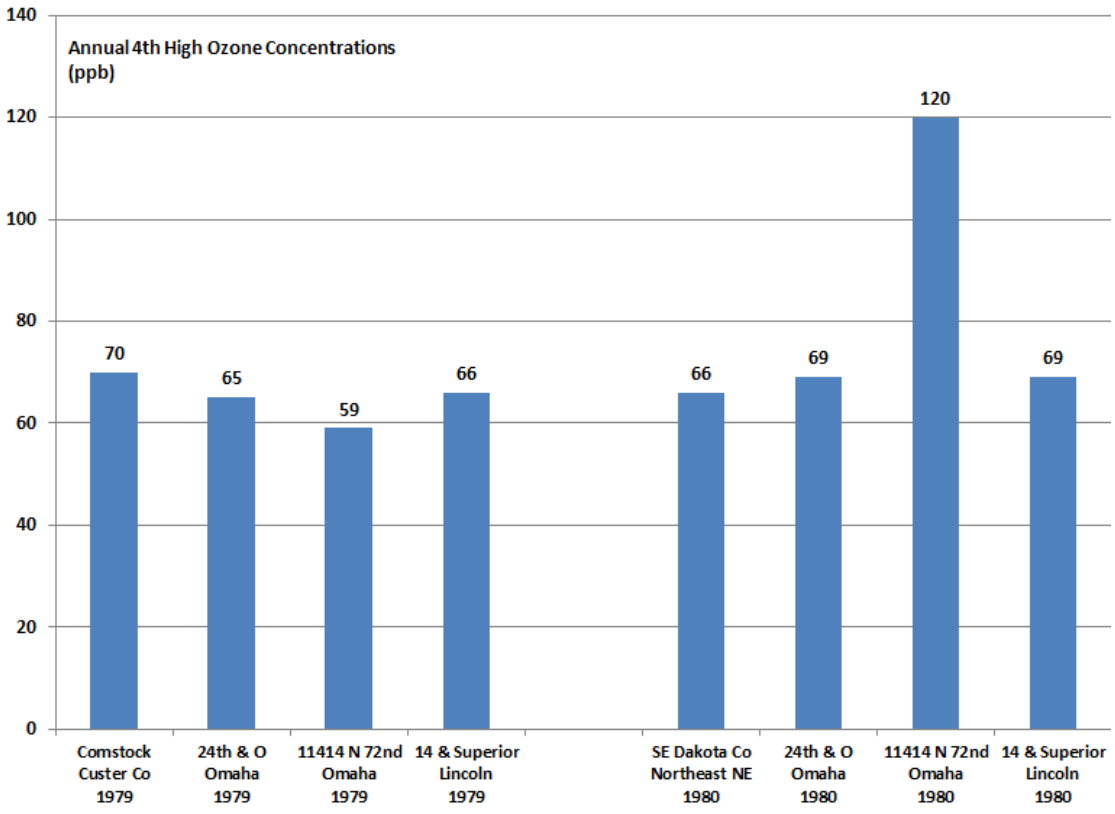



**Figure E-12: Ozone Levels in Nebraska 1979 & 1980**



## Other Areas of the Nebraska:

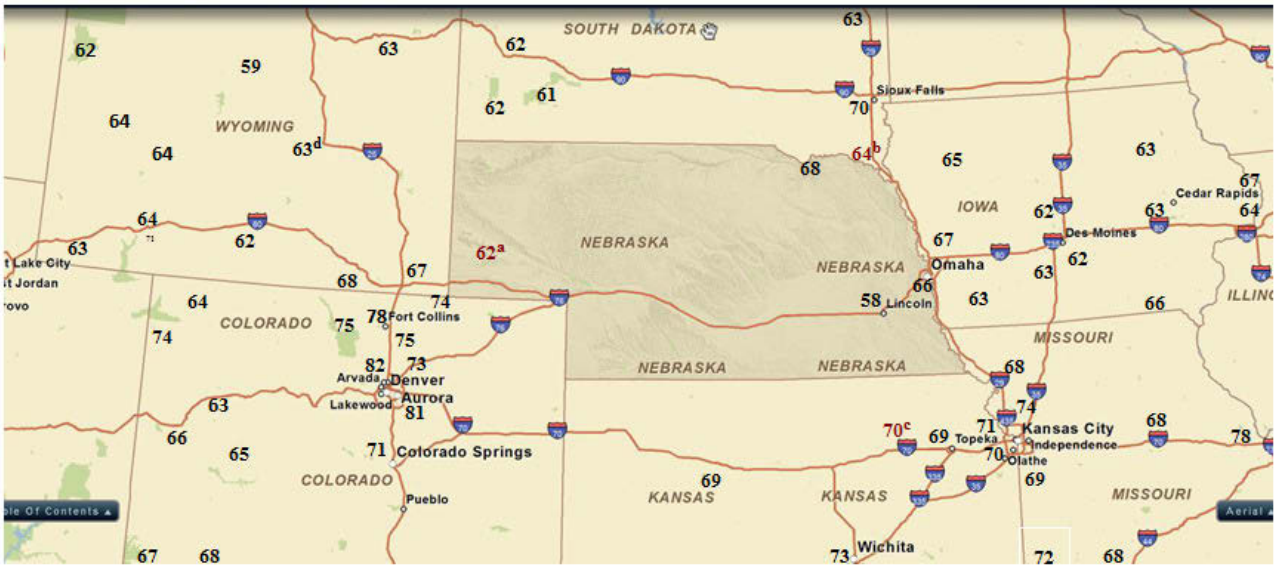
Background monitoring was conducted for 1 year at a rural site near Comstock, NE in Custer County in 1979, and at another rural site in southeast Dakota County in 1980. Dakota County is part of the Sioux City MSA, but the site location was in a rural location and upwind (SW) of the urbanized area of the MSA.

Figure E-12 shows the 4th high ozone levels found at these sites and Omaha and Lincoln sites for the same year. As can be seen, ozone levels at these two sites were similar to the ozone levels in Lincoln and Omaha, with the exception of the North 72nd St site in Omaha in 1980.

The 120 ppb 4th high value at the North 72nd Street site was the all-time highest ozone value ever detected in Nebraska.

A review of the Omaha data in Figure E-6 and Lincoln data in Figure E-8, shows that ozone levels detected at the Comstock and Dakota County sites were similar to those found in Lincoln at the time. They were also similar to the lower values found in Omaha at the time, although Omaha also had higher values. However, basing comparisons on 1-year of data from the rural sites does not provide for a definitive analysis or conclusion.

**Figure E-13: Ozone 2012-14 Design Values for Areas in and Around Nebraska**




Footnotes

a - Scottsbluff, NE: Only 2012 data available. 2012-2014 DV estimated by extrapolation using 2012 annual 4th high from Scottsbluff & Greeley, CO, and the 2012-14 DV from Greeley, CO ($eDV_{SB} = DV_{GR} \times Oz12_{SB} / Oz12_{Gr}$, where $DV_{SB}$ is the estimated 2012-14 DV for Scottsbluff, $DV_{GR}$ is the 2012-14 DV for Greeley CO, $Oz12_{SB}$ is the 2012 4th high ozone concentration at Scottsbluff, and $OZ12_{GR}$ is the 2012 4th high ozone concentration at Greeley CO)

b - Union Co SD (Sioux City MSA): The DV was calculated using the combined data from 2 rural sites in Union Co SD: 2012 & 13 data from 31986 475th Ave and 2014 data from 31102 471st Ave. These 2 sites are ~ 10 miles apart near Junction City, SD.

c – Konza Prairie south of Manhattan, KS: Only 2012 data available. 2012-2014 DV estimated by extrapolation using 2012 annual 4th-high from Konza Prairie & Peck, KS (Max. Conc. Wichita MSA site), and the 2012-14 DV from Peck ($eDV_{KP} = DV_{W} \times Oz12_{KP} / Oz12_{W}$, where $eDV_{KP}$ is the estimated 2012-14 DV for Konza Prairie, $DV_{W}$ is the 2012-14 DV for Peck, $Oz12_{KP}$ is the 2012 4th High ozone concentration at Konza Prairie, and $OZ12_{W}$ is the 2012 4th high ozone concentration at Peck)

d – Casper, WY: DV based on 2013 & 2014 data only from the 2800 Pleasant Drive site.

### 2.D. Geographical Distribution of Ozone in and around Nebraska: 2012- 2014 Design Values

Figure E-13 above shows the 2012-2014 Design Values for areas in Nebraska and in near-by states. The figure shows that areas with DVs in the 65 to 70 ppb range are ubiquitously distributed in and around Nebraska.

### 3) Nitrogen Dioxide ($NO_2$)

Nitrogen dioxide ($NO_2$) and other nitrogen oxide gases (NOx) are formed when fuel is burned at high temperatures, and come principally from motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. Vehicle emission standards and stationary source controls have resulted in significant reductions in the emission of NO2/NOx gases since air monitoring was initiated in the 1970's.

Monitoring for $NO_2$ was initially conducted in Nebraska from 1972 thru 1984. This early monitoring primarily generated 24-hour average data, but 1-hour data was collected from some sites. In 2011 monitoring for NOy and NO was initiated at the Omaha NCore site and continues to the current time with 1-hour data being collected.

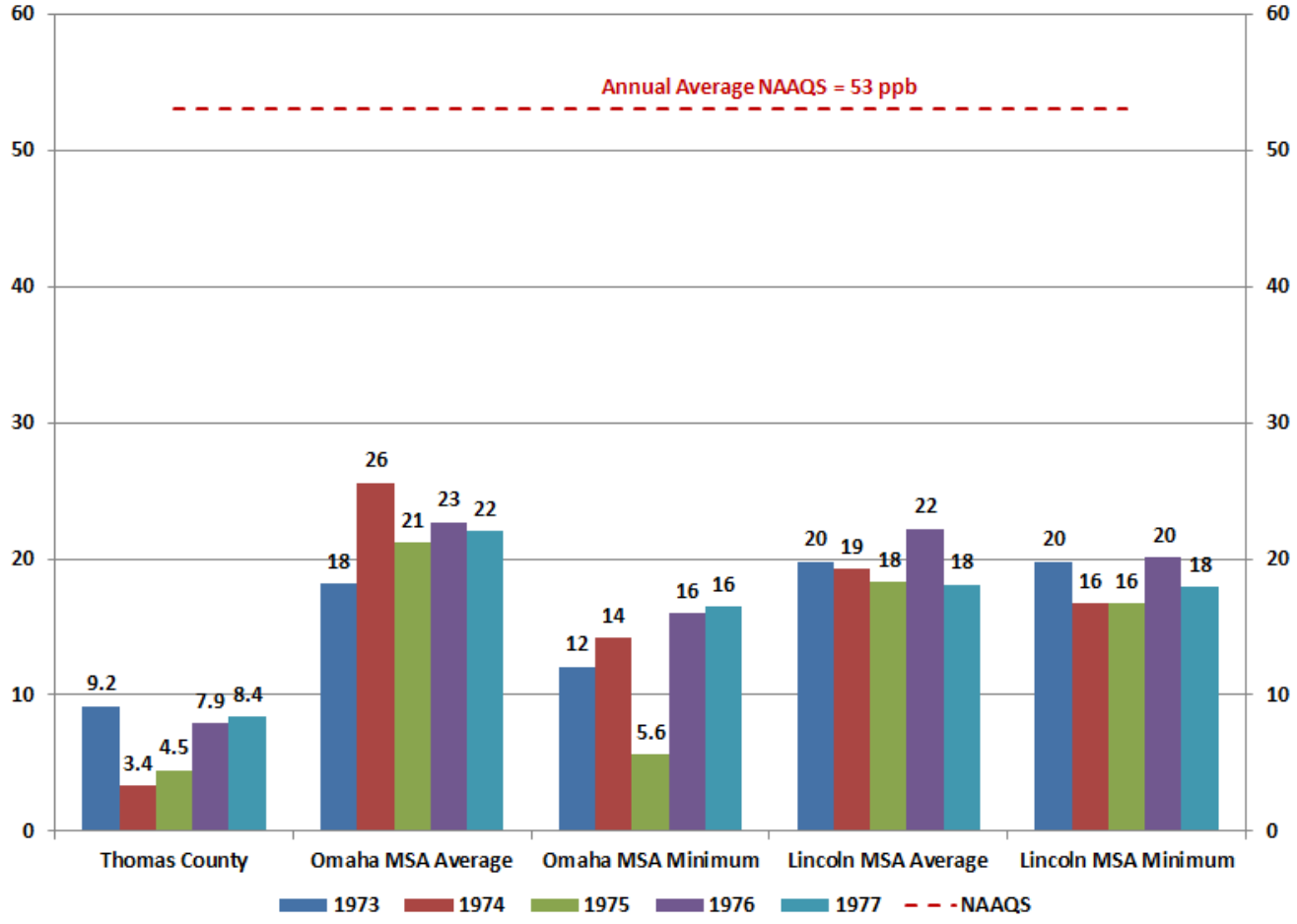
The NOy-NO parameter provides a good approximation of $NO_2$ concentrations, although NOx compounds other than $NO_2$ can contribute to NOy-NO. Thus, the NOy-NO parameter may over-estimate the NO2 concentration. Therefore, if the NOy-NO parameter is below the NAAQS, then $NO_2$ should be too.

Figures E-14 and E-15 contain summaries of annual average $NO_2$ data collected in the 1970s and early 1980s from sites located in the Omaha, Lincoln and Sioux City MSA's as well as 2 rural sites in central Nebraska. The results indicate two things:

1) $NO_2$ levels were well below the annual average NAAQS of 53 ppb that was promulgated in 1971 and remains in effect today; and
2) $NO_2$ levels were higher in the Omaha and Lincoln MSAs than at the other sites.

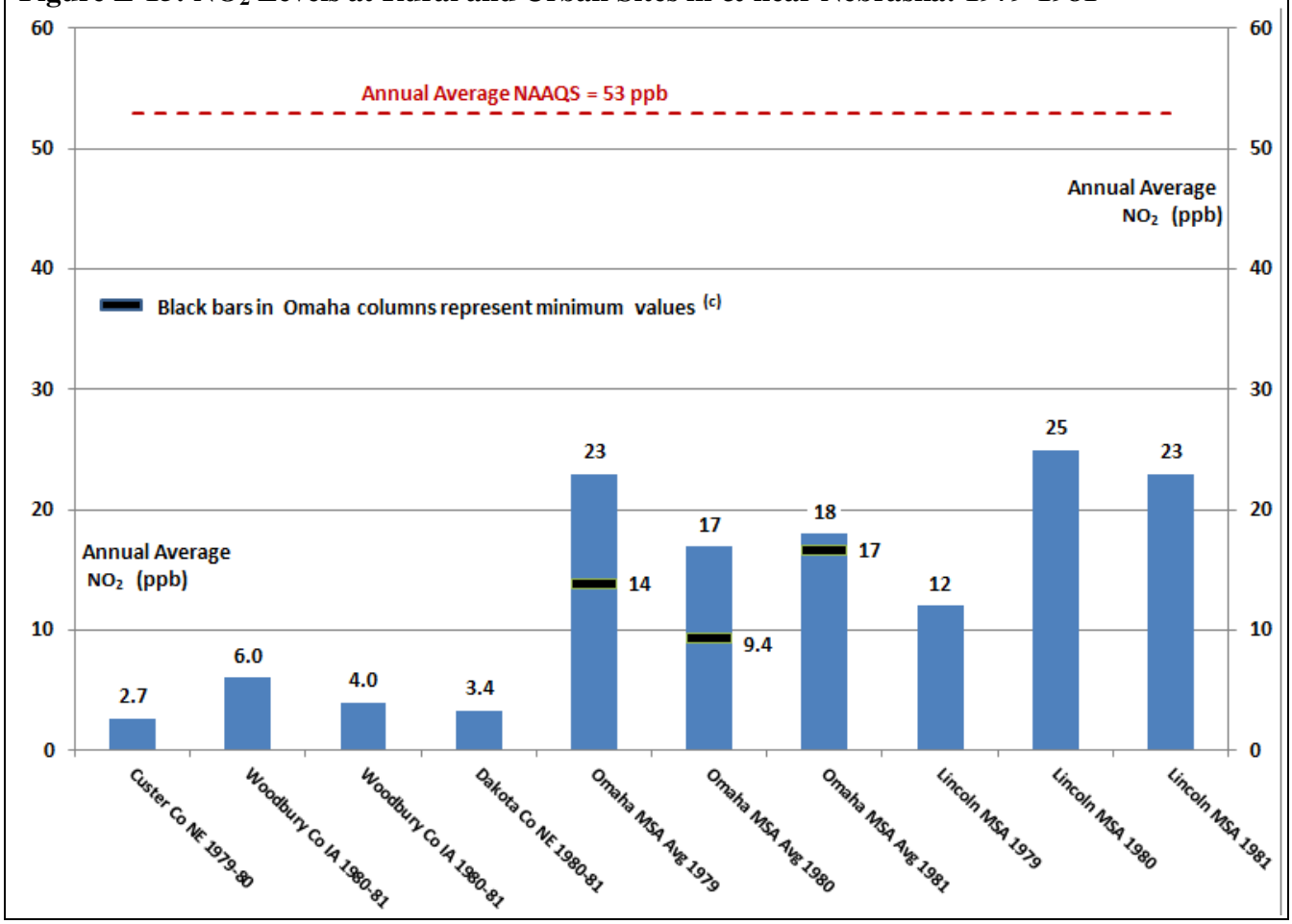
It is noteworthy that the sites in the Sioux City MSA were in rural locations surrounding the George Neal power Stations at least 6 miles south of the main urbanized areas of the MSA. This may explain why the $NO_2$ levels in the Sioux City MSA more closely approximated those in Custer and Thomas Counties (rural central Nebraska), than those in the Omaha and Lincoln MSAs.

**Figure E-14: Annual Average $NO_2$ Levels in Thomas County, Omaha and Lincoln 1973-1977** (a) (b) (c)




Footnotes:
(a) Thomas County: A background site operated in the Nebraska National Forest from 1973 thru 1977.
(b) Omaha MSA: Average and minimum statistical values from varying sites each year: 4 sites in 1973 and 10 sites in 1975 thru 1977.
(c) Lincoln MSA: Average and minimum statistical values from varying sites each year: 1 site in 1973 and 2 sites in 1975 thru 1977.

**Figure E-15: $NO_2$ Levels at Rural and Urban Sites in & near Nebraska: 1979-1981** [(a)(b)(c) & (d)]




Footnotes:
(a) Custer Co. NE: This was a rural background site in northheast Custer County near Comstock.
(b) Sioux City MSA: The Woodbury Co., IA and Dakota Co., NE sites were located south of the urbanized areas of the Sioux City MSA and within a 3 mile radius of the George Neal Power Plants. These sites operated from May 1980 thru April 1981, during the first year the George Neal South Station operated.
(c) Omaha MSA: There were 6 sites operating in the MSA in 1979 and 1980, and 3 sites in 1981. The blue columns represent the average $NO_2$ level of all the sites operating in that year. The black bars represent the lowest annual average $NO_2$ level reported by sites operating in that year.
(d) Lincoln MSA: $NO_2$ was monitored at 9th & J in 1979 and 10th & M in 1980 &1981.

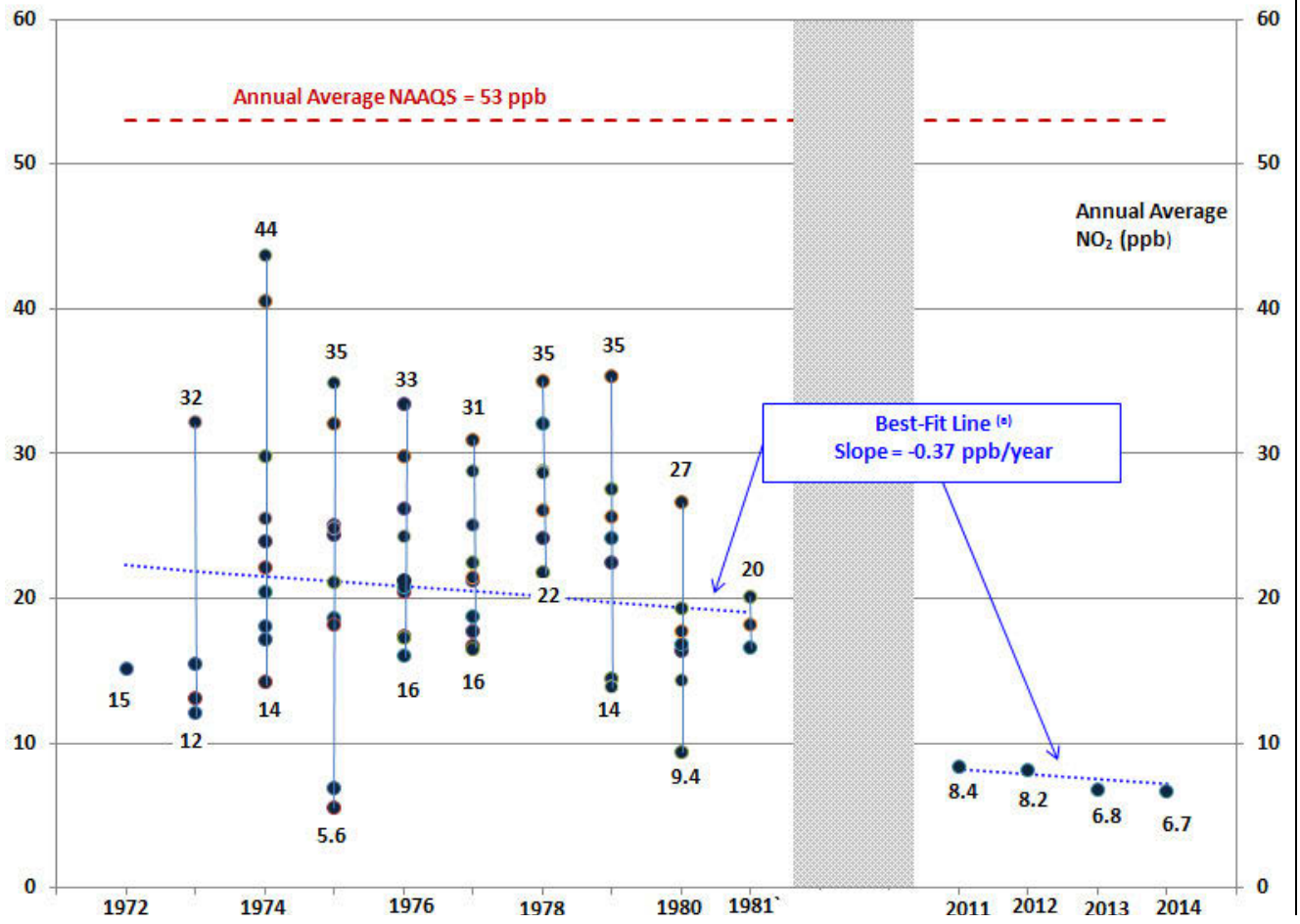
Observation: Monitoring sites in the Lincoln and Omaha MSA's recorded significantly higher $NO_2$ levels than the sites in the Sioux City MSA or Custer County.

Figure E-16 below is a plot of annual average $NO_2$ concentrations in the Omaha MSA in two time periods: 1972 thru 1981 and 2011 thru 2014. The results indicate two things:
1) Historical and current $NO_2$ levels are well below the annual NAAQS; and
2) $NO_2$ levels are lower now than they were in the 1972 thru 1981 time frame.

Although the figure contains a trend–line for the declining $NO_2$ concentrations, the data is not sufficient to indicate whether there was a gradual and continuing decline; or whether there was a more step-like decline between 1981 and 2011.

The Lincoln data in Figure E-17 indicates that $NO_2$ levels demonstrated neither an upward nor a downward trend from 1973 thru 1984, and were well below the annual average NAAQS.

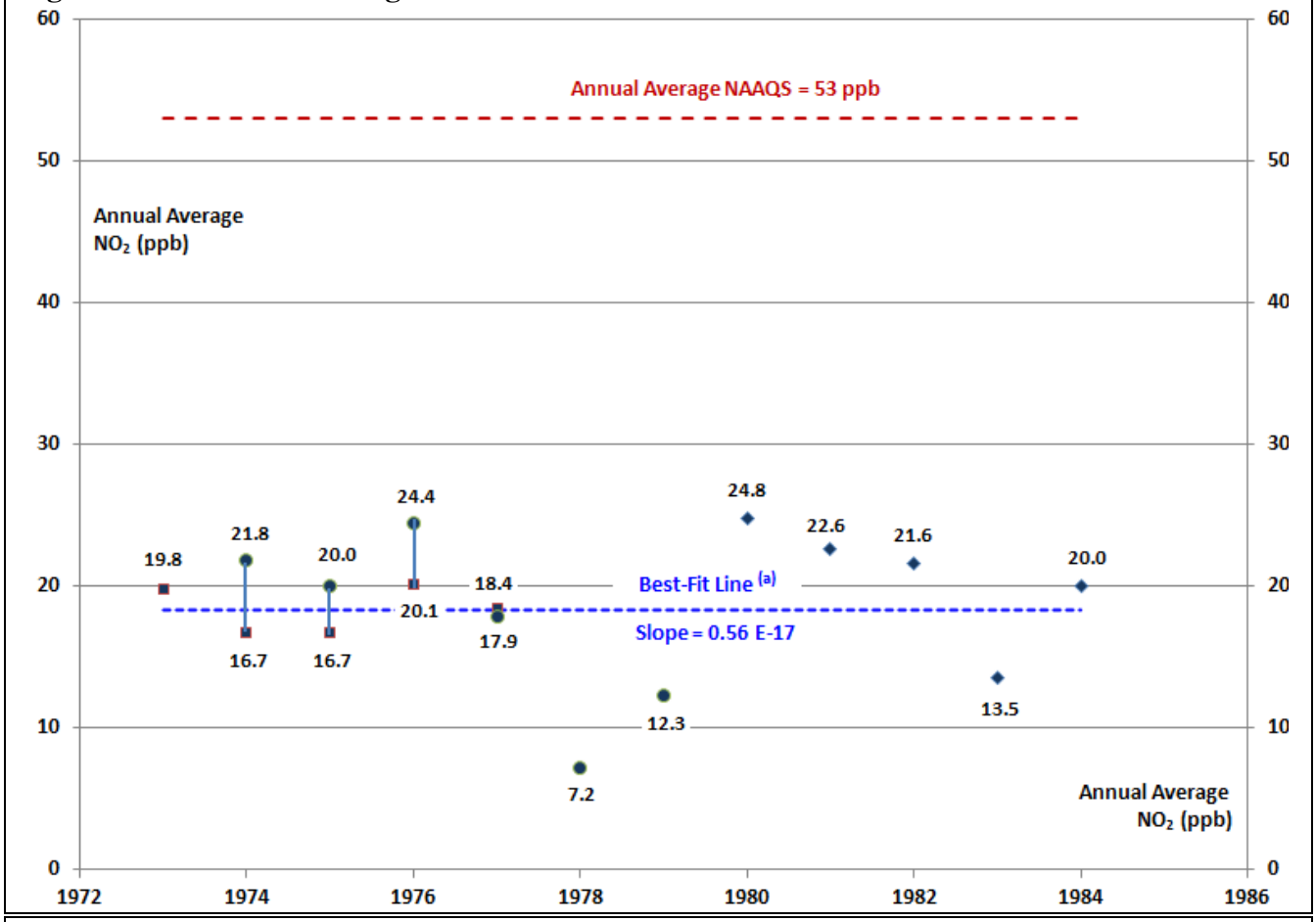
**Figure E-16: Annual Average $NO_2$ Concentrations in Omaha MSA: 1972–1981 & 2011-2014**




| Location | Address | Site # | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carter Lake, IA | 626 E Locust | 19-155-0001 | | 15.5 | 17.2 | 6.9 | | | | | | | | | | |
| Council Bluffs, IA | 40th St & 1st Av | 19-155-0017 | | 13.1 | 14.2 | 5.6 | 17.4 | 16.7 | | | | | | | | |
| Council Bluffs, IA | 915 20th Av | 19-155-0023 | | | | | | 16.5 | 21.8 | 14.5 | 9.4 | | | | | |
| Omaha, NE | 28th & Greebe | 31-055-0005 | | | 23.9 | 24.4 | 33.4 | 17.7 | 24.2 | 22.5 | 16.4 | | | | | |
| Omaha, NE | 42nd & Woolworth | 31-055-0019 | | | 20.4 | 18.7 | 16 | 18.8 | 32.1 | 24.2 | 16.8 | 16.6 | 8.4 | 8.2 | 6.8 | 6.7 |
| Omaha, NE | 11th & Dodge | 31-055-0024 | | | 40.5 | 32.1 | 29.8 | 31 | 35 | 35.4 | 26.7 | | | | | |
| Omaha, NE | 30th & Fort | 31-055-0026 | 15.1 | 12.1 | 18.1 | | | | | | | | | | | |
| Omaha, NE | 9th & Forest | 31-055-0027 | | | 22.2 | 18.2 | 20.5 | | | | | | | | | |
| Omaha, NE | 24th & O | 31-055-0028 | | | 29.8 | 21.1 | 17.3 | 22.5 | 28.8 | 27.6 | 19.3 | 20.1 | | | | |
| Omaha, NE | 1723 Harney | 31-055-0030 | | | | 25.1 | 26.2 | 21.2 | | | | | | | | |
| Omaha, NE | 11414 N 72nd | 31-055-0032 | | | | | 20.8 | | | | | | | | | |
| Omaha, NE | 10th & Marcy | 31-055-0033 | | | | | 21.2 | 21.5 | 26.1 | 25.7 | 17.7 | 18.2 | | | | |
| Omaha, NE | 19th & Howard | 31-055-0034 | | | | | | 25.1 | | | | | | | | |
| Omaha, NE | 18th & Dodge | 31-055-1001 | | 32.2 | 25.5 | 24.9 | | | | | | | | | | |
| Bellevue, NE | 22nd & Washington | 31-153-0002 | | | 43.7 | 34.9 | 24.3 | 28.8 | 28.7 | 13.9 | 14.4 | | | | | |
| | | Average of all sites | 15.1 | 18.2 | 25.6 | 21.2 | 22.7 | 22.0 | 28.1 | 23.4 | 17.2 | 18.3 | 8.4 | 8.2 | 6.8 | 6.7 |

Footnote (a): The best-fit line was created using the averaged data from all sites in any given year.

**Figure E-17: Annual Average $NO_2$ Concentrations in Lincoln MSA: 1973–1984**




Footnote (a): The best-fit line was created using the averaged data from all sites in any given year.

Legend: ■ - 555 S 10th St (1973-77) ● - 9th & J Sts (1974-79) ♦ - 10th & M Sts (1980-84)

Figure E-18 below shows Omaha 1-hour $NO_2$ data from 30th and Fort in 1972-1973 and again in 1975; and 1-hour NOy-NO data from the the Omaha NCore site (42nd & Woolworth) from 2011 thru 2014. The 98th percentile levels from the 1970's were 60% to 125% of the current 1-hour NAAQS (promulgated in 2010), while the 2011-2014 98th percentiles were 35% to 43% of the NAAQS. Although the data is limited, it is consistent with the annual average data discussed above, in that 1-hour $NO_2$ levels are lower now than in the 1970's and 1980's.

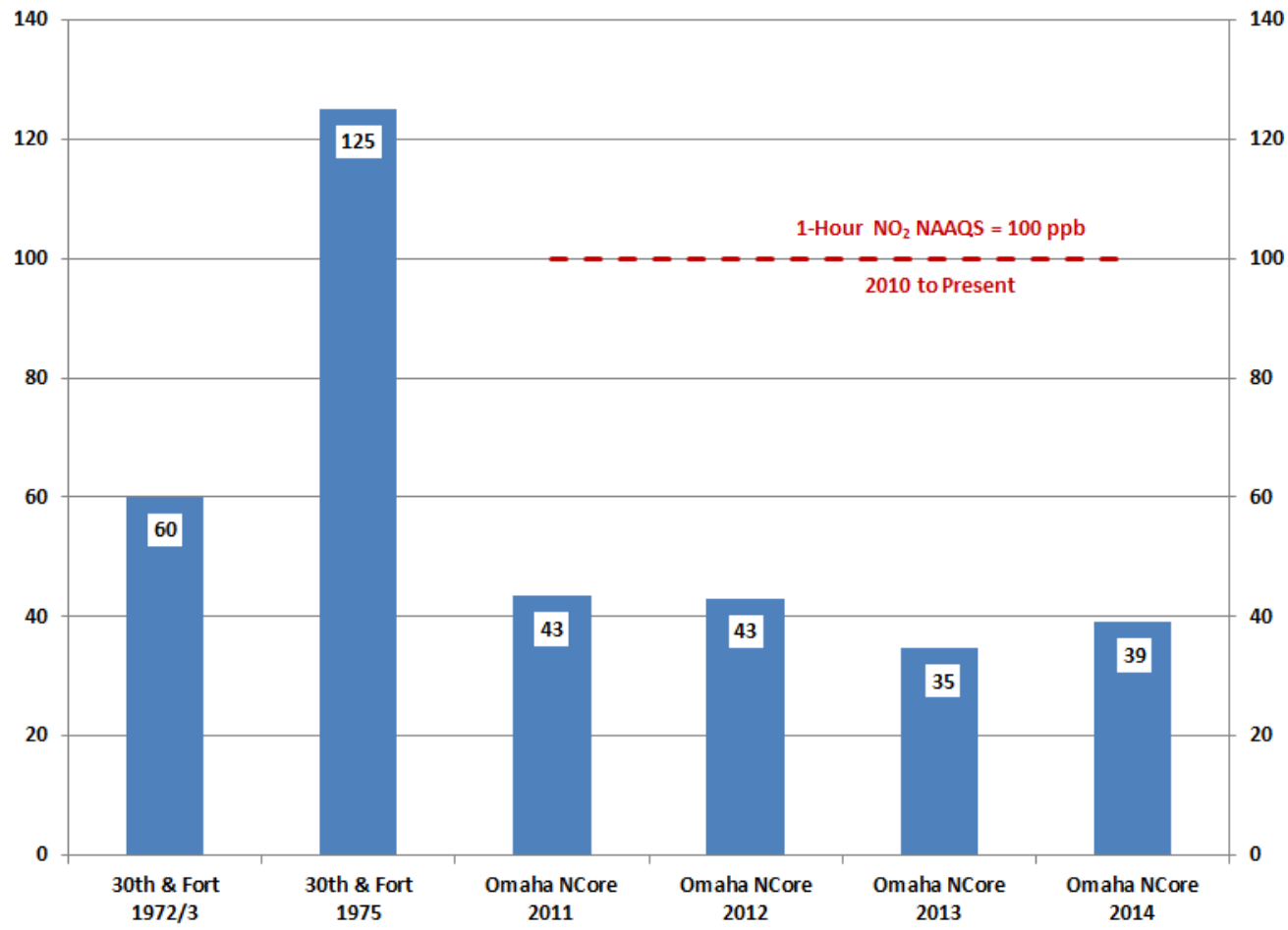
To summarize, monitoring in the 1970s and early 1980s demonstrated attainment with the 53 ppb annual average NAAQS with a significant safety factor.. Monitoring at the Omaha NCore site conducted from 2011 to present is demonstrating attainment with the 2010 100 ppb 1-hour NAAQS with a significant safety factor.

However, the NCore site is not a highest concentration site. Near-road, high-traffic areas are highest concentration sites for 1-hour $NO_2$. Current EPA regulations require a near-road, high-traffic area monitor to be operational in the Omaha MSA by January 1, 2017.

DCHD has proposed the current CO site at 78th and Dodge as the site for monitoring near-road $NO_2$. The DCHD proposal and the NDEQ review comments on it are included in Attachment G of this network review; while attachment H is NDEQ's review and concurrence with the DCHD proposal.

In the past, EPA has indicated that they may delay or rescind the need for near-road monitoring in metropolitan areas, like Omaha, with populations less than 1 million. This is because near-road monitoring in the larger metro-areas is finding attainment. This can be seen from the data in Table E-3: $NO_2$ levels at near-road sites in Denver, Minneapolis and St. Louis are at 72%, 47% and 50% of the NAAQS, respectively. These metro areas have 3 to 4 times the population of the Omaha MSA.

**Figure E-18: One-Hour 98th Percentile Levels for $NO_2$ & NOy-NO [(a)] in the Omaha MSA: $NO_2$ in the Early 1970's and NOy-NO from 2011 thru 2014**




Footnote (a): The NOy-NO concentration will be equal to or greater than the $NO_2$ concentration.

**Table E-3: One-Hour NOx Levels at Monitoring Sites in Nebraska and at Selected Sites in Near-By States for Comparison to the Primary NAAQS [(1)(2)(3)]**

| Site | Site # | 98th Percentiles (ppb) | | | DV (ppb) | % NAAQS | Pollutant |
|---|---|---|---|---|---|---|---|
| | | 2012 | 2013 | 2014 | | | |
| Omaha NE NCore | 31-055-0019 | 45.0 | 35.3 | 39.0 | 39.8 | 40% | NOy-NO |
| Des Moines IA | 19-153-0030 | 39.6 | 36.8 | 35.3 | 37.2 | 37% | $NO_2$ |
| Davenport IA | 19-163-0015 | 34.1 | 38.8 | 35.0 | 36.0 | 36% | $NO_2$ |
| Blaine MN Minneapolis MSA | 27-003-1002 | 41.0 | 43.0 | 50.0 | 44.7 | 45% | $NO_2$ |
| Rosemount MN Minneapolis MSA | 27-037-0020 | 36.0 | 38.0 | 35.0 | 36.3 | 36% | $NO_2$ |
| Minneapolis MN Near-road site | 27-053-0962 | nd | 45.0 | 48.0 | 46.5 | 47% | $NO_2$ |
| Sioux Falls SD | 46-099-0008 | 36.6 | 33.8 | 33.3 | 34.6 | 35% | $NO_2$ |
| Union Co. SD Sioux City MSA | 46-127-0001 | 15.9 | 17.6 | 20.7 | 18.1 | 18% | $NO_2$ |
| Rapid City SD | 46-103-0020 | 42.2 | 38.6 | 33.8 | 38.2 | 38% | $NO_2$ |
| Campbell Co WY | 56-005-0011 | 46.0[(4)] | 52.0 | 55.0 | 53.5 | 54% | $NO_2$ |
| Brookhurst WY Casper MSA | 56-025-2601 | 27.3 | 35.9 | 33.6 | 32.3 | 32% | $NO_2$ |
| Cheyenne WY | 56-021-0100 | 35.8 | 37.1 | 33.6 | 35.5 | 36% | $NO_2$ |
| Wamsutter WY | 56-037-0200 | 36.3 | 37.7 | 31.9 | 35.3 | 35% | $NO_2$ |
| Denver CO | 08-031-0002 | 72.0 | 67.6 | 76.6 | 72.1 | 72% | $NO_2$ |
| Wichita KS | 20-173-0010 | 85.1 | 39.6 | 40.1 | 54.9 | 55% | $NO_2$ |
| Kansas City KS | 20-209-0021 | 51.5 | 47.4 | 51.1 | 50.0 | 50% | $NO_2$ |
| Kansas City MO | 29-095-0034 | 52.8 | 48.1 | 52.7 | 51.2 | 51% | $NO_2$ |
| St. Louis MO | 29-510-0086 | 52.4 | 50.5 | 43.3 | 48.7 | 49% | $NO_2$ |
| St. Louis MO Near-road site | 29-510-0094 | nd | 50.4 | 50.1 | 50.3 | 50% | $NO_2$ |

Footnotes:

(1) The Omaha NCore site is the only NOx monitoring site in Nebraska. This site monitors for NO and NOy. The NOy-NO parameter includes $NO_2$ as well as other reactive forms of NOx. The NOy-NO parameter can be used demonstrate attainment with the NOx NAAQS, but not non-attainment.

(2) Sites from the near-by states of IA, MN, SD, WY, CO, KS and MO were selected in part on their proximity to NE. Urban sites and highest concentration sites also received priority. In areas where there was more than one NOx monitoring site, data from the site that had the highest NOx values is shown. The levels shown in this table include the highest found in each state.

(3) The NOx 1-hour primary NAAQS is 100 ppb. Attainment with the NAAQS is evaluated using the 3-year average of the annual 98th percentile values for $NO_2$. The NOy-NO value is equal to or greater than the NO2 value.

(4) There were only 3 quarters of 2012 data from the Campbell Co WY site.

## Current and Historical $NO_2$/NOx Monitoring Sites in Nebraska

Figure E-19 shows the locations of historical and current $NO_2$ monitoring sites in Nebraska. As discussed above, historical $NO_2$ monitoring conducted in Nebraska found $NO_2$ levels well below the NAAQS applicable at the time and the current NAAQS.

**Figure E-19: Location of Current and Historical $NO_2$/NOx Monitoring Sites in Nebraska and within Adjacent Counties in MSA's**


### 4) Sulfur Dioxide

Sulfur dioxide ($SO_2$) is emitted as a pollutant from combustion sources burning fossil fuels containing sulfur. Historically coal-fired boilers and diesel engines were significant sources of $SO_2$. Diesel fuel contained significant amounts of sulfur prior to 2007, but low sulfur diesel fuel requirements implemented in a phased manner beginning in 2007 have greatly reduced this source of $SO_2$. Emission control requirements associated with the implementation of the 2010 1-hour $SO_2$ NAAQS of 75 ppb are anticipated to lead to further reductions in $SO_2$ emissions from coal-fired boilers over the next few years.

$SO_2$ monitoring was initiated in Omaha in 1967 and continues today. In other areas of Nebraska, monitoring was initiated in 1970 and discontinued by 1982, although monitoring in Iowa and South Dakota is being conducted within the Sioux City MSA. $SO_2$ monitoring conducted within Nebraska has consistently demonstrated attainment with the NAAQS.

The initial $SO_2$ NAAQS were implemented in 1971: primary 24 hour NAAQS = 0.14 ppm and primary annual average NAAQS = 0.03 ppm. These were revoked in 2010 when the 1-hour primary NAAQS of 75 ppb was established. $SO_2$ monitoring conducted within Nebraska has consistently demonstrated attainment with the primary NAAQS.

Figure E-20 provides a summary of maximum annual average $SO_2$ levels in Nebraska from 1967 thru 2014. Note that in the initial monitoring period, 1967 thru 1982, SO2 levels were higher in the

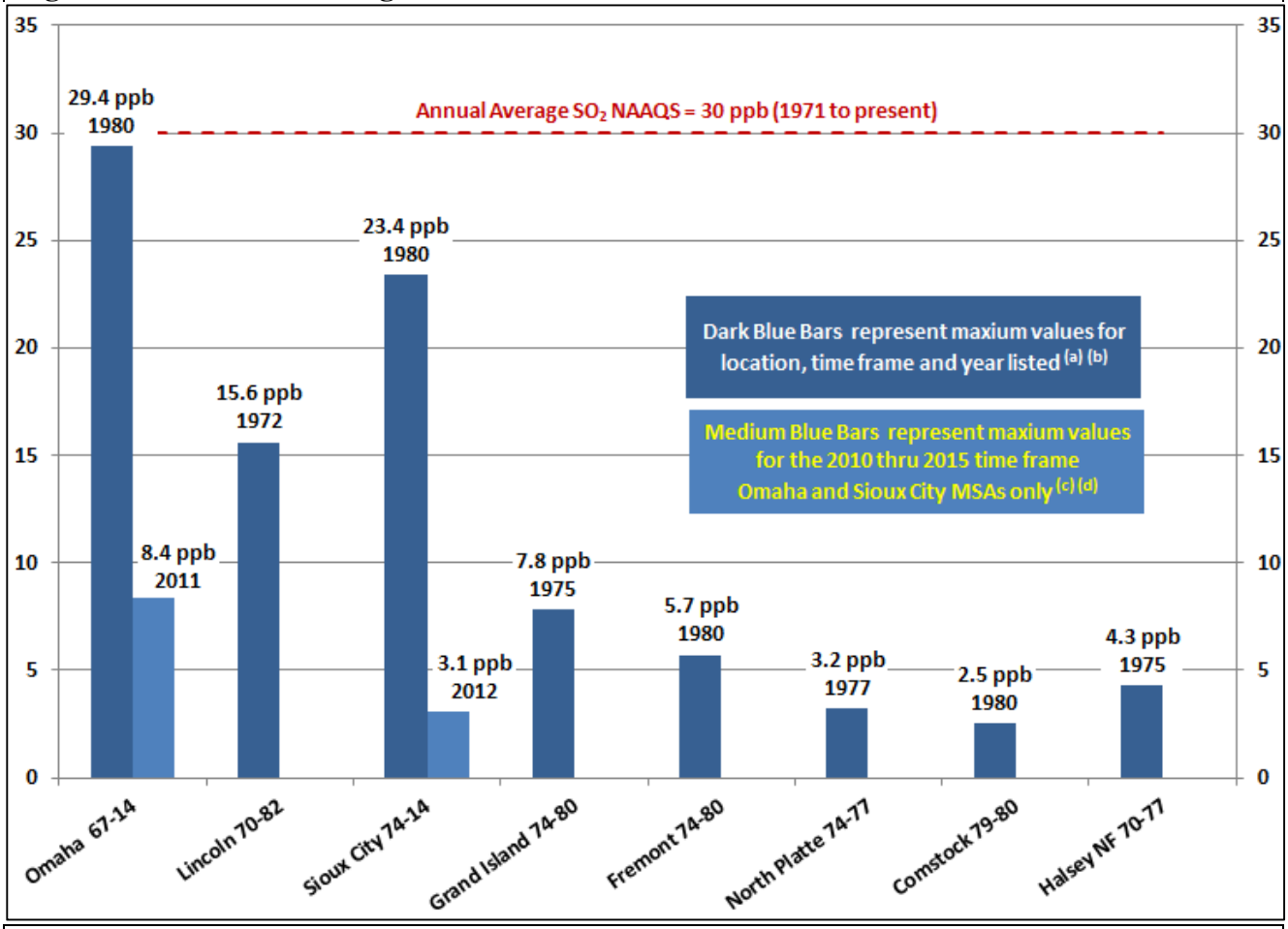
Omaha, Lincoln and Sioux City MSAs than other monitoring locations. Also note that the $SO_2$ levels in the Omaha and Sioux City MSAs are much lower now than in the initial monitoring period; the two areas in Nebraska where both historical and contemporary monitoring has been conducted.

Figure E-21 provides a historical view of maximum annual average $SO_2$ levels in the Omaha, Lincoln and Sioux City MSAs. This provides a better picture of $SO_2$ levels over time, especially in the Omaha MSA. The maximum levels found in the Omaha MSA were in the north Omaha at source-oriented sites located south of the OPPD North Omaha Power Station.

The earliest monitoring utilized bubbler-scrubber methods that yielded 24-hour average data, but not 1–hour average data. Beginning in 1974 continuous monitoring systems came into use at some sites in the Omaha and Sioux City MSAs. Figures E-22 and E-23 contain the maximum annual $99^{th}$ percentile 1-hour $SO_2$ values for the Omaha and Sioux City MSAs from 1974 thru 2014. As can be seen from the figures, there has been continuous monitoring within the Omaha MSA for hourly $SO_2$ since 1974, but only periodic monitoring within the Sioux City MSA except for more recently with continuous monitoring from 2009 thru 2014.

Note that since the 2010 1-hour NAAQS of 75 ppb was implemented, maximum $SO_2$ levels in Omaha MSA have ranged from 81% to 88% of the NAAQS, while in the Sioux City MSA have been in the range of 9% to 15% of the NAAQS.

**Figure E-20: Annual Average $SO_2$ Values at Different Locations and Time Frames**




Location & Time Frame Legend

**Omaha 67-14**: Monitoring conducted at various locations in the Omaha MSA from 1967 to present
**Lincoln 70-82**: Monitoring conducted in Lincoln and Lancaster County at various locations from 1970 to 1982
**Sioux City 74-14**: Monitoring conducted at various locations in the Sioux City MSA from 1974-82, 2001-2 & 2009-present
**Grand Island 74-80**: Monitoring conducted at 2nd & Pine in Grand Island from 1974 to 1980
**Fremont 74-80**: Monitoring conducted at two locations in Fremont from 1974 to 1980
**North Platte 74-77**: Monitoring conducted at 211 N 3rd Street in North Platte from 1974 to 1977
**Comstock 79-80**: Monitoring conducted in rural Custer County near Comstock in 1979 & 1980
**Halsey NF 70-77**: Monitoring conducted in the Nebraska National Forest near Halsey from 1970 to 1977

Footnotes:

(a) See Location and Time Frame Legend above for an explanation of the areas and time periods when $SO_2$ monitoring was conducted. Both continuous instrumental methods and 24 hour gas bubbler methods were used in the early years, with only continuous UV fluorescent methods being used after 1980.
(b) The date below the concentration label is the year in which the maximum value was found.
(c) From 2010 to 2014 the only locations within Nebraska where $SO_2$ monitoring was conducted were in Omaha. The maximum annual average value of 8.4 ppb was obtained at the 16th & Whitmore site in 2011.
(d) From 2010 thru 2014, $SO_2$ monitoring in the Sioux City MSA was conducted near Sergeant Bluff, IA and in rural Union County, SD. The maximum annual average value of 3.1 was found at the Sergeant Bluff, IA site in 2012

**Figure E-21: Maximum Annual Average $SO_2$ in Omaha, Lincoln & Sioux City MSAs: 1967 to 2014**

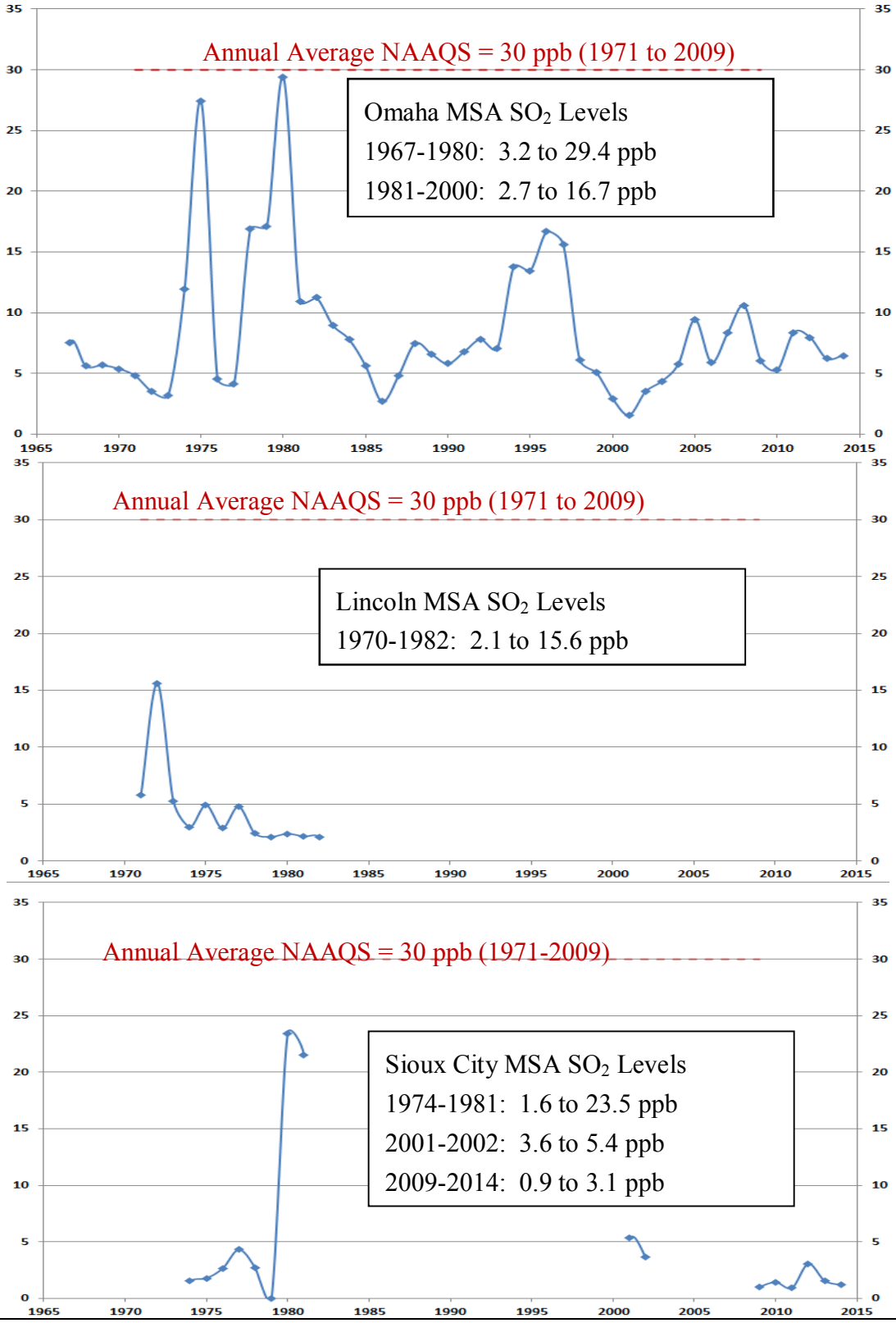


**Figure E-22: Maximum Annual 99th Percentile 1-Hour $SO_2$ Levels in the Omaha MSA: 1974 to 2014**

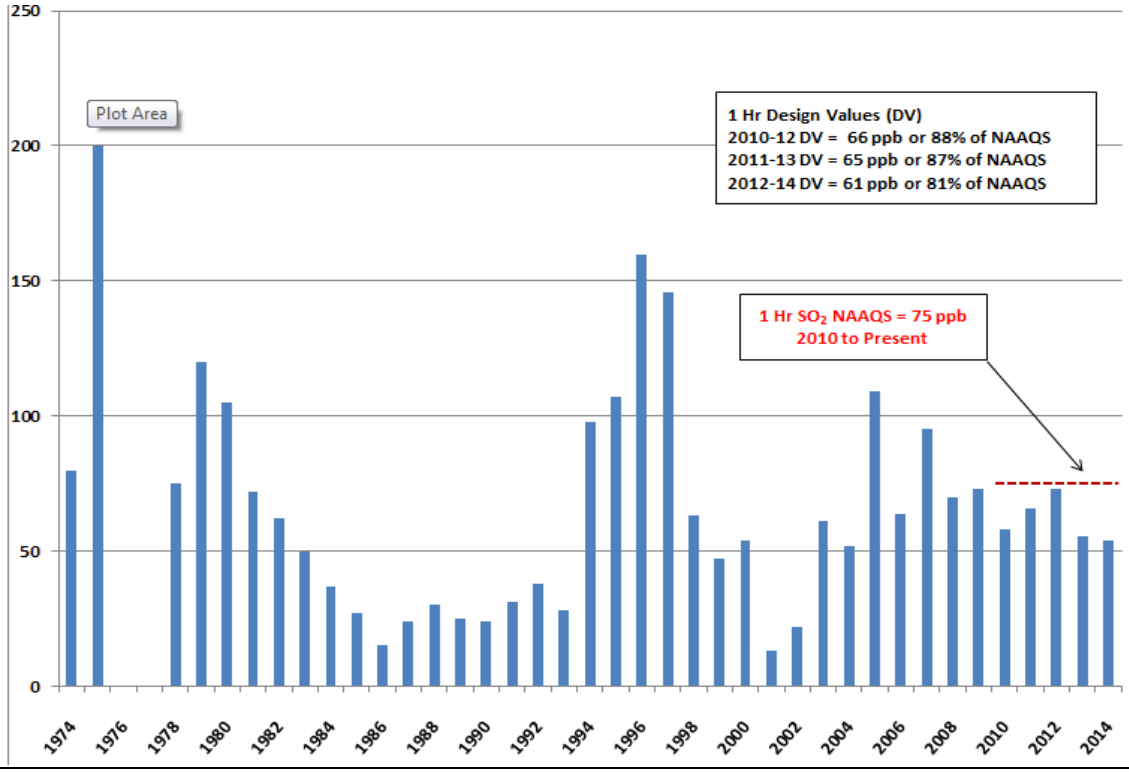
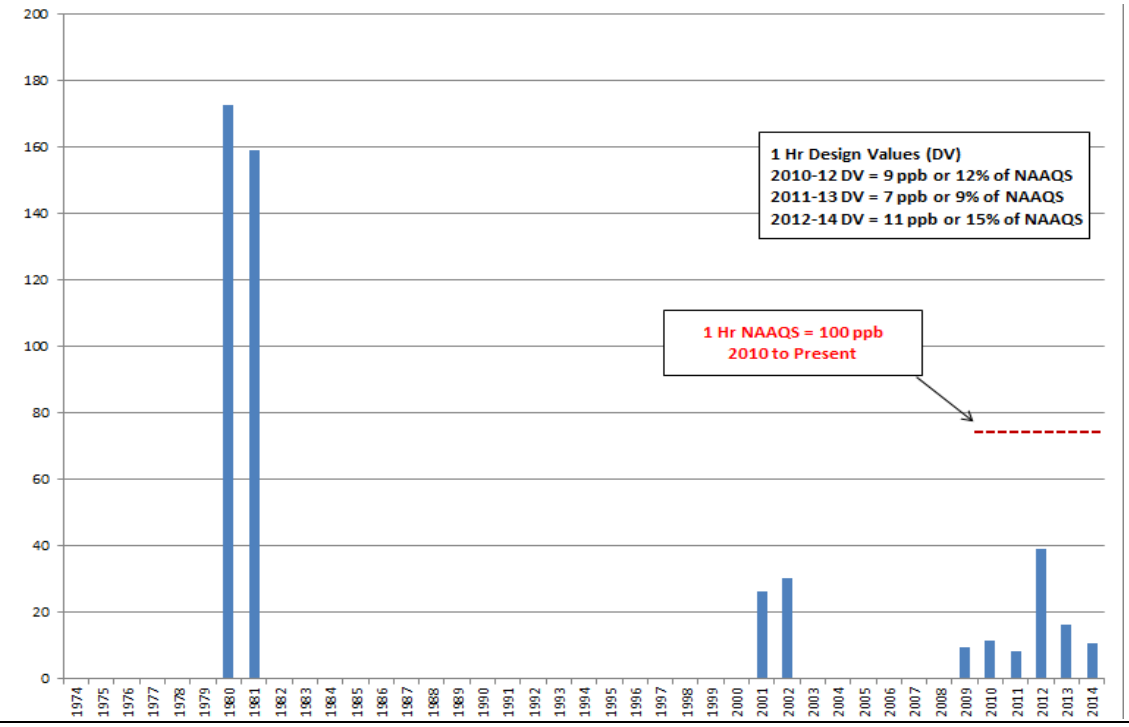


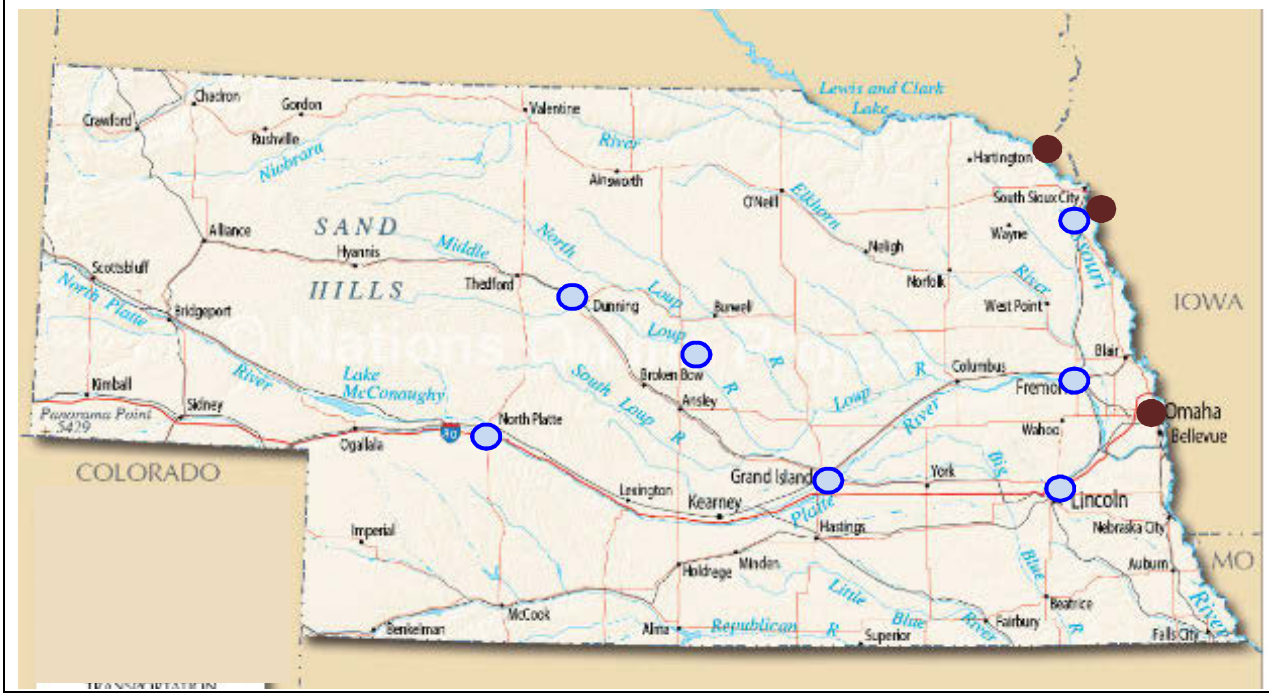

**Figure E-23: Maximum Annual 99th Percentile1-Hour $SO_2$ Levels in the Sioux City MSA: 1974 to 2014**



### Current and Historical $SO_2$ Monitoring Sites in Nebraska

Figure E-24 shows the locations of historical and current $SO_2$ monitoring sites in Nebraska.

**Figure E-24: Location of Current ● and Historical ○ $SO_2$ Monitoring Sites in Nebraska and within Adjacent State Areas of the Omaha & Sioux City in MSAs**




### 5) Particulate Matter: TSP, $PM_{10}$ and $PM_{2.5}$

Particilate matter regulations, monitoring and environmental/public health concerns have evuolved over time. Intitially monitoring efforts concentrated on total suspended particulate matter (TSP), then moved to $PM_{10}$ in the late 1980s, and then $PM_{2.5}$ was added in the late 1990's. The driving force being that finer particulates more easily penetrate into the lungs and thus present more potential for health impacts.

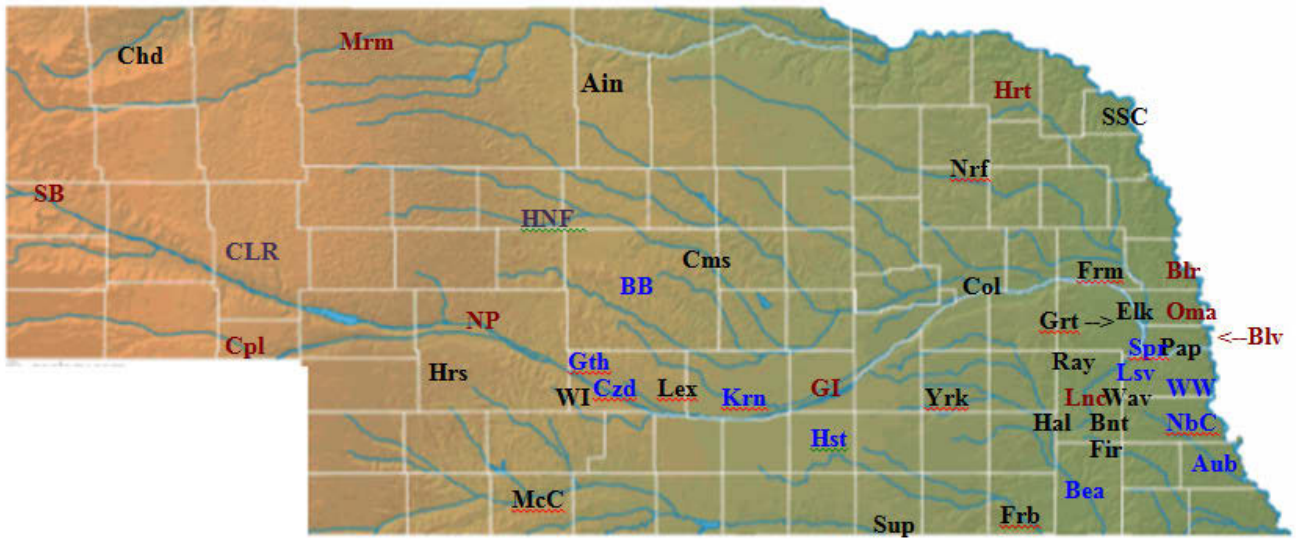
Defintions:
PM - refers collectively to TSP, $PM_{10}$ & $PM_{2.5}$
TSP - total suspended atmospheric particulate matter
$PM_{10}$ - particulate matter with an aerodynamic diameter of 10 microns or less.
$PM_{2.5}$ - particulate matter with an aerodynamic diameter of 2.5 microns or less.

Table E-4 below shows the history of the particulate NAAQS. It also lists the years monitoring was initiated for TSP, $PM_{10}$ and $PM_{2.5}$, and ended for TSP. Table E-5 lists the locations in Nebraska where TSP, $PM_{10}$ and $PM_{2.5}$ has been and is being conducted, and the time periods when the monitoring was conducted. Figure E-25 is a Nebraska map showing the location of all of the PM monitoring sites; both current and historical. Figure E-26 is a Nebraska map showing the location of all of the current $PM_{10}$ ansd $PM_{2.5}$ monitoring sites.

**Table E-4: Summary History of Particualte Matter NAAQS and Monitoring in Nebraska**

| Particulate Type | NAAQS Implementation | NAAQS History | Monitoring Started | Monitoring Ended |
|---|---|---|---|---|
| TSP | 1971 | Primary<br>24-hour of 260 *u*g/m$^3$<br>Annual Average of 75 *u*g/m$^3$<br>Secondary<br>24-hour of 150 *u*g/m$^3$<br>Annual Average of 75 *u*g/m$^3$ | 1957 | 1987 |
| | 1987 | TSP NAAQS rescinded | | |
| $PM_{10}$ | 1987 | Primary & Secondary<br>24-hour of 150 *u*g/m$^3$<br>Annual Average of 75 *u*g/m$^3$ | 1987 | Present |
| | 2006 | Annual Average NAAQS rescinded<br>24-hour NAAQS retained at 150 *u*g/m$^3$ | | |
| $PM_{2.5}$ | 1997 | Primary & Secondary<br>24-hour of 65 *u*g/m$^3$<br>Annual Average of 15 *u*g/m$^3$ | | |
| | 2006 | Primary & Secondary<br>24-hour of 35 *u*g/m$^3$<br>Annual Average of 15 *u*g/m$^3$ | | |
| | 2012 | Primary & Secondary<br>24-hour of 35 *u*g/m$^3$<br>Primary<br>Annual Average of 12 *u*g/m$^3$<br>Secondary<br>Annual Average of 15 *u*g/m$^3$ | | |

**Figure E-25: Historical and Current Particulate Monitoring Site Locations: 1957 – 2014**
**(see Table E-5 for site abbreviation legend)**



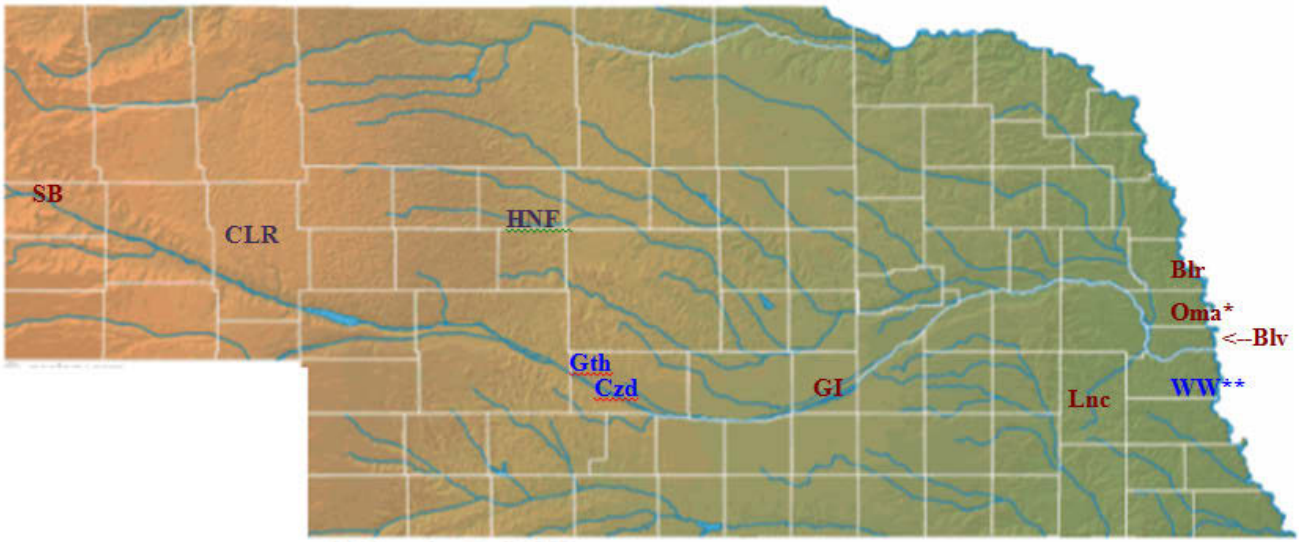

Black font depicts locations that had TSP monitoring, and no $PM_{10}$ or $PM_{2.5}$ monitoring.

Blue font depicts locations that have had $PM_{10}$ monitoring. Seven (7) of these have also had TSP monitoring Aub, Bea, Czd, Gth, Hst, Krn & NbC.

Red font depicts locations that have had $PM_{2.5}$ monitoring, except that WW was listed only as a $PM_{10}$ location because $PM_{2.5}$ monitoring was discontinued in 2005. TSP monitoring was also conducted at the Blv (Bellevue) & NP (North Platte) locations. TSP, $PM_{10}$ and $PM_{2.5}$ monitoring: GI (Grand Island), Lnc (Lincoln), Oma (Omaha), SB (Scottsbluff) and WW (Weeping Water).

Violet font is used to show IMPROVE sites at HNF (Halsey National Forest) and CLR (Crescent Lake Wildlife Refuge). IMPROVE sites monitor $PM_{2.5}$ constituents as part of a regional haze study.

**Figure E-26: Current Particulate Monitoring Site Locations**
**(see Table E-5 for site abbreviation legend)**




* There are 5 $PM_{10}$ sites and 2 $PM_{2.5}$ sites in Omaha.

** There are 3 $PM_{10}$ sites in the Weeping Water area.

Violet font is used to depict IMPROVE sites: CLR & HNF.

Red font is used to depict $PM_{2.5}$ sites: SB, GI Lnc, Blr, Oma & Blv.

Blue font is used to depict $PM_{10}$ sites: Gth, Czd & WW. Note that Oma has both $PM_{2.5}$ and $PM_{10}$ sites.

| **Table E-5: Particulate Monitoring Sites Operated In Nebraska from 1957 thru 2015** | | | | |
|---|---|---|---|---|
| **Site** | **Abbr.** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** |
| Ainsworth | **Ain** | 1974-1977 | | |
| Auburn | **Aub** | 1976-1992 | 1994-1995 | |
| Beatrice | **Bea** | 1971–1995 | 1994-1995 | |
| Bellevue | **Blv** | 1971-1992 | | 1999-Present |
| Bennett | **Bnt** | 1973-1977 | | |
| Blair | **Blr** | | | 1999-Present |
| Broken Bow | **BB** | | 1999-2002 | |
| Chadron | **Chd** | 1971-1977 | | |
| Chappell | **Cpl** | | | 1999-2002 |
| Columbus | **Col** | 1972-1993 | | |
| Comstock | **Cms** | 1979-1980 | | |
| Cozad | **Czd** | 1974-81 & 94 | 1994-Present | |
| Crescent Lake NWR* | **CLR** | | | 2002-Present* |
| Elkhorn | **Elk** | 1982-1989 | | |
| Fairbury | **Frb** | 1971-1978 | | |
| Firth | **Fir** | 1972-1982 | | |
| Fremont | **Frm** | 1972-1995 | | |
| Gothenburg | **Gth** | 1990-1992 | 1991-Present | |
| Grand Island | **GI** | 1971-1995 | 1994-1995 | 1999-Present |
| Gretna | **Grt** | 1985-1992 | | |
| Hallam | **Hal** | 1973-1979 | | |
| Halsey National Forest * | **HNF** | 1958 – 1977 | | 2002-Present* |
| Hartington | **Hrt** | | | 1999-2002 |
| Hastings | **Hst** | 1972-1992 | 1987-1996 | |
| Hershey (17 mi south) | **Hrs** | 1973-1985 | | |
| Kearney | **Krn** | 1972-1992 | 1988-1998 | |
| Lexington | **Lex** | 1971-1993 | | |
| Lincoln | **Lnc** | 1957,60,62,69-87 | 1988-1998 | 1999-present |
| Louisville | **Lsv** | 1971-1984 | 1987-1999 | |
| Merriman | **Mrm** | | | 1999-2002 |
| McCook | **MCk** | 1971-1973 | | |
| Nebraska City | **NbC** | 1975-1992 | 1987-1998 | |
| Norfolk | **Nrf** | 1971-1992 | | |
| North Platte | **NP** | 1971-1993 | | 1999-2005 |
| Omaha | **Oma** | 1957-2000 | 1987-Present | 1999-Present |
| Papillion | **Pap** | 1971-1992 | | |
| Raymond | **Ray** | 1973-1977 | | |
| Table continued on next page | | | | |

| Table E-5: Particulate Monitoring Sites Operated Between 1957 and 2015 - continued | | | | |
|---|---|---|---|---|
| **Site** | **Abbr.** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** |
| Scottsbluff | **ScB** | 1971-1992 | 1988-1998 | 1999-Present |
| South Sioux City | **SSC** | 1977-1994 | | |
| Springfield (4 mi SSW) | **Spr** | | 1995 | |
| Superior | **Sup** | 1973-1993 | | |
| Waverly | **Wav** | 1973-1987 | | |
| Weeping Water | **WW** | 1972-1992 | 1987-Present | 1999-2005 |
| Willow Island | **WI** | 1972-1973 | | |
| York | **Yrk** | 1976-1992 | | |
| * The Halsey National Forest and Crescent Lake National Wildlife Refuge have Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring sites. For more information on these sites see Appendix A or the US EPA website: http://www.epa.gov/ttnamti1/visdata.html. | | | | |

## V.A. Total Suspended Particulates (TSP)

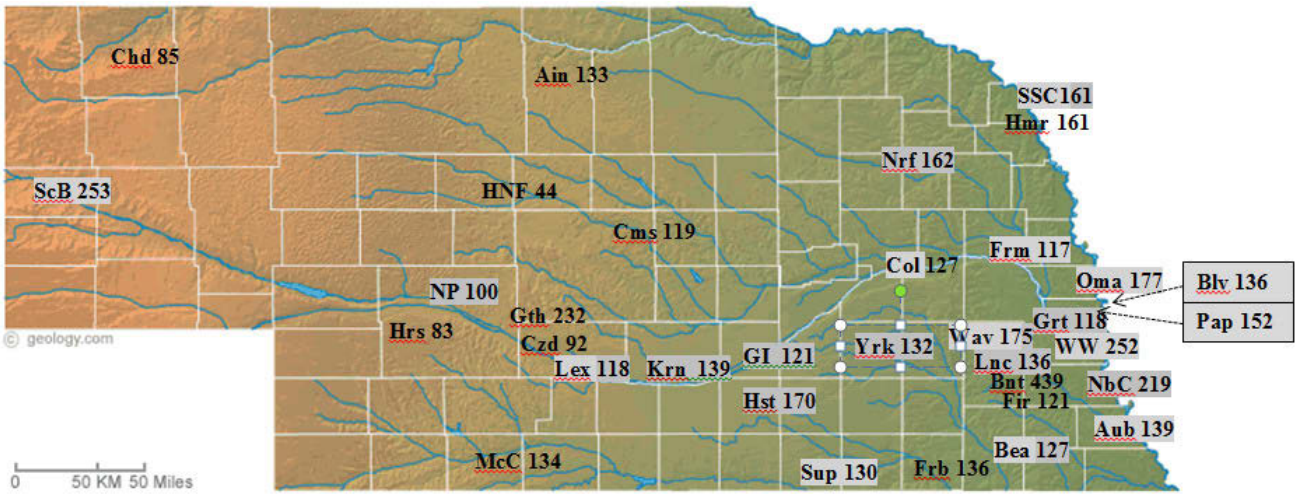
Monitoring for Total Suspended Particulates (TSP) was initiated in Lincoln and Omaha in 1957. TSP NAAQS were established in 1971 and then rescinded in 1987, when they were replaced by the $PM_{10}$ NAAQS (see Table E-4 above).

At various times between 1971 and 1987, TSP monitoring was performed at 90 sites in 35 Nebraska communities and four rural sites. Some of these sites continued operating into the 1990s, and one Omaha TSP site (at the Public Works building at 11$^{th}$ and Nicholas Sts) operated until 2000. A list of the communities where TSP monitoring was performed can be found in Table E-5. Figure E-25 shows the location of historical and current particulate monitoring sites in Nebraska, including the historical TSP sites.

See TSP data in Figure E-27, Figures E-28 and Table E-6 below. These provide a reasonable picture of TSP levels in Nebraska in the latter part of the 1980's. From 1971, when the TSP NAAQS was first promulgated, thru 1987 when the TSP NAAQS was first promulgated, significant particulate emission controls were implemented including restrictions on stack opacity, fugitive dust and open burning, as well as other source-specific limits. An examination of ambient monitoring data prior to 1988 demonstrates that these control measures were effective in reducing ambient TSP levels.

There were 3 areas where TSP levels exceeded the primary TSP NAAQS: Omaha, Louisville and Weeping Water. Particulate emission control measures were established in the Title 129 Nebraska Air Pollution Rules and Regulations in 1975, and many additional controls have been added in the years and decades since. TSP levels in these 3 sites dropped below the primary TSP NAAQS by 1984. TSP levels at all 3 sites remained above the secondary NAAQS until it was rescinded in 1987 and replaced with the $PM_{10}$ NAAQS.

**Figure E-27: Pre-1988 Total Suspended Particulate Matter (TSP): 4th High 24-Hour Values Over 3-Years** [(a) (b) (c) (d) (e) (f)]




Footnotes:

(a) The primary 24-Hour NAAQS was 260 *u*g/m$^3$ and secondary NAAQS was 150 *u*g/m$^3$. Neither value was to be exceeded more than once per year. The values shown in this figure are the 4th high value over a 3 year time frame, or if only 2 years of data was available, the 3rd high value. See Table E-6 for time frame information.

(b) See Table E-6 to explain the abbreviations and the PM values shown.

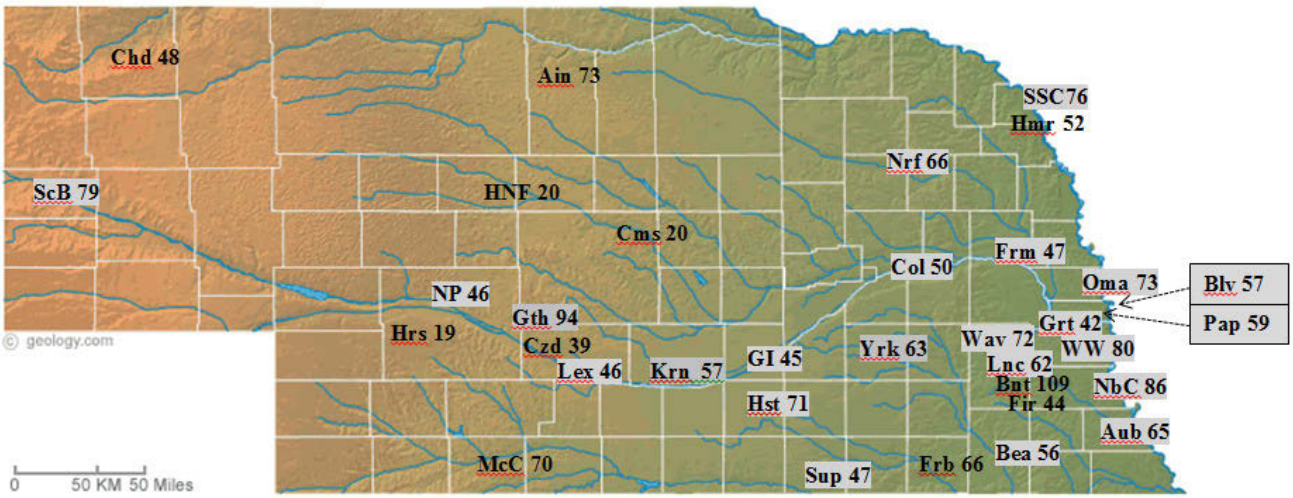
(c) Site abbreviations and values in gray highlight are for the 1985 to 1987 three year period, the last 3 years the TSP NAAQS was in effect.

(d) Site abbreviations and values not highlighted have average values from a 3-year period other than 1985 to 1987. See Table E-6 for additional information.

(e) Lincoln and Omaha had multiple sites. The value shown is the highest average value for the 1985 to 1987 time frame.

(f) One location on the map had values above the primary 260 ug/m3 annual average NAAQS:
Bennett (Lancaster Co): 1975-1977, 3-year average = 439 *u*g/m$^3$. Subsequent monitoring in Lincoln/Lancaster Co. for TSP, $PM_{10}$ and $PM_{2.5}$ has demonstrated attainment.

**Figure E-28: Pre-1988 Total Suspended Particulate Matter (TSP): 3–Year Average of Annual Average Values** [(a) (b) (c) (d) (e) (f)]




Footnotes:

(a) The primary annual average NAAQS = 75 $u$g/m$^3$ and secondary NAAQS was 60 $u$g/m$^3$ to be compared to the geometric mean for any given year. The values shown in this figure are 3-year average values (see Table E-6 for time frame information).

(b) See Table E-6 to explain abbreviations and the PM values associated with them.

(c) Site abbreviations and values in gray highlight are the averages for the 1985 to 1987 three year period, the last 3 years the TSP NAAQS was in effect.

(d) Site abbreviations and values not highlighted have average values from a 3-year period other than 1985 to 1987. See Table E-6 for additional information.

(e) Lincoln and Omaha had multiple sites. The value shown is the highest average value for the 1985 to 1987 time frame.

(f) Six locations on the map had values above the primary 75 $u$g/$^{m3}$ annual average NAAQS:

Bennet (Lancaster Co): 1975-1977, 3-year average = 109 $u$g/m$^3$. Subsequent monitoring in Lincoln/Lancaster Co. for TSP, $PM_{10}$ and $PM_{2.5}$ has demonstrated attainment.

Gothenburg (Dawson Co): ): 1985-1987, 3-year average = 94 $u$g/m$^3$. TSP replaced with $PM_{10}$ monitor that is currently operating and finding attainment.

Nebraska City (Otoe Co): 1985-1987, 3-year average = 86 $u$g/m$^3$. TSP monitoring continued until 1992 when the 3-year average of the 1990 to 1992 annual averages was 51 $u$g/m$^3$.

Scottsbluff (Scottsbluff Co): 1985-1987, 3-year average = 79 $u$g/m$^3$. TSP monitoring continued until 1994 when the 3-year average of the 1992 to 1994 annual averages was 56 $u$g/m$^3$.

South Souix City (Dakota Co): 1985-1987, 3-yr average = 76 $u$g/m$^3$. TSP monitoring continued until 1992 when the 3-year average of the 1990 to 1992 annual averages was 72 $u$g/m$^3$.

Weeping Water (Cass Co): 1985-1987, 3-year average = 80 $u$g/m$^3$. TSP monitoring continued until 1994 when the 3-year average of the 1992 to 1994 annual averages was 56 $u$g/m$^3$. The TSP sampler was replaced with $PM_{10}$ monitor that is currently operating and finding attainment.

**Table E-6: Historical TSP Values: Summary Table** [(a) (b) (c) & (d)] Page 1 of 3

| Site | Abbr. | County | Service Years | Design Years | 3-Year Annual Average ($ug/m^3$) | 3-Year 4th High ($ug/m^3$) |
|---|---|---|---|---|---|---|
| Ainsworth | **Ain** | Brown | 1974-1977 | 1975-77 | 73 | 133 |
| Auburn | **Aub** | Nemaha | 1976-1992 | 1985-87 | 65 | 139 |
| Beatrice | **Bea** | Gage | 1971–1995 | 1985-87 | 56 | 127 |
| Bellevue | **Blv** | Sarpy | 1971-1992 | 1985-87 | 57 | 136 |
| Bennett | **Btn** | Lancaster | 1972-1977 | 1975-77 | 109 | 439 |
| Chadron | **Chd** | Dawes | 1971-1977 | 1975-77 | 48 | 85 |
| Columbus | **Col** | Platte | 1972-1993 | 1985-87 | 50 | 127 |
| Comstock | **Cms** | Custer | 1979-1980 | 1979-80 | 20 | 119 |
| Cozad | **Czd** | Dawson | 1974-1994 | 1979-81 | 39 | 92 |
| Elkhorn | not shown | Douglas | 1982-1989 | 1985-87 | 35 | 86 |
| Fairbury | **Frb** | Jefferson | 1971-1978 | 1976-78 | 66 | 136 |
| Firth | **Fir** | Lancaster | 1972-1982 | 1980-82 | 44 | 121 |
| Fremont | **Frm** | Dodge | 1972-1995 | 1985-87 | 47 | 117 |
| Gothenburg | **Gth** | Dawson | 1990-1992 | 1990-92 | 94 | 232 |
| Grand Island | **GI** | Hall | 1971-1995 | 1985-87 | 52 | 121 |
| Gretna | not shown | Sarpy | 1985-1992 | 1985-87 | 42 | 118 |
| Hallam | **Hal** | Lancaster | 1973-1979 | 1977-79 | 49 | 133 |
| Halsey National Forest | **HNF** | Thomas | 1958-1977 | 1975-77 | 20 | 44 |
| Hastings | **Hst** | Adams | 1972-1992 | 1985-87 | 71 | 170 |
| Hershey (17 mi south) | **Hrs** | Lincoln | 1973-1985 | 1983-85 | 28 | 83 |
| Homer | **Hmr** | Dakota | 1980-1981 | 1980-81 | 52 | 161 |
| Kearney | **Krn** | Kearney | 1972-1992 | 1985-87 | 57 | 139 |
| Lexington | **Lex** | Dawson | 1971-1993 | 1985-87 | 46 | 118 |
| Lincoln [(e)] | **Lnc** | Lancaster | 1957-1987 | 1985-87 | 64 | 136 |
| Louisville | not shown | Cass | 1971-1984 | 1982-84 | 73 | 166 |
| McCook | **McC** | Red Willow | 1971-1973 | 1971-73 | 70 | 134 |
| Nebraska City | **NbC** | Otoe | 1975-1992 | 1985-87 | 86 | 219 |
| Norfolk | **Nrf** | Madison | 1971-1993 | 1985-87 | 66 | 162 |
| North Platte | **NP** | Cass | 1971-1993 | 1985-87 | 46 | 100 |
| Omaha – Eppley Airport | not shown | Douglas | 1971-1983 | 1981-83 | 60 | 143 |
| Omaha – 11th & Nicholas | **Oma** | Douglas | 1971-2000 | 1985-87 | 73 | 177 |
| Omaha – 15th & Read | not shown | Douglas | 1990-1992 | 1990-92 | 50 | 120 |
| Omaha – 17th & Harney | not shown | Douglas | 1975-1977 | 1975-77 | 72 | 125 |
| Omaha – 18th & Dodge | not shown | Douglas | 1957-1975 | 1973-75 | 92 | 163 |
| Omaha – 19th & Howard | not shown | Douglas | 1978-1992 | 1985-87 | 63 | 149 |
| Omaha – 2211 Paul St | not shown | Douglas | 1983-1990 | 1985-87 | 58 | 141 |
| Omaha – 24th & O | not shown | Douglas | 1976-1988 | 1985-87 | 58 | 126 |
| Omaha – 25th & L | not shown | Douglas | 1971-1976 | 1974-76 | 119 | 268 |
| Omaha – 30th & Hanover | not shown | Douglas | 1971-1981 | 1979-81 | 68 | 149 |

Table continued on next page

**Table E-6: Historical TSP Values: Summary Table** [(a) (b) (c) & (d)] Page 2 of 3

| Site | Abbr. | County | Service Years | Design Years | 3-Year Annual Average ($ug/m^3$) | 3-Year 4th High ($ug/m^3$) |
|---|---|---|---|---|---|---|
| Omaha – 4105 Woolworth | not shown | Douglas | 1971-1993 | 1985-87 | 45 | 97 |
| Omaha – 46th & Farnam | not shown | Douglas | 1990-1992 | 1990-92 | 69 | 180 |
| Omaha – 63rd & Frederick | not shown | Douglas | 1971-1989 | 1985-87 | 60 | 135 |
| Omaha – 72nd & Hartman | not shown | Douglas | 1971-1972 | 1971-72 | 59 | 103 |
| Omaha – 72nd & Hwy 36 | not shown | Douglas | 1971-1976 | 1974-76 | 49 | 126 |
| Omaha – 11414 N 72nd | not shown | Douglas | 1976-1989 | 1985-87 | 33 | 89 |
| Omaha – 77th & Dodge | not shown | Douglas | 1982-1997 | 1985-87 | 70 | 147 |
| Omaha 8801 Fort St | not shown | Douglas | 1975-1987 | 1985-87 | 42 | 97 |
| Omaha – 140th & Dodge | not shown | Douglas | 1971-1981 | 1979-81 | 55 | 125 |
| Papillion | **Pap** | Douglas | 1971-1992 | 1985-87 | 59 | 152 |
| Scottsbluff | **ScB** | Scotts Bluff | 1971-1992 | 1985-87 | 79 | 253 |
| South Sioux City | **SSC** | Dakota | 1971-1994 | 1985-87 | 76 | 161 |
| Superior | **Sup** | Nuchols | 1973-1993 | 1985-87 | 55 | 130 |
| Waverly | **Wav** | Lancaster | 1973-1987 | 1985-87 | 72 | 175 |
| Weeping Water | **WW** | Cass | 1972-1992 | 1985-87 | 80 | 252 |
| Willow Island | not shown | Dawson | 1972-1973 | 1972-73 | 113 | 342 |
| York | **Yrk** | York | 1976-1992 | 1975-77 | 63 | 132 |

Footnotes:

(a) The primary annual average NAAQS = 75 $ug/m^3$ and secondary NAAQS was 60 $ug/m^3$ to be compared to the geometric mean for any given year. The values shown in this figure are 3-year average values for the time frame shown in the "Design Years" column.

(b) The primary 24-Hour NAAQS was 260 ug/m3 and secondary NAAQS was 150 ug/m3. Neither value was to be exceeded more than once per year. The values shown in this figure are the 4th high value over a 3 year time frame , or if only 2 years of data was available, the 3rd high value.

(c) Data from 1985 to 1987, when available, was preferentially used because this was the last 3 years when the TSP NAAQS was in effect. Gray highlight in the "Design Value" column was used to identify sites where 1985-87 data was used.

(d) Yellow highlight was used to identify values above the NAAQS.

(e) There were 14 different TSP monitoring sites at various times in Lincoln. The data shown for Lincoln was from the 10th & M Street site, which operated from 1980 to 1987. It was the only site operated after 1985 and was the highest concentration site in the 1980's.

## V.B. $PM_{10}$

NAAQS for $PM_{10}$ were established in 1987 with identical primary and secondary standards set at150 $ug/m^3$ averaged over 24 hours (i.e., a daily average concentration) not to be exceeded more than once per year, and a 50 $ug/m^3$ annual average. These NAAQS were evaluated over a three-year period such that the 150 $ug/m^3$ level cannot be exceeded more than three times in any 3 consecutive calendar years, and the three-year average of the annual averages cannot exceed 50 $ug/m^3$. In 2006, the 50 $ug/m^3$ annual standard was rescinded. The subsequent review completed in 2012 left the $PM_{10}$ NAAQS unchanged. See Table E-4 above.

Monitoring for $PM_{10}$ was initiated in Nebraska in 1987 and 1988 in eight (8) communities (Hastings, Kearney, Lincoln, Louisville, Nebraska City, Omaha, Scottsbluff, and Weeping Water) and continues today in four (4) communities (Cozad, Gothenburg, Omaha and Weeping Water). Over the last 23 years, $PM_{10}$ monitoring has been conducted in or near 15 Nebraska communities (Auburn, Beatrice, Broken Bow, Cozad, Gothenburg, Grand Island, Springfield, Hastings, Kearney, Lincoln, Louisville, Nebraska City, Omaha, Scottsbluff, and Weeping Water). Table E-6 summarizes $PM_{10}$ monitoring results from 1987 to 1999, which demonstrate attainment with the NAAQS (after 1999 there were only 4 monitoring sites and their monitoring history is examined in detail below).

There have been two areas in Nebraska where $PM_{10}$ levels have exceeded the NAAQS as defined in 40 CFR Part 58 Appendix K: Weeping Water and the 46th & Farnam site in Omaha. Appendix K allows 3 24-hr $PM_{10}$ values to exceed 150 $u$g/m$^3$ in any 3-year time frame, with the 4th excursion indicating the NAAQS is not being met.

Weeping Water: This area has several limestone mining and processing areas. NDEQ Title 129 Chapter 21 has Cass County specific controls for rock processing activities that were promulgated in 1975 to reduce particulate emissions in the Weeping Water and Louisville areas.

The sampler that found the high $PM_{10}$ values is located 2 miles west of the Weeping Water and within a ½ mile of limestone processing facilities. In October thru November 2010 there were four 24-hour values that exceeded 150 $u$g/m$^3$: 176 on 10/20, 249 on 10/26, 306 on 10/27 & 209 on 11/26. There was also one 24-hour exceedence in 2012: 179 on 1/5. There were no other exceedences in the 2008 to 2014 time frame.

After the sources in the area were made aware of the 2010 exceedences, $PM_{10}$ levels dropped, such that the highest 24-hour value for 2011 was 108 $u$g/m$^3$, and other than the 179 $u$g/m$^3$ value found on January 5th, the 2nd high value for 2012 was 129 $u$g/m$^3$. Thus increased awareness on the part of the sources was effective in reducing $PM_{10}$ levels and no further action was needed.

46th & Farnam Omaha: This site was source-oriented with respect to the Omaha Steel Company foundry. Between September 2011 and June 2012, there were 4 excursions above 150 $u$g/m$^3$: 172 on 9/28/11, 159 on 1/5/12, 199 on 5/14/12 and 181 on 6/5/12. The Omaha Steel facility was in the process of moving to a new location. Their move was completed in 2014. The highest values since 2012 have been 94 $u$g/m$^3$ in 2013 and 115 $u$g/m$^3$ in 2014.

Dawson County: The maximum 24-hr values at Cozad and Gothenburg have been below 150 $u$g/m$^3$ as detailed below:

- Cozad: The highest maximum value = 146 $u$g/m$^3$ and the 2nd high maximum = 106 $u$g/m$^3$; both occurred in 2002 (monitoring conducted from 1994 to 2014).
- Gothenburg: The highest maximum value = 143 $u$g/m$^3$ in 2004 and 2nd high maximum = 125 $u$g/m$^3$ in 2000 (monitoring conducted from 1991 to 2014).

Figures E-29 thru E-32 show the annual average $PM_{10}$ monitoring results from 4 locations: Omaha (all sites), Weeping Water (all sites), Cozad, and Gothenburg. The annual average values have decreased in all 4 areas: 0.040 $u$g/m$^3$/year in Omaha, 0.046 $u$g/m$^3$/year in Weeping Water, 0.25 $u$g/m$^3$/year at Cozad and 0.48 $u$g/m$^3$/year at Gothenburg. Annual average values were plotted because it was felt they would better represent trends than annual highest values.

**Table E- 7: $PM_{10}$ Monitoring Result Summary: 1987 to 1999 [(a)(b)]**

| Abbr. | City | Years Sampled | # of Years | Annual Average Range ($ug/m^3$) | Annual Maximum Range ($ug/m^3$) |
|---|---|---|---|---|---|
| ABN | Auburn | 1994 – 1995 | 2 | 25 – 28 | 63 - 133 |
| BTC | Beatrice | 1994 – 1995 | 2 | 16 – 33 | 25 - 109 |
| CZD | Cozad [(a)(b)] | 1994 – 1999 | 6 | 21 - 34 | 51 - 99 |
| GI | Grand Island | 1994 – 1995 | 2 | 19 – 26 | 24 - 48 |
| GTH | Gothenburg [(a)(b)] | 1991 – 1999 | 9 | 29 – 41 | 78 - 141 |
| HST | Hastings | 1987 - 1996 | 10 | 19 - 39 | 48 - 138 |
| KN | Kearney | 1988 – 1998 | 11 | 17 – 40 | 28 - 127 |
| LNC | Lincoln | 1988 – 1998 | 11 | 24 - 34 | 48 - 102 |
| LSV | Louisville (not shown) | 1985 - 1999 | 15 | 25 - 46 | 55 - 137 |
| NC | Nebraska City | 1985 – 1998 | 14 | 22 – 58 | 31 - 114 |
| OMA | Omaha (7 sites) [(a)(b)] | 1985 – 1999 | 15 | 27 - 47 | 55 - 290 |
| SB | Scotts Bluff | 1988 – 1998 | 11 | 21 – 58 | 32 - 131 |
| SPR | Springfield (not shown) | 1995 | 1 | 23 | 78 |
| WW | Weeping Water [(a)(b)] | 1985 – 1999 | 15 | 26 - 49 | 88 - 187 |

Footnotes:

(a) The 1987 to 1999 time frame was chosen because from 2000 to present $PM_{10}$ was conducted at 4 locations: Cozad, Gothenburg, Omaha and Weeping Water. Thus this table compares the early year monitoring results from all 14 locations where $PM_{10}$ monitoring was conducted.

(b) A more detailed analysis of PM10 trends at Cozad, Gothenburg, Omaha and Weeping Water can be found below.

**Figure E-29: Annual Average $PM_{10}$ Levels in Omaha, NE (All sites): 1985 thru 2014**

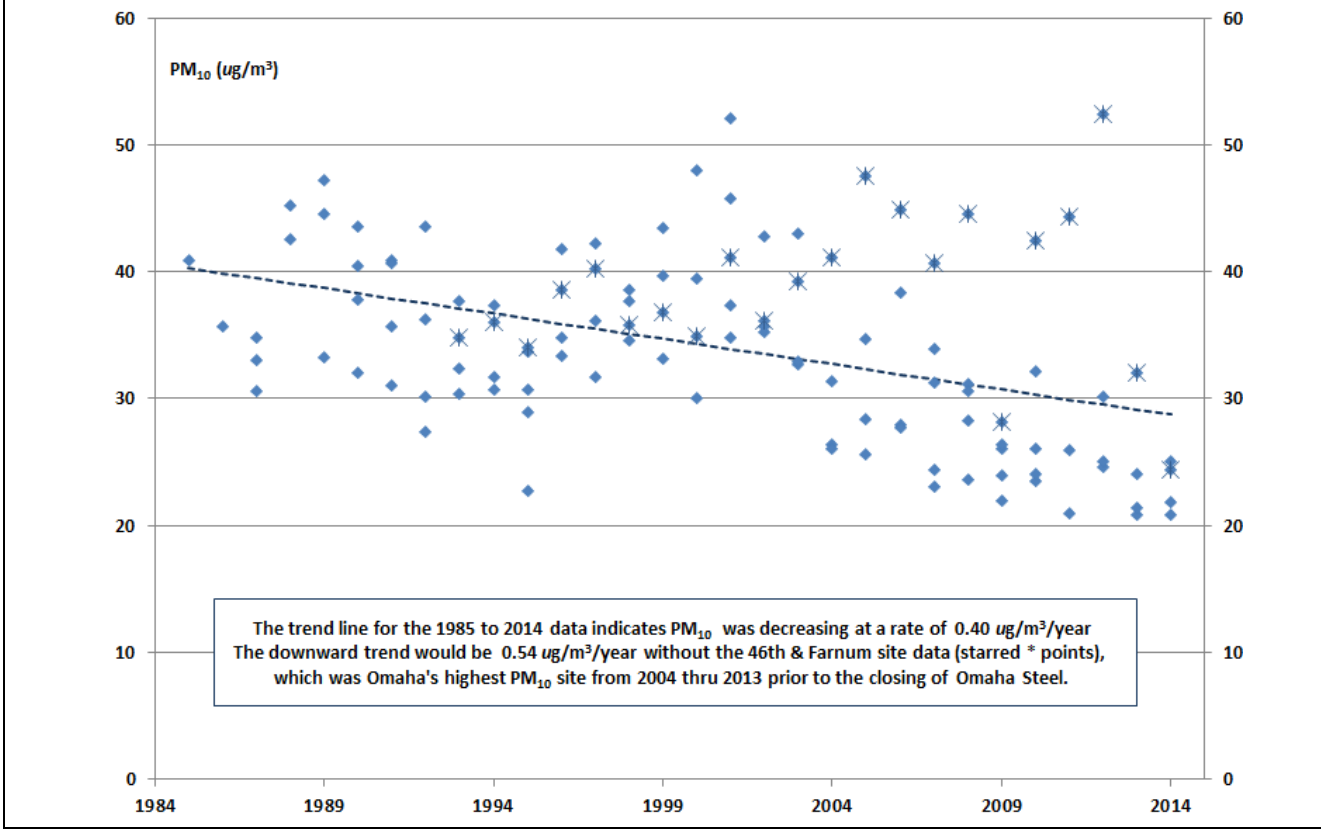


**Figure E-30: Annual Average $PM_{10}$ Levels at Weeping Water Area Sites: 1988 thru 2014**

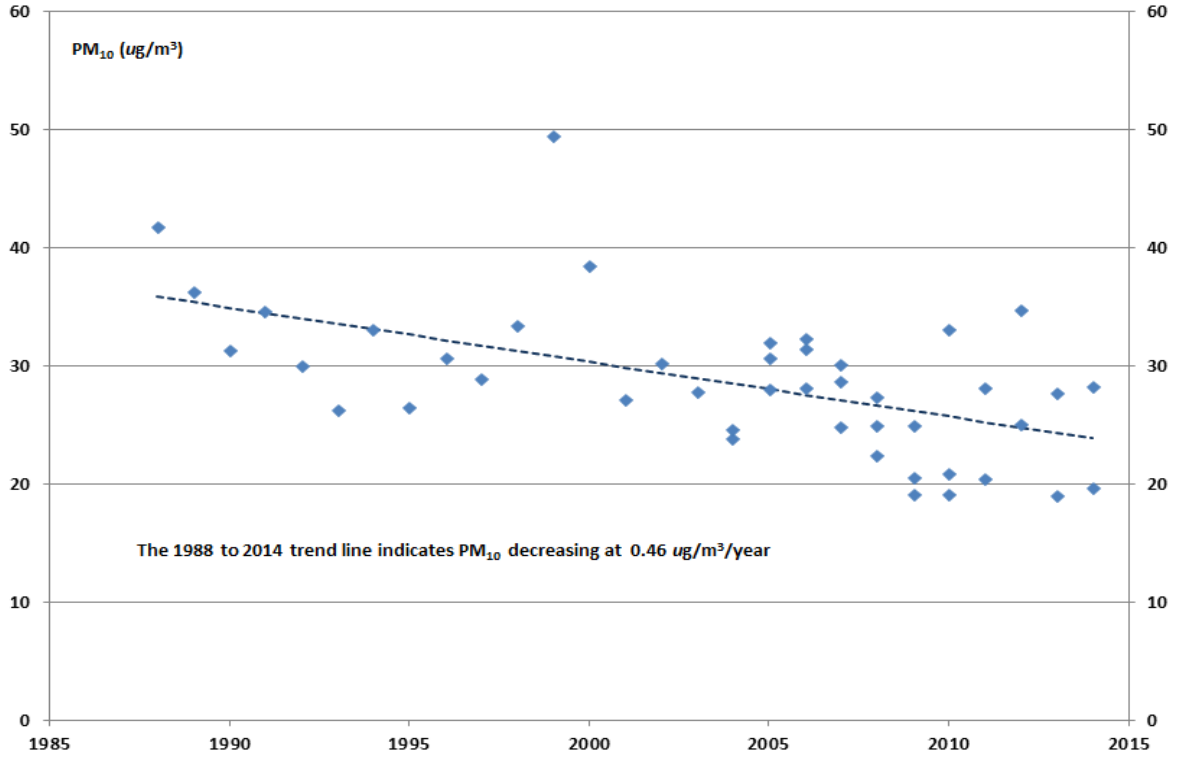



**Figure E-31: Annual Average $PM_{10}$ Levels at Cozad: 1994 thru 2014**

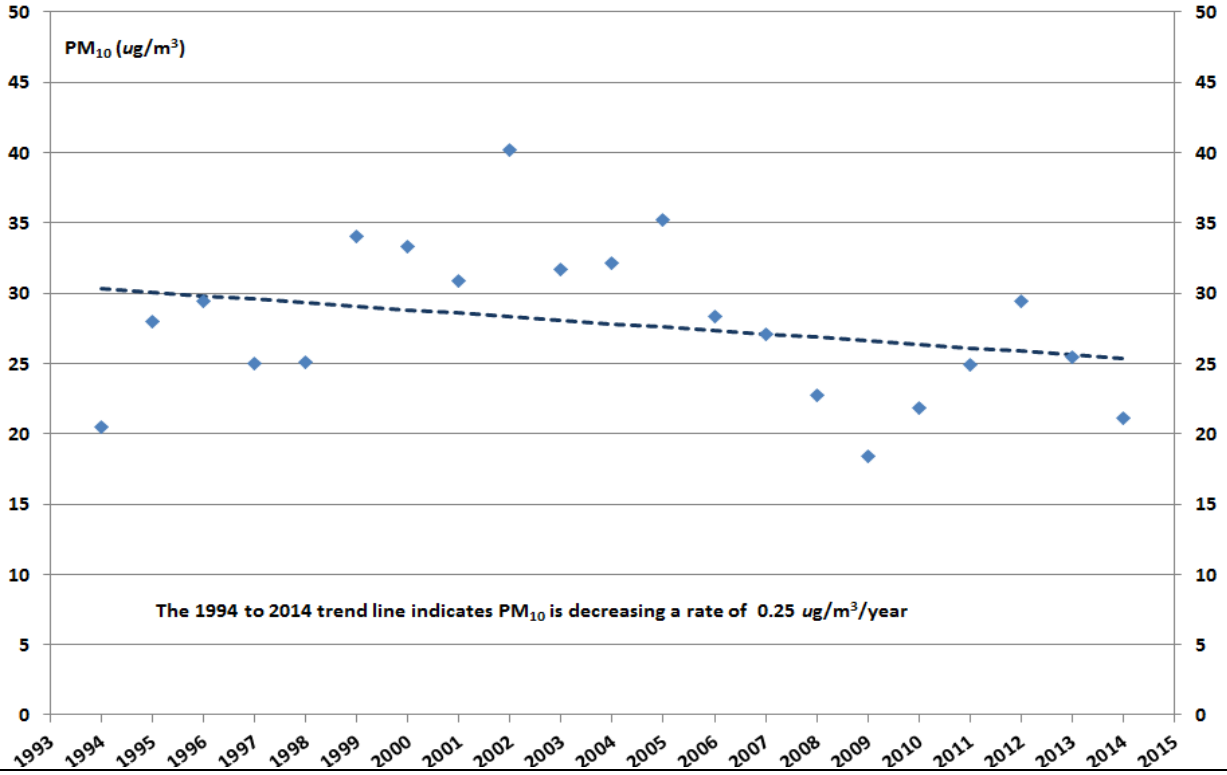
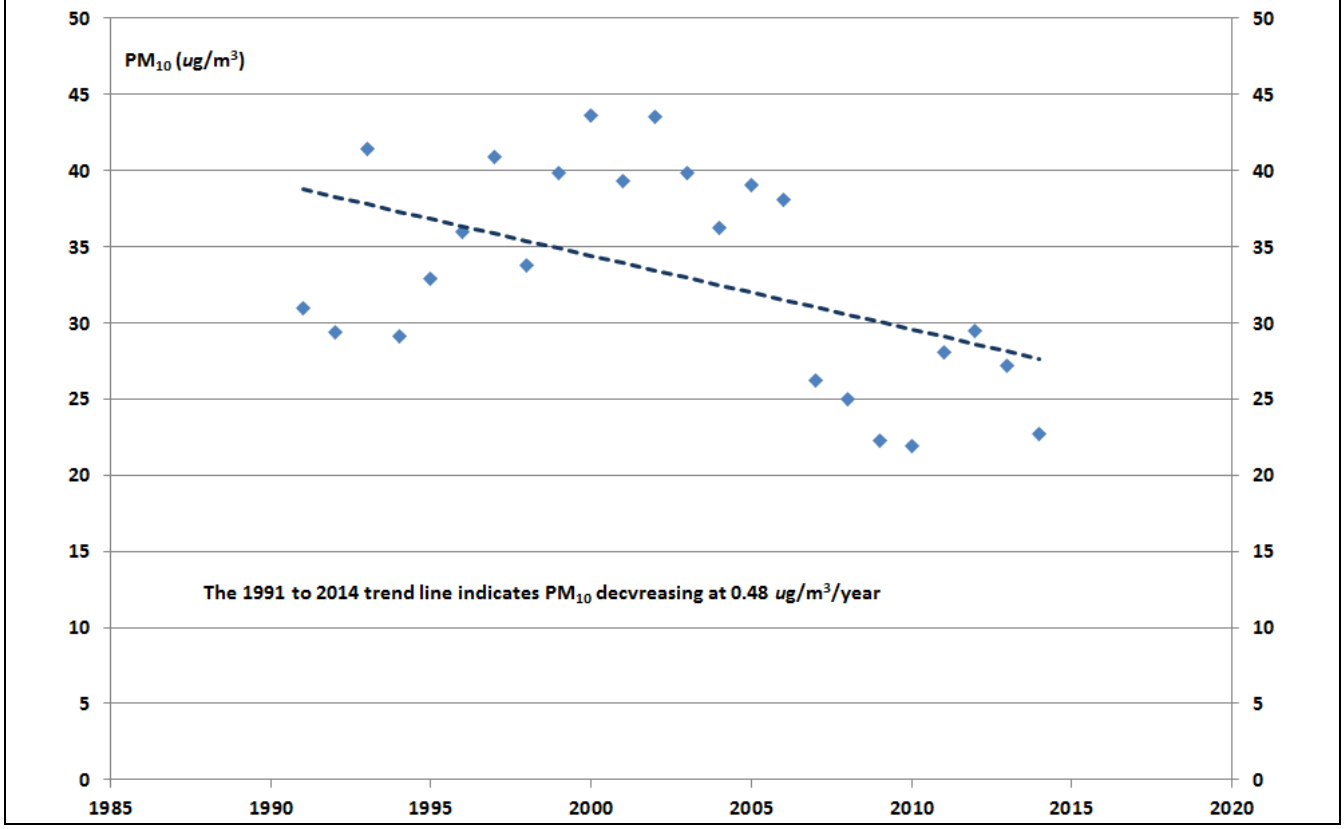


**Figure E-32: Annual Average $PM_{10}$ Levels in Gothenburg: 1991 thru 2014**




## V.C. $PM_{2.5}$

$PM_{2.5}$ forms in situ (in the atmosphere) from pollutant precursors such as ammonia in combination with $NO_2$ or $SO_2$, and it can also be an emission pollutant from stationary and mobile sources. Thus, $PM_{2.5}$ is not nearly as source-oriented as TSP and $PM_{10}$.

As stated at the start of this PM subsection, the finer $PM_{2.5}$ can more easily penetrate the lungs than larger diameter $PM_{10}$ and TSP particles. For this reason, the $PM_{2.5}$ NAAQS are set lower than the $PM_{10}$ NAAQS.

$PM_{2.5}$ NAAQS were established in 1997. A 65 $u$g/m$^3$ 24-hour standard and a 15 $u$g/m$^3$ annual average were established. In 2006, the 24-hour standard was lowered to 35 $u$g/m$^3$. The $PM_{2.5}$ standard is currently under review, and EPA is expected to propose revisions in early 2011. The Clean Air Scientific Advisory Committee (CASAC) has recommended that the annual standard be lowered to be within the range of 11 to 13 $u$g/m$^3$, and has requested EPA consider lowering the 24-hour standard to 30 $u$g/m$^3$.

In 1999, $PM_{2.5}$ monitoring was initiated at 13 sites at or near 11 Nebraska communities (Bellevue, Blair, Chappell, Grand Island, Hartington, Lincoln, Merriman, North Platte, Omaha (3 sites), Scottsbluff and Weeping Water). Three sites were shutdown in 2002 after attainment had been demonstrated: Chappell, Hartington and Merriman. Three more sites were shut-down in 2004 thru 2005: North Platte, Weeping Water, and one site in Omaha. Currently there are 7 sites running in 6 communities: Bellevue, Blair, Grand Island, Lincoln, Omaha (2 sites) and Scottsbluff.

40 CFR Part 58 Appendix D Section 4.7.3 requires each state to operate a regional transport and background site. The Grand Island site is Nebraska's transport site and the Scottsbluff site is the background site.

There were also 2 sites established by Iowa in 1999 in the Omaha and Sioux City MSAs; both of these sites continue to operate. In 2009, South Dakota established 2 sites in Union County, which is in the Sioux City MSA; one was closed after 2013, the other remains operating.

Figure E-33 shows actual and estimated 2012 thru 2014 $PM_{2.5}$ design values (3-year average values) for all of the current and historical $PM_{2.5}$ monitoring sites in Nebraska and in the Omaha and Sioux City MSAs. As can be seen in Figure E-33, the 2012 thru 2014 design values (DVs) are in attainment with the NAAQS.

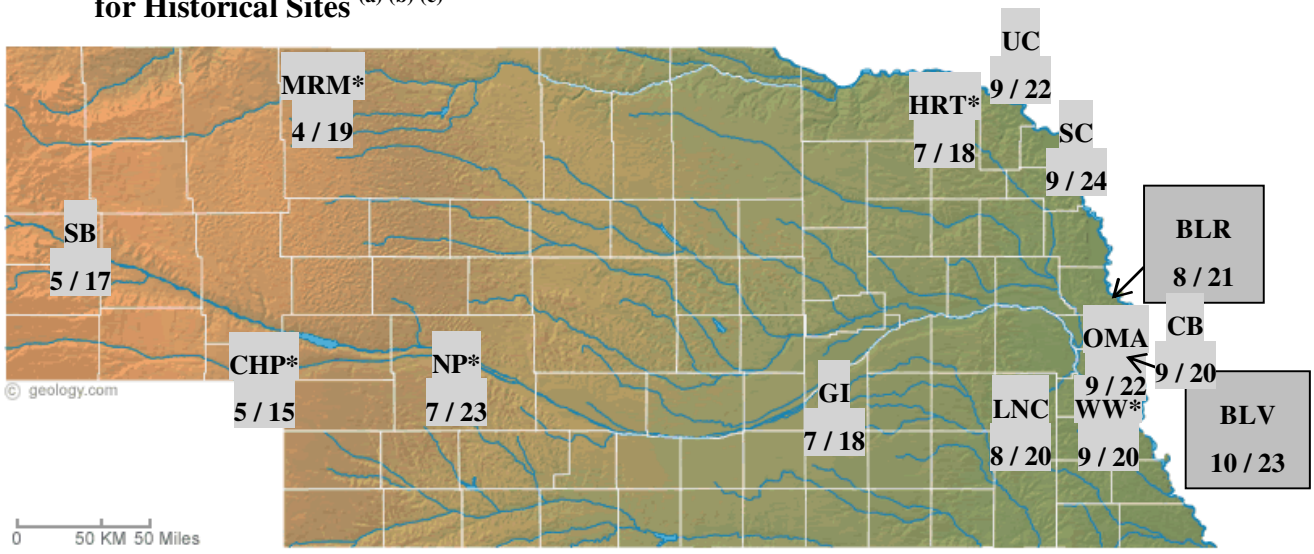
Figures E-34 thru E-38 show the complete history of $PM_{2.5}$ monitoring results in the following 5 locations: Omaha MSA (NE & IA sites, includes Bellevue and Blair), Lincoln, Sioux City MSA (IA & SD sites), Grand Island and Scottsbluff. Two significant things the $PM_{2.5}$ monitoring results from these 5 locations have in common:

- All the results indicate attainment with the NAAQS since monitoring was initiated in 1999; and
- Both annual average and $99^{th}$ percentile values have trended downward from 1999 to 2014.

The downward trend in $99^{th}$ percentile values at Scottsbluff is minimal, but the 2012-14 DV is slightly less than 50% of the NAAQS.

It is also noted that the Bellevue and Council Bluffs sites in the Omaha MSA had annual average values above 12 $u g/m^3$ in 2010. NAAQS attainment is evaluated using a 3-year average, and the 2010-12 DVs at these sites were 11.5 $u g/m^3$ and 11.1 $u g/m^3$ respectively. These sites remain the two highest concentration sites at 82% to 83% of the NAAQS.

**Figure E-33: Annual Average & 24-Hour $PM_{2.5}$ Design Values & Extrapolated Design Values for Historical Sites** [(a) (b) (c)]




Footnotes:

(d) The site letter designation is explained in the legend below. The first number is the 2012-14 annual average design value (DV), which is the 3-year average of the 2012-14 annual averages. The second number is the 2012-14 99th percentile DV, which is the 3-year average of the 2012-14 99th percentile values.

(e) Sites marked with a * were not operating in 2014. The 2014 DV for these sites were estimated using the data trends from nearby sites:

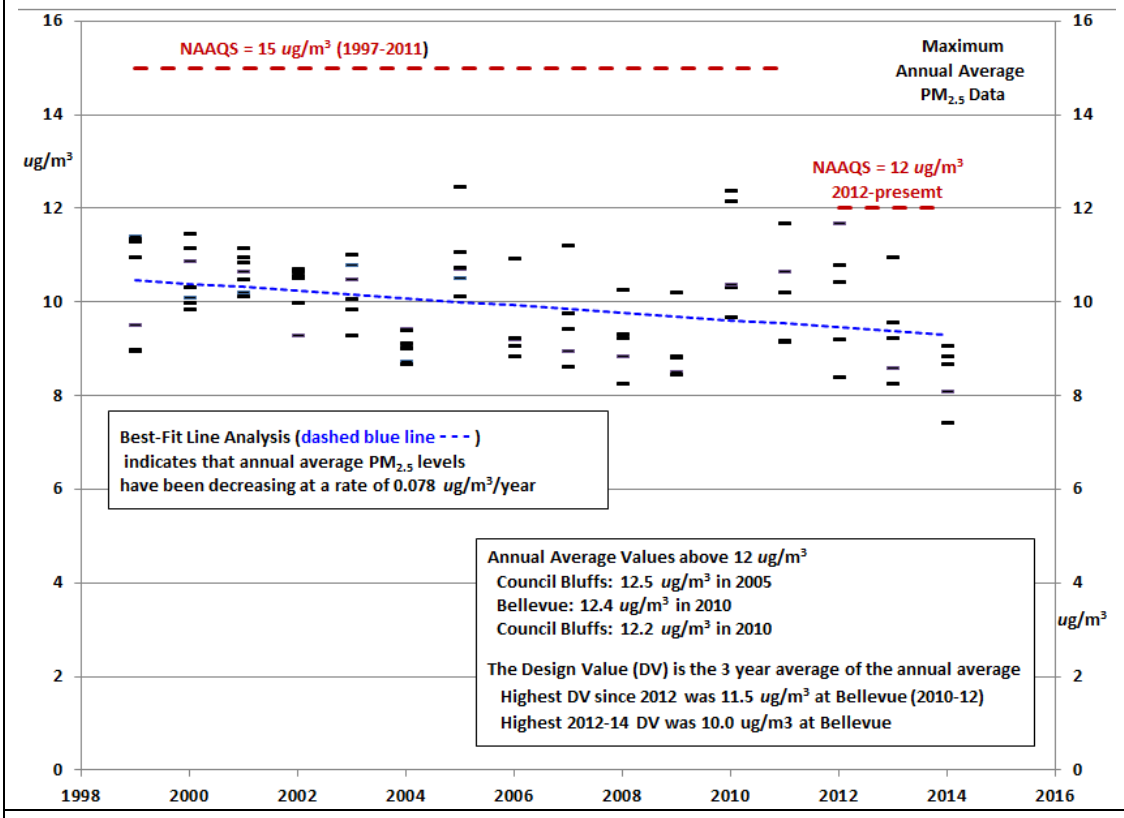
- Chappell (CHP) DV estimated using Scottsbluff (SB) data
- Hartington (HRT) DV estimated using Blair (BLR), Grand Island (GI) & Sioux City IA (SC) data
- Merriman (MRM) DV estimated using Scottsbluff (SB) data
- North Platte (NP) DV estimated using Grand Island (GI) and Scottsbluff (SB)

(f) Annual Average NAAQS = 12 $u$g/m$^3$ & 99th Percentile NAAQS = 35 $u$g/m$^3$

Legend: Abbreviations followed by an * indicate that 2012-2014 DVs were estimated from historical data using data from currently operating near-by sites.

| Abbr. | City | Years Sampled | # of Years | Annual Average Range ($u$g/m$^3$) | 98th Percentile Range ($u$g/m$^3$) |
|---|---|---|---|---|---|
| BLR | Blair | 1999-2014 | 16 | 7.4 to 10.1 | 17 to 27 |
| BLV | Bellevue | 1999-2014 | 16 | 8.3 to 12.6 | 18 to 33 |
| CB | Council Bluffs, IA | 1999-2014 | 16 | 9.0 to 12.5 | 20 to 33 |
| CHP | Chappell | 2000-2002 | 3 | 5.5 to 5.9 | 13 to 14 |
| GI | Grand Island | 1999-2014 | 16 | 6.5 to 10.2 | 14 to 29 |
| HRT | Hartington | 2000-2002 | 3 | 7.5 to 9.3 | 20 to 25 |
| LNC | Lincoln | 1999-2014 | 16 | 7.7 to 10.6 | 16 to 29 |
| MRM | Merriman | 2000-2002 | 3 | 4.0 to 4.8 | 12 to 25 |
| NP | North Platte | 1999-2005 | 7 | 6.7 to 7.9 | 16 to 32 |
| OMA | 42nd & Woolworth, Omaha | 1999-2014 | 16 | 8.4 to 11.5 | 20 to 30 |
| | 9225 Berry St., Omaha | 1999-2014 | 16 | 8.1 to 11.7 | 19 to 31 |
| | 4606 Terrace St., Omaha | 1999-2004 | 6 | 8.9 to 11.2 | 23 to 27 |
| SB | Scottsbluff | 1999-2014 | 16 | 4.5 to 8.2 | 12 to 23 |
| SC | Sioux City, IA | 1999-2014 | 16 | 8.4 to 10.8 | 22 to 34 |
| WW | Weeping Water | 1999-2005 | 7 | 8.7 to 11.4 | 23 to 31 |
| UC | Union County, SD | 2009-2014 | 6 | 7.4 to 10.5 | 20 to 29 |

## Figure E-34: $PM_{2.5}$ Levels in Omaha MSA: 1999 to 2014



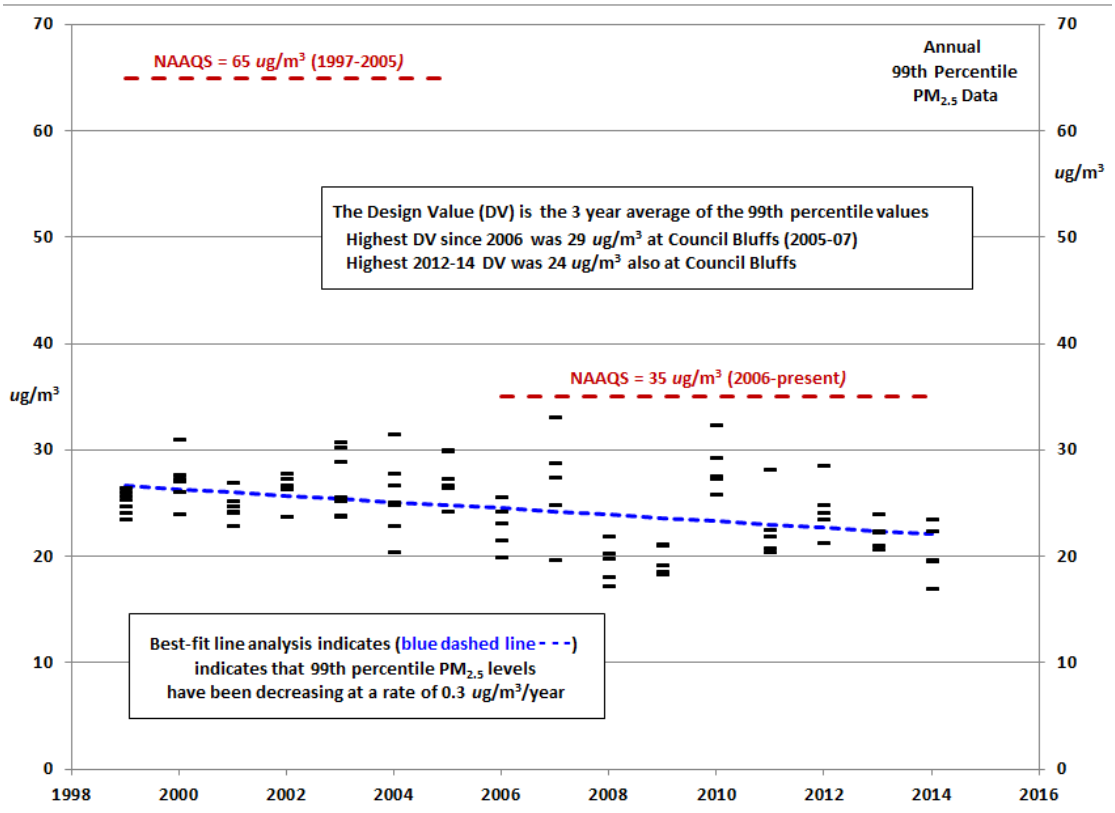
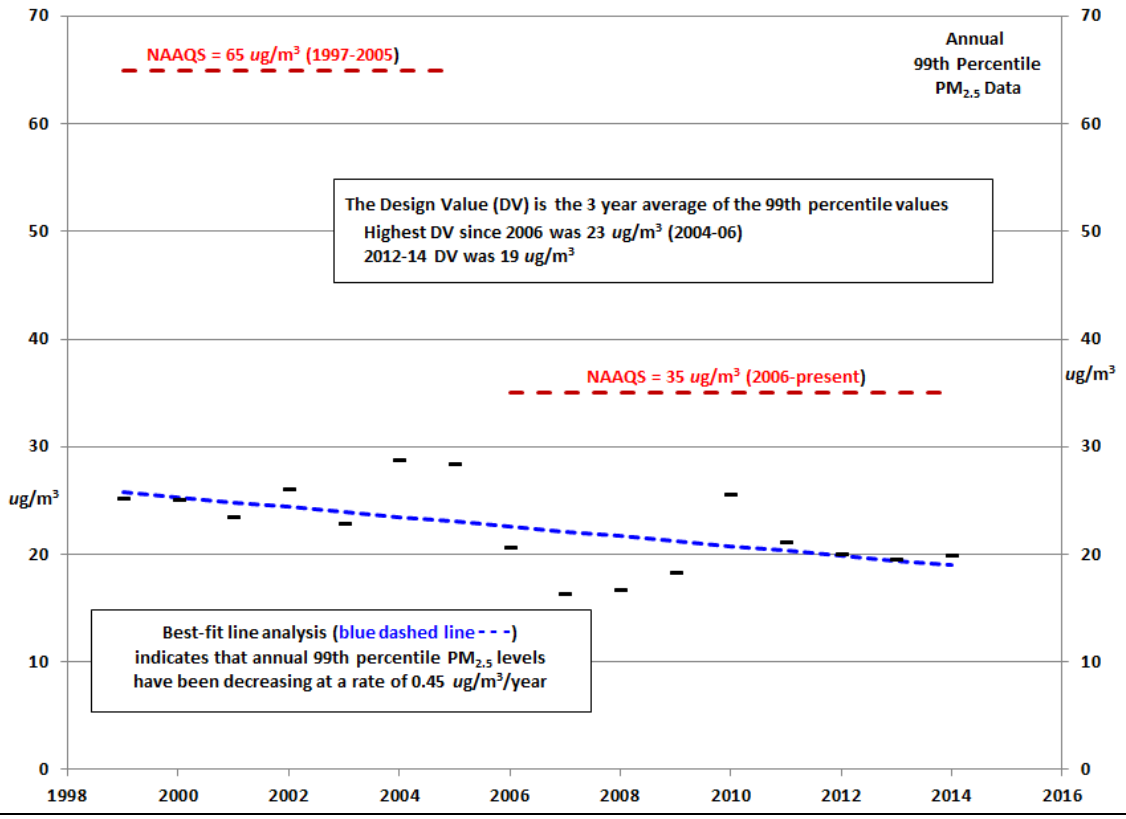



**Figure E-35: $PM_{2.5}$ Levels in Lincoln: 1999 to 2014**



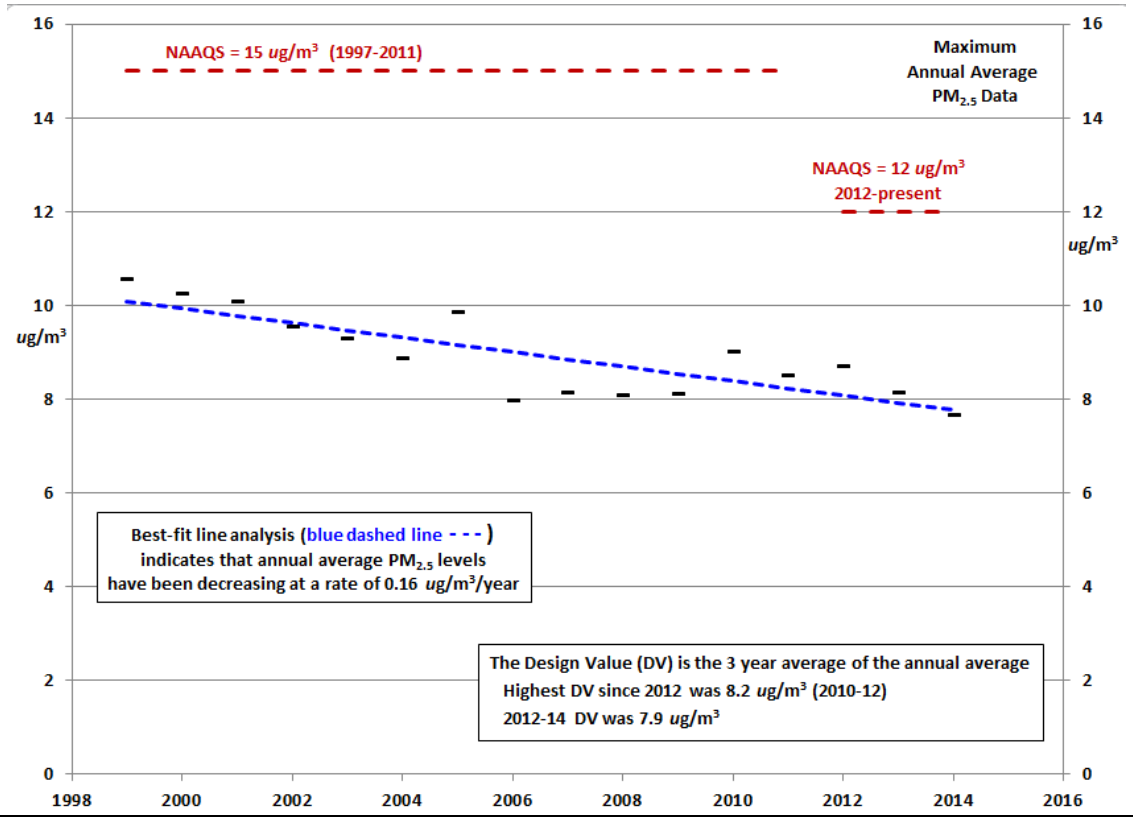
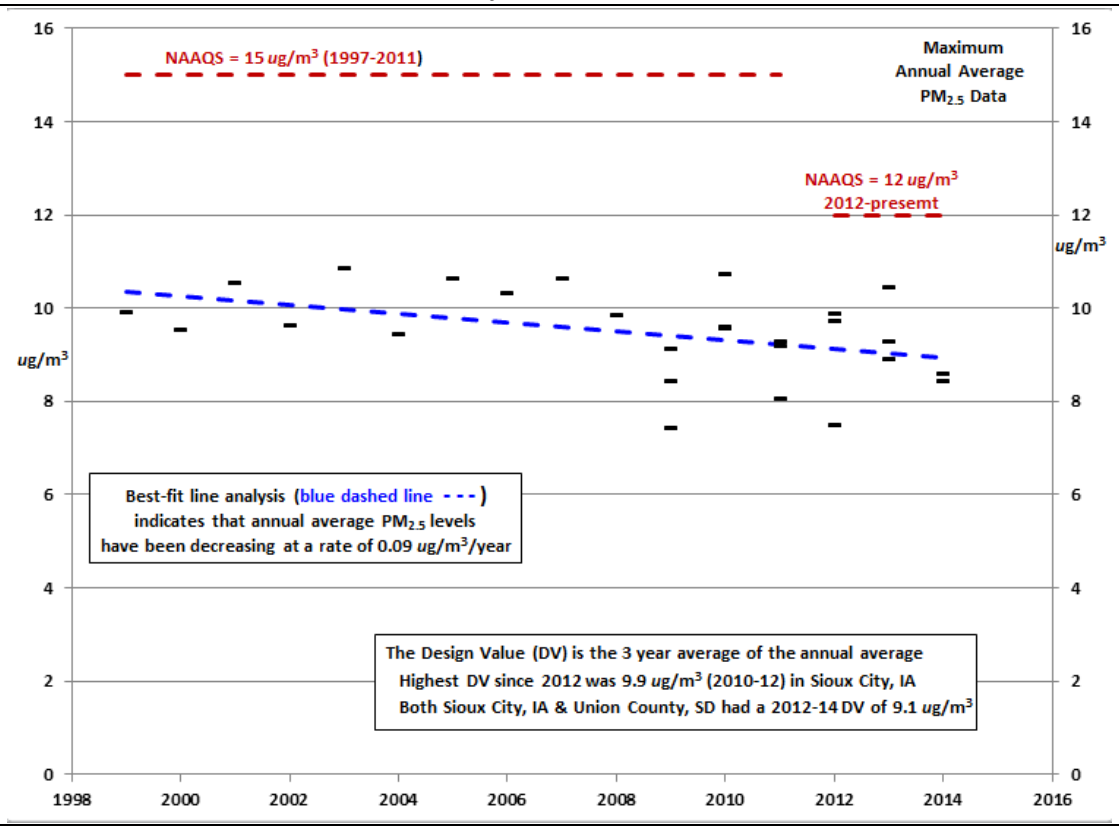



**Figure E-36: $PM_{2.5}$ Levels in the Sioux City MSA: 1999 to 2014**



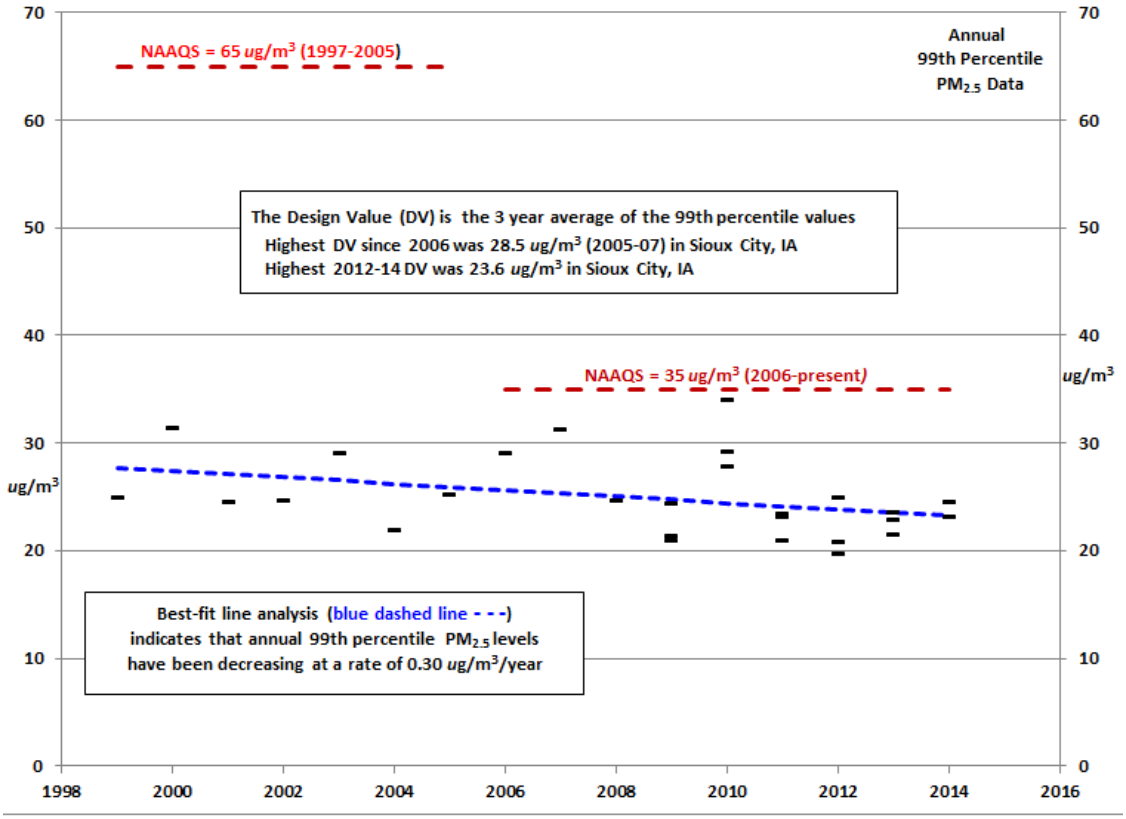
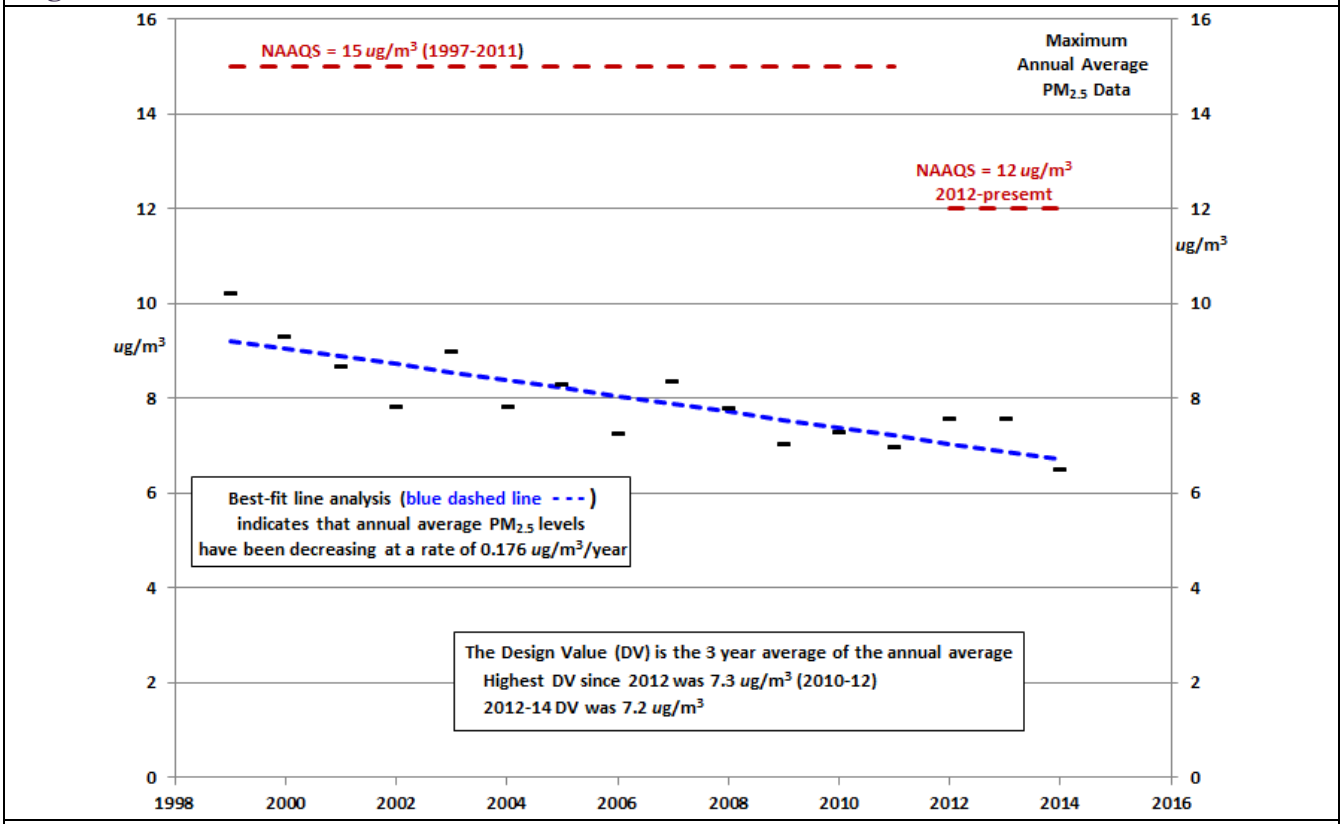



**Figure E-37: $PM_{2.5}$ Levels in the Grand Island: 1999 to 2014**



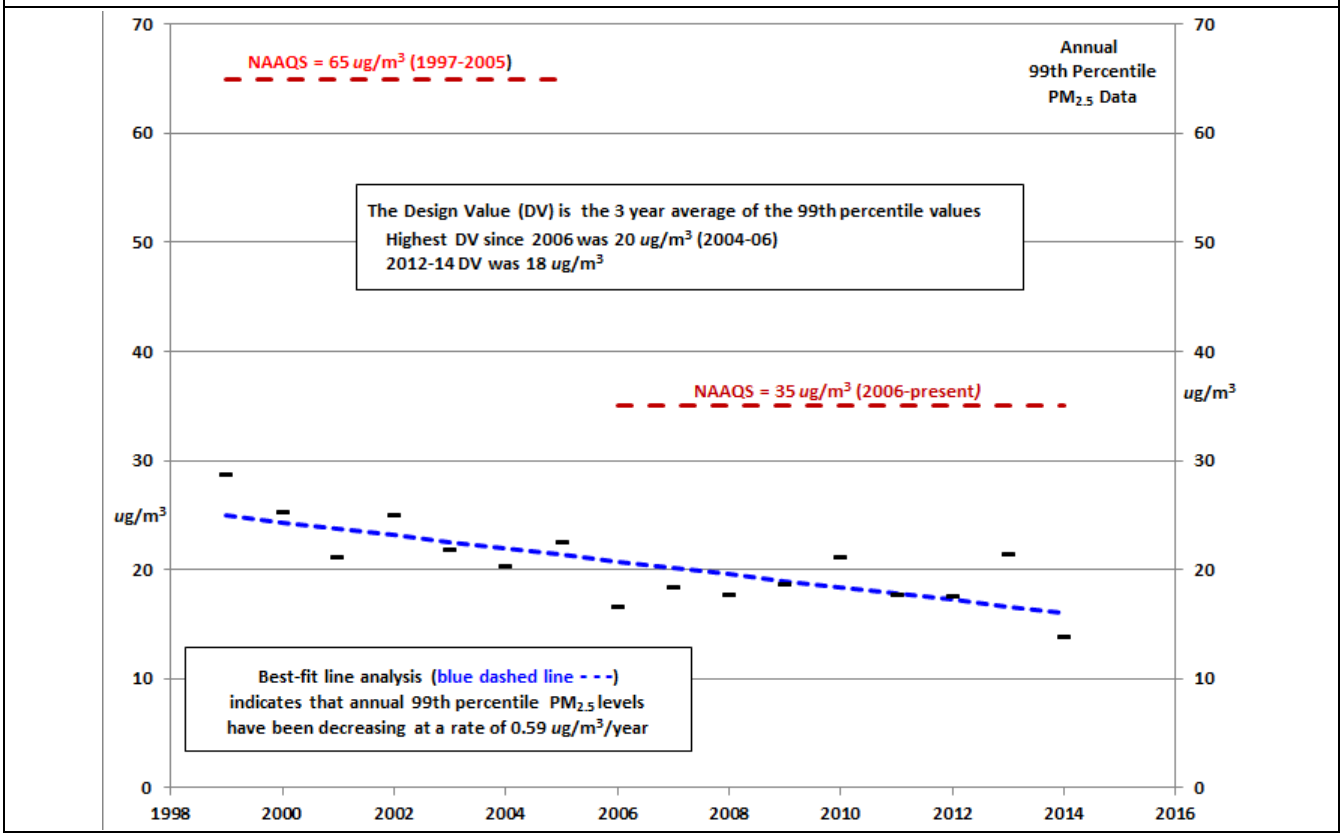
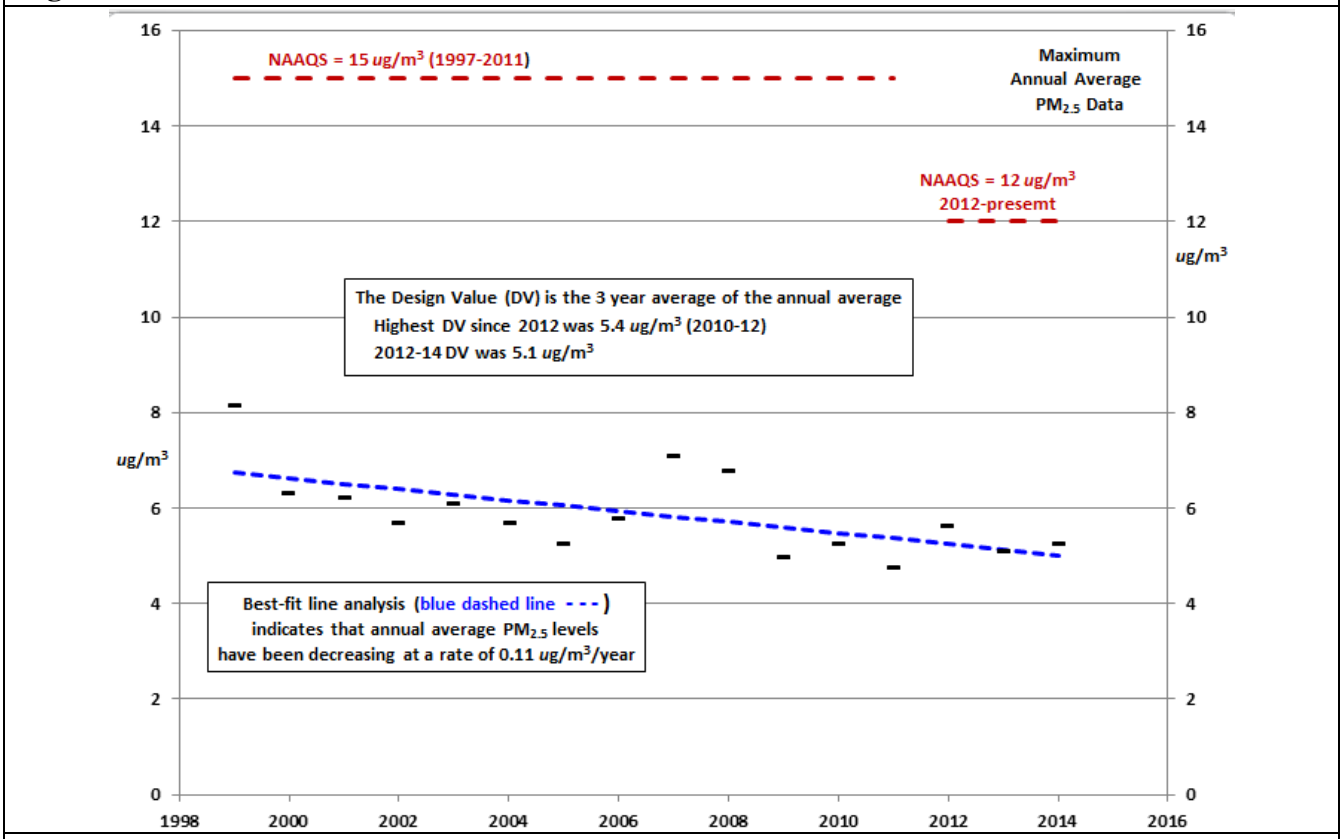
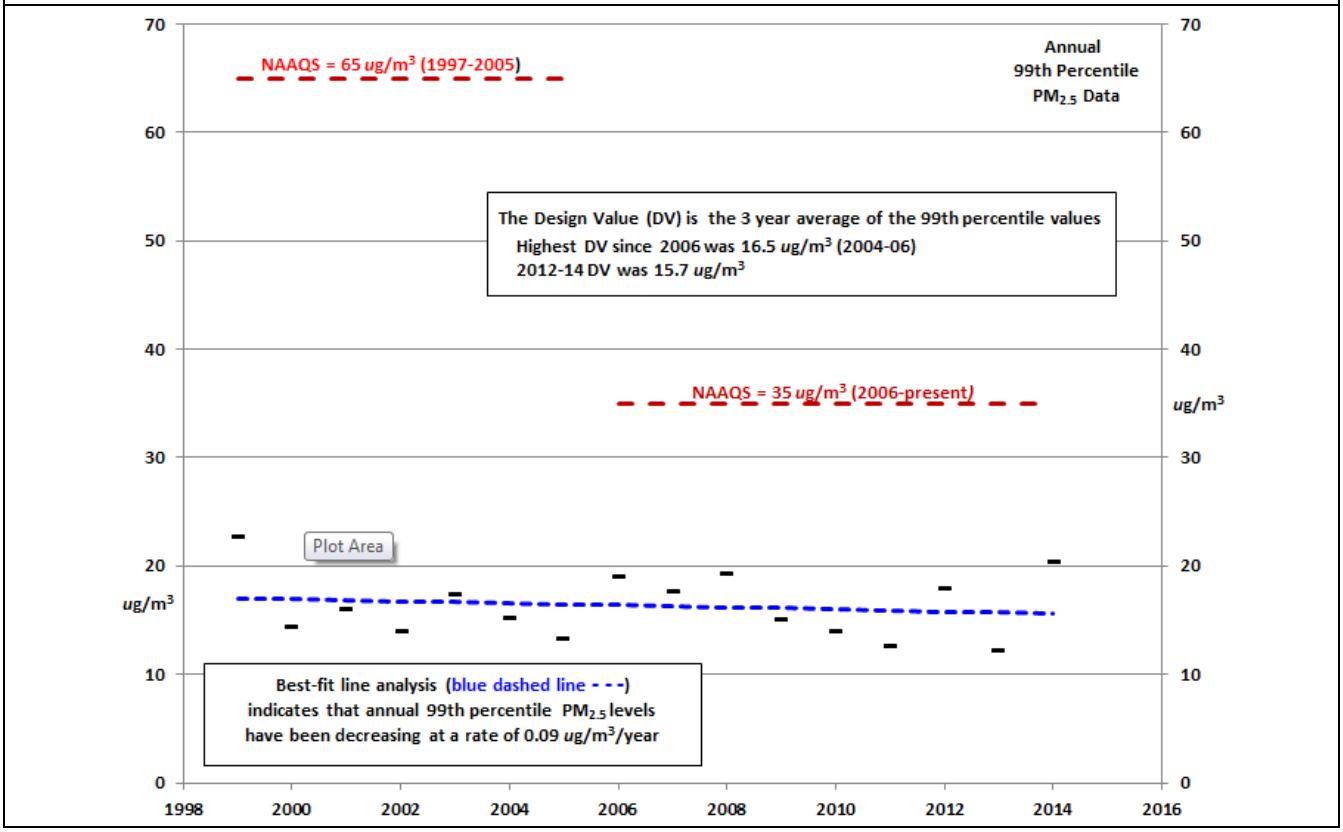



**Figure E-38: $PM_{2.5}$ Levels in the Scottsbluff: 1999 to 2014**



## VI. Lead

Lead sources in Nebraska include certain process industries (e.g., foundries, lead smelters, battery recyclers), coal-fired boilers, leaded gasoline (currently only available for aircraft), and natural sources (minimal). Control measures have significantly decreased lead emissions and atmospheric lead levels. Significance sources of lead emissions include:

1) Particulate emission controls placed on coal-fired boilers, foundries, and other process industry sources;
2) The phasing out of leaded gasoline from 1975 thru 1986, with the complete elimination of leaded gasoline for on-road vehicles in 1996; and
3) In Omaha, the closing of the ASARCO lead factory in 1997.

The lead NAAQS was first promulgated in 1978 and modified in 2008. See Table E-8 below.

**Table E-8: History of the Lead NAAQS**

| Effective Date | Primary and Secondary NAAQS | Compliance Evaluation |
|---|---|---|
| October 5, 1978 | 1.5 ug/m3 STP [(a)] | Quarterly averages are not to exceed NAAQS |
| November 12, 2008 | 0.15 ug/m3 LC [(b)] | Rolling 3-month averages are not to exceed NAAQS |

Footnote:
(a) STP - Sampling volume expressed in standard conditions of 20º C and 760 mm Hg.
(b) LC - Sampling volume expressed at local atmospheric conditions without adjustment for temperature and pressure.

Monitoring was first conducted for lead in Omaha in 1959, and in Lincoln and Louisville in 1962. Table E-9 provides a summary of lead monitoring locations, time frames and levels. Figures E-39 thru E-41 are plots of lead monitoring results from various times and locations in Nebraska. These figures show both historical monitoring conducted to evaluate attainment with the 1.5 $u$g/m$^3$ NAAQS, which was in place from 1978 thru 2008; and newer data from 2010 thru 2014 that conducted to evaluate attainment with the current 0.15 $u$g/m$^3$ NAAQS, which became effective in 2008. These figures contain explanatory narratives relative to trends and factors the trends.

Figure E-42 specifically shows 3-month average data from the 3 lead monitoring sites currently operating in Nebraska: Auburn, Fremont and Omaha. As can be seen in the figure, the current monitoring is demonstrating attainment, although 2010 thru 2012 data completeness was an issue, as explained in the footnotes of the figure.

The three current monitoring sites are sited in accordance with regulations that require source-oriented lead monitoring around sources with lead emissions of 0.5 tons per year (tpy) or more (i.e., the Auburn and Fremont sites); and a non-source-oriented site at the Omaha NCore site.

With respect to source-oriented sites, the 2011 National Emission Inventory lists three facilities in Nebraska with lead emissions of 0.5 tpy or more:

- Magnolia Metal Corp, a bronze casting foundry in Auburn, at 2.17 tpy,
- Magnus Division of LV Ventures, a brass/bronze casting and lead babbitt bearing manufacturer in Fremont, at 0.72 tpy, and
- Nucor Steel a steel foundry in Norfolk, at 0.5 tpy.

Nucor Steel submitted modeling demonstrating ambient lead concentrations will not exceed 50% of the NAAQS. This modeling was reviewed and accepted by NDEQ and EPA. Thus monitoring near Nucor was not required (see 40 CFR Part 58 Appendix D Section 4.5.a.ii).

Magnolia Metals in Auburn has installed additional monitoring equipment such that lead emissions are now below the 0.5 tpy threshold for requiring monitoring. Attachment F contains a detailed analysis of monitoring results at Auburn to support a request to discontinue monitoring near Magnolia Metals.

**Table E-9: Historical Lead Monitoring Summary [(a)]**

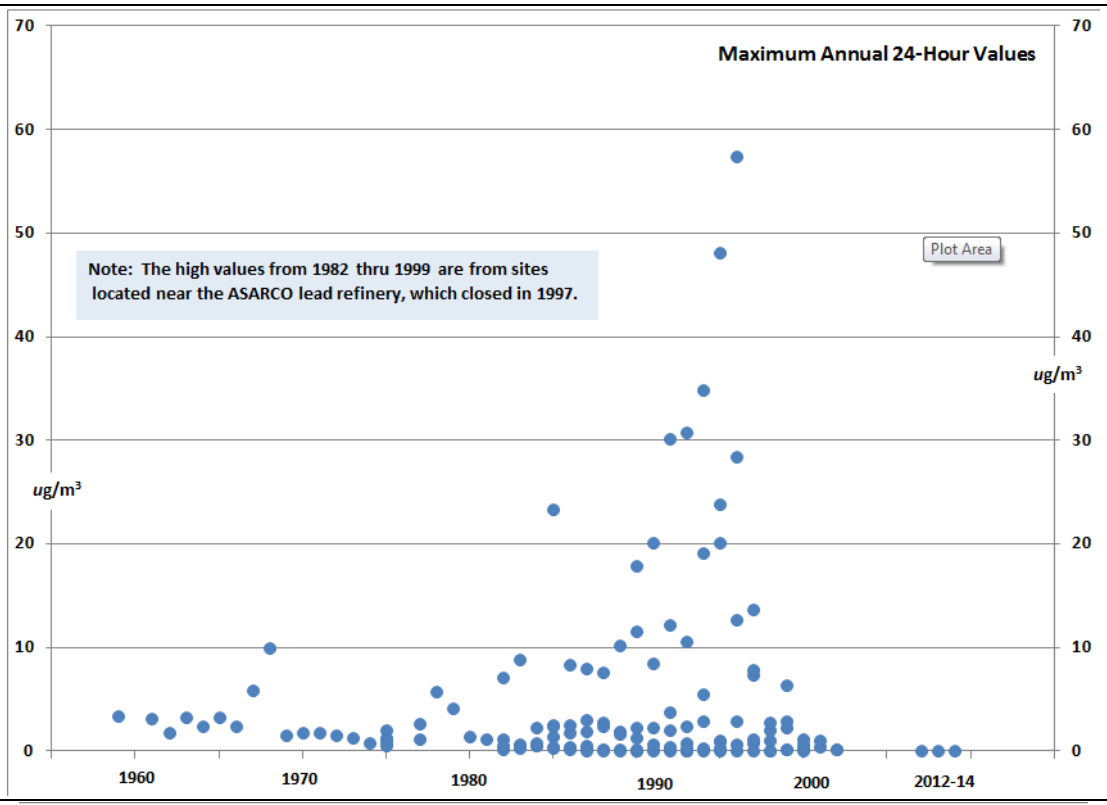
| Location | Years Monitored | 24-Hour Annual Maximum Range ($\mu g/m^3$) | Annual Average Range ($\mu g/m^3$) |
|---|---|---|---|
| Omaha | 1959 - 2002 | 0.03 to 57.5 | 0.01 to 5.9 |
| | 2012 - 2014 | 0.013 to 0.021 | 0.0037 to 0.0048 |
| Lincoln | 1962 | 0.3 | 0.1 |
| | 1970 - 1975 | 0.34 to 0.95 | 0.19 to 0.37 |
| | 1977 - 1986 | 0.12 to 0.95 | 0.06 to 0.57 |
| Louisville | 1962 | 0.006 | 0.275 |
| Halsey National Forest (b) | 1965 – 1977 | 0.00 to 0.23 | 0.00 to 0.058 |
| Bellevue | 1982 – 1986 | 0.25 to 0.52 | 0.06 to 0.15 |
| Fremont | 1990 – 1995 | 0.13 to 2.1 | 0.06 to 0.18 |
| | 2010 - 2014 | 0.56 to 0.64 | 0.037 to 0.06 |
| Auburn | 2010 - 2014 | 0.04 to 0.57 | 0.005 to 0.040 |

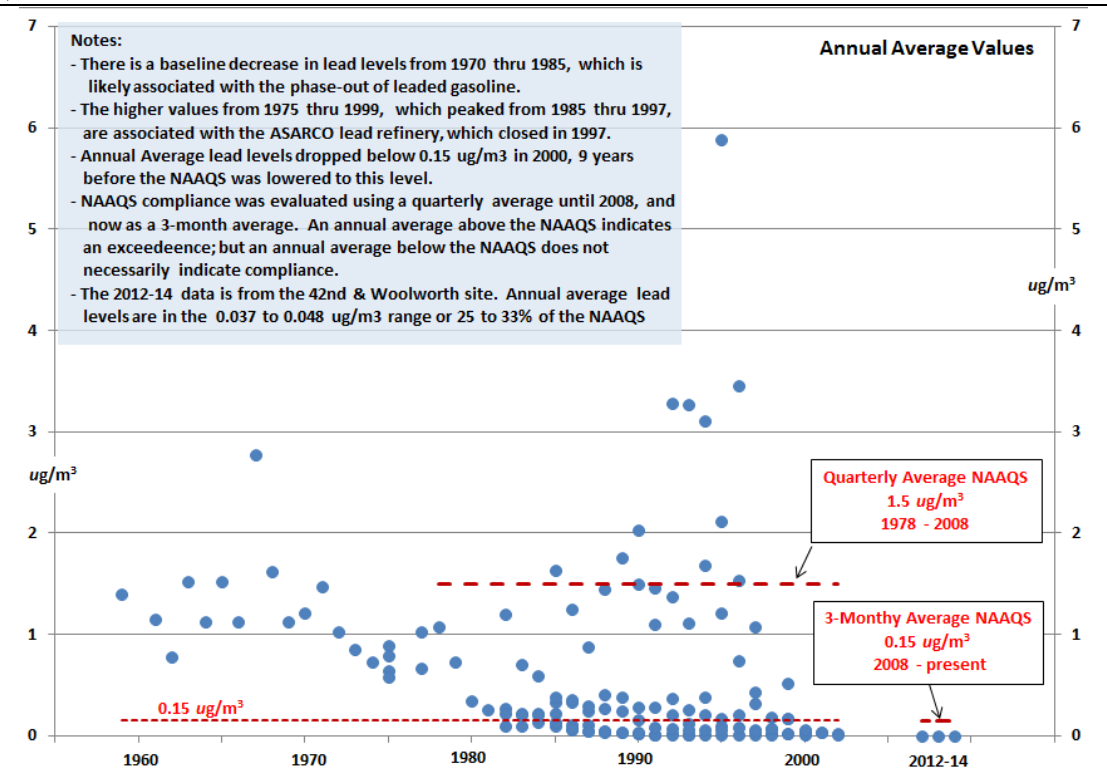
Footnotes:

(a) For Monitoring conducted prior to 2010, the results are in STP units, while results for 2010 and after are in LC units. STP units are adjusted for standard conditions of 20º C and 760 mm Hg. LC units are expressed at local atmospheric conditions.

(b) Halsey National Forest was not sampled in 1971 and 1976. Also sampling was less than 1/6 days: 2 events in 1974, 4 events in 1965-67, 1969-70 & 1973, 8 events in 1977, 20 events in 1975 & 24 events in 1968.

**Figure E-39: Ambient Lead Concentrations in Omaha: 1958-2002 (STP) & 2012-2014 (LC) [(a)]**




Footnote (a) For monitoring conducted prior to 2010, the results are in STP units, while results for 2010 and after are in LC units. STP units are adjusted for standard conditions of 20° C and 760 mm Hg. LC units are expressed at local atmospheric conditions.

**Figure E-40: Ambient Lead Concentrations in Bellevue, Lincoln, Louisville & Halsey National Forest: 1962 to 1986**

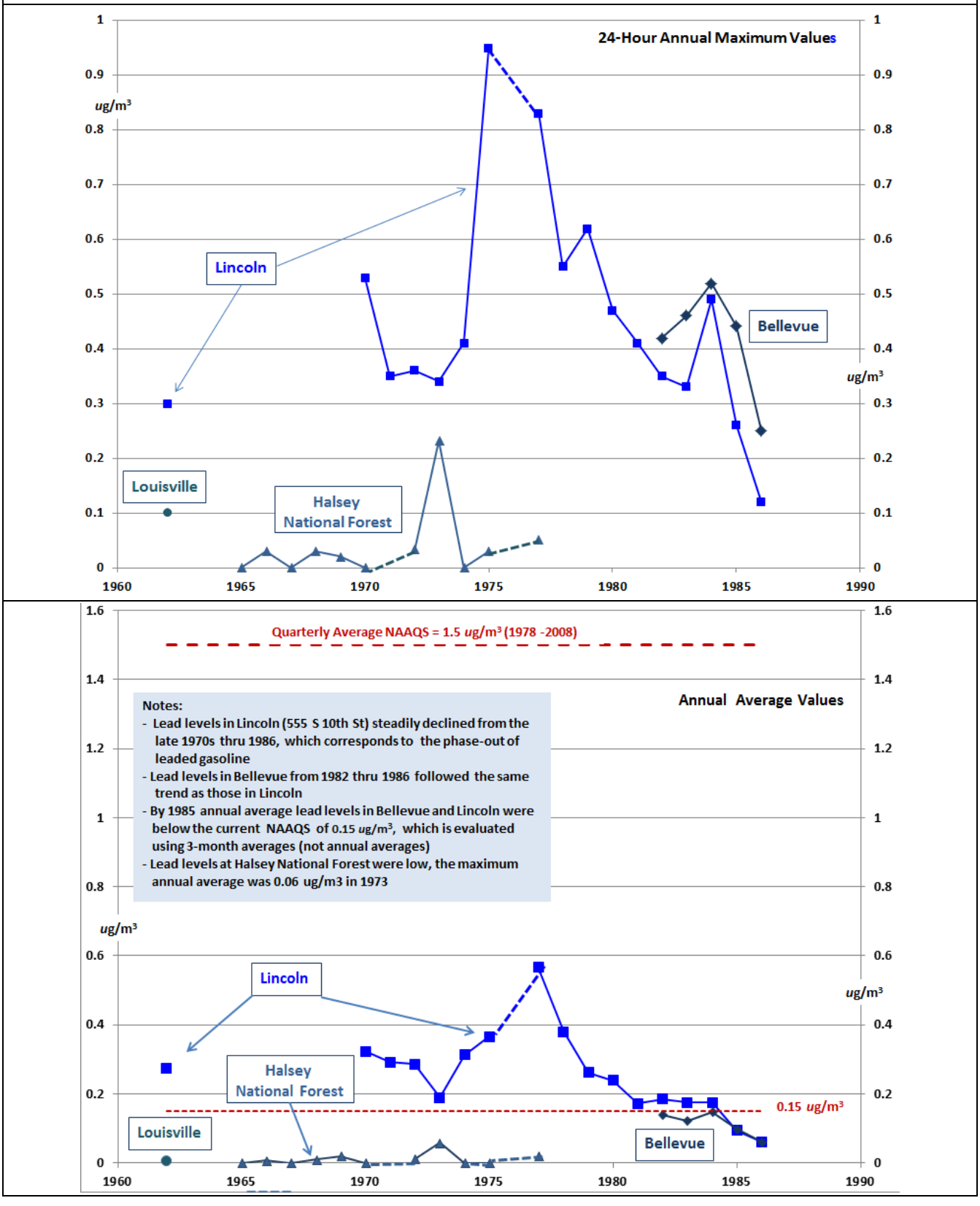
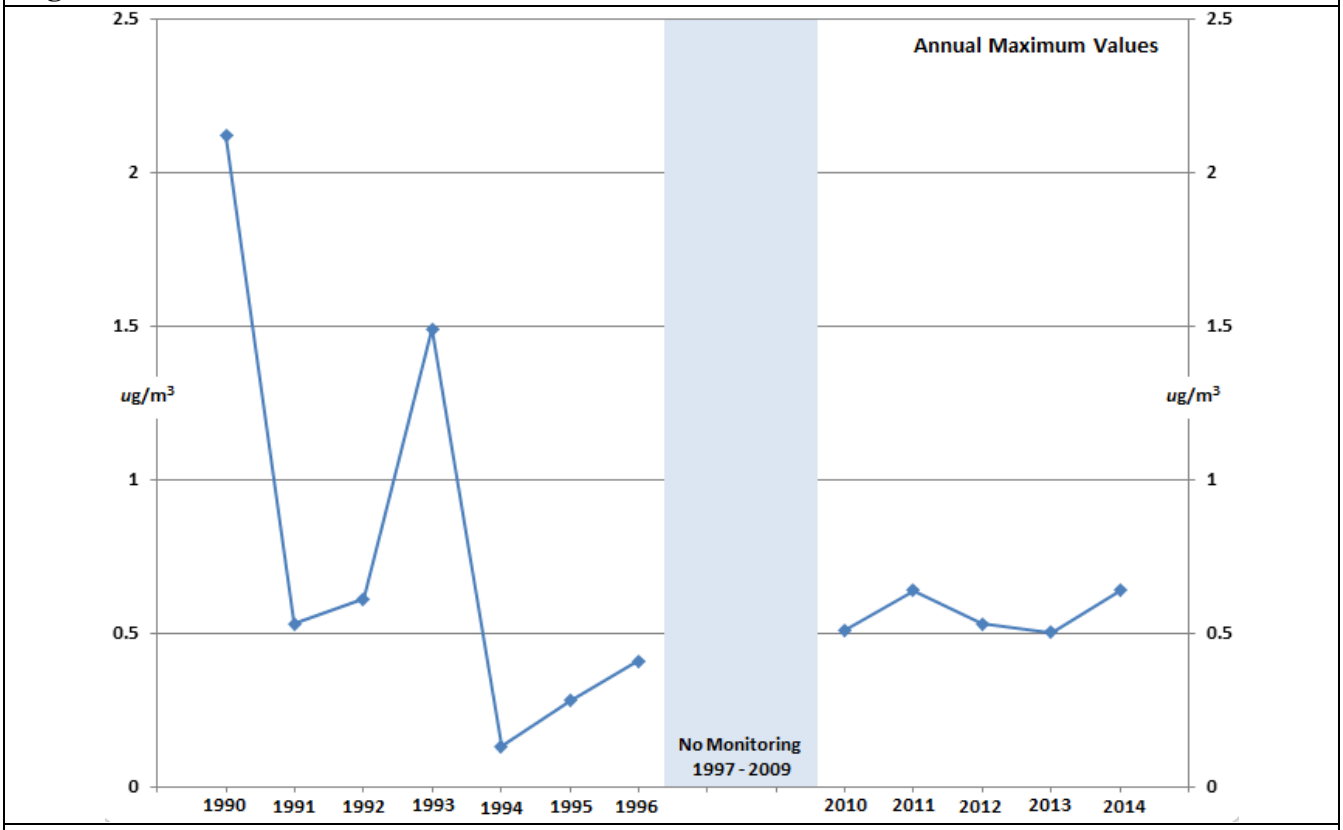


**Figure E-41: Ambient Lead Concentrations in Fremont: 1990-1995 & 2010-2014**



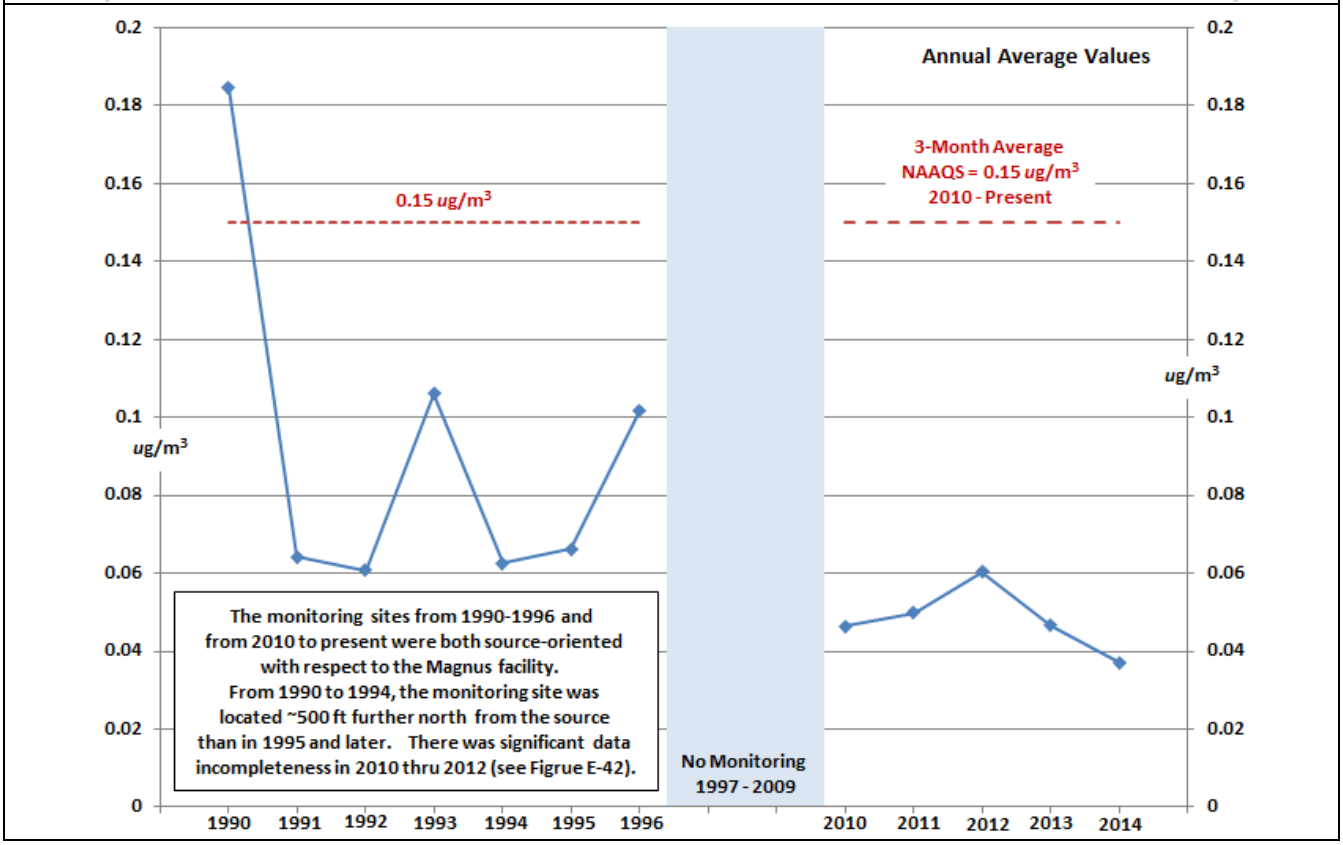
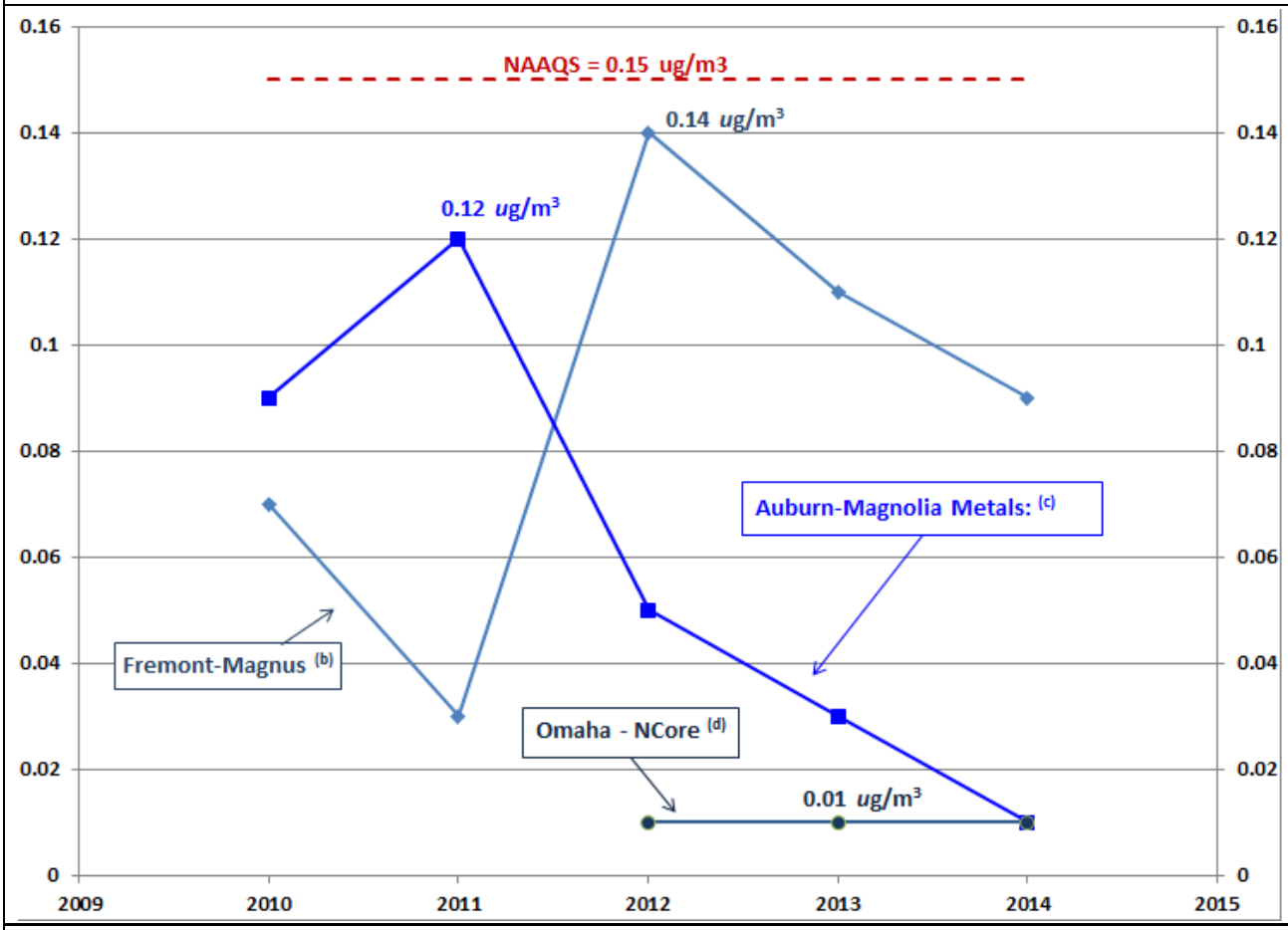



**Figure E-42: Maximum Annual 3-Month Average Lead Concentrations at Auburn, Fremont and Omaha: 2010 to Present [a]**




Footnotes:

(a) Incomplete data from the Auburn and Fremont sites, due to sampler problems, was an issue in 2010 and 2011 as shown below.

(b) The Fremont site is source-oriented with respect to the Magnus Division of LV Ventures, a brass/bronze casting and lead babbitt bearing manufacturing facility. Data incompleteness was high in 2011.

(c) The Auburn site is source-oriented with respect the Magnolia Metals Corp., a/bronze casting facility.

(d) The Omaha site is at the NCore site. It is not source-oriented. It began operation in 2012.

Months with 75% complete data

| Year | Auburn Magnolia Metals | Fremont Magnus | Omaha NCore |
|---|---|---|---|
| 2010 | 7 | 6 | Not Applicable |
| 2011 | 2 | 9 | Not Applicable |
| 2012 | 11 | 8 | 10 |
| 2013 | 12 | 12 | 12 |
| 2014 | 9 | 12 | 12 |

## VII. Total Reduced Sulfur (TRS)

Nebraska promulgated ambient air quality standards for Total Reduced Sulfur (TRS) in 1997 with a 1-hour standard of 10 ppm and a 30-minute standard of 0.1 ppm. Compliance with the 30-minute average standard ensures compliance with the 1 minute standard (i.e., 10/30 =0.33).

The TRS standards were developed in response to hydrogen-sulfur-like odors (rotten egg odor) in the South Sioux City/Dakota City and Lexington areas. Also, preliminary monitoring with portable devices in these two areas indicated that hydrogen sulfur ($H_2S$)levels were such that a public health concern could exist.

Each of these communities had anaerobic lagoons associated with and operated by IBP beef processing facilities. In the Sioux City MSA there were other potential sources including the Sioux City wastewater treatment facility and a rending facility, both in Iowa. IBP's anaerobic lagoons were somewhat unique from other packing plant lagoons in that they had little or no grease cover, a consequence of their efficiency in capturing non-edible by-products.

The Dakota City facility had two additional features which contributed to $H_2S$ production.

1) There is a tannery at the facility that uses acidic sulfate salts and produces $H_2S$ emissions. The sulfate salts used in tanning are converted to $H_2S$ during the process and the acidic environment facilitates the release of $H_2S$ to the atmosphere.
2) Water supplies in the South Sioux City/Dakota City area have a high sulfate concentration, and in anaerobic lagoons the sulfate is converted to $H_2S$.

In the late 1990's IBP agreed to cover their Dakota City and Lexington lagoons with the captured off-gas being scrubbed to remove hydrogen sulfide and then flared. The lagoon cover and gas capture systems were completed in 2000. Air emission controls were also applied to the tannery in the form of scrubbers on the building and on certain process units. Process pH controls were also implemented in some tannery processes to reduce $H_2S$ emissions (i.e., acidic conditions increase H2S release).

The off-gas is a combination of methane, carbon dioxide and $H_2S$. The mixture is flammable and $H_2S$ scrubbing was required to reduce $SO_2$ emissions.

The Dakota City and Lexington facilities are now owned and operated by Tyson Foods. Further up-grades in the lagoon gas handling procedures have been made and both facilities now have the capability of using lagoon off-gas in production boilers.

From 2000-2002 TRS monitoring was also conducted in Broken Bow in response to hydrogen-sulfide-like odors. The primary potential source being a cattle feedlot approximately 2 miles S-SE of Broken Bow. The monitoring did not find $H_2S$ levels above the Nebraska standards, with the highest 30-minute value found being 0.085 ppm in 2001.

Figures E-43 and E-44 are plots of annual maximum 30-minute values. Figure E-43 contains summarized data from South Sioux City and Dakota City. Figure E-44 shows summarized data from Lexington and Broken Bow. The data is summarized in that it only shows annual maximum values (i.e., worst case) for the communities listed (i.e., the data is not site-specific). There were 2 sites in South Sioux City thru 2002, and 2 sites in Lexington from 1999-2002.

The figures conclusively show the positive air quality impacts that occurred following the covering of the IBP lagoons in 2000 at Dakota City and Lexington. Since 2002, all of the sites, but one, the Pine Street site in Dakota City, have been in continuous compliance with the $H_2S$ standard, and the

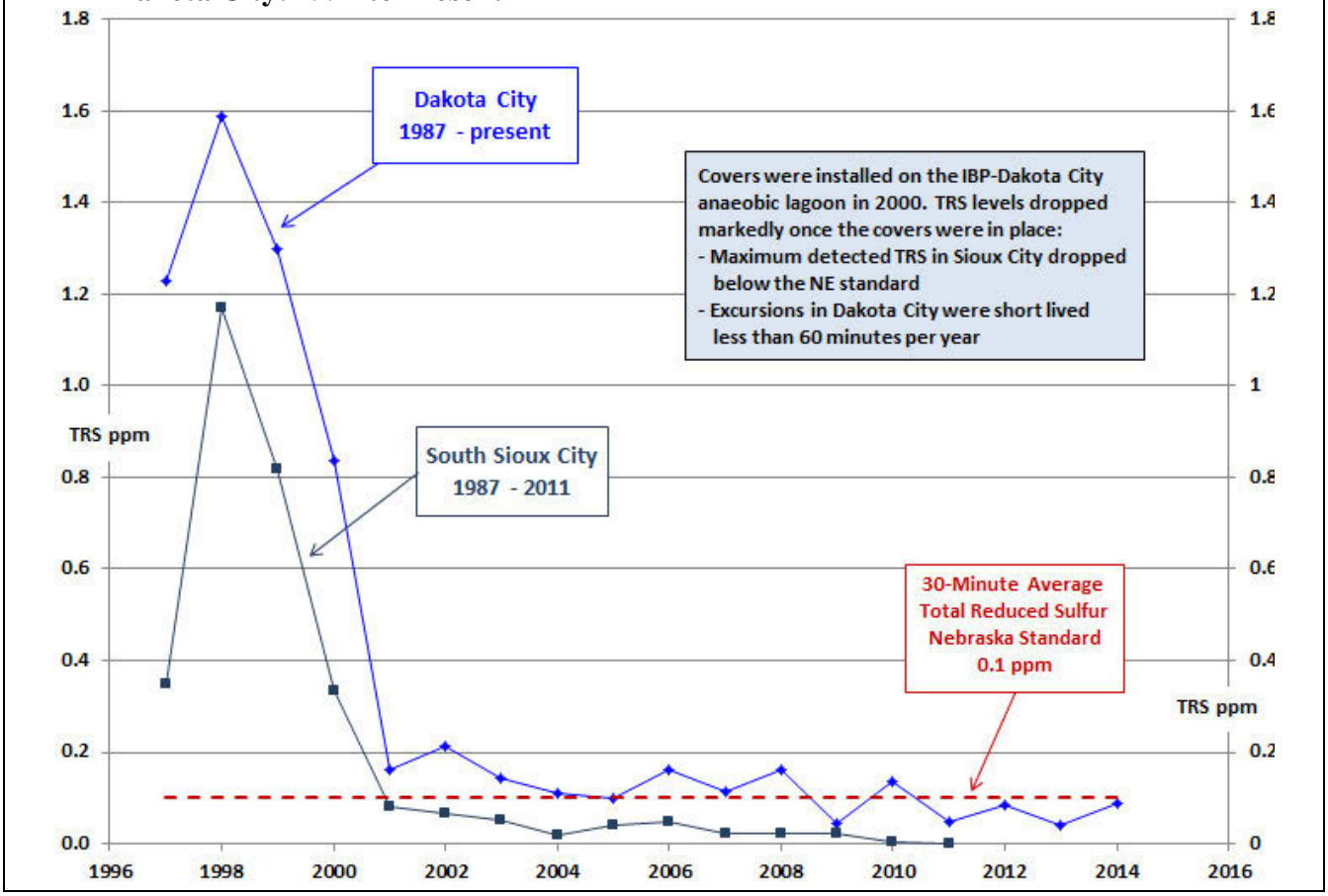
excursions at the Dakota City site have been brief and intermittent (i.e., since 2004 annual excursions have never exceeded 1 hour per year, and they occurred in the spring from March thru May).

Only 30-minute data is plotted in Figures E-43 and E-44 because compliance with the 30-minute standard ensures compliance with the 1-minute standard. The highest 1-minute $H_2S$ level ever detected was 4.6 ppm at Lexington in 1998.

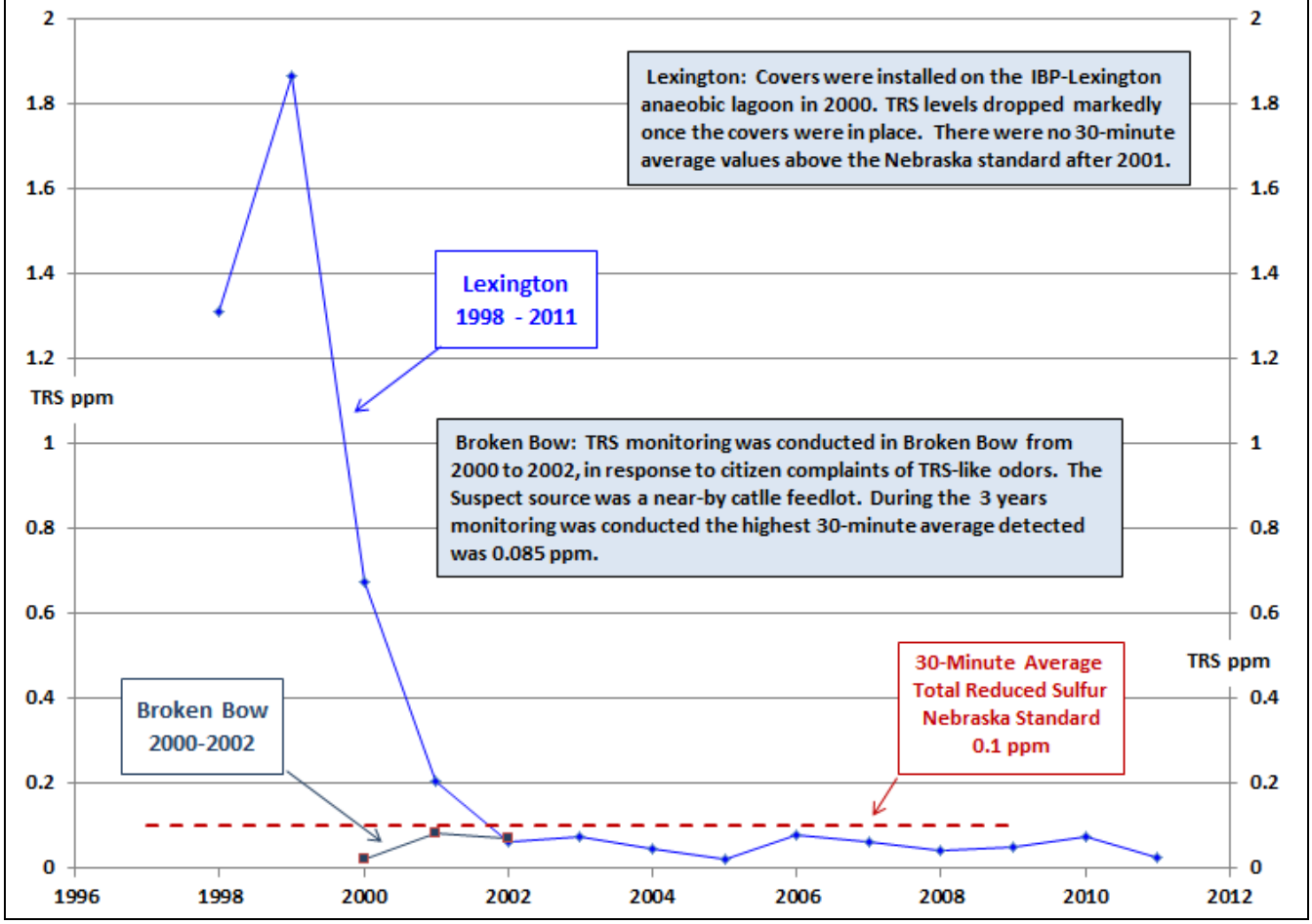
The federal NAAQS are associated with regulatory procedures for evaluating attainment (e.g., attainment with the 1-hour 0.075 ppm $SO_2$ NAAQS is evaluated using the 3-year average of the annual 99$^{th}$ percentile values from the most recent 3 years). The Nebraska standard does not include such criteria for evaluating attainment. The NDEQ response to the short-term excursions that have occurred at the Dakota City since the lagoon was covered, has been to contact IBP/Tyson to inform them of the excursion and to investigate potential causes at their facility. This approach improves source awareness and encourages voluntary action.

There are other TRS sources in the Sioux City MSA. Local efforts to identify and mitigate odor issues in the MSA pre-date NDEQ TRS monitoring efforts and continue to this day. Sioux City IA and South Sioux City, NE have odor response programs. Sioux City. IA strengthened their odor ordinances in 2013 with an emphasis to reduce odors from their wastewater treatment facility. Lance Hedquist, the South Sioux City Administrator, said that they had not " received any odor complaints in years."

**Figures E-43: Annual Maximum 30-Minute Average TRS Levels in South Sioux City and Dakota City: 1997 to Present**



**Figures E-44: Annual Maximum 30-Minute Average TRS Levels in Lexington (1998-2011) and Broken Bow (2000-2002)**



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## Background:

In October 2008, the 24-hour average NAAQS for lead (abbr. Pb) was lowered from1.5 *u*g/m$^3$ to 0.15*u*g/m$^3$. Concurrent with the NAAQS revision was a requirement in 40 CFR Part 58 Appendix D Section 4.5 to perform monitoring near Pb sources with emissions of 1 ton per year or more of Pb. There were 2 facilities in Nebraska that met this emission threshold: Magnolia Metals in Auburn and Magnus Farley in Fremont. Monitoring was initiated near both of these facilities in 2010. The 1 tpy threshold was lowered to 0.5 tpy beginning in 2011.

There is a waiver provision in 40 CFR Part 58 Appendix D Section 4.5.a (ii): *The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under §58.10(d).*

## Lead (Pb) Emission Reductions at Magnolia Metals in Auburn

Beginning in 2012, Magnolia Metals began a series of upgrades to production and pollution control facilities that significantly reduced Pb emissions. The continuous casting line (CCL) in the secondary bronze casting facility was upgraded to allow larger parts to be produced, and two high performance dust collectors were installed. Enforceable limits related to these modifications were included in a construction permit issued in August 2012. The permit review indicated that the upgrades would reduce potential lead emissions nearly 5 fold.

The Pb emission reduction activities undertaken in 2012 and 2013 are summarized below.

- March 2012: Installation of new dust collection technology was initiated on the continuous casting line (CCL).
- December 2012: Modifications to CCL dust collection system were completed.
- May 2013: An on-site soil remediation project was completed.
- December 2013: A new bag-house was installed on the permanent mold exhaust and the CCL bag-house was further upgraded with the installation of an additional filter bank.

Emission testing conducted in May 2014 confirmed that Pb emission limits set forth in the construction permit issued in August 2012 were being met.

Emission inventory (EI) data from 2008 thru 2014 is shown in the Table Pb-1 below. The EI data shows Pb emissions falling below 0.5 tpy in 2013 and a further reduction to 0.1 tpy in 2014. The EI data is based in part on the emission testing data (i.e., stack test data) from May 2014. Overall, the EI data shows more than a 20-fold reduction in Pb emissions from 2011 to 2014.

Table F-1: Lead (Pb) Emissions from Magnolia Metals in Auburn as Reported on State and National Emission Inventory (EI) Submittals

| Source [(a)] | Year | Lead (tpy) |
|---|---|---|
| National EI | 2008 | 1.98 |
| National EI | 2011 | 2.17 |
| Nebraska EI | 2012 | 0.93 |
| Nebraska EI | 2013 | 0.45 |
| Nebraska EI | 2014 | 0.1 |

Footnotes

(a) Nebraska sources submit Emission Inventory data to the NDEQ annually. Once every three years this data is also submitted to USEPA to be included in the National Emission Inventory.

Ambient monitoring data also indicates that Pb emissions from this facility have been dramatically decreased as shown in Figure Pb-1 and Table Pb-2 below. Average ambient Pb concentrations have decreased 90% and the maximum 3-month average values have decreased 93%.

From January 1, 2014 thru July 31, 2015, the maximum 3-month average value was 0.008 ug/m3 or 5% of the NAAQS; and the average 3-month value was 0.005 ug/m3 or 3% of the NAAQS. Thus the NAAQS is being attained with a very significant safety factor. Magnolia Metals emission control efforts had dramatic and commendable results.

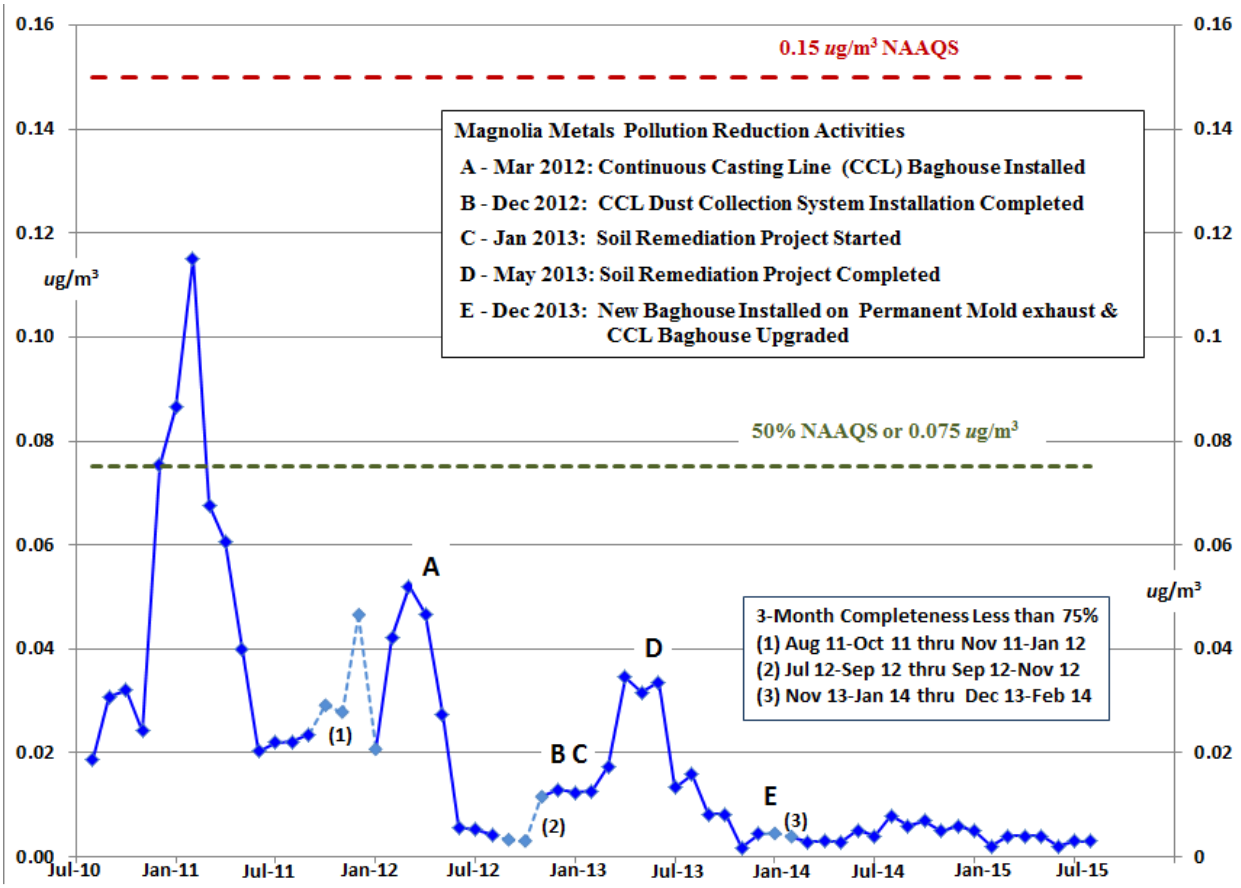
**Request to Discontinue Lead (Pb) Monitoring at Auburn, NE**

The NDEQ requests that EPA approve the closure of the Auburn Pb monitoring site on the basis that the emissions from this facility are now well below the 0.5 tpy threshold for requiring monitoring. The reduction in Pb emissions was the result of pollution controls installed at the Magnolia Metals facility and enforceable controls in the construction permit issued in August 2012 require those controls to operated and maintained. Emission testing (stack testing) in May 2014 verified that the emissions were meeting permit requirements.

In addition, ambient monitoring indicates that Pb levels have been at or below 5% of the NAAQS since the completion of the Pb emission reduction projects at the facility.

This is not a request for a waiver under 40 CFR Part 58 Appendix D Section 4.5.a (ii), but rather a permanent closure request. If future emission inventory submittals or on-site testing indicate that the 0.5 tpy threshold is being exceeded, then the NDEQ would re-initiate Pb monitoring in the vicinity of the facility.

**Figure F-1: Ambient Lead (Pb) Concentrations in Auburn, NE near the Magnolia Metals Facility and the Time-Table for Emission reduction Activities**




Dashed lines & lighter data markers identify periods when 3-month data completeness fell below 75%.

**Table F-2: Ambient Lead (Pb) Concentrations in Auburn NE Before and After Emission Control Upgrades at Magnolia Metals [(a)(b)]**

| Time Frame | Average Ambient Pb Concentration | Maximum 3-Month Average Value |
|---|---|---|
| May 2010 thru February 2012 | 0.043 $ug/m^3$ (29% of NAAQS) | 0.115 $ug/m^3$ (73 % of NAAQS) |
| January 2014 thru June 23, 2015 | 0.005 $ug/m^3$ (3% of NAAQS) | 0.008 $ug/m^3$ (5% of NAAQS) |
| Percent Reduction in Ambient Pb Concentrations | 90% | 93% |

Footnotes:
(a) Magnolia Metals undertook a series of emission control upgrades between March 2012 and December 2013. See Figure Pb-1 for summary and time-table of improvements.
(b) The Pb NAAQS is a 3-month average value of 0.15 $ug/m^3$ not to be exceeded within the last 3 years..

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The U.S. Environmental Protection Agency (U.S. EPA) requires the establishment of a near-road NO2 monitoring site. Federal regulations specify that there must be one microscale near-road NO2 monitoring station in each CBSA with a population of 500,000 or more. The CBSA of Omaha would fall into the range requiring a NO2 site location.

According to the 2010 Census, the CBSAs in Nebraska with population of at least 500,000 are:

Omaha–Council Bluffs, NE–IA 865,000 and the 59th largest CBSA

Douglas County Health Department (DCHD) will provide and submit performance reports to the EPA and NDEQ with monitoring data, siting criteria, and equipment inventory needed for the proposed NO2 site.

**Proposed Parameter Monitored at DCHD site:**

DCHD has one proposed site at 7747 Dodge Street with an AIRS ID of 31-055-0056

Proposed site will measure both Near Road CO (currently in operation) and NO/NO2/NOx as the Primary pollutants of concern.

**Proposed Site Location:**

NDEQ and DCHD have a site currently located at 7747 Dodge Street which is 15 feet off of the Dodge street traffic roadway. Currently DCHD monitors the air quality for Near-road CO at this location. DCHD is looking for the approval of this site at this location to satisfy the requirement of a Near-road NO monitoring site per EPA regulations.

**Current CO Site at 7747 Dodge Street**

**Site Selection Procedure:**

DCHD used TAD guidance in determining if the current CO near-road site would meet criteria for the NO near-road guidance requirements**.** Traffic data was collected and analyzed to determine the best possible road segments for the site location. DCHD also wanted a safe environment for the field operators with eliminated many of the interstate systems in the Omaha CBSA.

**Annual Average Daily Traffic Counts (AADT)**

DCHD used City of Omaha Traffic Counts to determine if this location would meet or satisfy the TAD requirements for NO near-road monitoring. The stretches of Dodge Street from 90th and Dodge to 72nd and Dodge Street have the most traffic per segment. Even though there are areas in the Omaha CBSA with slightly higher traffic counts, Dodge Street has a much higher congestion rate due to the number of traffic lights from 90th and Dodge to 72nd and Dodge. Federal guidance recommends that, to evaluate traffic volume AADT needs to account for higher pollution emissions. DCHD considers Dodge Street to possess such higher emissions due to vehicle idling and congestion patterns along this stretch of roadway.

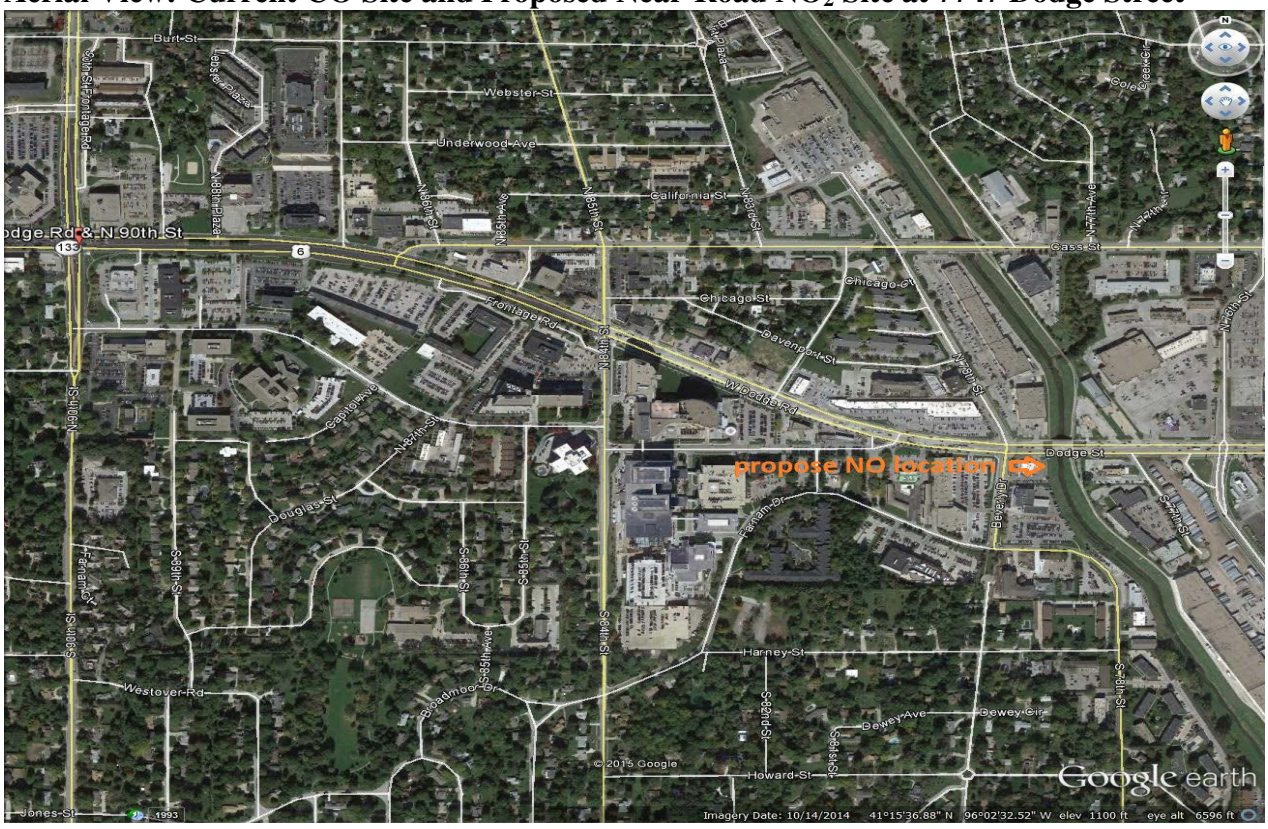
**Estimated Average Daily Traffic Data**

| **Location** | **EADT** |
|---|---|
| **90th and Dodge** | **107,596** |
| **78th/Beverly Dr. & Dodge** | **71,968** |
| **76th/Rose Blumkin & Dodge** | **73,768** |
| **72nd and Dodge** | **93,524** |

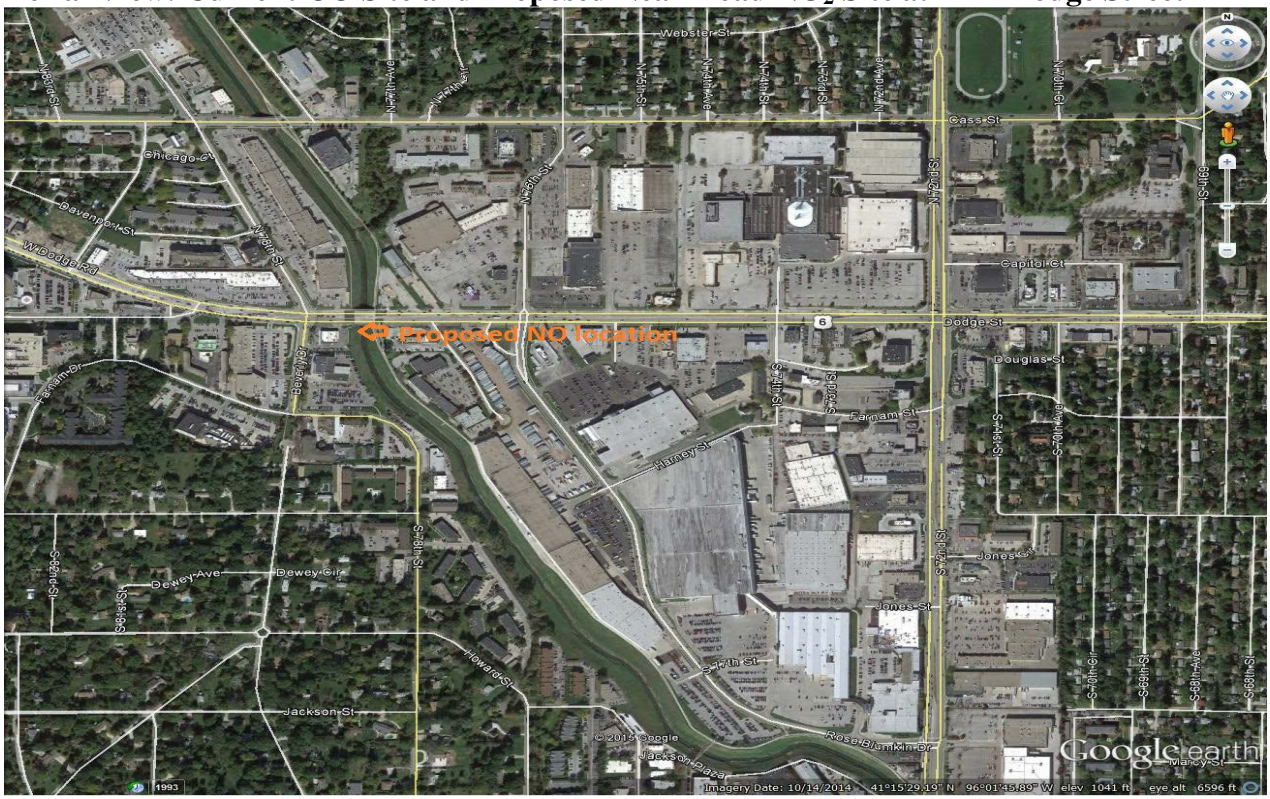
**DCHD Near-Road $NO_2$ Site Proposal**

DCHD recommends based on cost for building structure (structure already built and sited), EADT traffic counts, technician safety, and traffic congestion/higher emissions, the site proposed for NO Near-road monitoring should be located at 7747 Dodge Street (EPA site id 31-055-0056).

**Aerial View: Current CO Site and Proposed Near-Road $NO_2$ Site at 7747 Dodge Street**




**Aerial View: Current CO Site and Proposed Near-Road $NO_2$ Site at 7747 Dodge Street**



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## DCHD Proposal

The Douglas County Health Department has proposed using the current CO monitoring site at 78th Street and West Dodge Street. as the near-road NOx monitoring site. The DCHC analysis cited:

- High traffic counts on Dodge St from 72nd St. to 90th St.;
- Significant traffic congestion at 78th & Dodge St;
- The site is immediately adjacent to Little Papillion Creek in a valley area; and

Also there is an existing highest-concentration, microscale CO site at this location. The criteria for siting the CO site are essentially the same as the near-road $NO_2$ site: high traffic, traffic congestion and road-canyon areas being highest concentration areas for both CO and $NO_2$.

## NDEQ Review

Non-interstate traffic count data from the City of Omaha for 9/30/15 was reviewed. The top 11 intersections and through-traffic road sections with respect to traffic counts are shown in Tables G-1 thru G-2, respectively. An examination of this data shows that the highest traffic count road segments, in order of highest to lowest, are:
1). West Dodge Road from 90th. to 96th Streets;
2). L Street from I-80 to 132nd; and
3). West Dodge Street from 69th to 90th Streets.
The location of these 3 road segments along with the highest EADT segment of I-80 are shown in Figure H-1.

DCHD proposed the 78th & Dodge site because it was a high traffic area with significant traffic congestion. The NDEQ concurs. Dodge Street from 69th to 90th has 3 lanes in both directions a 35 mph speed limit from 69th to 80th and a 40 mph speed limit from 80th to 90th. There are stop lights at 72nd, 74th, 76th, 78th and 84th (5 in a 1 mile segment). This is a bottle-neck, stop and go traffic area, in which auto emissions per vehicle will be high. Little Papillion Creek runs perpendicular to West Dodge Street and crosses it immediately east of 78th Street. Thus this is a traffic-congestion area in the bottom of the creek valley. The 78th & Dodge monitoring site is immediately adjacent to West Dodge Street and Little Papillion Creek. See aerial and street level views of the 78th and Dodge Street site area in Figures H-2 thru H-5.

In contrast, West Dodge Road from 90th to 96th has 4 lanes in each direction and a 45 mph speed limit. This is a hill-top location; not a valley or street canyon location. There are 3 stop lights in this 0.5 mile segment at 90th, 93rd (a business/commercial park entrance, north side only) and 96th Streets. These lights are timed to keep through-traffic on Dodge Road moving, with the lower-traffic, N-S Streets getting less through-time. See Figures H-6 and H-7.

Similarly, L Street from I-80 to 132nd Street has 3 lanes in both directions and a 45 mph speed limit. This is a hill-top location; not a valley or street canyon location. There are 3 stop lights at 120th, 126th (shopping mall entrance north side only) and 132nd Streets. These lights are timed to keep through- traffic on L Street moving, with the lower-traffic, N-S Streets getting less through-time. See Figures H-8 and H-9.

The Nebraska Department of Roads (NDOR) and the Metropolitan Area Planning Agency (MAPA) produce traffic count estimates for the inter-state highways in the Omaha MSA. The NDOR and MAPA data indicate that maximum traffic counts are found on I-80 between the I-380 and 42nd Street exchanges:

- NDOR: 2012 traffic count data identified I-80 at 42nd St. to be the heaviest traveled segment with ~170,000 AADT.
- MAPA: The *2010 Traffic Flow Map* identified the heaviest traveled road segment as I-80 between I-480 and 42nd St interchanges with an estimated 183,500 annual average weekday traffic (AAWT) count. The AAWT should be slightly higher than the AADT.

I-80 between I-480 and 42nd Street has a 60 mph speed limit. There are 4 west-bound lanes and 6 east-bound lanes. The inter-state right-of-way is wide, at least 275 feet, and open. This is not a street-canyon or valley location. The width and openness of the right-of-way, coupled with the speed of the mobile sources will greatly facilitate the dispersion of the pollutants emitted. See Figures H-10 and H-11.

### Vehicle Residence Comparison

The NDEQ undertook an analysis to compare vehicle density on these four road segments. First rush hour traffic speeds were estimated. Then the time a vehicle would reside in a 1 mile segment was calculated:

Vehicle Residence Time (VRT) = (60 min/hr) / *x* mph = *y* min/mile

A Vehicle Density Factor (VDF) was then calculated as follows:

VDF = AADT * VRT

where AADT = Annual Average Daily Traffic

The results are shown in Table G-3. West Dodge Street @ 76th Street had the highest VDF.

This is not an exact analysis. Limitations include the lack of information on:

- Rush hour traffic counts, and
- Actual vehicle speeds during rush hour.

Also vehicle emission rates were not considered. However, it does provide a means of comparing vehicle density. The VDF analysis results are consistent with the earlier conclusion that vehicle emissions can be expected to be higher at the 78th & West Dodge location than on the other 3, higher-traffic, segments examined.

### NDEQ Conclusion:

The NDEQ concurs with DCHD that the current CO site at 78th and Dodge is the best location for siting a near-road $NO_2$. This site should produce highest concentration data for near-road CO and $NO_2$ in the Nebraska portion of the Omaha MSA.

**Table H-1: Inter-Section Traffic Count Estimates: Omaha's Top 11 Inter-Sections** (1)(2)

| | Location | EADT | North | South | East | West | Date |
|---|---|---|---|---|---|---|---|
| 1 | West Dodge Rd & 90th St | 102,686 | 27,194 | 26,824 | 71,626 | 79,728 | 03/15 |
| 2 | 93rd & West Dodge Rd | 98,630 | 8,826 | 0 | 90,534 | 97,900 | 08/15 |
| 3 | L St/Industrial Rd & 132nd St | 97,098 | 33,716 | 47,088 | 68,824 | 44,568 | 10/12 |
| 4 | L St & 120th St | 94,724 | 21,396 | 27,674 | 73,664 | 66,714 | 08/15 |
| 5 | West Dodge St & 72nd St | 93,524 | 37,380 | 39,860 | 56,986 | 52,822 | 04/14 |
| 6 | L St & 126th Plz | 81,162 | 12,670 | 0 | 75,220 | 74,434 | 08/15 |
| 7 | 72nd & Pacific | 76,716 | 51,156 | 49,508 | 26,130 | 26,638 | 06/14 |
| 8 | W Dodge & 76th/Rose/Blumkin | 73,768 | 8,862 | 12,208 | 58,954 | 67,512 | 03/12 |
| 9 | 108th & West Maple Rd | 72,184 | 25,738 | 22,506 | 55,390 | 40,734 | 08/14 |
| 10 | I 680 & West Maple Rd SB Rp | 71,358 | 14,512 | 12,058 | 55,346 | 60,800 | 09/14 |
| 11 | West Dodge Rd and Cass (86th) | 71,094 | 14,056 | 0 | 57,038 | 71,094 | 05/14 |

Footnotes:
(1) Estimated Annual Daily Traffic (EADT) data from the City of Omaha, released 9/30/15.
(2) Three road segments were recognized from the data in this table and Table G-2:
West Dodge from 90th to 96th (green highlight)
L Street from I-480 to 132nd St. (blue highlight)
West Dodge from 69th to 90th (orange highlight)

**Table H-2: Through-Traffic Count Estimates: Omaha's Top 11 Road Segments** (1)(2)

| Rank | Location | EADT | Traffic-Flow Direction |
|---|---|---|---|
| 1 | West Dodge Road @ 93rd Street | 188,434 | East-West |
| 2 | West Dodge Road @ 90th Street | 151,354 | East-West |
| 3 | L Street @ 126th Plaza | 149,654 | East-West |
| 4 | L Street @ 120th Street | 140,378 | East-West |
| 5 | West Dodge Road @ Cass Street (86th Street) | 128,132 | East-West |
| 6 | West Dodge Street @ Rose/Blumkin/76th Streets | 126,466 | East-West |
| 7 | Dodge Street @ 69th Street | 117,322 | East-West |
| 8 | 72nd Street @ Pine Street | 15,584 | North-South |
| 9 | I-680 & West Maple Road SB Ramps | 116,146 | East-West |
| 10 | L Street /Industrial Road @ 132nd Street | 113,392 | East-West |
| 11 | West Dodge Road @ 84th Street | 110,374 | East-West |

Footnotes:
(1) Estimated Annual Daily Traffic (EADT) data from the City of Omaha traffic counts released 9/30/15.
(2) Three road segments were recognized from the data in this table and Table G-1:
West Dodge from 90th to 96th (green highlight)
L Street from I-480 to 132nd St. (blue highlight)
West Dodge from 69th to 90th (orange highlight)

**Table H-3: Vehicle Density Analysis** (1)

| VDF Rank | Location | Estimated Rush-Hour Vehicle Speed (mph) | Vehicle Residence Time (VRT) | EADT | Vehicle Density Factor (VDF) |
|---|---|---|---|---|---|
| 1 | West Dodge Street @ 76th Street | 20 | 3.0 | 126,466 | 379,398 |
| 2 | West Dodge Road @ 93rd Street | 35 | 1.7 | 188,434 | 323,030 |
| 3 | L Street @ 126th Plaza | 35 | 1.7 | 149,654 | 256,550 |
| 4 | I-80 from I-480 to 42nd Street | 50 | 1.2 | 183,400 | 220,080 |

Footnotes:
(1) The use of this table and the calculations performed in making it are explained in the text above.

**Figure H-1: High Traffic Count Areas in Omaha, NE**

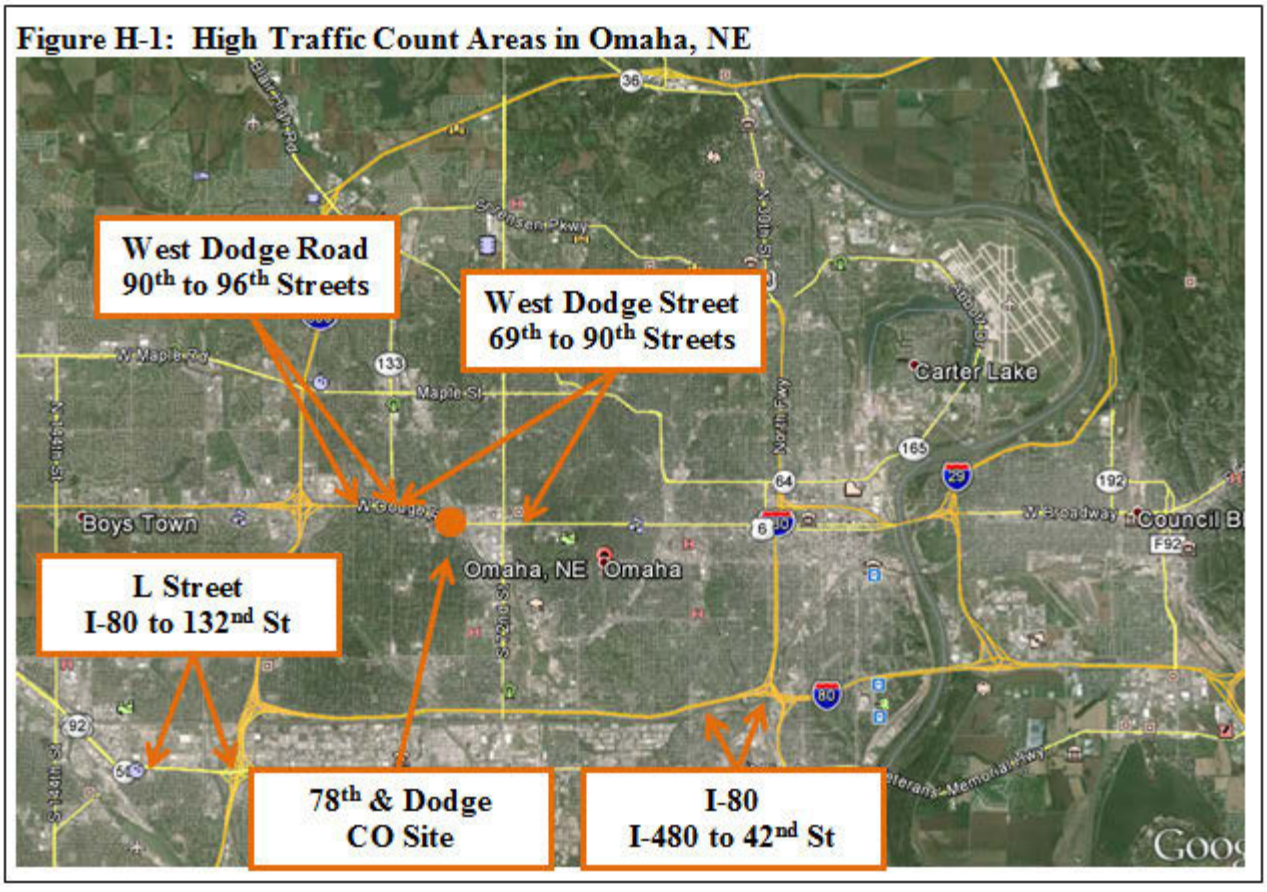
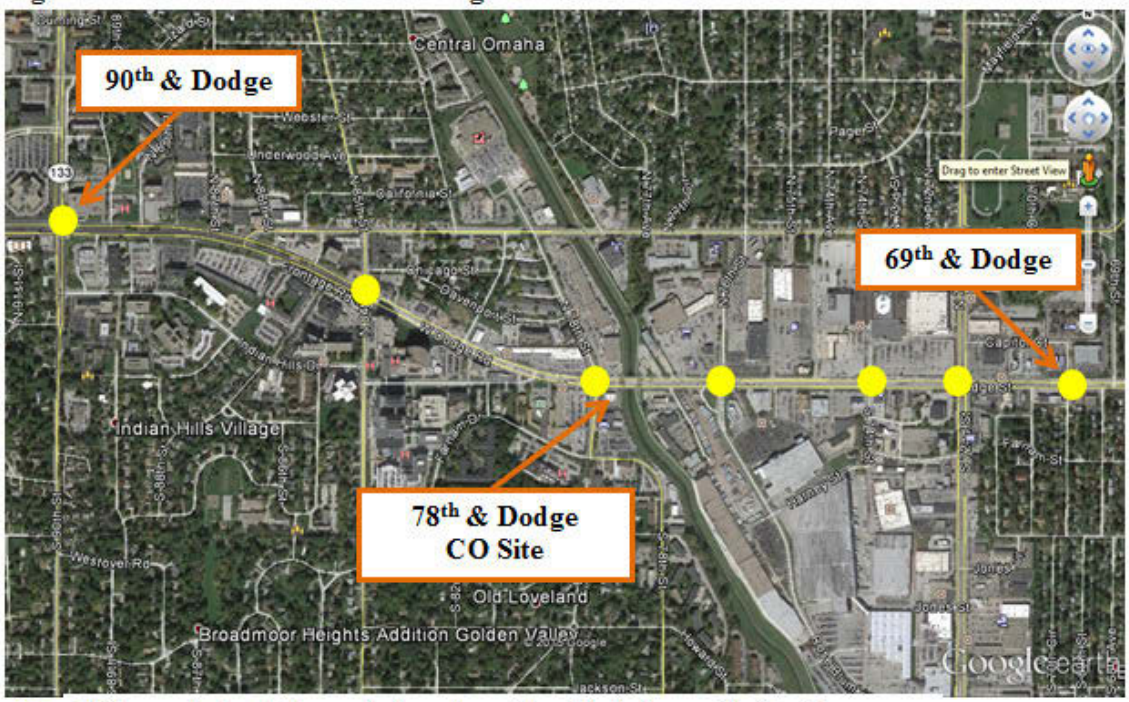


**Figure H-2: Aerial View of West Dodge Street from 69th Street to 90th Street**




Yellow circles indicate the location of traffic lights on Dodge Street

**Figure H-3: Aerial View of 78th and Dodge CO Monitoring Site**


Note the monitoring site is immediately adjacent to both West Dodge Street and Little Papillion Creek.

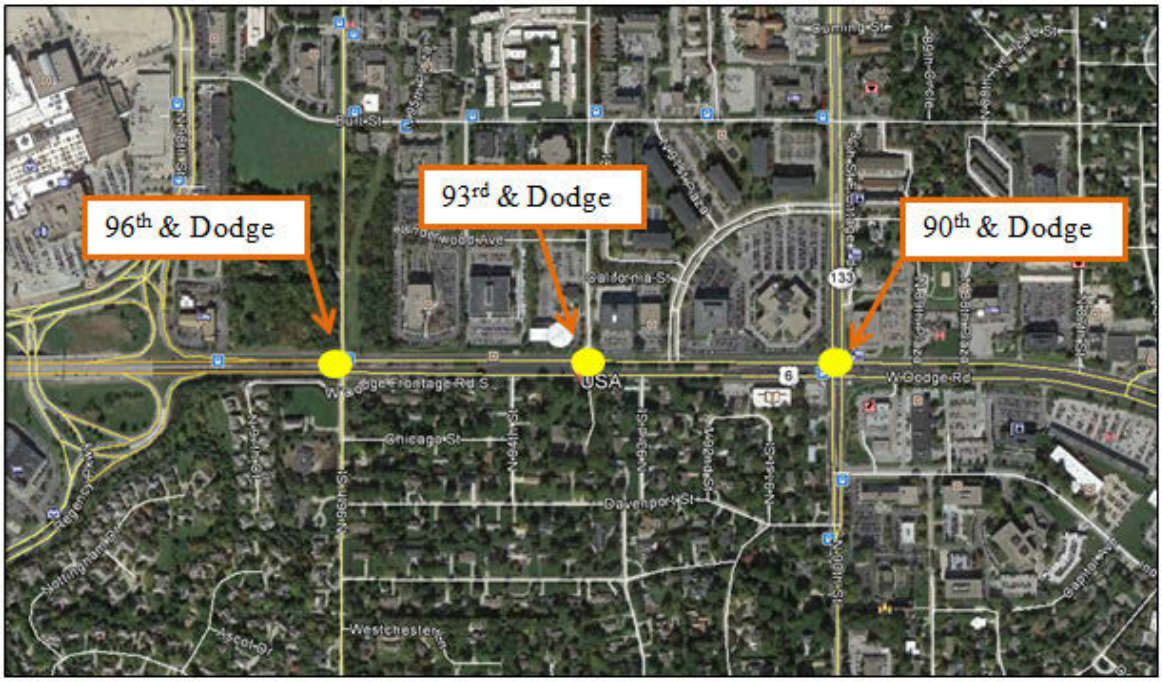
**Figure H-4: East-Bound on West Dodge Street at 78th Street**


West Dodge Street from 69th to 90th Street has 3-lane traffic both directions and a 35 mph speed limit.

**Figure H-5: West-Bound on West Dodge Road at 76th Street**


West Dodge Street from 69th to 80th has 3-lanes both directions and a 35 mph speed limit

**Figure H-6: Aerial View of West Dodge Road: 90th Street to 96th Street**




Yellow circles indicate the location of traffic stop lights

**Figure H-7: West-Bound on West Dodge Road between 90th and 93rd Streets**


Dodge Street from 90th to 96th has 4- lane traffic both ways and a 45 mph speed limit.

**Figure H-8: L Street in Omaha from I-80 to 132nd Street**

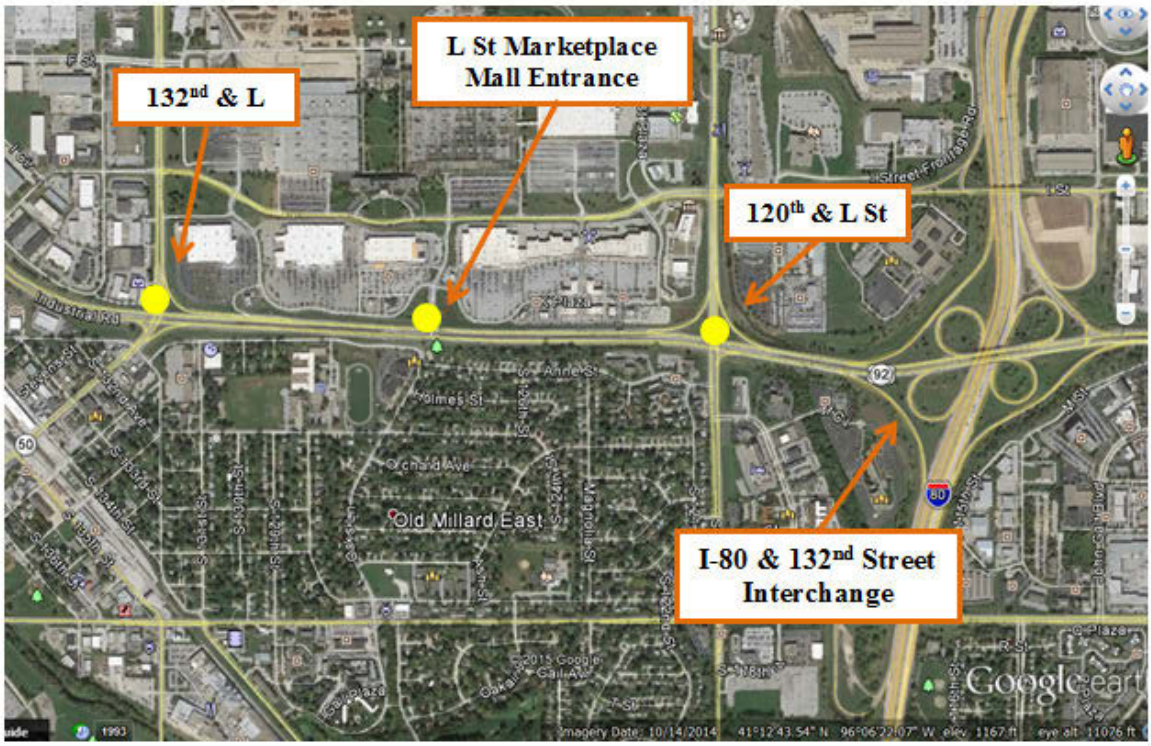



**Figure H-9: West-Bound on L Street at the 120th Street Entrance Ramp**


L Street from the I-80 Interchange to 132nd Street has 3-lanes both directions and a 45 mph speed limit.

**Figure H-10: I-80 in Omaha from I-480 to 42nd Street**

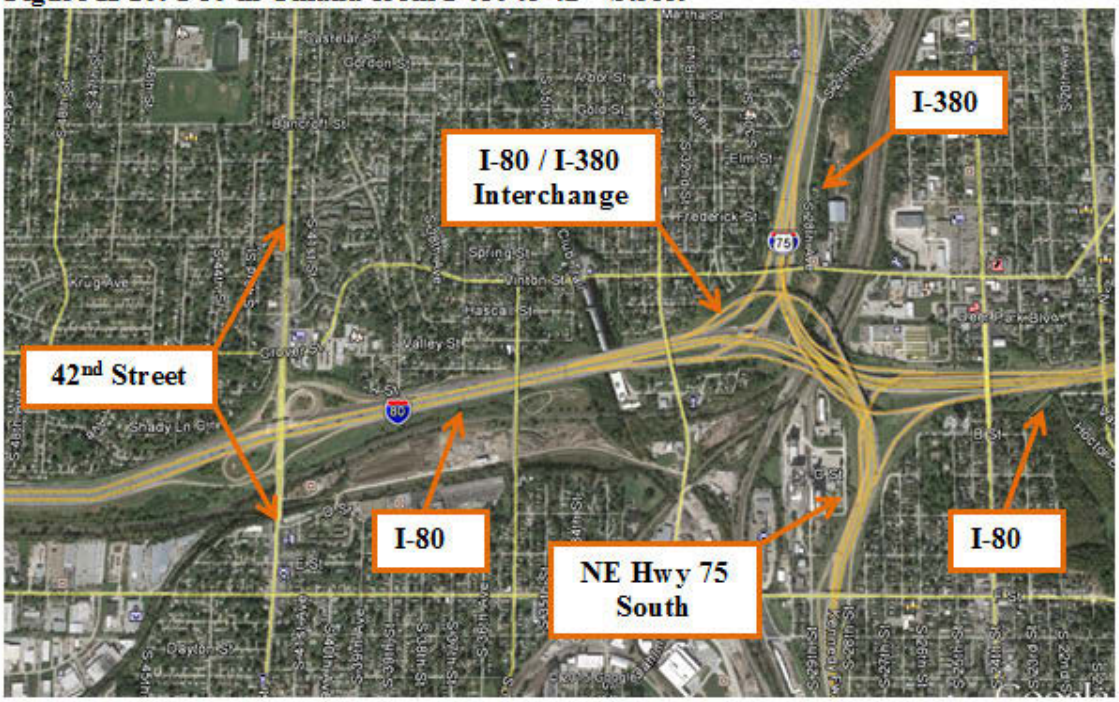



**Figure H-11: Eastbound I-80 at 42nd Street Entrance Ramp**


I-80 has 6 east-bound lines and 4 west-bound lanes from I-480 to 42nd Street and a 60 mph speed limit.