UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
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Ref: 8P-AR

JUN 24 2015

Mr. Terry L. O'Clair, P.E.
Director, Division of Air Quality
Environmental Health Section
Gold Seal Center
918 East Divide Avenue
Bismarck, North Dakota 58501-1947

Dear Mr. O'Clair:

Thank you for submitting the 2014 North Dakota Annual Monitoring Network Plan (AMNP) dated 2014. The final AMNP was received by Region 8 on May 11, 2015, as an attachment to your letter. Region 8 has reviewed the submitted AMNP and found that the requirements specified in 40 CFR Part 58.10, as well as the 105 grant commitment to conduct a review annually, have been met with the submission of this document. We note that all references to industrial monitors, which were included in previous AMNPs, have been removed from the AMNP for 2014 and believe that warrants further discussions concerning upcoming area designations in North Dakota as described below.

As discussed in the March 20, 2015, letter to David Glatt from Janet McCabe, EPA identified areas in North Dakota that may have violated the 2010 SO_2 National Ambient Air Quality Standard (NAAQS) based on preliminary air quality monitoring data collected between 2012 and 2014 at the Amerada Hess #3 industry monitor located in Williams County. We look forward to continued discussions with you and your staff as we work together to implement the 2010 SO_2 standard and achieve its intended public health protection.

If you have any questions on this issue, please contact me at (303) 312-6416 or Albion Carlson, of my staff, at (303) 312-6207.

Sincerely,

Carl Daly

Carl Daly, Director
Air Program

cc: Chuck Hyatt, DAQ

NORTH DAKOTA
DEPARTMENT of HEALTH

ENVIRONMENTAL HEALTH SECTION
Gold Seal Center, 918 E. Divide Ave.
Bismarck, ND 58501-1947
701.328.5200 (fax)
www.ndhealth.gov

May 1, 2015

Carl Daly, Director
Air Program, Mail Code 8P-AR
1595 Wynkoop Street
Denver, CO 80305

Re: 2014 North Dakota Ambient Air Monitoring Network Plan

Dear Mr. Daly:

The Code of Federal Regulations Title 40 Part 58 states that "(Agencies) shall adopt and submit to the Regional Administrator an annual monitoring network plan". This plan identifies monitoring stations and monitors that make up an air quality surveillance network under authority of the State. Additionally, the plan outlines any proposed changes or modifications to the network. Please find attached the 2014 ambient air monitoring network plan for the State of North Dakota. A thirty day public comment period was held which ended on April 30, 2015. No comments were received.

If you have any questions concerning the materials provided or require additional information or clarification, please contact Charles Hyatt of my staff at (701)328-5188.

Sincerely,

Terry O'Clair

Terry L. O'Clair, P.E.
Director
Division of Air Quality

TLO/CRH:csc
Enc:

Annual Report

North Dakota Ambient Monitoring Network Plan 2014

NORTH DAKOTA
DEPARTMENT *of* HEALTH

Annual Report

North Dakota Ambient Monitoring Network Plan 2014

Jack Dalrymple
Governor

Terry L. Dwelle, M.D.
State Health Officer

L. David Glatt
Environmental Health Section Chief

North Dakota Department of Health
Division of Air Quality
Air Quality Monitoring Branch
918 E. Divide Ave.
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1.0 INTRODUCTION

The North Dakota Department of Health (Department), Division of Air Quality, has the primary responsibility of protecting the health and welfare of North Dakotans from the detrimental effects of air pollution. Toward that end, the Division of Air Quality ensures the ambient air quality in North Dakota is maintained in accordance with the levels established by the state and federal Ambient Air Quality Standards (AAQS) and the Prevention of Significant Deterioration of Air Quality (PSD) Rules.

To carry out this responsibility, the Division of Air Quality operates and maintains a network of ambient air quality monitoring (AAQM) sites throughout the state.

The Division of Air Quality conducts an annual review of the network to determine if all federal monitoring requirements as set forth in 40 CFR 58[1] are being met. This document is an account of the review. The annual review also serves to identify any network modifications that are necessary to meet federal requirements. Modifications could include the establishment of new sites, relocation of sites to more appropriate areas, or the removal of sites where the original justification for the site no longer exists. Modifications described in this report are proposed for a period within 18 months of publication.

1.1 Site Selection

1.1.1 Monitoring Objectives

The process of selecting a monitoring site begins by identifying a monitoring objective. Appendix D of 40 CFR 58 defines the six basic monitoring objectives used to choose the locations of sites in a monitoring program:

- To determine the highest pollutant concentrations expected to occur in an area covered by the network.
- To determine representative concentrations in areas of high population density.
- To determine the impact on ambient pollution levels by a significant source or source categories.
- To determine the general/background concentration levels.
- To determine the impact on air quality by regional transport.
- To determine welfare-related impacts (such as on visibility and vegetation).

[1] The Code of Federal Regulations - 40 CFR 58 was promulgated by EPA on October 17, 2006

1.1.2 Spatial Scale

Once an objective for a site has been identified, a spatial scale is chosen. EPA has defined a set of spatial scales based on physical dimensions that, given a particular objective, would be likely to have similar pollutant concentrations throughout. These are:

- **Micro-scale**
  – Dimensions ranging from several meters up to about 100 meters.
- **Middle Scale**
  – Areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 km.
- **Neighborhood Scale**
  – City areas of relatively uniform land use with dimensions of 0.5 to 4.0 km.
- **Urban Scale**
  – Overall, city-wide dimensions on the order of 4 to 50 km (Usually requires more than one site for definition).
- **Regional Scale**
  – Rural areas of reasonably homogeneous geography covering from 50 km to hundreds of km.
- **National or Global Scale**
  – The entire nation or greater.

The relationships between monitoring objectives and spatial scales, as specified by EPA, are as follows:

Monitoring Objective	Appropriate Siting Scales
Highest Concentration	Micro, middle, neighborhood, (sometimes urban or regional for secondarily formed pollutants)
Population Oriented	Neighborhood, urban
Source Impact	Micro, middle, neighborhood
General/Background	Urban, regional
Regional Transport	Urban, regional
Welfare-related Impacts	Urban, regional

Spatial scales appropriate to the criteria pollutants monitored in North Dakota are shown below:

Criteria Pollutant	Spatial Scales
Inhalable Particulate	micro, middle, neighborhood, urban, regional
Sulfur Dioxide	middle, neighborhood, urban, regional
Ozone	middle, neighborhood, urban, regional
Nitrogen Dioxide	middle, neighborhood, urban

A good understanding of the appropriate monitoring objective and spatial scale allow a site location to be chosen. Using these criteria to locate sites allows for an objective approach, ensures compatibility among sites, and provides a common basis for data interpretation and application. The annual review process involves assessing each site and associated monitors to confirm that all still meet their intended purpose. Sites and/or monitors that no longer satisfy the intended purpose are either terminated or modified accordingly.

1.2 General Monitoring Needs

Each air pollutant has certain characteristics that must be considered when establishing a monitoring site. These characteristics may result from (A) variations in the number and types of sources and emissions in question; (B) reactivity of a particular pollutant with other constituents in the air; (C) local site influences such as terrain and land use; and (D) climatology. The Department's AAQM network is designed to monitor air quality data for five basic conditions: (1) monitoring of criteria pollutant background concentrations; (2) quantifying population exposure to pollutants; (3) monitoring significant sources of pollutants or class category; (4) long range transport of pollutants; and (5) regional haze.

The 2008 National Ambient Air Monitoring Strategy (NAAMS[2]) establishes a monitoring site classification system for the national AAQM network. State and Local Monitoring Stations (SLAMS) make up the primary network for determining criteria pollutant AAQS compliance. The Department operates eight ambient air quality monitoring sites in North Dakota (Figure 1). Additionally a ninth site, the Theodore Roosevelt National Park – South Unit site at Painted Canyon, is operated by the Department in partnership with the National Park Service (NPS). All of the state operated sites and the partnership site at Painted Canyon have been designated SLAMS sites. A National Core (NCore) site is a one in a network of approximately 80 multi-pollutant monitoring sites throughout the United States designed to support specific EPA core monitoring objectives in public reporting, emissions trends tracking, and AAQS compliance

[2] Document available online at www.epa.gov/ttn/amtic/monstratdoc.html

evaluation. Each state is required to have one or more NCore designated sites. In addition to being a SLAMS site, Fargo NW has been designated the required NCore site in North Dakota.

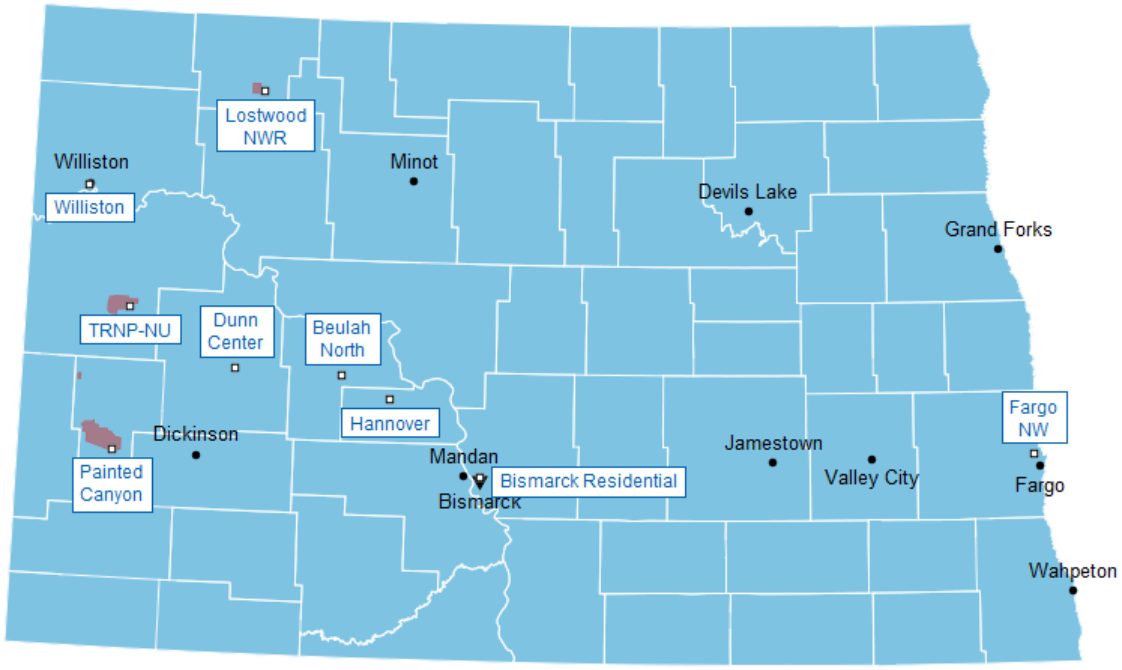

Figure 1. North Dakota Ambient Air Quality Monitoring Sites

The Fargo site is also a part of EPA's Chemical Speciation Network (CSN) as a trends site. The Speciation Trends Network (STN; a subset of the CSN) was established to monitor long term trends in concentration of selected particulate matter constituents. The NAAMS document provides additional information regarding these national networks.

The monitoring sites in the state fall into two categories: 40 CFR 58 required (3 sites) and supplemental (6 sites). The primary function of the Department's three required sites is to satisfy five monitoring objectives (Table 1). The Beulah monitoring site, which lies between the city of Beulah and two major air pollutant emissions sources (and in the vicinity to a third), has been designated a significant source and population-oriented site. The Fargo NW site has been designated a population orientated site because the city of Fargo is a major population center in North Dakota with five major emissions sources located in the area. The data from the Fargo site are used in dispersion modeling to evaluate construction and operating permit applications for projects located in the eastern part of the state. The TRNP-NU site is used to evaluate background concentrations, long-range transport, and welfare-related impacts of pollutants. The remaining six sites are used to support air dispersion model calibration and/or validation and to supplement data collected at the required sites. For the national $PM_{2.5}$ program, the Department is required to operate three "non-Core required" sites (these being Fargo, Bismarck and Beulah).

Table 1. AAQM Network Description

Site Name AQS* Site Number	Parameter Monitored											Monitoring Objective
	SO_2	NO_2	O_3	CO	cont. $PM_{2.5}$	cont. PM_{10}	Manual $PM_{2.5}$	PM_{fine} Speciation	NH_3	NO_y	Wind Speed & Direction	
1 Beulah North 380570004	★	★	★		★	★	★		★		★	Population Exposure & Significant Source
2 Bismarck Residential 380150003	★	★	★		★	★	★				★	Population Exposure
3 Dunn Center 380250003	★	★	★		★	★					★	General Background
4 Fargo NW 380171004	★	★	★	★	★	★	★	★		★	★	Population Exposure
5 Hannover 380650002	★	★	★		★	★					★	Source Impact
6 Lostwood NWR 380130004	★	★	★		★	★		★	★		★	General Background & Significant Source
7 Painted Canyon 380070002	★		★		★		★				★	General Background
8 TRNP – NU 380530002	★	★	★		★	★					★	General Background, Long-range Transport, & Welfare-related
9 Williston 381050003			★		★	★					★	Population Exposure

* Air Quality System – EPA's computer database and information system of ambient air quality data.

Background, welfare-related and long-range transport sites are chosen to determine concentrations of air contaminants in areas remote from urban sources. These are generally sited using the regional spatial scale. Once a specific location is selected for a site, the site is established in accordance with the specific sitting criteria specified in 40 CFR 58, Appendices A, C, D and E.

1.3 Monitoring Objectives

The Department operates SLAMS sites at selected locations around the state to track those pollutants that are judged to have the potential for violating either state or federal Ambient Air Quality Standards. Figure 1 shows the approximate site locations, Table 1 lists basic site information, and Appendix A contains a full description for each site, site photographs, and a site map.

The Department evaluates any monitoring requirements and site changes needed to support the

visibility regulations in 40 CFR 51.300, 40 CFR 51.308 (regional haze rules) and 40 CFR 51, Appendix Y (Best Available Retrofit Technology, BART).

2.0 AMBIENT AIR MONITORING NETWORK COVERAGE

The State of North Dakota is in attainment for all ambient standards for criteria pollutants. The nine ambient air quality monitoring sites in the state are positioned to satisfy the five monitoring objectives described in Section 1.3, above, and to collect data to compare to the State and Federal ambient air quality standards and support dispersion modeling activities relating to visibility/regional haze and source permit evaluation. The following sections describe state monitoring efforts with respect to each pollutant.

2.1 Sulfur Dioxide

Energy development in the west and west-central portions of North Dakota has produced a number of sources of sulfur dioxide (SO_2). These sources include coal-fired steam-powered electrical generating facilities, a coal gasification plant, natural gas processing plants, oil refineries, and flaring at oil/gas well sites. As a result, SO_2 is one of the Department's primary interests with respect to visibility: first, to aid in establishing the visibility baseline, then to track visibility improvement over time.

2.1.1 Point Sources

The major SO_2 point sources (>100 Tons per Year or TPY) based on 2013 emissions are listed in Table 2. Figure 2 shows the approximate locations of these facilities. Figure 3 shows the total annual SO_2 emissions from point sources and three sub-categories for 1984 through 2013.

2.1.2 Other Sources

The western part of the state has a number of potential SO_2 sources including oil wells, oil storage facilities, and natural gas compressor stations. These sources may directly emit amounts of hydrogen sulfide (H_2S) to the ambient air (see Section 2.7 for further discussion on H_2S) or they may flare the H_2S creating SO_2 and contributing to concentrations of this pollutant.

2.1.3 Monitoring Network

There are eight SO_2 monitoring sites in the state. As can be seen in Figure 2, the majority of the sites are concentrated in the vicinity of the oil and gas development in the west and the coal-fired steam electrical generating plants in the west-central part of the state.

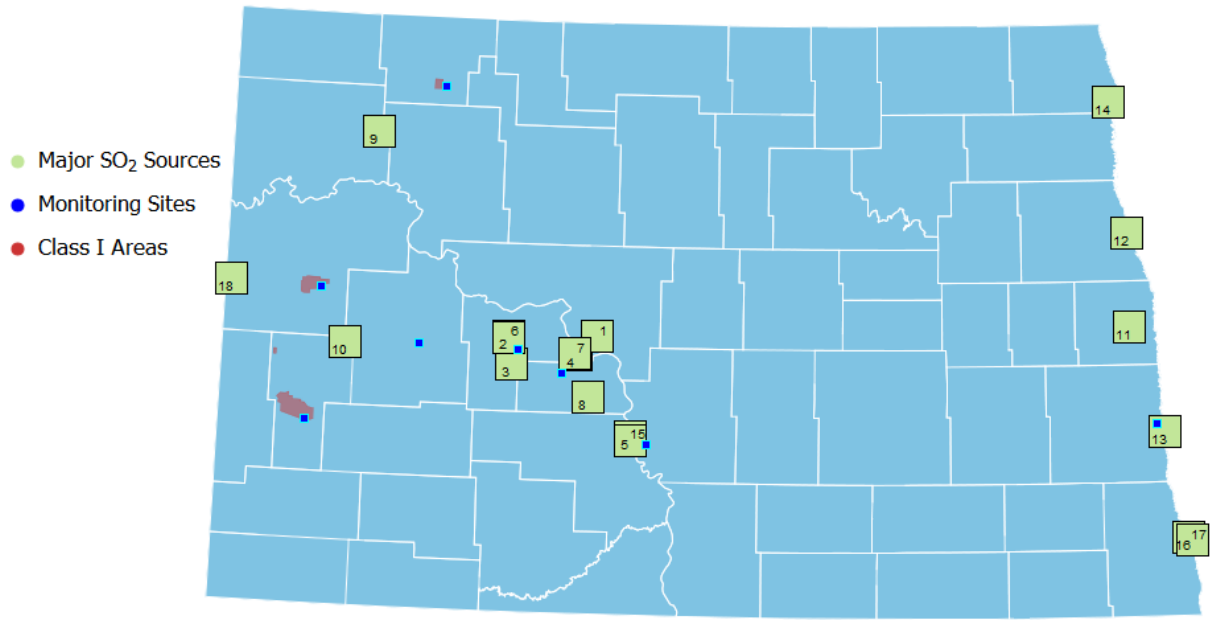

Figure 2. Major Sulfur Dioxide Sources

Table 2. Major SO_2 Sources (>100 TPY)

#	Company Name	Source	Facility ID
1	Great River Energy	Coal Creek Station	3805500017
2	Basin Electric Power Cooperative	Antelope Valley Station	3805700011
3	Otter Tail Power Company	Coyote Station	3805700012
4	Basin Electric Power Cooperative	Leland Olds Station	3805700001
5	Montana Dakota Utilities Company	RM Heskett Station	3805900001
6	Dakota Gasification Company	Great Plains Synfuels Facility	3805700013
7	Great River Energy	Stanton Station	3805700004
8	Minnkota Power Cooperative, Inc.	Milton R. Young Station	3806500001
9	Hess Corporation	Tioga Gas Plant	3810500004
10	Petro-Hunt, LLC	Little Knife Gas Plant	3800700002
11	American Crystal Sugar Company	Hillsboro Plant	3809700019
12	University of North Dakota	UND Heating Plant	3803500003
13	North Dakota State University	NDSU Heating Plant	3801700005
14	American Crystal Sugar Company	Drayton Plant	3806700003
15	Tesoro Refining and Marketing Company	Mandan Refinery	3805900003
16	Cargill Corn Milling	Wahpeton Facility	3807700110
17	Minn-Dak Farmers' Cooperative	Wahpeton Plant	3807700026
18	ONEOK Rockies Midstream, LLC	Grasslands Gas Plant	3805300023

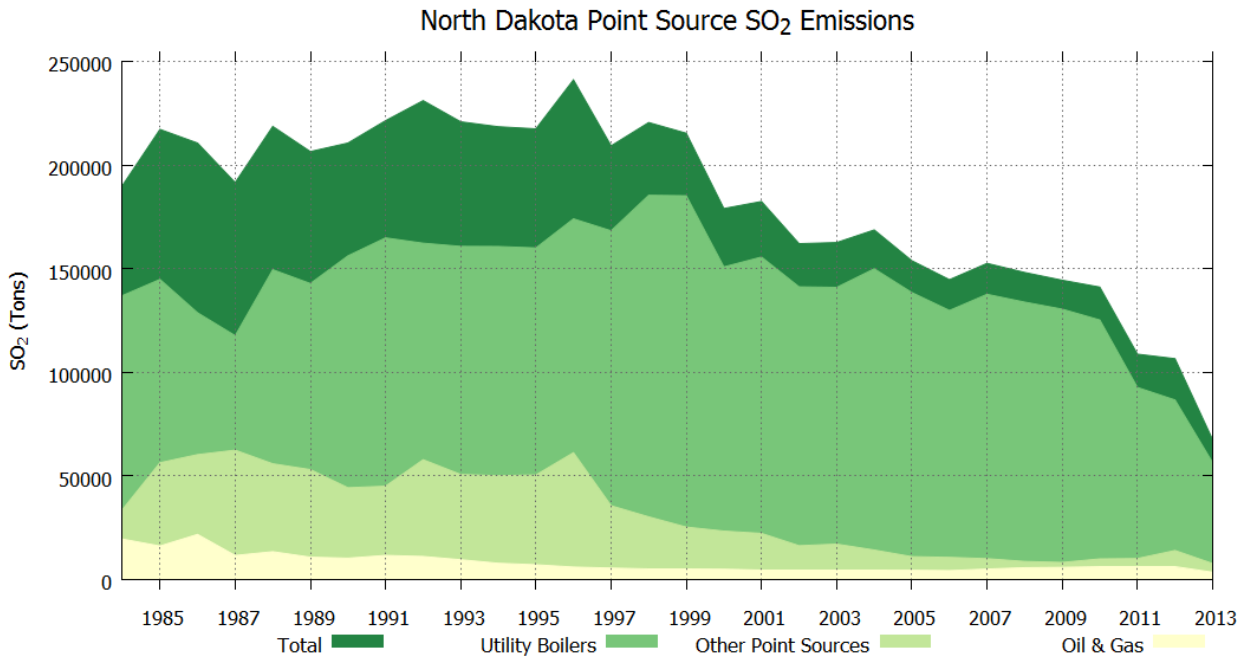

Figure 3. Annual Sulfur Dioxide Emissions

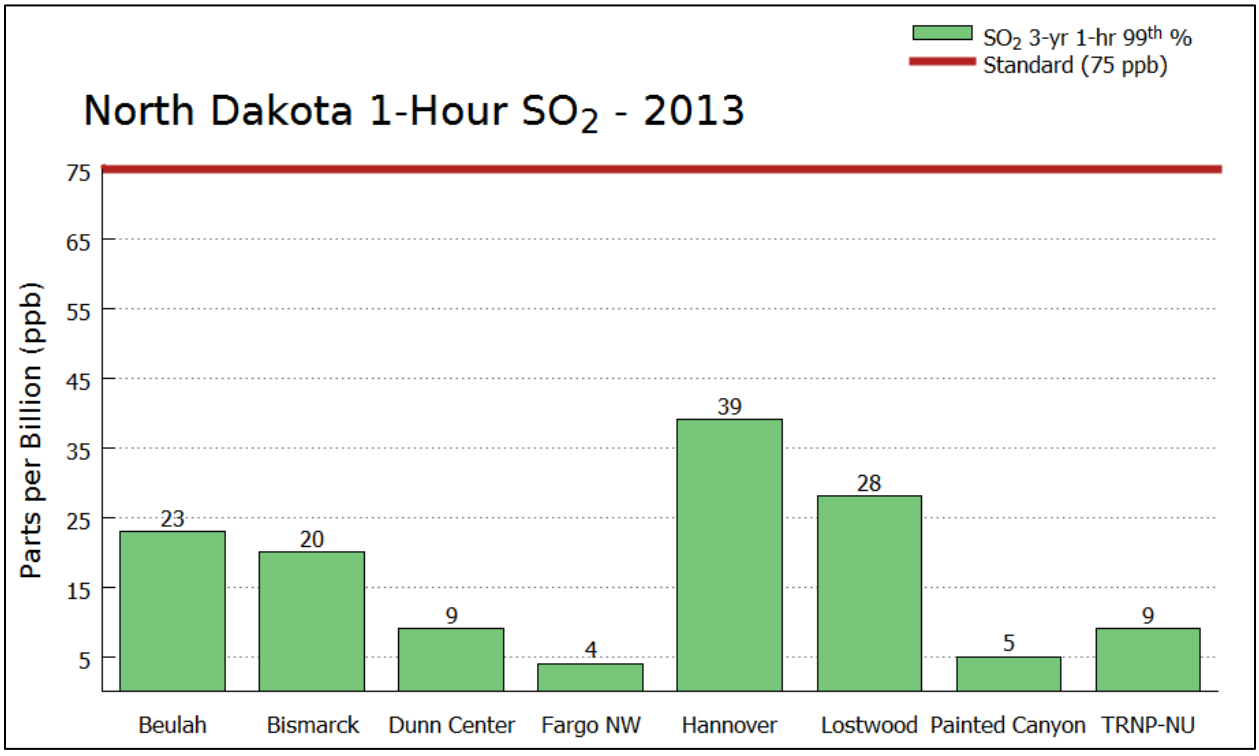

Figure 4. SO_2 Concentrations Compared to the 1-hour Standard

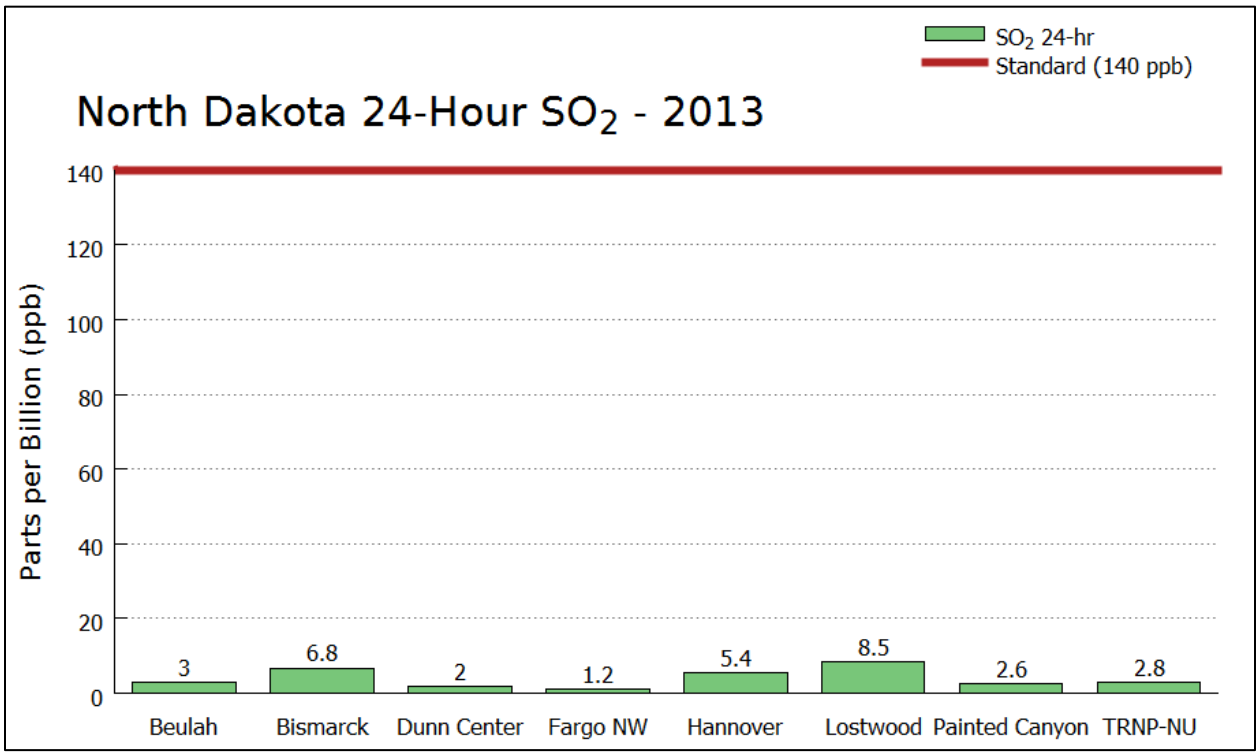

Figure 5. SO_2 Concentrations Compared to the 24-hour Standard

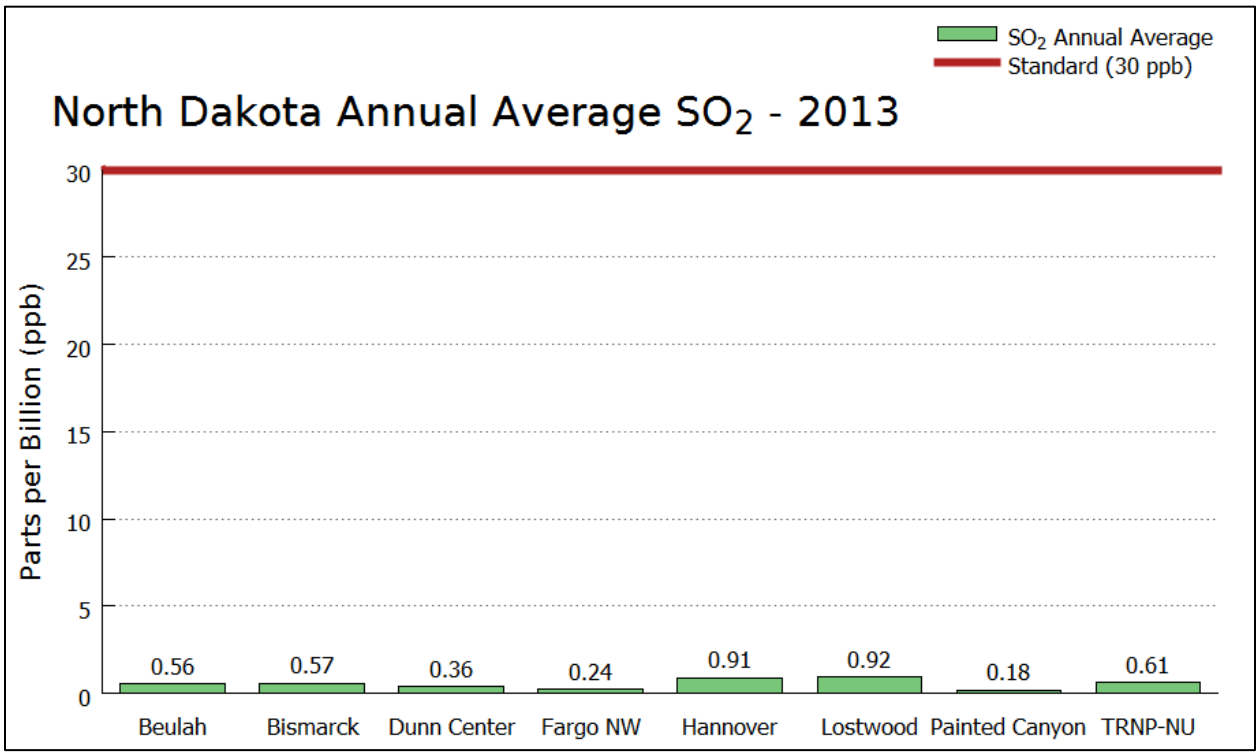

Figure 6. SO_2 Concentrations Compared to the Annual Standard

2.1.4 Network Analysis

Figures 4, 5, and 6 show the 2013 SO_2 monitoring results in comparison to the 1-hour, 24-hour, and annual SO_2 AAQS. Numbers above the bars indicate monitored concentrations.

Ten major SO_2 sources are within 45 miles of both the Beulah and Hannover sites. This makes these two sites very important in tracking the impact of these sources on the ambient air. Also, Lostwood NWR is within 45 miles of four major sources: two natural gas processing plants and two power plants. The two natural gas processing plants are the Lignite Gas Plant and Tioga Gas Plant. The two power plants, Shand Power Station and Boundary Dam Power Station, are located near Estevan, Saskatchewan, approximately 40 miles to the northwest.

One would expect that as the large sources in Oliver and Mercer counties came on line beginning in 1980, a noticeable change would be seen on the ambient air quality. This has not been the case. There have been possible short-term influences, but no significant long-term impact by these sources combined has been demonstrated in the data. Figures 7, 8 and 9 present the following for the Department-operated sites: (1) 1-hour maximums; (2) 24-hour maximums; and (3) annual maximums.

To calculate valid statistics, at least 75 percent of the data for each averaging period must be valid. The result of the 75 percent requirement is that each 1-hour average must have at least 45

valid minutes of data; the 24-hour average must have at least 18 valid hourly averages; and, the annual average must have 6,570 hours of data.

Beginning in 1980, major events are traceable. In 1980, the oil industry was expanding. In 1981, Otter Tail Power's Coyote Power Station began operation. In 1982 the oil industry in western North Dakota hit a peak in activity prior to the most recent increase. Dunn Center and TRNP – NU show the influence from the oil field activity as the oil fields expanded and flared the gas. As pipelines were built and wells were tied into the pipelines, the amount of hydrogen sulfide gas flared decreased, reducing the amount of sulfur dioxide emitted. Once the wells were tied into pipelines, the predominant influence at these two sites has been long-range transport from major point sources.

Dunn Center and TRNP – NU are indicators of the "oil patch" activity and tracked the activity very well. Since TRNP – NU is more centrally located in the "oil patch," it is the stronger indicator. Dunn Center, which is on the eastern edge of the oil development area, demonstrates influences from both the "oil patch" and the coal conversion facilities to the east.

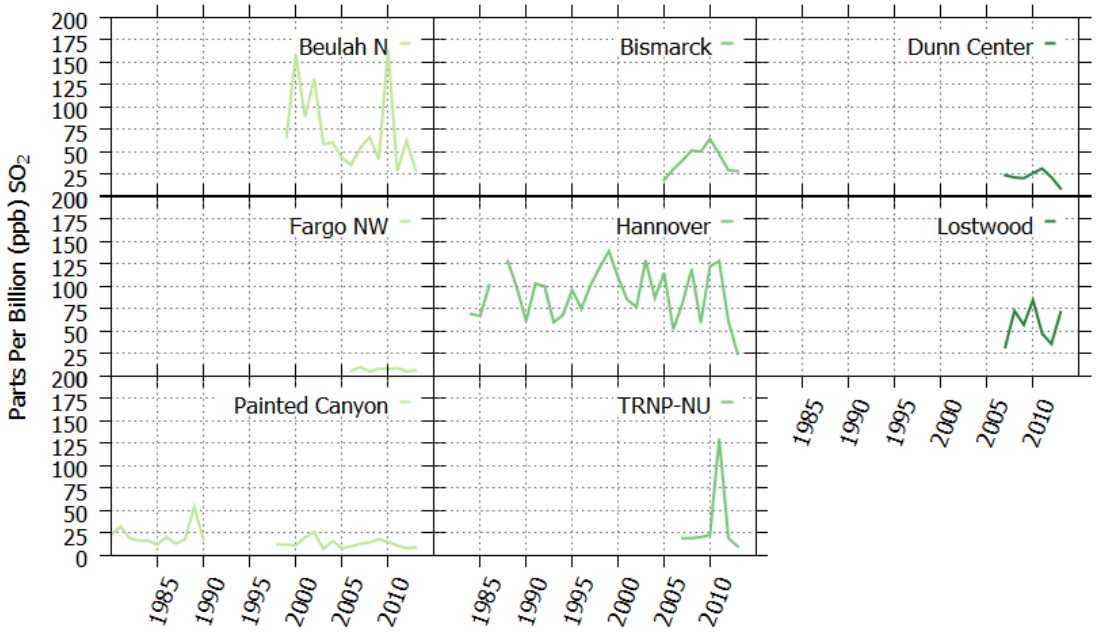

Figure 7. SO_2 Maximum 1-Hour Concentrations

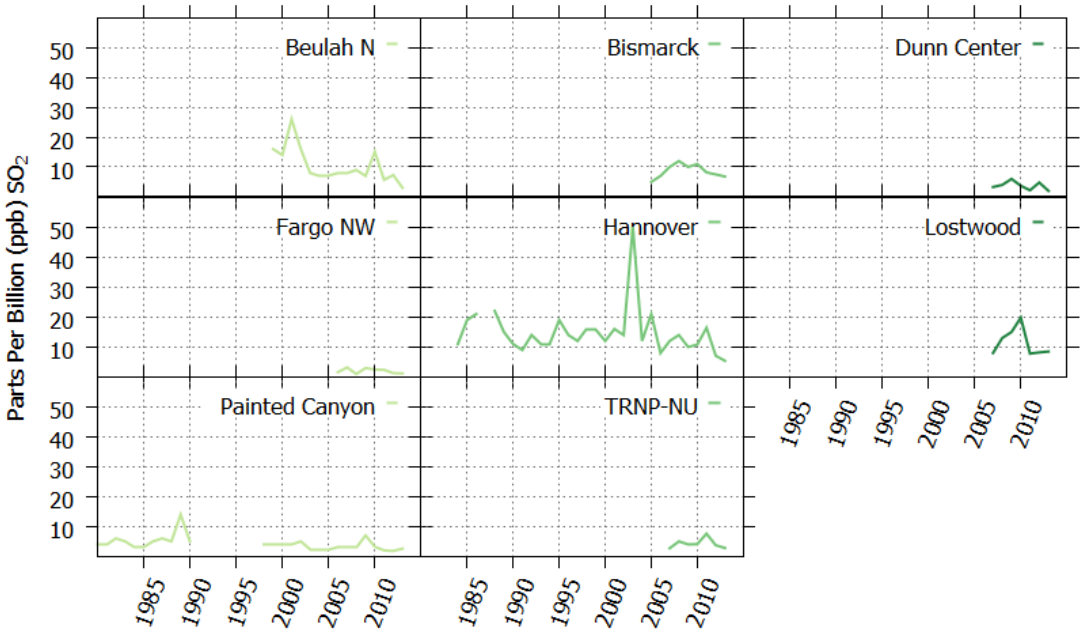

Figure 8. SO_2 Maximum 24-Hour Concentrations

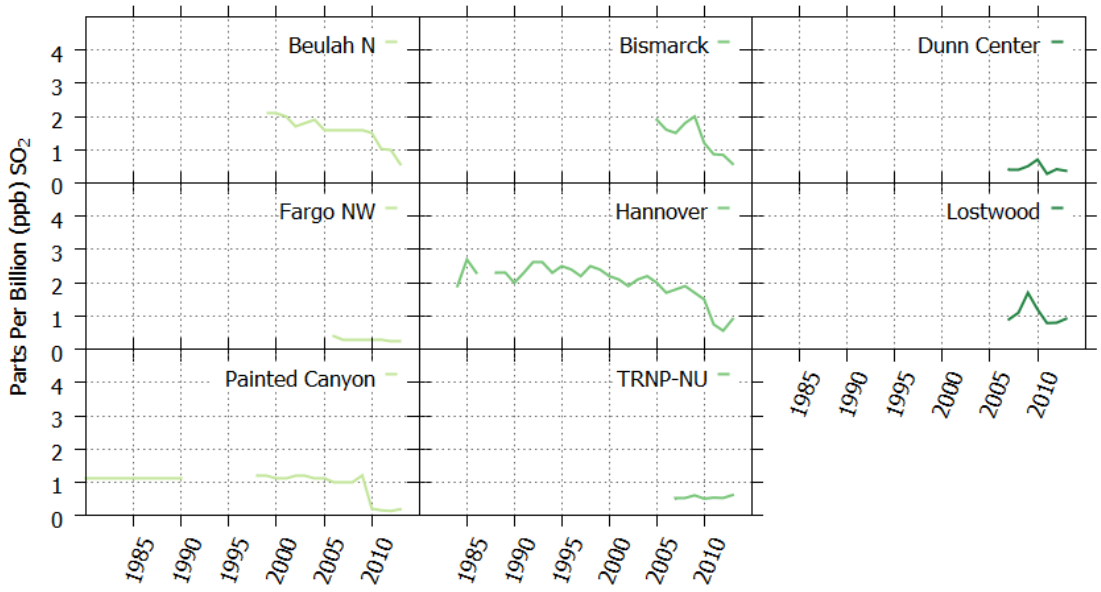

Figure 9. SO_2 Maximum Annual Concentrations

The years 1983, 1984 and 1985 were startup years for Basin Electric's Antelope Valley Unit #1, the synthetic natural gas plant (aka, Dakota Gasification Company, DGC), and Antelope Valley Unit #2, respectively. At Hannover, 1985 and 1986 reflected these startups (1984 had only three months of data and shut down Dec. 31, 1986). Hannover was started up again Jan. 1, 1988; and the Beulah - North site began operation in 1999 and has tracked the Hannover data.

2.1.5 Network Changes

The SO_2 monitoring sites are shown in Figure 2. There were no significant changes made to the SO_2 monitoring network in 2013. There are no significant changes planned for 2014.

2.2 Oxides of Nitrogen

"Oxides of Nitrogen" (NO_x) is the term used to represent nitric oxide (NO) plus nitrogen dioxide (NO_2). NO_2 is formed when NO is oxidized in the ambient air. There is no ambient air quality standard for NO.

2.2.1 Point Sources

The major NO_x stationary point sources (>100 TPY) are listed in Table 3, along with their emissions as calculated from the most recent emission inventories reported to the Department.

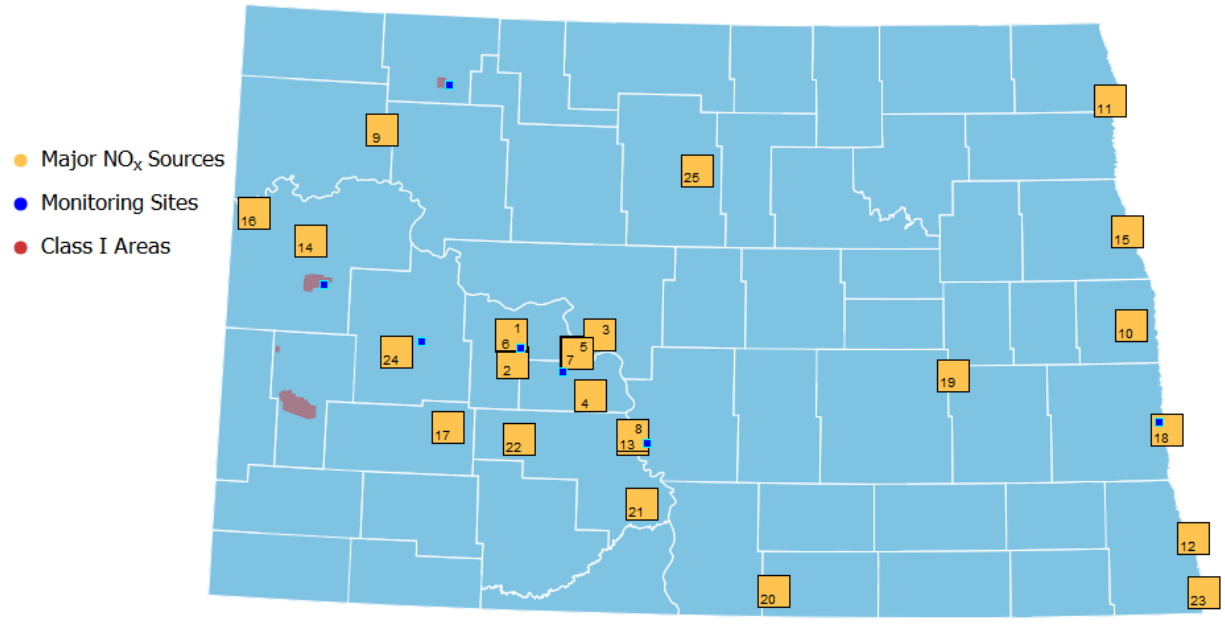

Figure 10. Major Oxides of Nitrogen Sources

Table 3. Major NO_x Sources (> 100 TPY)

#	Company	Source	Facility ID
1	Basin Electric Power Cooperative	Antelope Valley Station	3805700011
2	Ottertail Power Company	Coyote Station	3805700012
3	Great River Energy	Coal Creek Station	3805500017
4	Minnkota Power Cooperative, Inc.	Milton R. Young Station	3806500001
5	Basin Electric Power Cooperative	Leland Olds Station	3805700001
6	Dakota Gasification Company	Great Plains Synfuels Facility	3805700013
7	Great River Energy	Stanton Station	3805700004
8	Montana Dakota Utilities Company	RM Heskett Station	3805900001
9	Hess Corporation	Tioga Gas Plant	3810500004
10	American Crystal Sugar Company	Hillsboro Plant	3809700019
11	American Crystal Sugar Company	Drayton Plant	3806700003
12	Minn-Dak Farmers Cooperative	Wahpeton Plant	3807700026
13	Tesoro Refining and Marketing Company	Mandan Refinery	3805900003
14	Northern Border Pipeline Company	Compressor Station #4	3805300014
15	University of North Dakota	UND Heating Plant	3803500003
16	ONEOK Rockies Midstream, LLC	Fort Buford Compressor Station	3805300028
17	Red Trail Energy, LLC	Richardton Ethanol Plant	3808900058
18	North Dakota State University	NDSU Heating Plant	3801700005
19	Alliance Pipeline, LP	Wimbledon Compressor Station	3800300013
20	Northern Border Pipeline Company	Compressor Station #8	3805100001
21	Northern Border Pipeline Company	Compressor Station #7	3805900014
22	Northern Border Pipeline Company	Compressor Station #6	3805900007
23	Guardian Hankinson, LLC	Hankinson Renewable Energy, LLC	3807700113
24	Northern Border Pipeline Company	Compressor Station #5	3802500014
25	Alliance Pipeline, LP	Towner Compressor Station	3804900006

Figure 10 shows the approximate locations of these facilities (the numbers correspond to the site and source tables). The larger NO_x point sources in North Dakota are associated with coal-fired steam-powered electrical generating plants in the west-central portion of the state and large internal combustion compressor engines in the natural gas fields in the western part of the state. Figure 11 shows the contribution of point sources to the total NO_X emissions. The "Point Sources" category consists of utility boilers (power plant boilers) and oil and gas wells.

2.2.2 Area Sources

Another source of NO_X is automobile emissions. North Dakota has no significant urbanized areas

with respect to oxides of nitrogen; the entire population of the state is less than 1,000,000 people and the largest Metropolitan Statistical Area (MSA; includes Fargo) has a population of 223,490 (2013). Figure 11 shows the contribution of "Other Point Sources" and "Utility Boilers." The "Other Point Sources" category consists of coal gasification, oil refineries, natural gas processing plants and agricultural processing plants.

2.2.3 Monitoring Network

The Department currently operates seven $NO/NO_2/NO_x$ analyzers. From Figure 10 it can be seen that $NO/NO_2/NO_x$ analyzers, except for Dunn Center and TRNP - NU, are well placed with respect to the major NO_x sources: TRNP - NU is defined as a background and long-range transport/welfare-related site.

2.2.4 Network Analysis

Figures 12 and 13 show the 2013 NO_2 monitoring results in comparison to the 1-hour and annual NO_2 AAQS, respectively. Numbers above the bars indicate monitored concentrations.

Nine of the ten largest NO_X sources in the state are within 45 miles of the Beulah and Hannover monitoring sites. Figure 14 shows the annual average concentrations for the Department-operated sites for 1980 - 2013.

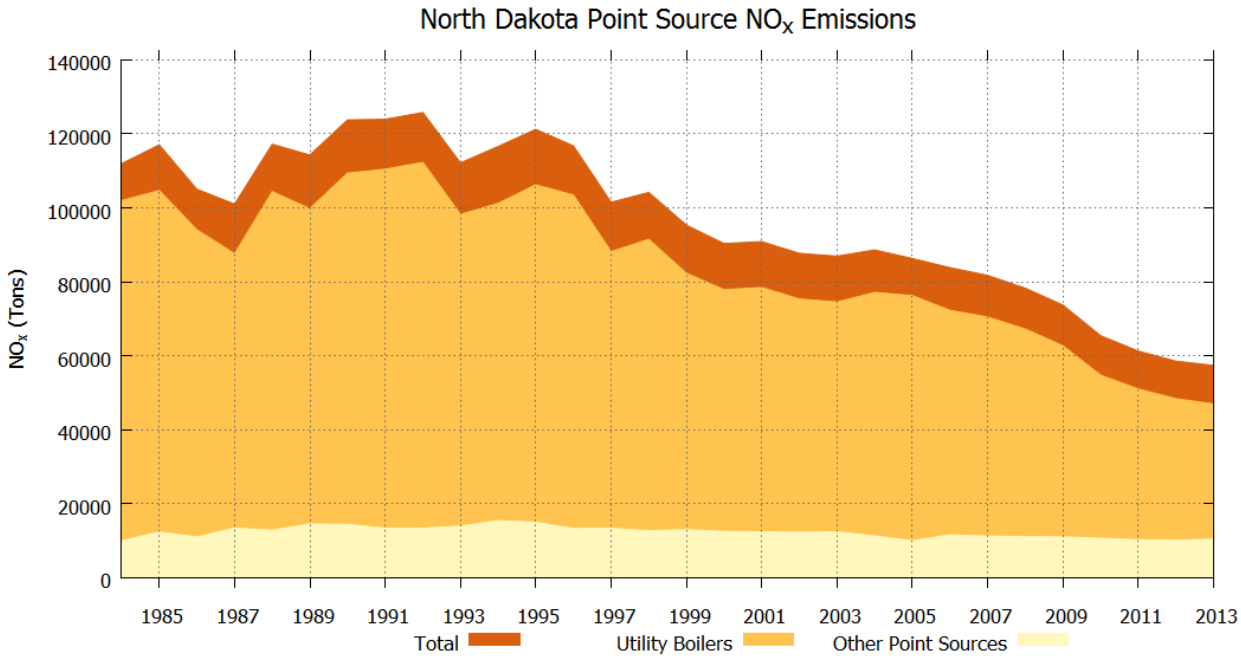

Figure 11. Annual Oxides of Nitrogen Emissions

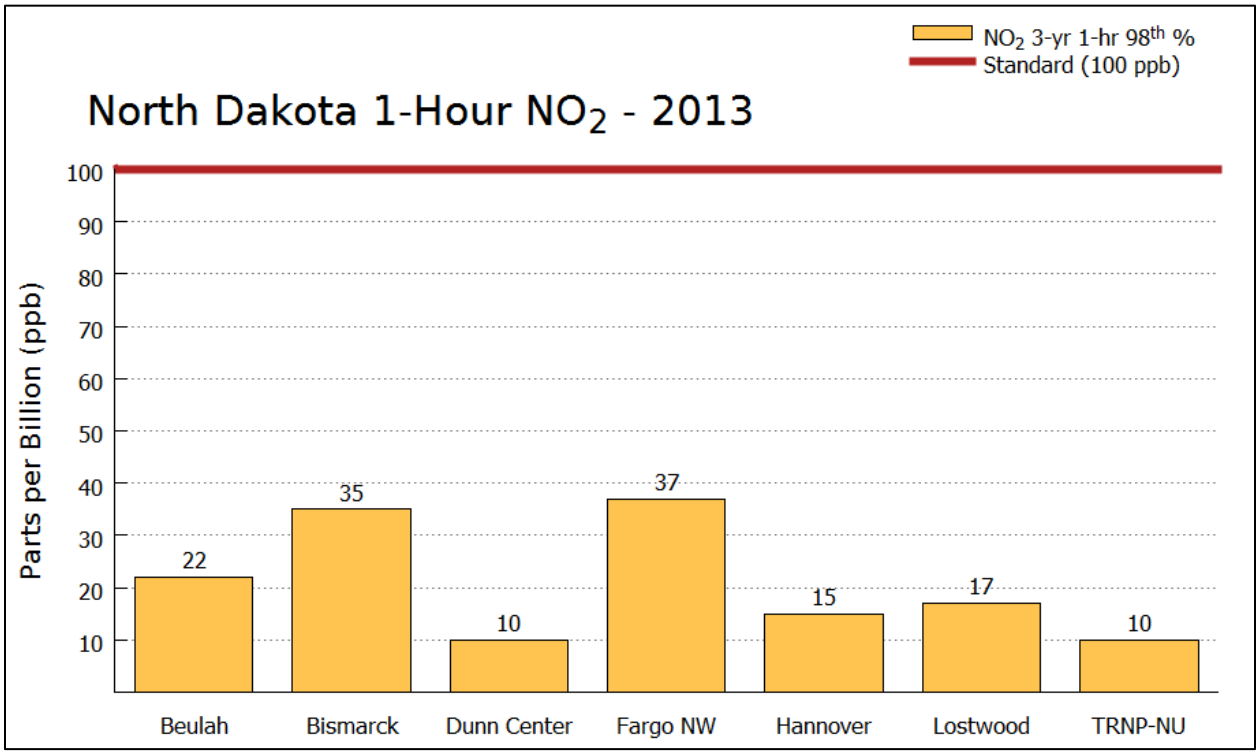

Figure 12. NO_2 Concentrations Compared to the 1-hour Standard

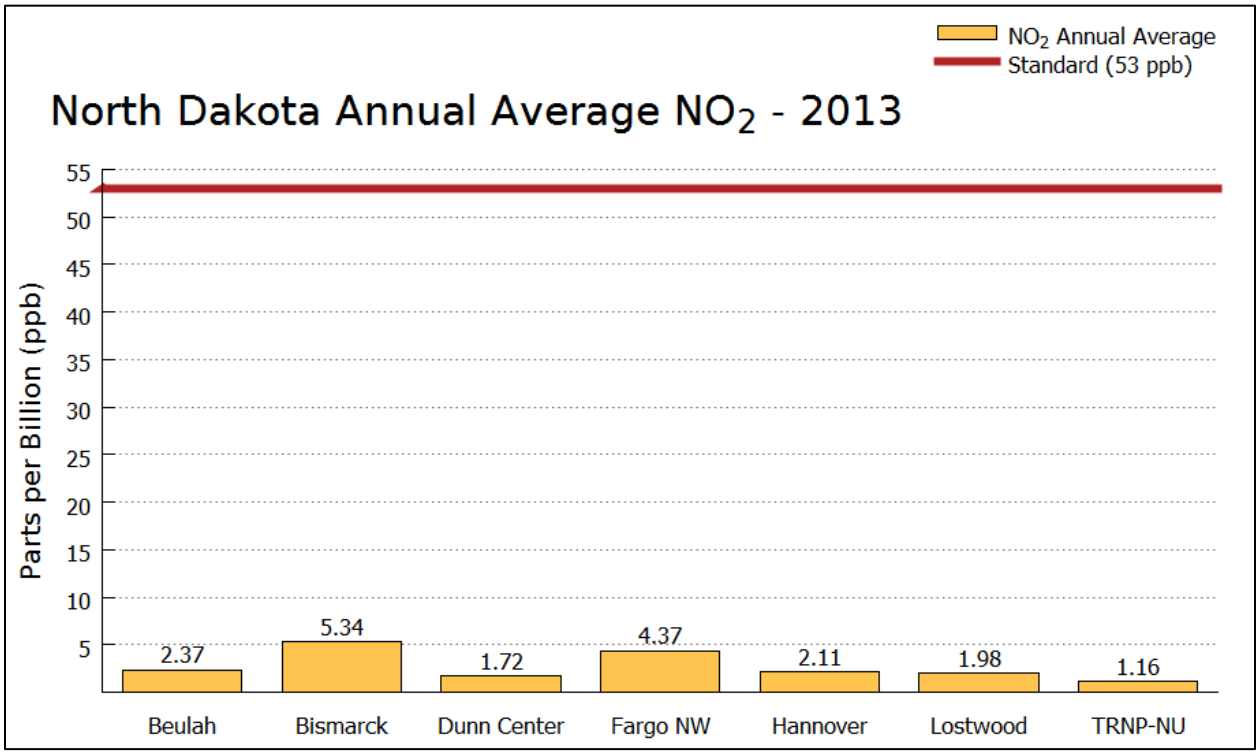

Figure 13. NO_2 Concentrations Compared to the Annual Standard

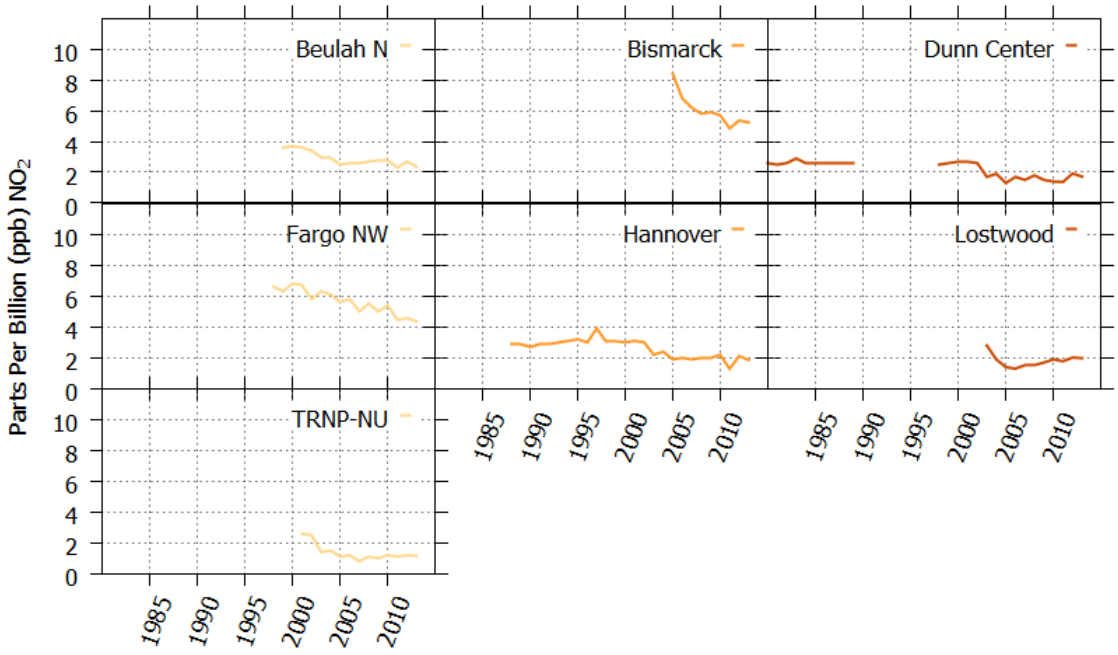

Figure 14. NO_2 Annual Average Concentrations

2.2.5 Network Changes

There were no significant changes made to the NO_x network in 2013. There are no changes planned for 2014.

2.3 Ozone

Unlike most other pollutants, ozone (O_3) is not emitted directly into the atmosphere but results from a complex photochemical reaction between volatile organic compounds (VOC), NO_x, and solar radiation. Both VOC and NO_x are emitted directly into the atmosphere. Since solar radiation is a major factor in O_3 production, O_3 concentrations are known to peak in summer months. 40 CFR 58 defines the O_3 monitoring season for North Dakota as May 1 through September 30.

2.3.1 Point Sources

The major stationary point sources (> 100 TPY) of VOC as calculated from the most recent emission inventories reported to the Department are listed in Table 4. Figure 15 shows the approximate locations of these facilities.

2.3.2 Area Sources

Point sources contribute only part of the total VOC and NO_x emissions. The remaining emissions can be attributed to oilfield-related activities and mobile sources in urban areas. The EPA has specified design criteria for selecting locations for O_3 as any urbanized area having a population of 50,000 to less than 350,000. North Dakota has three urbanized areas (Bismarck; Fargo, ND-Moorhead, MN; and Grand Forks) populated enough to qualify for population-oriented monitoring. However, to require monitoring, the 4th highest 8-hour average concentration must be at least 68 parts per billion. As can be seen from Figure 16 (numbers above the bars indicate concentration), none of the O_3 monitors at SLAMS sites reach this threshold.

2.3.3 Monitoring Network

The Department currently has nine continuous ozone analyzers in operation (Figure 15). Figure 16 presents the 2013 8-hour data summaries. The Department has installed a chemiluminescence ozone analyzer at the Lostwood site to determine the cause(s) of elevated readings occurring in the UV photometric analyzer located there. The elevated readings have since been deemed to be caused by interference in the UV photometric analyzer that does not register in the chemiluminescence based machine. The Department is researching the feasibility of transitioning to all chemiluminescence based analyzers.

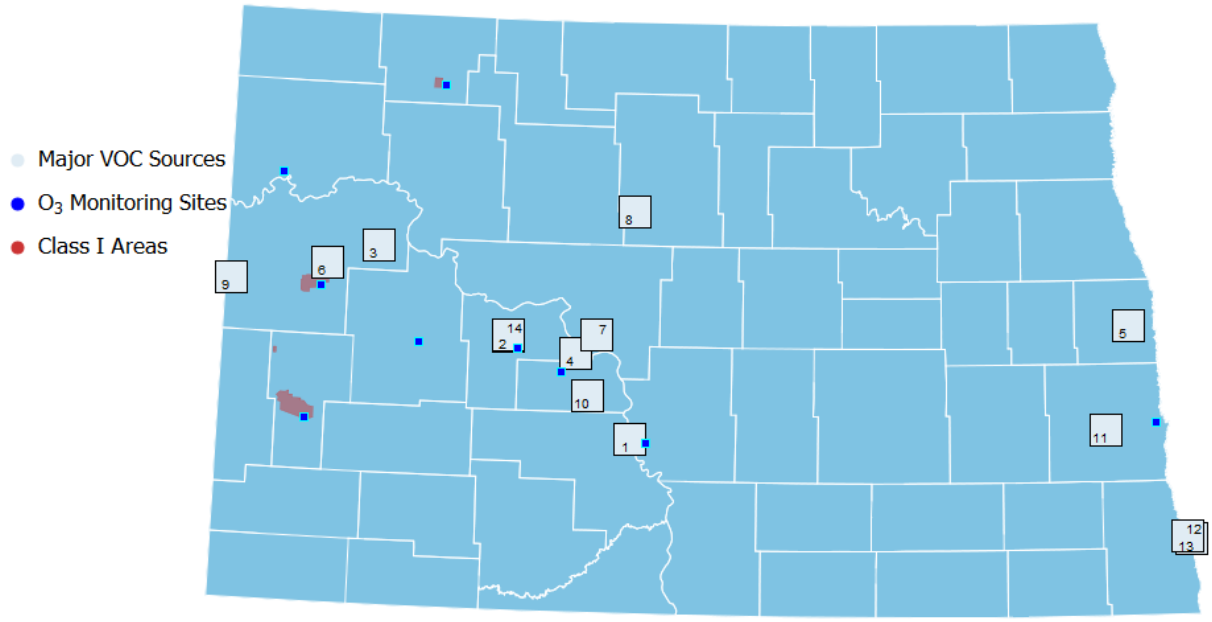

Figure 15. Major VOC Sources

Table 4. Major VOC Sources (> 100 TPY)

#	Company	Source	Facility ID
1	Tesoro Refining and Marketing Company	Mandan Refinery	3805900003
2	Dakota Gasification Company	Great Plains Synfuels Facility	3805700013
3	Arrow Midstream Holdings, LLC	Central Delivery Facility	3805300101
4	Basin Electric Power Cooperative	Leland Olds Station	3805700001
5	American Crystal Sugar Company	Hillsboro Plant	3809700019
6	Targa Badlands, LLC	Little Missouri Gas Plant	3805300112
7	Great River Energy	Coal Creek Station	3805500017
8	ADM Processing	Velva Facility	3804900005
9	ONEOK Rockies Midstream, LLC	Grasslands Gas Plant	3805300023
10	Minnkota Power Cooperative, Inc.	Milton R. Young Station	3806500001
11	Tharaldson Ethanol Plant I, LLC	Tharaldson Ethanol Plant I, LLC	3801700134
12	Cargill Corn Milling	Wahpeton Facility	3807700110
13	Minn-Dak Farmers Cooperative	Wahpeton Plant	3807700026
14	Basin Electric Power Cooperative	Antelope Valley Station	3805700011

2.3.4 Network Analysis

Only three of the eight monitoring sites are in an area not significantly influenced by VOC sources (see Figure 15). Beulah and Hannover are within 45 miles of five of the 12 major VOC sources in the state. Lostwood NWR and TRNP - NU are located in Class I areas surrounded by oil fields. Bismarck Residential and Fargo NW are located in population centers and influenced by city traffic. Dunn Center is located in a rural area surrounded by crop land. With this diversity of site locations and influences, one would expect to see a diversity of ozone concentrations. On the contrary, Figure 16 shows a striking similarity among the 4th maximum 8-hour annual concentrations. Since 1980, only four 8-hour averages have been higher than 70 ppb. Another, even stronger, indication of a uniform ozone distribution is the 8-hour concentrations: for all sites, the difference among the 4th highest average is 3 ppb (see Figure 16). Figure 17 shows the annual average concentrations for the Department-operated sites for 1980 - 2013.

2.3.5 Network Changes

The Department intends to install a chemiluminescence based ozone analyzer at the Beulah site. This will operate alongside the existing continuous ozone analyzer which is present at the site.

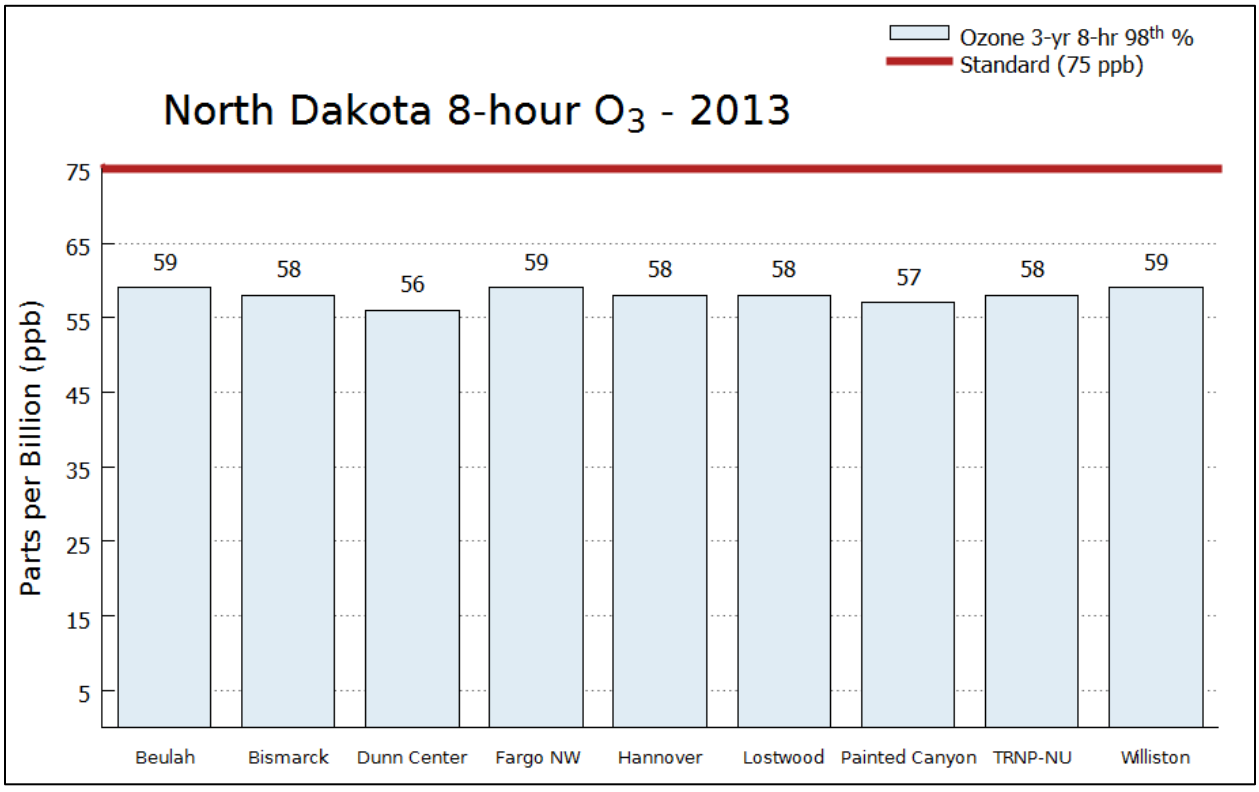

Figure 16. Ozone Concentrations Compared to the 8-hour Standard

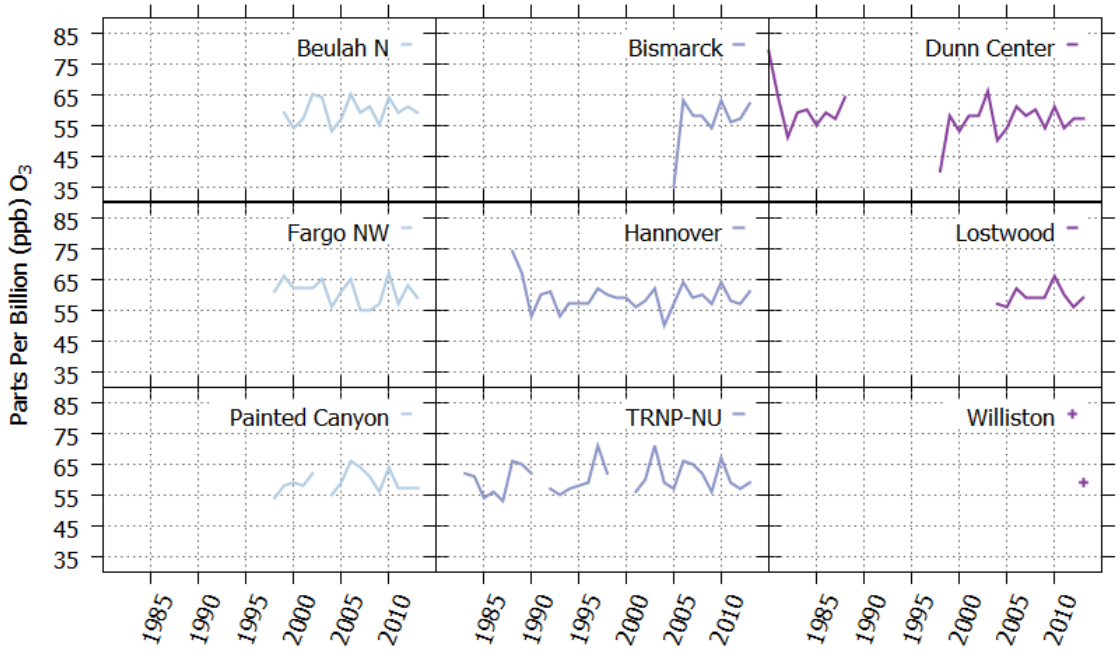

Figure 17. Annual 4th Highest 8-HR Ozone Concentrations
(Current Standard is 75 ppb)

2.4 Inhalable Particulates

The inhalable particulate standards are designed to protect against those particulates that can be inhaled deep into the lungs and cause respiratory problems. The major designation for particulates is PM. Within this designation there are two subgroups: PM_{10} and $PM_{2.5}$. The PM_{10} particulates have an aerodynamic diameter less than or equal to a nominal 10 microns, while the $PM_{2.5}$ particulates have an aerodynamic diameter less than or equal to a nominal 2.5 microns. The EPA has also defined PM subgroup of particles called "coarse fraction," designated $PM_{10\text{-}2.5}$, with an aerodynamic diameter between 10 and 2.5 microns. Specific health effects have been identified for both the $PM_{10\text{-}2.5}$ and $PM_{2.5}$ groups.

2.4.1 Sources

The major PM_{10} point sources (>100 TPY) are listed in Table 5. Figure 18 shows the approximate locations of these facilities (the numbers correspond to the site and source tables). Most of these sources are large coal-fired facilities, and the PM_{10} particles are part of the boiler stack emissions; however, some of the emissions are the result of processing operations. Not included in this table are sources of fugitive dust such as coal mines, gravel pits, agricultural fields and unpaved roads. Figure 19 shows the contribution of point sources to the total PM_{10} emissions. The "Utility Boilers" category consists of power plant boilers. The "Other Point Sources" category consists of coal gasification, oil

refineries, natural gas processing plants and agricultural processing plants.

2.4.2 Monitoring Network

The Department operated eight continuous PM_{10} analyzer sites, four manual $PM_{2.5}$ sites, eight FEM continuous $PM_{2.5}$ analyzer sites, and one speciation sampler site.

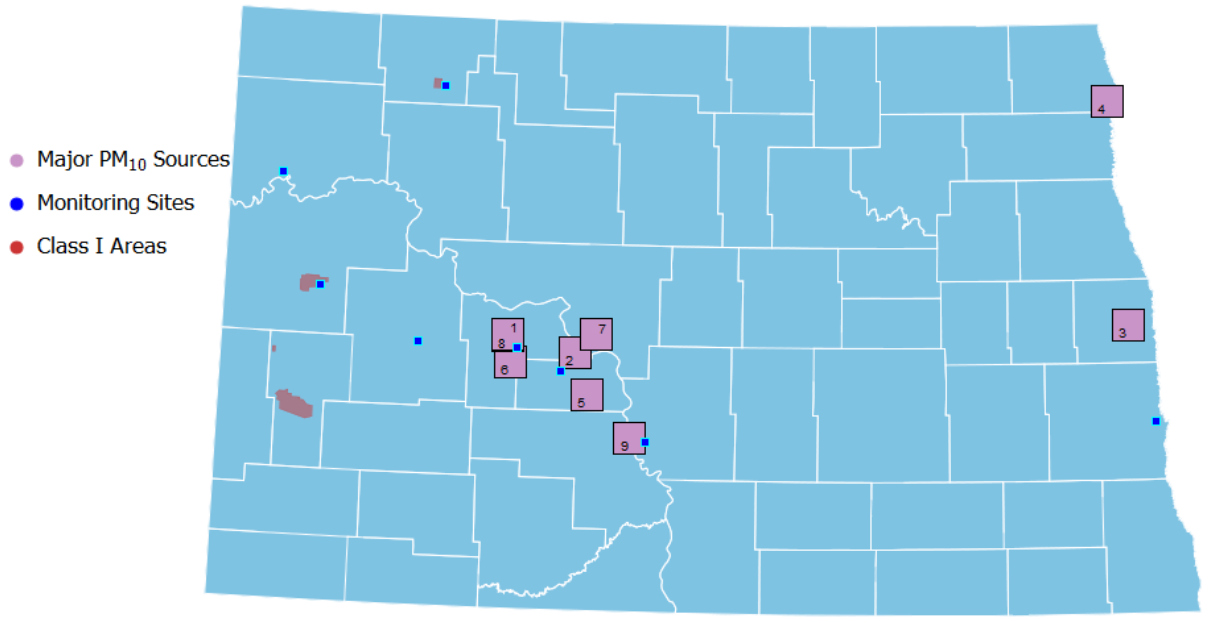

Figure 18. Major PM_{10} Sources

Table 5. Major PM_{10} Sources (> 100 TPY)

#	COMPANY	SOURCE	Facility ID
1	Basin Electric Power Cooperative	Antelope Valley Station	3805700011
2	Basin Electric Power Cooperative	Leland Olds Station	3805700001
3	American Crystal Sugar Company	Hillsboro Plant	3809700019
4	American Crystal Sugar Company	Drayton Plant	3806700003
5	Minnkota Power Cooperative, Inc.	Milton R. Young Station	3806500001
6	Otter Tail Power Company	Coyote Station	3805700012
7	Great River Energy	Coal Creek Station	3805500017
8	Dakota Gasification Company	Great Plains Synfuels Facility	3805700013
9	Tesoro Refining and Marketing Company	Mandan Refinery	3805900003

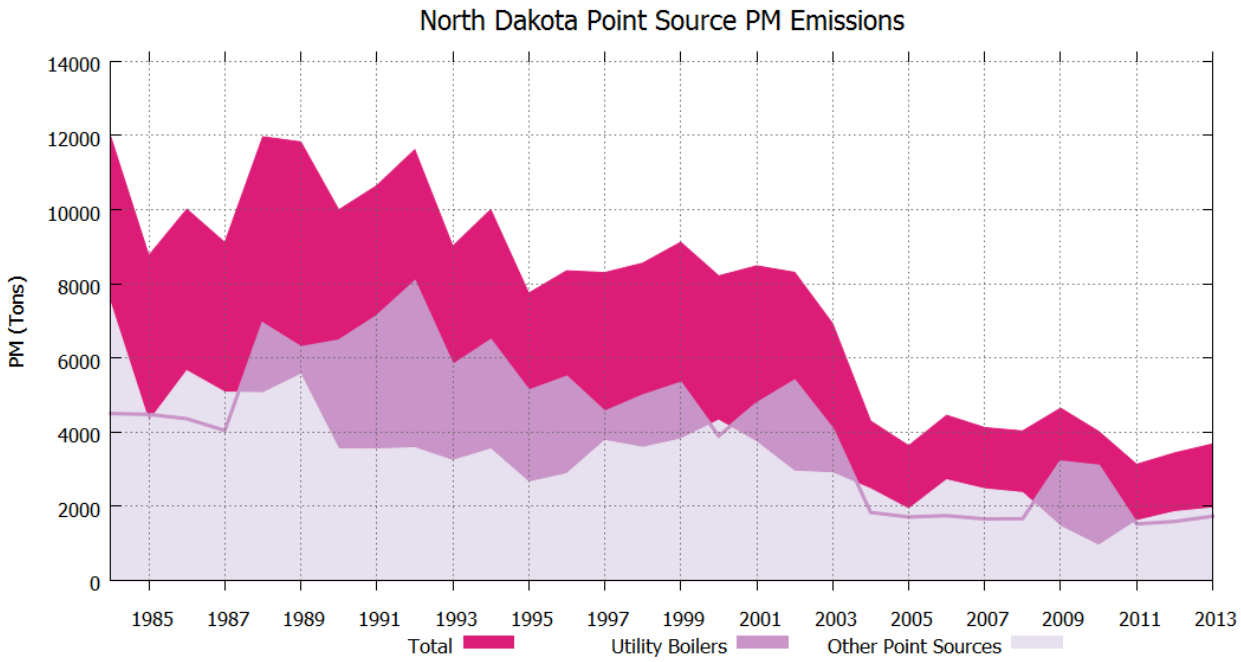

Figure 19. Annual PM Emissions

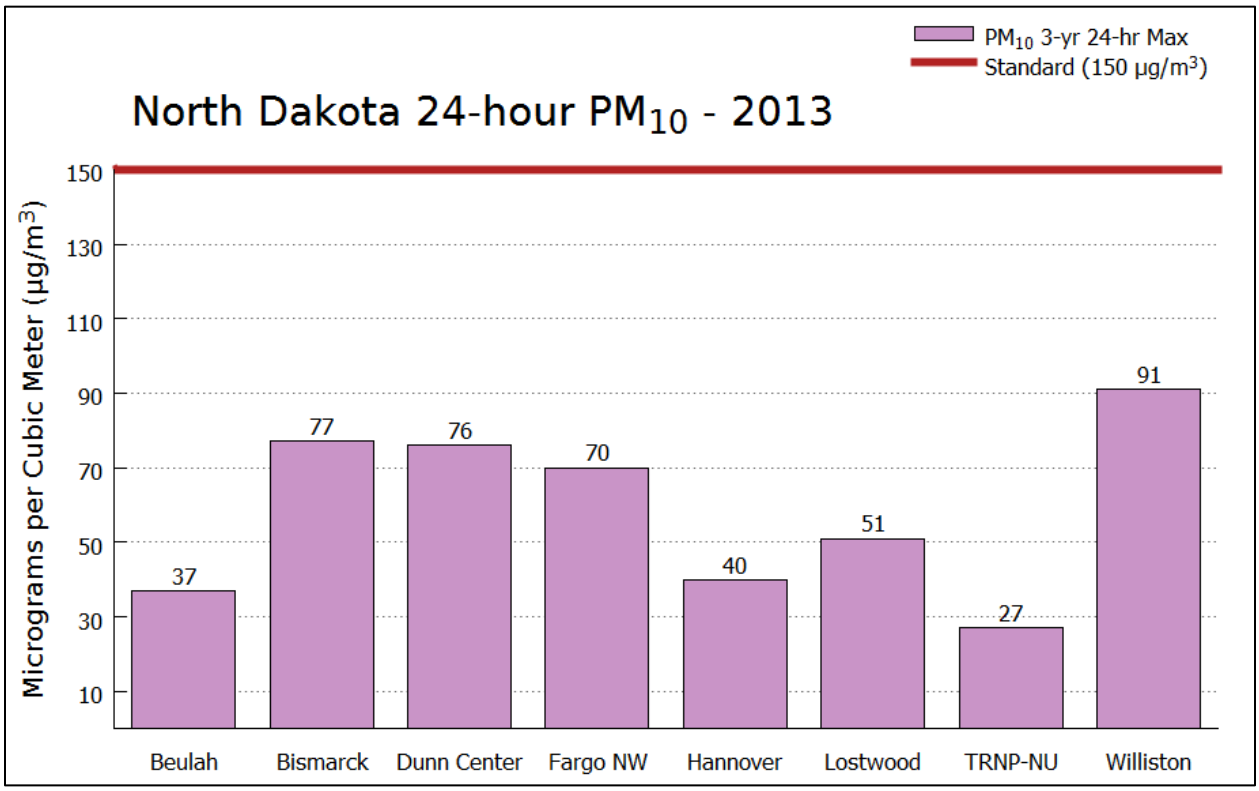

Figure 20. PM_{10} Concentrations Compared to the 24-hour Standard

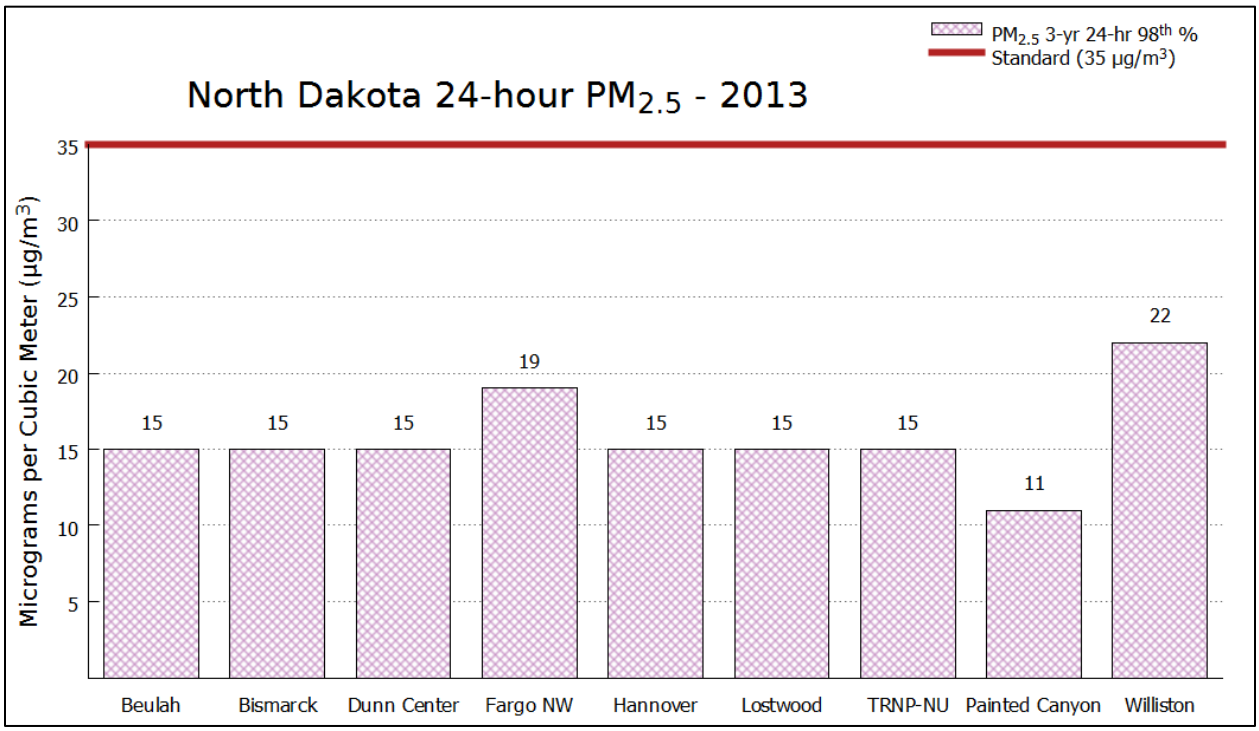

Figure 21. $PM_{2.5}$ Concentrations Compared to the 24-hour Standard

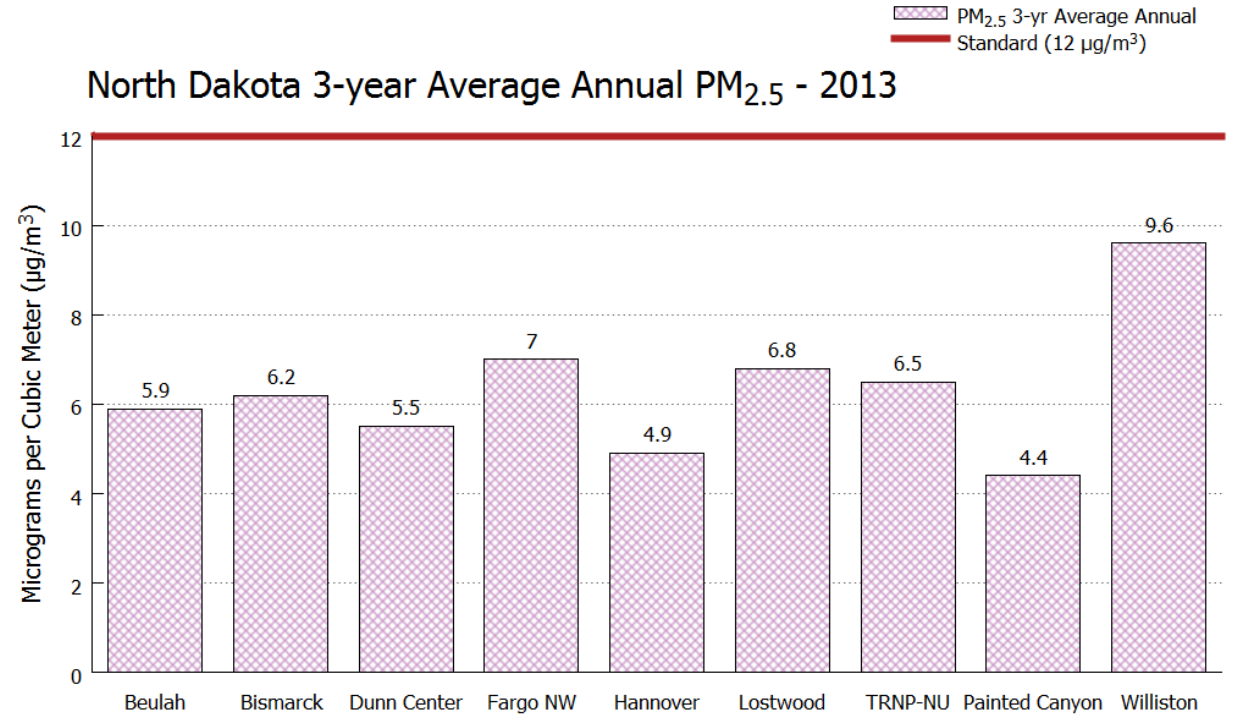

Figure 22. $PM_{2.5}$ Concentrations Compared to the Annual Standard

2.4.3 PM_{10} Network Analysis

PM_{10} and smaller particles are of concern mainly because of their health effects. Continuous PM_{10} analyzers are used with the continuous $PM_{2.5}$ analyzers to determine the $PM_{10-2.5}$ fraction. The data also are compared to both the state and federal ambient air quality standards. Figure 20 shows the 2013 PM_{10} particulate monitoring results in comparison to the 24-hour AAQS. Numbers above the bars indicate monitored concentrations.

2.4.4 $PM_{2.5}$ Network

The manual $PM_{2.5}$ network currently has four sites: Bismarck, Beulah, Fargo and Painted Canyon. Bismarck and Fargo operate on a 1-in-3 day schedule, while Beulah and Painted Canyon operate on a 1-in-6 day schedule. FEM Continuous $PM_{2.5}$ analyzers have been installed at all sites in the network. Figures 21 and 22 show the 2013 $PM_{2.5}$ particulate monitoring results in comparison to the 24-hour and annual standards. Numbers above the bars indicate monitored concentrations.

2.4.5 Speciation Network

One speciation sampler is installed as a National Trends Network sampler in Fargo. The data collected by this sampler are added to the AQS database by an EPA contractor (RTI).

2.4.6 Network Changes

The Painted Canyon site located in the south unit of Theodore Roosevelt National Park (operated in partnership with the NPS), currently monitors continuous $PM_{2.5}$ using a $PM_{2.5}$TEOM which has not been designated as a Federal Equivalent Method (FEM). This unit is owned by the NPS and maintained by the Department. After consulting with the NPS, the Department intends to replace this unit with a Department owned FEM $PM_{2.5}$ Bata Attenuation Monitor (BAM).

2.5 Carbon Monoxide

Many large urban areas in the United States have problems attaining the AAQS for carbon monoxide (CO) where the primary source of CO is automobiles. North Dakota does not have sufficient population with the corresponding traffic congestion and geographical/ meteorological conditions to create significant CO emission problems. However, there are several stationary sources in the state that emit more than 100 TPY of CO.

2.5.1 Sources

The major stationary CO sources (>100 TPY) are listed in Table 6. Figure 23 shows the approximate locations of these facilities (the numbers correspond to the site and source tables). Most of these sources are the same sources that are the major emitters of SO_2 and NO_x. However, the corresponding CO levels from these sources are considerably lower.

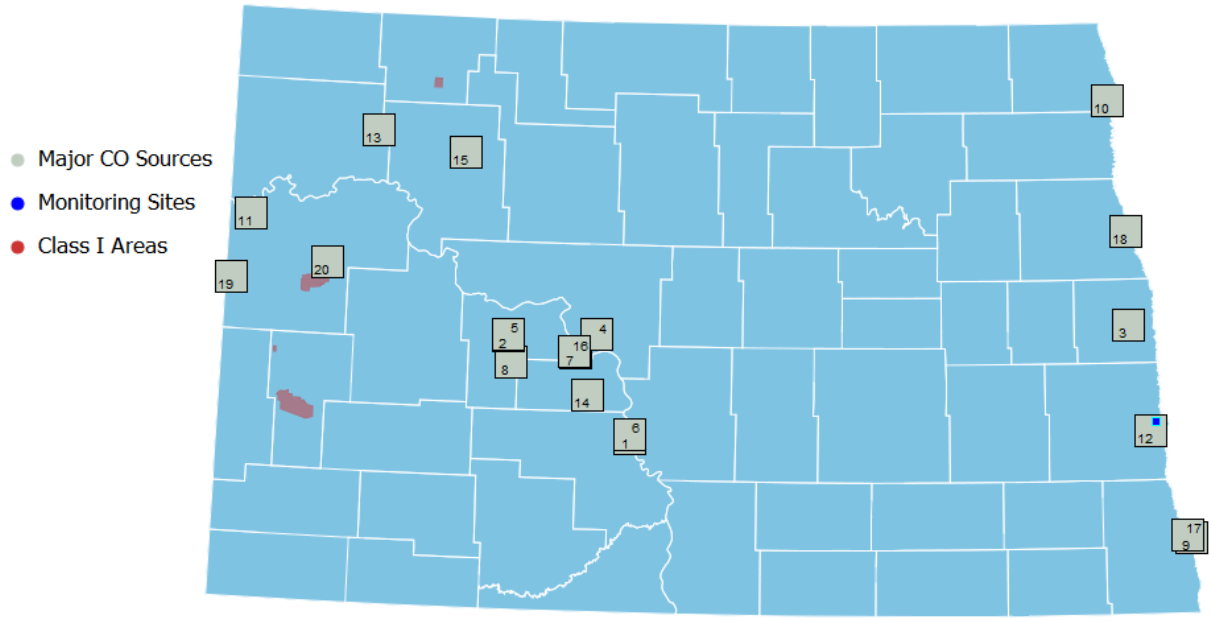

Figure 23. Major CO Sources

Table 6. Major CO Sources (> 100 TPY)

#	COMPANY	SOURCE	Facility ID
1	Dakota Gasification Company	Great Plains Synfuels Facility	3805700013
2	Great River Energy	Coal Creek Station	3805500017
3	American Crystal Sugar Company	Hillsboro Plant	3809700019
4	Basin Electric Power Cooperative	Antelope Valley Station	3805700011
5	Tesoro Refining and Marketing Company	Mandan Refinery	3805900003
6	Montana Dakota Utilities Company	RM Heskett Station	3805900001
7	Minnkota Power Cooperative, Inc.	Milton R. Young Station	3806500020
8	Basin Electric Power Cooperative	Leland Olds Station	3805700001
9	Otter Tail Power Company	Coyote Station	3805700012
10	American Crystal Sugar Company	Drayton Plant	3806700003
11	Minn-Dak Farmers Cooperative	Wahpeton Plant	3807700026
12	ONEOK Rockies Midstream, L.L.C.	Fort Buford Compressor Station	3805300028
13	Cargill, Inc.	Cargill Oilseeds Processing	3801700066
14	Hess Corporation	Tioga Gas Plant	3810500004
15	Great River Energy	Stanton Station	3805700004
16	Cargill Corn Milling	Wahpeton Facility	3807700110
17	University of North Dakota	UND Heating Plant	3803500003

2.5.2 Monitoring Network

Carbon monoxide monitoring in North Dakota was terminated March 31, 1994, after operating five years. The conclusion drawn from the data was that North Dakota did not have a CO problem. A summary report of the data collected at the West Acres Shopping Mall was drafted for the Fargo-Moorhead Council of Governments for use in its traffic planning program. The Department operates a Trace Level CO analyzer at the Fargo NW site in order to comply with the NCore requirements. Figure 24 shows CO concentrations at Fargo in comparison to the 1- and 8-hour AAQS.

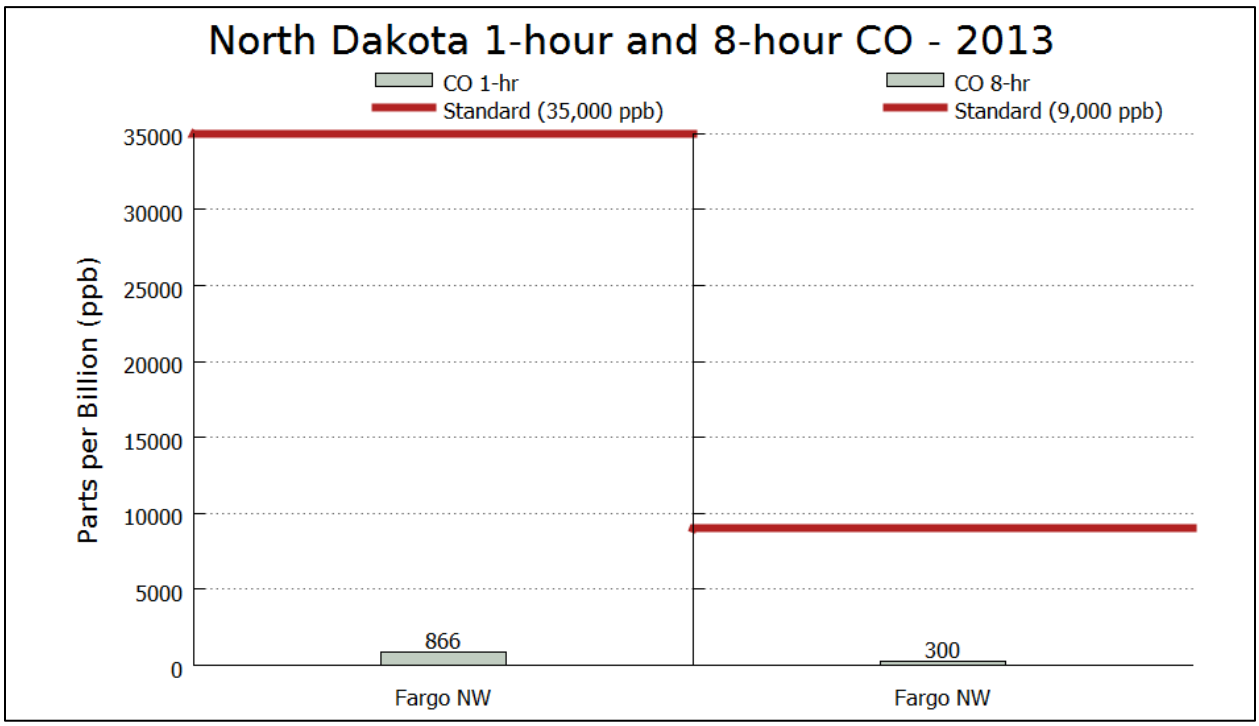

Figure 24. CO Concentrations Compared to the 1-hour and 8-hour Standards

2.5.3 Network Changes

There were no significant changes made to the CO network in 2013. There are no changes planned for 2014.

2.6 Lead

Through prior sampling efforts, the Department has determined that the state has low lead concentrations and no significant lead sources. This determination, coupled with the federal lead monitoring requirements, resulted in the state lead monitoring program ending effective Dec. 31, 1983. Along with the low monitored concentrations, lead has been completely removed from gasoline since lead monitoring began in 1979.

2.6.1 Network Changes

There were no significant changes made to the lead monitoring network in 2013. There are no changes planned for 2014.

2.7 Hydrogen Sulfide

Although no Federal Ambient Air Quality Standard exists for hydrogen sulfide (H_2S), the state of North Dakota has developed H_2S standards in response to historically high petroleum sulfur content (during the 1980s in particular) and associated high H_2S. Emissions have been reduced significantly over time as production from these older sites has declined. The Bakken formation, the focus of the most recent oil and gas activity in the state, has been found to result in very low H_2S emissions when compared to legacy (non-Bakken) operations.

2.7.1 Sources

H_2S emissions of concern stems almost totally from the oil and gas operations in the western part of the state. Flares and treater stacks associated with oil/gas wells, oil storage tanks, compressor stations, pipeline risers, and natural gas processing plants are potential H_2S emission sources.

2.7.2 Monitoring Network

Currently there are no state H_2S monitoring sites.

2.7.3 Network Changes

There were no significant changes made to the H_2S network in 2013. There are no changes planned for 2014.

2.8 Air Toxics

Currently there are no state or federal air toxics monitoring sites.

2.8.1 Sources

The major air toxics sources are listed in Table 7 and Figure 25 shows the approximate locations of these facilities (the numbers correspond to the source table).

2.8.2 Monitoring Network

Currently there are no state air toxics monitoring sites. The historic raw data and associated summaries are available in EPA's Air Quality System.

2.8.3 Network Changes

There were no significant changes made to the Air Toxics network in 2013. There are no changes planned for 2014.

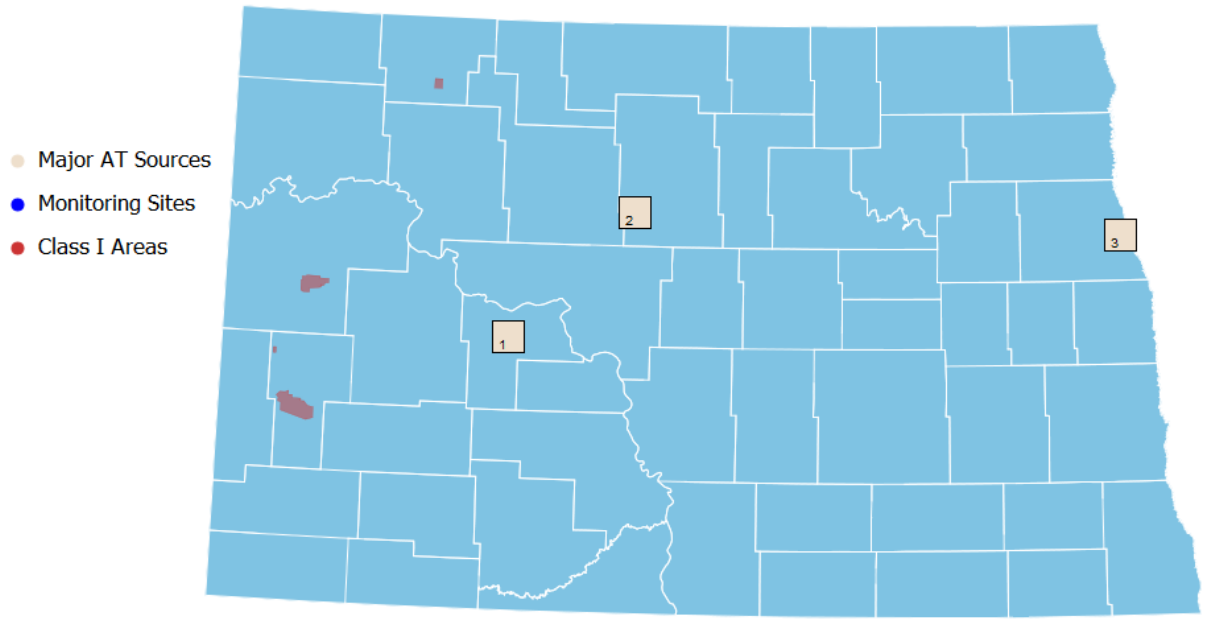

Figure 25. Major Air Toxics Sources

Table 7. Major Air Toxics Sources (> 100 TPY)

#	COMPANY	SOURCE	Facility ID
1	Dakota Gasification Company	Great Plains Synfuels Facility	3805700013
2	ADM Processing	Velva Facility	3804900005
3	LM Wind Power Blades	Grand Forks Facility	3803500067

3.0 SUMMARY AND CONCLUSIONS

The North Dakota Ambient Air Quality Monitoring Network is designed to monitor those air pollutants that demonstrate the greatest potential for deteriorating the air quality of North Dakota. Due to a greater number of pollution-producing sources in the western part of the state (primarily associated with the energy producing industries) the greatest percentage of the network is located in the western part of the State.

3.1 Sulfur Dioxide (SO_2)

Neither the state nor federal standards were exceeded at any state operated monitoring site. The

maximum concentrations were as follows: 3-year average 1-hour 99th percentile – 39 ppb; 24-hour – 8.5 ppb; annual 0.92 ppb.

3.2 Nitrogen Dioxide (NO_2)

Neither the state nor federal standards were exceeded at any of the monitoring sites. The maximum concentrations were as follows: Three year average of the 98th percentile 1-hour average concentrations – 37 ppb; annual – 5.34 ppb.

3.3 Ozone (O_3)

Neither the state nor federal standard was exceeded during the year. The maximum fourth-highest 8-hour concentration was 59 ppb. The Department intends to install a chemiluminescence monitor at the Beulah site.

3.4 Inhalable Particulates

Neither the state nor federal PM_{10} standards were exceeded during the year. The maximum concentration was: 24-hour – 91.0 µg/m^3.

The federal $PM_{2.5}$ standards were not exceeded during the year. The maximum concentrations are as follows: 24-hour – 22 µg/m^3; annual – 9.6 µg/m^3. The Department intends to replace the non-equivalent $PM_{2.5}$ TEOM with a FEM $PM_{2.5}$ BAM.

3.5 Carbon Monoxide (CO)

Neither the state nor federal standards were exceeded at the monitoring site. The maximum concentrations are as follows: 1-hour – 866 ppb; 8-hour – 300 ppb.

3.6 Lead

No monitoring was conducted.

3.7 Hydrogen Sulfide

No monitoring was conducted.

3.8 Air Toxics

No monitoring was conducted.

Appendix A AAQM Site Descriptions

This appendix includes site descriptions and information relating to State operated analyzers and samplers onsite. Please note that all sites meet the siting criteria specified in 40 CFR 58, Appendices A, C, D, and E. When selecting a site, five factors are considered: modeling results, landowner permission, power availability, year-round access to the site, and prevailing wind direction.

The sites addressed in this report are only the current active sites. A complete list of sites and all monitoring that has been conducted at each site can be found in the AQS system at www.epa.gov/air/data/aqsdb.html. Also available at this site are air quality summary data and emissions data.

Map images in this appendix are from the North Dakota Geographic Information Systems (GIS) Hub site at http://www.nd.gov/gis.

Site Name: Beulah – North

Station Type: SLAMS (required)
AQS#: 38-057-0004 **MSA:** 0000
Address: 6024 Highway 200
Beulah, ND
Latitude: +47.298611 **Longitude:** -101.766944

Site Description: This is one of three key sites in the Department's ambient monitoring network to meet the six required monitoring objectives. When this site was established, it was decided to enhance the site to include ammonia, solar radiation and delta temperature to support air quality dispersion modeling. This site is one of the required $PM_{2.5}$ monitoring sites for North Dakota

Gas/Particulate parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Monitoring Objective	Spatial Scale
Sulfur Dioxide	Instrumental Pulsed Florescent	Continuous	Population Exposure	Urban
Nitrogen Dioxide	Instrumental Chemiluminescence	Continuous	Population Exposure	Urban
Ozone	Instrumental Ultra Violet	Continuous	Population Exposure	Urban
Ammonia	Instrumental Chemiluminescence	Continuous	General Background	Regional
$PM_{2.5}$	24-hour Gravimetric	1/6	Population Exposure	Urban
$PM_{2.5}$	FEM $PM_{2.5}$ BAM	Continuous	Population Exposure	Urban
PM_{10}	PM_{10} TEOM Gravimetric 50° Celsius	Continuous	Population Exposure	Urban

Meteorological parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Tower Height	Spatial Scale
Wind Speed	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Wind Direction	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Ambient Temperature	Elec. or Mach Avg.	Continuous	10 meters	Urban
Delta Temperature	Elec. or Mach Avg.	Continuous	10 - 2 meters	Urban
Ambient Pressure	Barometric Pressure Transducer	Continuous	6 meters	Urban
Solar Radiation	Pyranometer	Continuous	2 meters	Urban

There are no plans to move or remove this site. The Department intends to co-locate an Instrumental Chemiluminescence ozone monitor at this site with the existing Instrumental Ultra Violet unit.

Site Pictures: **Beulah North**

North

South

East

West

Looking Northeast

Looking Northwest

Beulah - North

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0 0.15 0.3 0.6 mi
0 0.25 0.5 1 km
North Dakota state agencies and the ND GIS Hub

Site Name: Bismarck Residential

Station Type: SLAMS
AQS#: 38-015-0003 **MSA:** 1010
Address: 1810 N 16th Street
Bismarck, ND
Latitude: +46.825425 **Longitude:** -100.768210

Site Description: This site is located in the second largest metropolitan area in the state. When two special purpose sites in Mandan were closed, this site was expanded from a particulates-only site to be a full site for gases, continuous particulates (inc. ambient pressure) and the basic meteorological parameters (wind speed, wind direction and temperature). Another key role this site plays is to field test new types of equipment and procedures isolated from the equipment used to report data to AQS.

Gas/Particulate parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Monitoring Objective	Spatial Scale
Sulfur Dioxide	Instrumental Pulsed Florescent	Continuous	Population Exposure	Urban
Nitrogen Dioxide	Instrumental Chemiluminescence	Continuous	Population Exposure	Urban
Ozone	Instrumental Ultra Violet	Continuous	Population Exposure	Urban
$PM_{2.5}$	24-hour Gravimetric	1/3	Population Exposure	Urban
$PM_{2.5}$	FEM $PM_{2.5}$ BAM	Continuous	Population Exposure	Urban
PM_{10}	PM_{10} BAM	Continuous	Population Exposure	Urban

Meteorological parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Tower Height	Spatial Scale
Wind Speed	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Wind Direction	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Ambient Temperature	Elec. or Mach Avg.	Continuous	10 meters	Urban
Ambient Pressure	Barometric Pressure Transducer	Continuous	6 meters	Urban

There are no plans to move or remove this site.

Site Pictures: **Bismarck Residential**

North

East

West

Looking Northwest

South

Looking Southeast

Bismarck Residential

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0 0.25 0.5 1 km
North Dakota state agencies and the ND GIS Hub

Site Name: Dunn Center

Station Type: SLAMS
AQS#: 38-025-0003 **MSA:** 0000
Address: 9610 Seventh Street SW
Dunn Center, ND
Latitude: +47.313200 **Longitude:** -102.527300

Site Description: This site is located about midway between the oil development all along the North Dakota – Montana border and the seven coal conversion facilities to the east. The importance lies in the ability to monitor the transport of sulfur dioxide, nitrogen dioxide, and $PM_{2.5}$ between these two areas. Also, this is a key site used in dispersion model calibration and validation.

Gas/Particulate parameters

Parameter	Sampling & Analysis Method	Operating Schedule	Monitoring Objective	Spatial Scale
Sulfur Dioxide	Instrumental Pulsed Florescent	Continuous	General/Background	Urban
Nitrogen Dioxide	Instrumental Chemiluminescence	Continuous	General/Background	Urban
Ozone	Instrumental Ultra Violet	Continuous	General/Background	Urban
$PM_{2.5}$	FEM $PM_{2.5}$ BAM	Continuous	General/Background	Urban
PM_{10}	PM_{10} TEOM Gravimetric 50° Celsius	Continuous	General/Background	Urban

Meteorological parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Tower Height	Spatial Scale
Wind Speed	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Wind Direction	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Ambient Temperature	Elec. or Mach Avg.	Continuous	10 meters	Urban
Delta Temperature	Elec. or Mach Avg.	Continuous	10 - 2 meters	Urban
Ambient Pressure	Barometric Pressure Transducer	Continuous	6 meters	Urban
Solar Radiation	Pyranometer	Continuous	2 meters	Urban

There are no plans to move or remove this site.

Site Pictures: **Dunn Center**

North

West

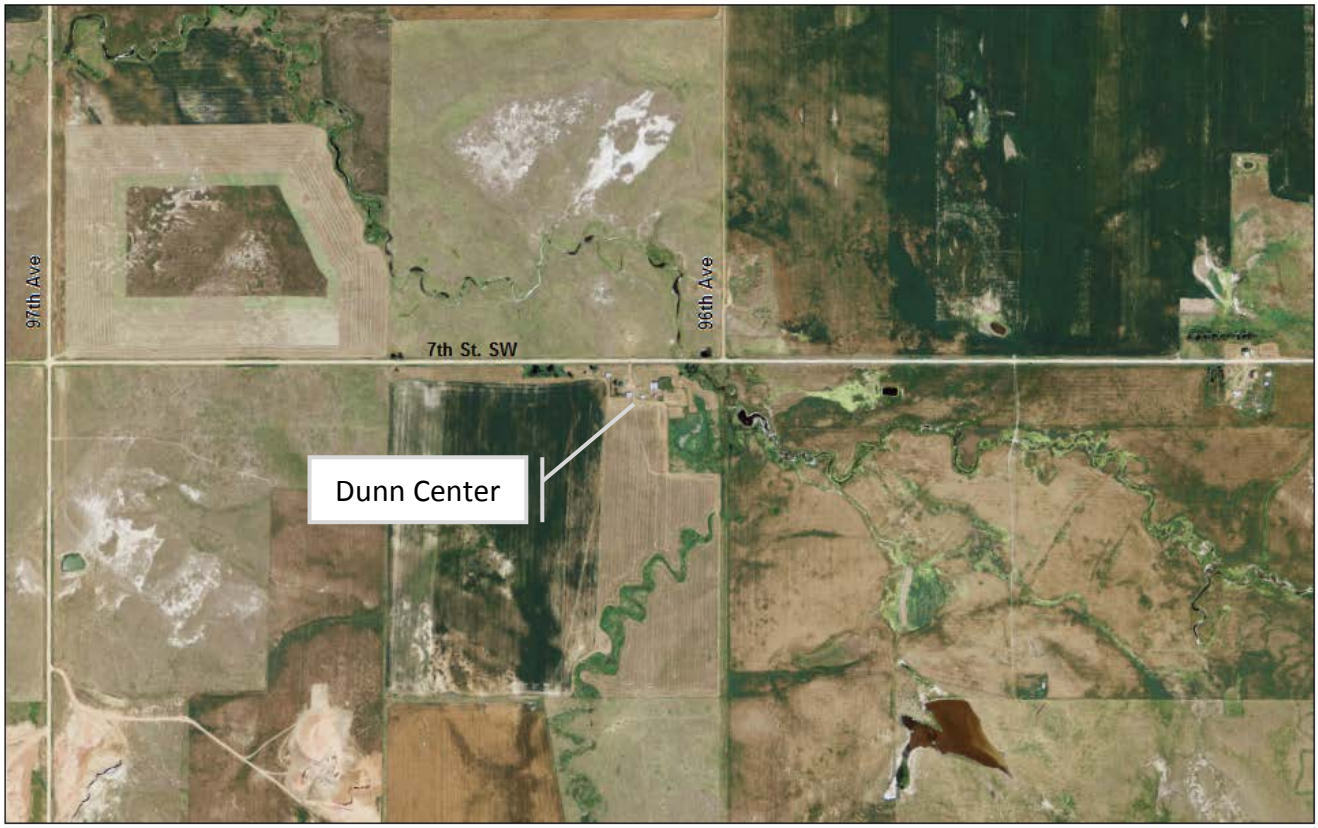
East

South

Looking Northwest

Looking Northeast

Dunn Center



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0 0.25 0.5 1 km
North Dakota state agencies and the ND GIS Hub

Site Name: Fargo NW

Station Type: SLAMS (required)
AQS#: 38-017-1004 **MSA:** 2520
Address: 4266 40th Avenue North
Fargo, ND
Latitude: +46.933754 **Longitude:** -96.855350

Site Description: This site is one of EPA's 54 Speciation Trends Network sites, the state's required NCORE site, located in the largest metropolitan area in North Dakota. The data collected at this site are used in dispersion modeling for input, calibration and validation. As an NCORE site, it is required to have trace level analyzers for sulfur dioxide, carbon monoxide, and NO_Y (total reactive nitrogen) operational by January 1, 2011. The trace level analyzers are installed.

Gas/Particulate parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Monitoring Objective	Spatial Scale
Sulfur Dioxide	Instrumental Pulsed Florescent	Continuous	Population Exposure	Urban
Nitrogen Dioxide	Instrumental Chemiluminescence	Continuous	Population Exposure	Urban
Carbon Monoxide	Instrumental Gas Filter Correlation	Continuous	Population Exposure	Urban
NO_y	Instrumental Chemiluminescence	Continuous	Population Exposure	Urban
Ozone	Instrumental Ultra Violet	Continuous	Population Exposure	Urban
$PM_{2.5}$	24-hour Gravimetric	1/3	Population Exposure	Urban
$PM_{2.5}$	FEM $PM_{2.5}$ BAM	Continuous	Population Exposure	Urban
PM_{10}	PM_{10} BAM	Continuous	Population Exposure	Urban
$PM_{10-2.5}$ Speciation	METOne SASS 24-hour Gravimetric	1/3	Population Exposure	Urban

Meteorological parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Tower Height	Spatial Scale
Wind Speed	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Wind Direction	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Ambient Temperature	Elec. or Mach Avg.	Continuous	10 meters	Urban
Delta Temperature	Elec. or Mach Avg.	Continuous	10 - 2 meters	Urban
Ambient Pressure	Barometric Pressure Transducer	Continuous	6 meters	Urban
Relative Humidity	Hygroscopic Plastic Film	Continuous	10 meters	Urban
Solar Radiation	Pyranometer	Continuous	2 meters	Urban

There are no plans to move or remove this site.

Site Pictures: **Fargo NW**

North

West

East

South

Looking Northeast

Looking West

Fargo NW

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0 0.15 0.3 0.6 mi
0 0.25 0.5 1 km
North Dakota state agencies and the ND GIS Hub

Site Name: Hannover

Station Type: SLAMS
AQS#: 38-065-0002 **MSA:** 0000
Address: 1575 Highway 31
Stanton, ND
Latitude: +47.185833 **Longitude:** -101.428056

Site Description: This site is centrally located to the power plants in the Oliver-Mercer-McLean county area. The data collected here are used to supplement ambient data collected at Beulah – North and TRNP – NU.

Gas/Particulate parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Monitoring Objective	Spatial Scale
Sulfur Dioxide	Instrumental Pulsed Florescent	Continuous	Source Oriented	Urban
Nitrogen Dioxide	Instrumental Chemiluminescence	Continuous	Source Oriented	Urban
Ozone	Instrumental Ultra Violet	Continuous	Source Oriented	Urban
$PM_{2.5}$	FEM $PM_{2.5}$ BAM	Continuous	Source Oriented	Urban
PM_{10}	PM_{10} TEOM Gravimetric 50° Celsius	Continuous	Source Oriented	Urban

Meteorological parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Tower Height	Spatial Scale
Wind Speed	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Wind Direction	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Ambient Temperature	Elec. or Mach Avg.	Continuous	10 meters	Urban
Ambient Pressure	Barometric Pressure Transducer	Continuous	6 meters	Urban

There are no plans to move or remove this site.

Site Pictures: **Hannover**

North

East

South

West

Looking Southwest

Looking Northeast

Hannover


Hannover
16th St.
1:9,028
0 0.075 0.15 0.3 mi
0 0.1 0.2 0.4 km
North Dakota state agencies and the ND GIS Hub

Site Name: Lostwood NWR

Station Type: SLAMS
AQS#: 38-013-0004 **MSA:** 0000
Address: 8315 Highway 8
Kenmare, ND
Latitude: +48.641930 **Longitude:** -102.401800

Site Description: This site is located in a PSD Class I area. Because this site is downwind of the two power plants near Estevan, SK, and located in the Souris River Airshed, these data are also usable by SaskEnvironment in a study they are conducting in the western region of the Souris Basin Airshed.

The site has an IMPROVE sampler operated by the US Fish and Wildlife Service. These data will be used with the other ambient data collected here to evaluate long-range transport of aerosols affecting regional haze/visibility.

Gas/Particulate parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Monitoring Objective	Spatial Scale
Sulfur Dioxide	Instrumental Pulsed Florescent	Continuous	Regional Transport	Regional
Nitrogen Dioxide	Instrumental Chemiluminescence	Continuous	Regional Transport	Regional
Ozone	Instrumental Ultra Violet	Continuous	Regional Transport	Regional
Ozone	Instrumental Chemiluminescence	Continuous	Regional Transport	Regional
$PM_{2.5}$	FEM $PM_{2.5}$ BAM	Continuous	Regional Transport	Regional
PM_{10}	PM_{10} TEOM Gravimetric 50° Celsius	Continuous	Regional Transport	Regional

Meteorological parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Tower Height	Spatial Scale
Wind Speed	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Wind Direction	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Ambient Temperature	Elec. or Mach Avg.	Continuous	10 meters	Urban
Delta Temperature	Elec. or Mach Avg.	Continuous	10 - 2 meters	Urban
Ambient Pressure	Barometric Pressure Transducer	Continuous	6 meters	Urban
Solar Radiation	Pyranometer	Continuous	2 meters	Urban
Relative Humidity	Hygroscopic Plastic Film	Continuous	10 meters	Urban

There are no plans to move or remove this site.

Site Pictures: **Lostwood NWR**

North

South

East

West

Looking Northwest

Looking North

Lostwood NWR

1:18,056
0 0.15 0.3 0.6 mi
0 0.25 0.5 1 km
North Dakota state agencies and the ND GIS Hub

Site Name: Painted Canyon

Station Type: SLAMS
AQS#: 38-007-0002 **MSA:** 0000
Address: Theodore Roosevelt National Park – South Unit
13881 I94 East
Latitude: +46.894300 **Longitude:** -103.378530

Site Description: Located in the South Unit of Theodore Roosevelt National Park, this Class I area site is operated in partnership with the National Park Service. As it is positioned south of the majority of oil and gas activity in the state, this station plays a key role in monitoring general background conditions and providing data for dispersion modeling input, calibration and validation.

The site has an IMPROVE sampler operated by the National Park Service. These data will be used with the other ambient data collected here to evaluate long-range transport of aerosols affecting regional haze/visibility.

Gas/Particulate parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Monitoring Objective	Spatial Scale
Sulfur Dioxide	Instrumental Pulsed Florescent	Continuous	General/Background	Urban
Ozone	Instrumental Ultra Violet	Continuous	General/Background	Urban
$PM_{2.5}$	24-hour Gravimetric	1/6	General/Background	Urban

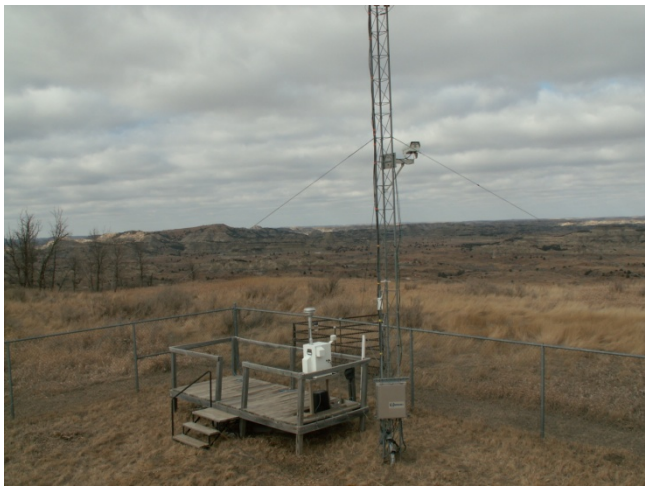
Meteorological parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Tower Height	Spatial Scale
*	*	*	*	*

* All meteorological parameters are monitored as part of the NPS network.

There are no plans to move or remove this site. There are plans to replace a non-equivalent $PM_{2.5}$ TEOM operated by the NPS at the site with a Department operated FEM $PM_{2.5}$ BAM.

Site Pictures: **Painted Canyon**



North

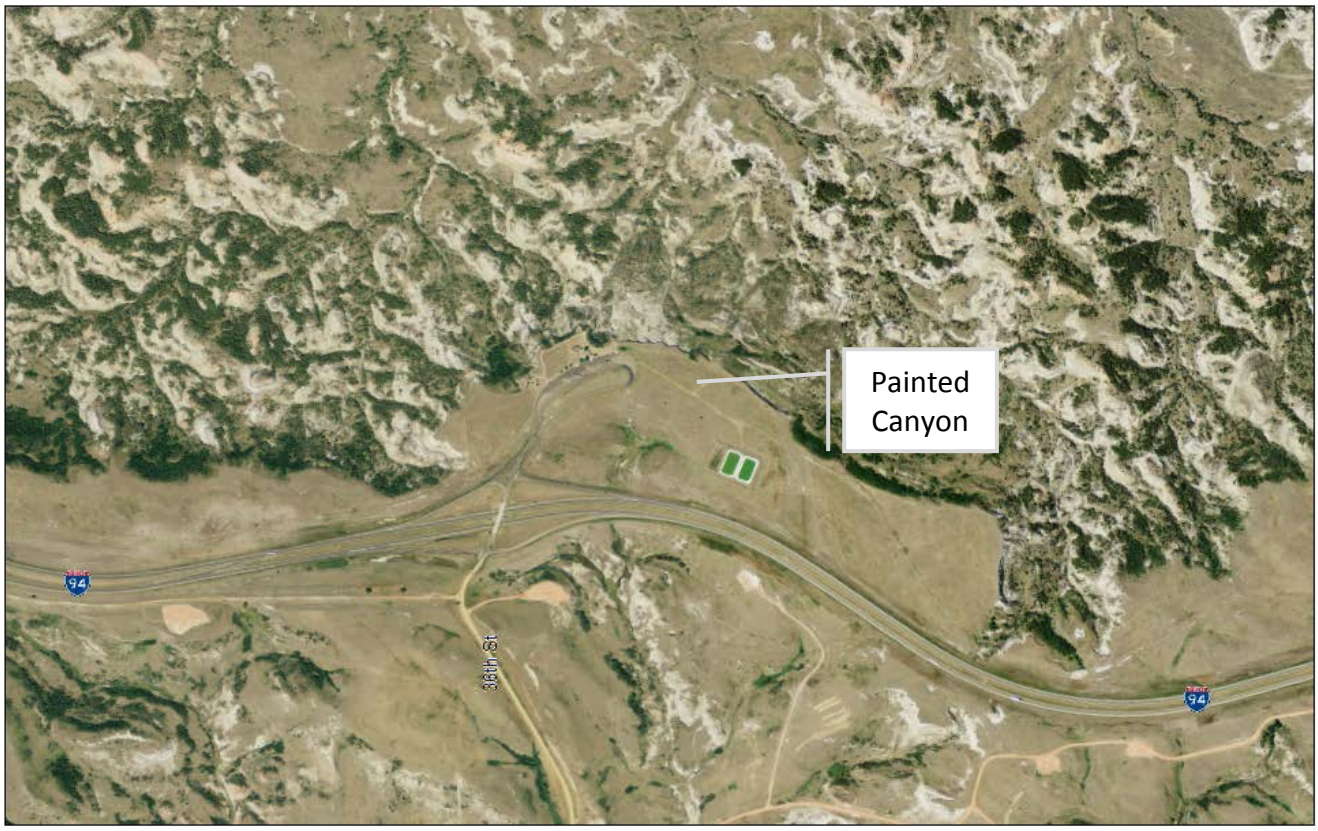
East

South

West

Looking Southwest

Painted Canyon



1:18,056
0 0.15 0.3 0.6 mi
0 0.25 0.5 1 km
North Dakota state agencies and the ND GIS Hub

Site Name: TRNP-NU

Station Type: SLAMS (required)
AQS#: 38-053-0002 **MSA:** 0000
Address: 229 Service Road
Watford City, ND
Latitude: +47.581200 **Longitude:** -103.299500

Site Description: This site is located in Theodore Roosevelt National Park – North Unit and is one of three key sites in the Department's ambient monitoring network to meet the six required monitoring objectives. The data collected are used for model calibration/validation.

Gas/Particulate parameters:

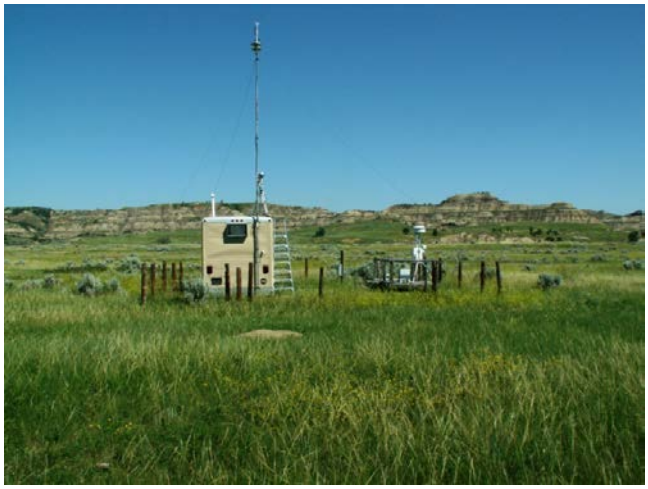
Parameter	Sampling & Analysis Method	Operating Schedule	Monitoring Objective	Spatial Scale
Sulfur Dioxide	Instrumental Pulsed Florescent	Continuous	General/Background	Regional
Nitrogen Dioxide	Instrumental Chemiluminescence	Continuous	General/Background	Regional
Ozone	Instrumental Ultra Violet	Continuous	General/Background	Regional
$PM_{2.5}$	FEM $PM_{2.5}$ BAM	Continuous	General/Background Regional Transport	Regional
PM_{10}	PM_{10} TEOM Gravimetric 50° Celsius	Continuous	General/Background Regional Transport	Regional

Meteorological parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Tower Height	Spatial Scale
Wind Speed	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Wind Direction	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Ambient Temperature	Elec. or Mach Avg.	Continuous	10 meters	Urban
Ambient Pressure	Barometric Pressure Transducer	Continuous	6 meters	Urban
Relative Humidity	Hygroscopic Plastic Film	Continuous	10 meters	Urban

There are no plans to move or remove this site.

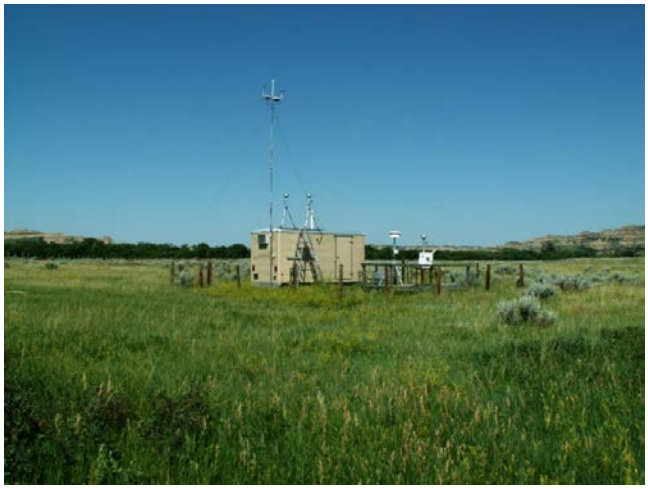
Site Pictures: **TRNP-NU**



North

South

East

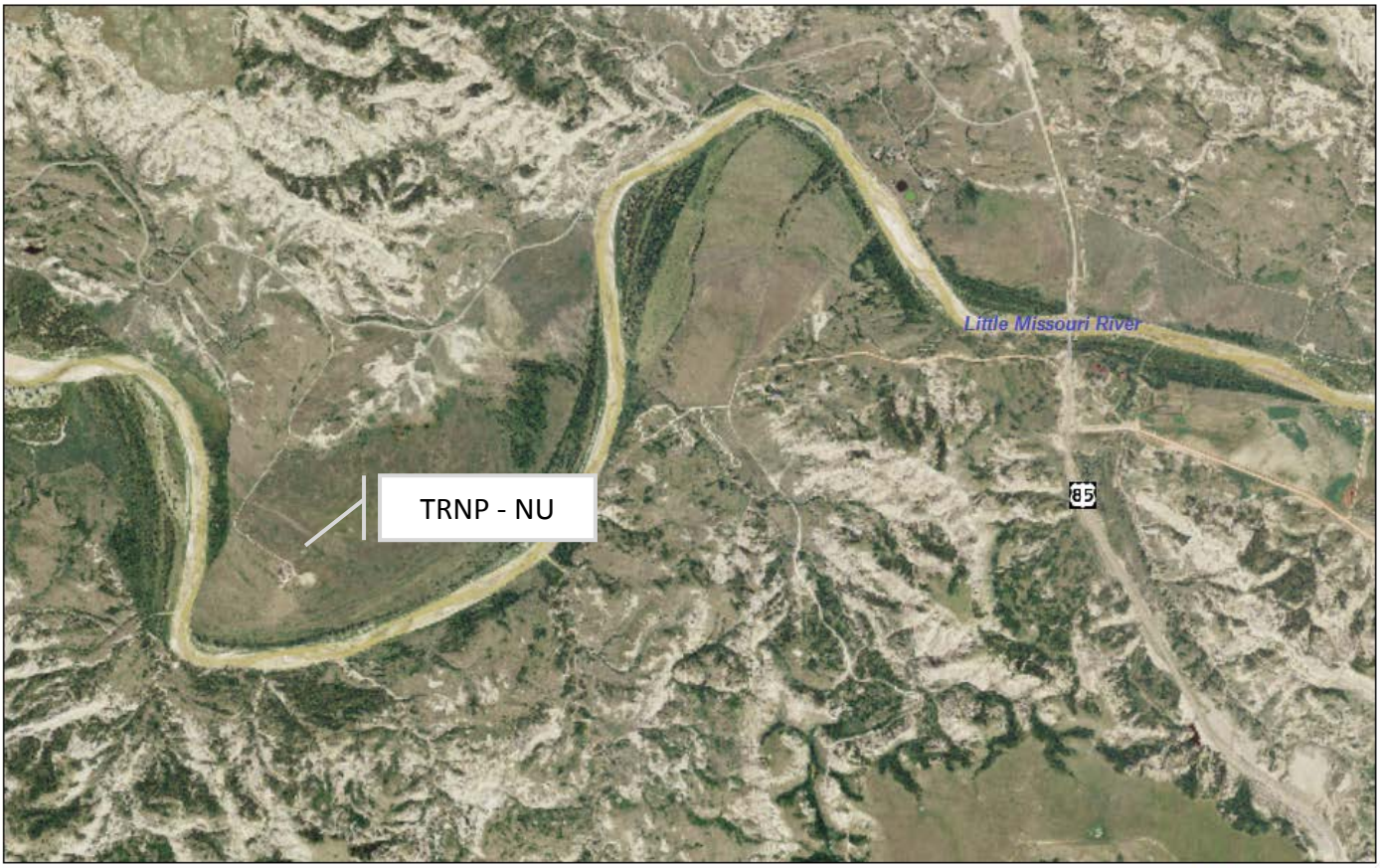


West

Looking Northwest

Looking Northeast

Theodore Roosevelt National Park - North Unit



1:36,112
0 0.3 0.6 1.2 mi
0 0.5 1 2 km
North Dakota state agencies and the ND GIS Hub

Site Name: Williston

Station Type: SLAMS
AQS#: 38-105-0003 **MSA:** 0000
Address: 10th Street West
Williston, ND
Latitude: +48.152780 **Longitude:** -103.639510

Site Description: This site is located in the Williston Riverview Cemetery in downtown Williston. It is in the heart of the oil and gas development activity area and serves to meet the objective of monitoring population exposure to particulate matter and ozone.

Gas/Particulate parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	Instrumental Ultra Violet	Continuous	Population Exposure	Urban
$PM_{2.5}$	FEM $PM_{2.5}$ BAM	Continuous	Population Exposure	Urban
PM_{10}	PM_{10} TEOM Gravimetric 50° Celsius	Continuous	Population Exposure	Urban

Meteorological parameters:

Parameter	Sampling & Analysis Method	Operating Schedule	Tower Height	Spatial Scale
Wind Speed	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Wind Direction	Elec. or Mach Avg. Level 1	Continuous	10 meters	Urban
Ambient Temperature	Elec. or Mach Avg.	Continuous	10 meters	Urban
Ambient Pressure	Barometric Pressure Transducer	Continuous	6 meters	Urban

There are no plans to move or remove this site.

Site Pictures: **Williston**

North

South

East

West

Williston

1:18,056

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

North Dakota state agencies and the ND GIS Hub

Appendix B Public Comments

REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM (VERSION 2, 4/1/04)

DATE: March 26, 2015	CITY: Theodore Roosevelt National Park – South Unit	STATE: ND
AQS SITE ID: 38-007-0002	SITE NAME: Painted Canyon	

PROPOSED MODIFICATION/REASON WHY: Replace a non-equivalent PM2.5 TEOM operated by the National Park Service with a Federal Equivalent Method PM2.5 Beta Attenuation Monitor operated by the Department.

AIR QUALITY PARAMETER (PM10, SO2, CO, NO2, ETC.)	MONITOR TYPE (NAMS, SLAMS, SPM, TRIBAL, etc.)	CHECK ONE OR MORE OF THE APPLICABLE CATEGORIES BELOW:				LIST SAMPLER EQUIPMENT
		MAX CONC	SOURCE IMPACT	POPULATION EXPOSURE	BACKGROUND	
PM2.5	SLAMS				X	BAM 1020

PROPOSED SAMPLING START OR REMOVAL DATE OR DATE STARTED OR REMOVED: Monitoring started January 01, 2014

ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:

LOCATION (LAT./LONG. OR UTM=S):Latitude: +46.894300, Longitude: -103.378530 WGS84

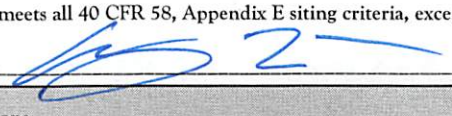
SITE ELEVATION (M. MSL): 832 Meters				PROBE HEIGHT (M. AGL): 5 Meters	
DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS
No trees at site					
No obstacles at site					
UNRESTRICTED AIR FLOW:		>270 DEG.	>180 DEG.	<CRITERIA_____360_____DEG.	

DISTANCE TO FLUES/INCINERATORS (M): N/A

DISTANCE TO INTERSECTIONS (M):			DISTANCE FROM SUPPORTING STRUCTURES (M): VERT._1 m___HORIZ._0 m___			
DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
		NORTH				
		EAST				
		SOUTH				
		WEST				

DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)	DIRECTION TO AREA SOURCES	COMMENTS
N/A		N/A		

CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except as noted with submittal.

Printed Name: Charles Hyatt Signature: 

FOR EPA USE ONLY: Received Date:_____ Follow-up Actions:_____ Approval Status Given:_____ Email Response Date:_____ Letter Response Date:_____

REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM (VERSION 2, 4/1/04)

DATE: March 26, 2015	CITY: Beulah	STATE: ND
AQS SITE ID: 38-057-0004	SITE NAME: Beulah - North	

PROPOSED MODIFICATION/REASON WHY: Add an Instrumental Chemiluminescence ozone monitor for collocation with the existing Instrumental Ultra Violet unit. As the two units operate with different methods/chemistries, this addition will allow the Department to evaluate data peaks for chemistry specific interference.

AIR QUALITY PARAMETER (PM10, SO2, CO, NO2, ETC.)	MONITOR TYPE (NAMS, SLAMS, SPM, TRIBAL, etc.)	CHECK ONE OR MORE OF THE APPLICABLE CATEGORIES BELOW:				LIST SAMPLER EQUIPMENT
		MAX CONC	SOURCE IMPACT	POPULATION EXPOSURE	BACKGROUND	
O3	SLAMS			X		Instrumental Chemiluminescence

PROPOSED SAMPLING START OR REMOVAL DATE OR DATE STARTED OR REMOVED: Monitoring started January 01, 2015

ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:

LOCATION (LAT./LONG. OR UTM=S):Latitude: +47.298611, Longitude: -101.766944 WGS84

SITE ELEVATION (M. MSL): 630 Meters				PROBE HEIGHT (M. AGL): 4 Meters	
DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS
No trees at site					
No obstacles at site					

UNRESTRICTED AIR FLOW:	>270 DEG. >180 DEG.	<CRITERIA_____360_____DEG.

DISTANCE TO FLUES/INCINERATORS (M): N/A

DISTANCE TO INTERSECTIONS (M):			DISTANCE FROM SUPPORTING STRUCTURES (M): VERT._1 m___HORIZ._0 m___			
DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
32 Meters	Highway 200	NORTH	1000	1998	THRU ST OR HY	
1000 Meters	County Road	EAST	100	1998	LOCAL ST OR HY	
		SOUTH				
3200 Meters	City Street	WEST	250	1998	THRU ST OR HY	

DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)	DIRECTION TO AREA SOURCES	COMMENTS
N/A		N/A		

CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except as noted with submittal.

Printed Name: Charles Hyatt Signature: _____

FOR EPA USE ONLY: Received Date:_____ Follow-up Actions:_____ Approval Status Given:_____ Email Response Date:_____ Letter Response Date:_____