

# Annual Report

## North Dakota Ambient Monitoring Network Plan 2012



NORTH DAKOTA  
DEPARTMENT *of* HEALTH

# Annual Report

## North Dakota Ambient Monitoring Network Plan 2012

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## 1.0 INTRODUCTION

The North Dakota Department of Health, 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 monitors and requires three major industrial pollution sources to conduct source-specific ambient air quality monitoring. There are 16 ambient air quality monitoring sites currently operating in the State. However, this review addresses only the seven department-operated sites. The Theodore Roosevelt National Park – South Unit site at Painted Canyon is a National Park Service site. The department operates and maintains the sulfur dioxide, ozone and continuous fine particulate analyzers at the National Park Service’s request. The remaining eight sites are department-required industry-supported sites

To evaluate the effectiveness of the state's air quality monitoring effort, the U.S. Environmental Protection Agency (EPA) requires the Division of Air Quality to conduct an annual review of the department’s ambient air quality monitoring (AAQM) network. EPA's requirements, as set forth in 40 CFR 58.10, are to (1) determine if the system meets the monitoring objectives defined in 40 CFR 58, Appendix D, and (2) identify network modifications such as termination or relocation of unnecessary sites or establishment of new sites that are necessary.

The 2005 Draft National Ambient Air Monitoring Strategy (NAAMS, [www.epa.gov/ttn/amtic/monstratdoc.html](http://www.epa.gov/ttn/amtic/monstratdoc.html)) established a new monitoring site classification system for the national AAQM network structure. There are two primary categories: National Core (NCore) and State, Local, and Tribal (SLT). Each state is required to have at least one NCore site. Fargo NW has been selected as North Dakota’s required NCore site. Fargo NW is also a part of EPA’s 54-site Speciation Trends National Network. The NAAMS explains the purpose of these national networks and rationale for each gaseous and particulate measurement.

For the States and tribes, the State and Local Monitoring Systems (SLAMS), SPM, Prevention of Significant Deterioration (PSD) and Tribal Networks site designations still apply. The remaining six department-operated sites are designated as SLAMS sites.

## 1.1 Network Plan Process

*The locations of sites in a monitoring program are established to meet certain objectives. The Oc. 17, 2006, Federal Register (40 CFR 58, Appendix D), defined six basic monitoring objectives. These objectives are as follows:*

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

The link between basic monitoring objectives and the physical location of a particular monitoring site involves the concept of spatial scale of representativeness. This spatial scale is determined by the physical dimensions of the air parcel nearest a monitoring site throughout which actual pollutant concentrations are reasonably similar. The goal in locating sites is to match the spatial scale represented by the sample of monitored air with a spatial scale most appropriate for the monitoring objective. Spatial scales of representativeness, as specified by EPA, are described as follows:

Microscale – 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.

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

<u>Monitoring Objective</u>	<u>Appropriate Siting Scales</u>
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

Recommended scales of representativeness appropriate to the criteria pollutants monitored in North Dakota are shown below:

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

Using this physical basis 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 reviewing each site and associated monitors to evaluate their monitoring objectives and spatial scales to ensure each site and monitor still meets the intended purpose. Sites and monitors that no longer satisfy the intended purpose are either terminated or modified accordingly. Further details on network design can be found in 40 CFR 58, Appendix D.

## 1.2 General Monitoring Needs

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

There are a total of 16 ambient air quality monitoring sites operating in the state: eight are source-specific industry sites and one site, Painted Canyon in Theodore Roosevelt National Park, is a part of the National Park Service's (NPS) network. The department, at the NPS's request, provides sulfur dioxide and ozone analyzers and a manual fine particulate (PM<sub>2.5</sub>) sampler. The NPS also provides a continuous PM<sub>2.5</sub> analyzer, which the department operates

and maintains. The remaining seven sites fall into two categories: 40 CFR 58 required sites (3) and supplemental sites (4). The primary function of the department's three required sites (see Table 1) are to satisfy five monitoring objectives. Beulah is a significant source and population-oriented site because of the three major sources in the vicinity of Beulah. Also, the site is between the city and downwind of two major sources. Fargo NW is population orientated because Fargo is a major population center with five major sources in the Fargo, ND-Moorhead, MN, area. The data from this site is used as input to dispersion models to evaluate permits-to-construct and permits-to-operate for projects located in or near population centers in the eastern part of the state. And, TRNP-NU is the background/long-range transport/welfare-related site. The remaining four sites are used to support modeling activities (model calibration and/or validation) and supplement data collected at the required sites. For the national PM<sub>2.5</sub> program, the department is required to operate three "non-Core required" sites (Fargo, Bismarck and Beulah).

Background, welfare-related and long-range transport sites are chosen to determine concentrations of air contaminants in areas remote from urban sources and generally are sited using the regional spatial scale. This is true for NO<sub>2</sub> despite the fact that the regional spatial scale is not normally used for NO<sub>2</sub> monitoring. Once a specific location is selected for a site, the site is established in accordance with the specific siting criteria specified in 40 CFR 58, Appendices A, C, D and E.

### 1.3 Monitoring Objectives

The department's monitoring objective is to track those pollutants that are judged to have the potential for violating either state or federal Ambient Air Quality Standards. To accomplish this objective, the department operates SLAMS sites at selected locations around the state. Table 1 lists basic site information: Appendix A contains a full description for each site, site photographs, and a site map taken from Google Earth<sup>TM</sup> mapping service. Figure 1 shows the approximate site locations.

With 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) coming into effect, the department is beginning to evaluate monitoring requirements and changes needed to support the visibility regulations.

**Table 1**  
**AAQM Network Description**

Site Name AQS Site #	Parameter Monitored <sup>1</sup>	Monitoring Objective <sup>2</sup>
1 Beulah North 380570004	SO <sub>2</sub> , NO <sub>2</sub> , O <sub>3</sub> , NH <sub>3</sub> , MET cont. PM <sub>2.5</sub> , cont. PM <sub>10</sub> Manual PM <sub>2.5</sub>	Population Exposure & Significant Source
2 Bismarck Residential 380150003	SO <sub>2</sub> , NO <sub>2</sub> , O <sub>3</sub> , MET cont. PM <sub>2.5</sub> , cont. PM <sub>10</sub> Manual PM <sub>2.5</sub>	Population Exposure
3 Dunn Center 380250003	SO <sub>2</sub> <sup>4</sup> , NO <sub>2</sub> , O <sub>3</sub> , MET cont. PM <sub>2.5</sub> , cont. PM <sub>10</sub>	General Background
4 Fargo NW 380171004	SO <sub>2</sub> , NO <sub>2</sub> , O <sub>3</sub> , CO, NO <sub>y</sub> , MET cont. PM <sub>2.5</sub> , cont. PM <sub>10</sub> Manual PM <sub>2.5</sub> PM <sub>fine</sub> Speciation	Population Exposure Population Exposure Population Exposure Population Exposure
5 Hannover 380650002	SO <sub>2</sub> , NO <sub>2</sub> , O <sub>3</sub> , MET cont. PM <sub>2.5</sub> , cont. PM <sub>10</sub>	Source Impact
6 Lostwood NWR 380130004	SO <sub>2</sub> <sup>4</sup> , NO <sub>2</sub> , O <sub>3</sub> , NH <sub>3</sub> , MET, cont. PM <sub>2.5</sub> , cont. PM <sub>10</sub> PM <sub>fine</sub> Speciation (IMPROVE)	General Background & Significant Source
7 TRNP - NU 380530002	SO <sub>2</sub> <sup>4</sup> , NO <sub>2</sub> , O <sub>3</sub> , MET cont. PM <sub>2.5</sub> , cont. PM <sub>10</sub>	General Background, Long range Transport, & Welfare-related

1. MET refers to meteorological and indicates wind speed and wind direction monitoring equipment.  
2. Not applicable to MET.  
3. This analyzer will serve a dual role of population exposure and general background.

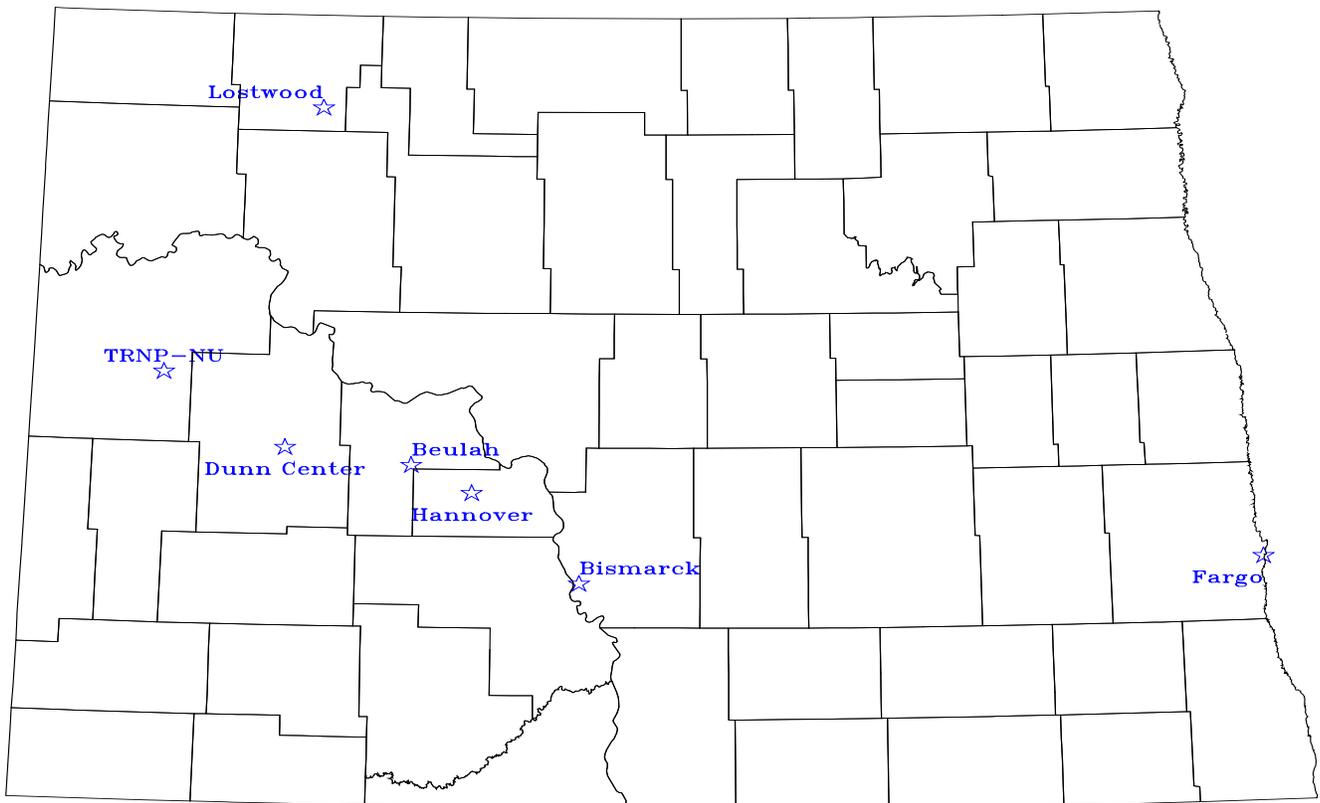


Figure 1 North Dakota Ambient Air Quality Monitoring Sites

## 2.0 Ambient Air Monitoring Network Coverage

The State of North Dakota is in attainment for all ambient standards for criteria pollutants, including PM<sub>2.5</sub> and 8-hour ozone. The seven department-operated ambient monitoring sites are positioned to satisfy five monitoring objectives and collect data to compare to the State and federal ambient air quality standards and support dispersion modeling activities relating to, first, visibility/regional haze, and, second, source permit evaluation.

### 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<sub>2</sub>). These sources include coal-fired steam-powered electrical generating facilities, a coal gasification plant, natural gas processing plants, an oil refinery, and flaring at oil/gas well sites. As a result, SO<sub>2</sub> is one of the Department's primary interests in regard to visibility: first, to aid in establishing the visibility baseline, then to track visibility improvement over time.

#### 2.1.1 Point Sources

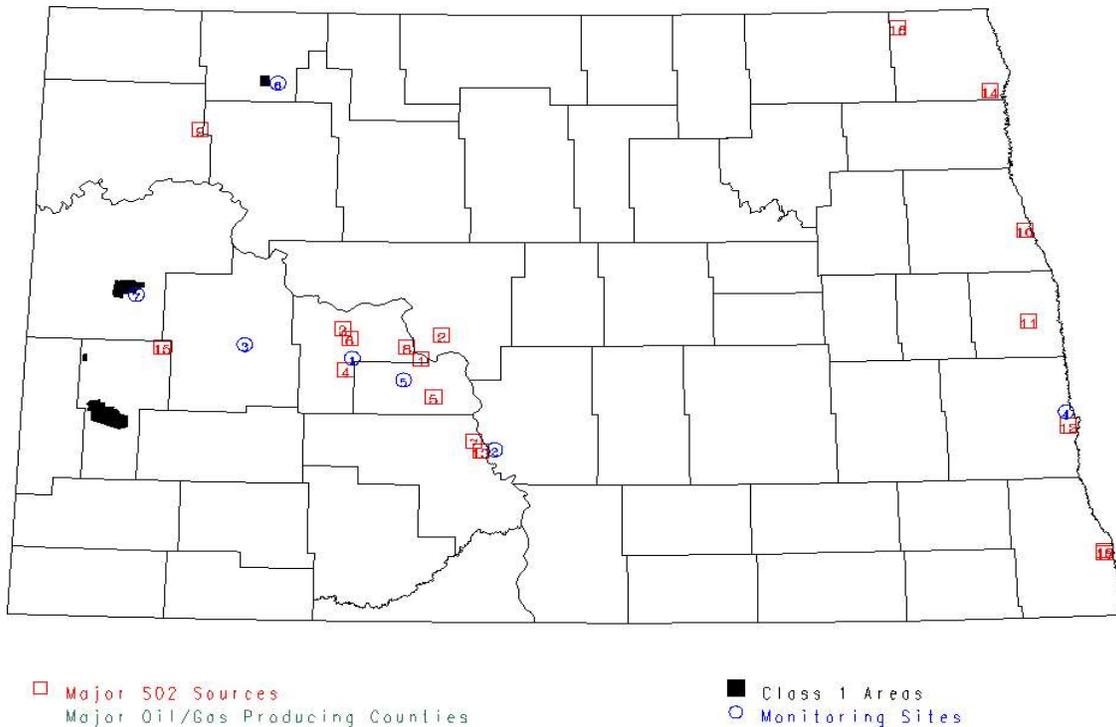
The major SO<sub>2</sub> point sources (>100 Tons Per Year or TPY) based on 2011 emissions are listed in Table 2. Figure 2 shows the approximate locations of these facilities (the numbers correspond to the site and source tables). Figure 2A shows the total annual SO<sub>2</sub> emissions from point sources and three sub-categories for 1984 through 2011.

#### 2.1.2 Other Sources

The western part of the state has a number of potential SO<sub>2</sub> sources associated with the development of oil and gas. These sources include individual oil/gas wells, oil storage facilities, and compressor stations. Emissions from these sources may lead to two problems. First, these sources may directly emit significant amounts of hydrogen sulfide (H<sub>2</sub>S) to the ambient air (see Section 2.7). Second, flaring the H<sub>2</sub>S from these sources may create significant concentrations of SO<sub>2</sub> in the ambient air. The primary counties for these sources in western North Dakota are outlined in green on Figure 2. Figure 2A shows the contribution of an "Other Point Sources" category that consists of Dakota Gasification Company (DGC), oil refineries, natural gas processing plants, and agricultural processing plants.

**Table 2**  
Major SO<sub>2</sub> Sources  
(>100 TPY)

#	Company Name	SOURCE	Facility ID
1	Basin Electric Power Cooperative	Leland Olds Station	3805700001
2	Great River Energy	Coal Creek Station	3805500017
3	Basin Electric Power Cooperative	Antelope Valley Station	3805700011
4	Otter Tail Power Company	Coyote Station	3805700012
5	Minnkota Power Cooperative, Inc.	Milton R. Young Station	3806500001
6	Dakota Gasification Company	Great Plains Synfuels Facility	3805700013
7	Montana Dakota Utilities Company	RM Heskett Station	3805900001
8	Great River Energy	Stanton Station	3805700004
9	Hess Corporation	Tioga Gas Plant	3810500004
10	University of North Dakota	UND Heating Plant	3803500003
11	American Crystal Sugar Company	Hillsboro Plant	3809700019
12	North Dakota State University	NDSU Heating Plant	3801700005
13	Tesoro Refining and Marketing Company	Mandan Refinery	3805900003
14	American Crystal Sugar Company	Drayton Plant	3806700003
15	Petro-Hunt, LLC	Little Knife Gas Plant	3800700002
16	ADM Corn Processing	Walhalla Ethanol Plant	3806700004
17	Minn-Dak Farmers Cooperative	Wahpeton Plant	3807700026
18	Cargill Corn Milling	Wahpeton Facility	3807700110



**Figure 2 Major Sulfur Dioxide Sources**

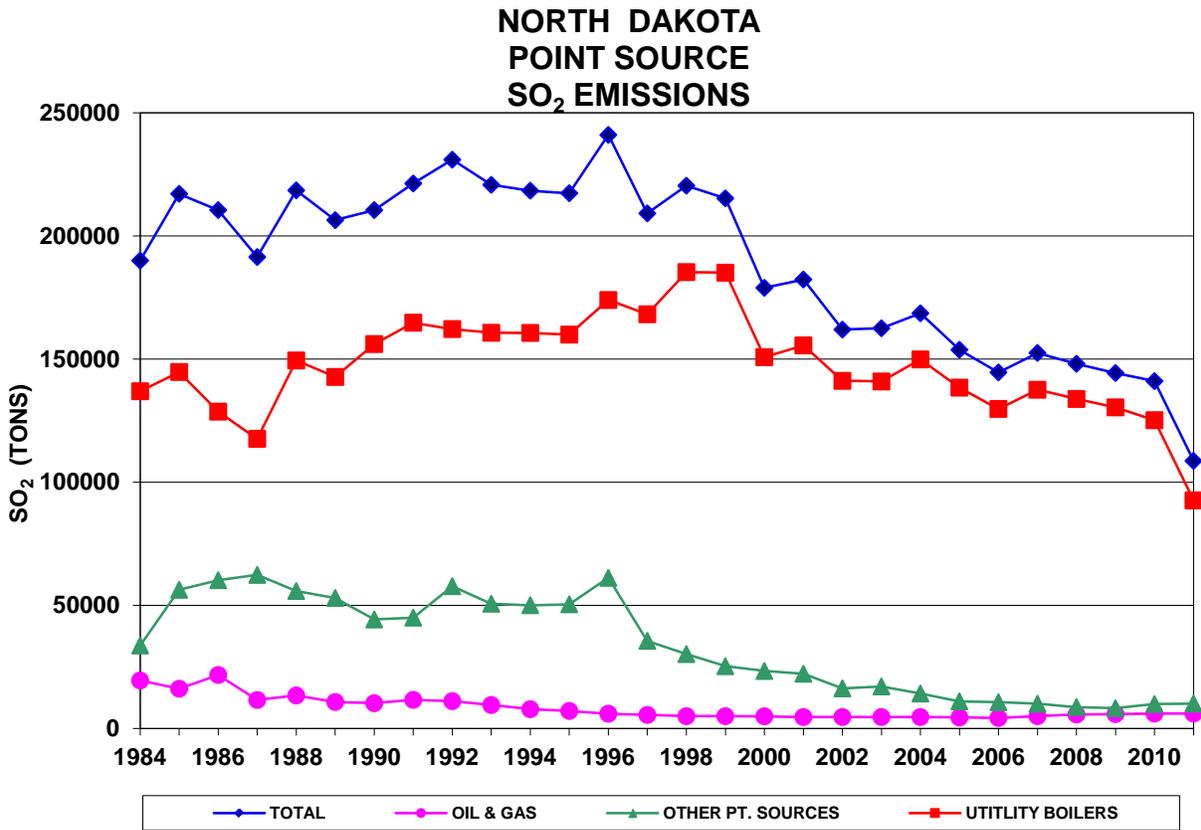


Figure 2A Annual Sulfur Dioxide Emissions

### 2.1.3 Monitoring Network

The SO<sub>2</sub> monitoring sites are shown on Figure 2. There were no significant changes made to the SO<sub>2</sub> monitoring network in 2011. There are no significant changes planned for 2013.

As can be seen in Figure 2, the monitoring 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. Tables 3 and 3A show the 2011 annual SO<sub>2</sub> data summaries; Tables 4 and 4A show the 5-minute data summaries. There were no exceedances of either state or federal SO<sub>2</sub> standards.

### 2.1.4 Network Analysis

Ten major SO<sub>2</sub> 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 3, 4 and 5 present the following for the Department-operated sites: (1) 1-hour maximums; (2) 3-hour maximums; and (3) 24-hour maximums. Because the industry sites are sited specifically for maximum expected concentrations (primarily as predicted by dispersion models and secondarily in a downwind direction), the industry sites are not reviewed for particular long-term trends.

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 3-hour average must have three valid values. The 24-hour average must have at least 18 valid hourly averages. And, the annual average must have 6,570 hours of data.

TABLE 3

COMPARISON OF AIR QUALITY DATA WITH  
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS \*

POLLUTANT : SULFUR DIOXIDE (ppb)

LOCATION	YEAR	NUM OBS	1 - 1ST	HOUR 2ND	M A 99 <sup>TH</sup> % 1HR	X I 3 - HOUR 1ST	M A 2ND	24 - 1ST	HOUR 2ND	ARITH MEAN	3yr Avg	1HR #>273	24HR #>99
Beulah - North	2011	8662	28	25	52	17.6	17.6	5.7	5.0	1.02	34		
Bismarck Residential	2011	8623	47	28	22	25.6	21.3	8.2	7.7	0.86	31		
Hannover	2011	8684	128	118	52	96.6	63.3	16.4	12.0	0.75	51		

\* The air quality standards are:

STATE Standards -

- 1) 75 ppb Three year average of the annual 99<sup>th</sup> percentile (4<sup>th</sup> highest) of the daily maximum 1-hour average concentration in a year.
- 2) 500 ppb highest 3-hour average concentration not to be exceeded more than once per year.

FEDERAL Standards -

- 1) 75 ppb Three year average of the annual 99<sup>th</sup> percentile (4<sup>th</sup> highest) of the daily maximum 1-hour average concentration in a year.
- 2) 500 ppb highest 3-hour average concentration not to be exceeded more than once per year.
- 3) 140 ppb highest 24-hour concentration not to be exceeded more than once per year.
- 4) 30 ppb annual arithmetic mean.

TABLE 3A

COMPARISON OF AIR QUALITY DATA WITH  
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS \*

POLLUTANT : TRACE LEVEL SULFUR DIOXIDE (ppb)

LOCATION	YEAR	NUM OBS	1 - 1ST	HOUR 2ND	M A 99 <sup>TH</sup> % 1HR	X I 3 - HOUR 1ST	M A 2ND	24 - 1ST	HOUR 2ND	ARITH MEAN	3yr Avg	1HR #>273	24HR #>99
Dunn Center	2011	6927 ***	30.9	11.0	10.0	5.7	5.6	2.2	1.8	0.27	13		
Fargo NW	2011	8134	9.1	5.6	5.0	5.8	4.8	2.4	2.3	0.29	5		
Lostwood NWR	2011	8607	47.4	34.6	30.0	30.9	25.3	7.8	17.8	0.79	43		
TRNP - NU	2011	8695 **	130.3	17.5	9.0	53.7 **	13.5	7.6	5.5	0.55	10		

\* The air quality standards are:

STATE Standards -

- 1) 75 ppb Three year average of the annual 99<sup>th</sup> percentile (4<sup>th</sup> highest) of the daily maximum 1-hour average concentration in a year.
- 2) 500 ppb highest 3-hour average concentration not to be exceeded more than once per year.

FEDERAL Standards -

- 1) 75 ppb Three year average of the annual 99<sup>th</sup> percentile (4<sup>th</sup> highest) of the daily maximum 1-hour average concentration in a year.
- 2) 500 ppb highest 3-hour average concentration not to be exceeded more than once per year.
- 3) 140 ppb highest 24-hour concentration not to be exceeded more than once per year.
- 4) 30 ppb annual arithmetic mean.

\*\*\* Less than 80% of the possible samples (data) were collected.

\*\* Qualified Prescribed Burn

TABLE 4

COMPARISON OF AIR QUALITY DATA WITH  
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS \*

POLLUTANT : SO2 5-Minute Averages (ppb)

LOCATION	YEAR	NUM OBS	5 - M I N U T E M A X I M A			# HOURS >600
			1ST	2ND	3RD	
Beulah - North	2011	8559	114	68	66	
Bismarck Residential	2011	8623	71	61	58	
Hannover	2011	8684	290	283	191	

\* No Standard is currently in effect

TABLE 4A

COMPARISON OF AIR QUALITY DATA WITH  
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS \*

POLLUTANT : Trace Level SO2 5-Minute Averages (ppb)

LOCATION	YEAR	NUM OBS	5 - M I N U T E M A X I M A			# HOURS >600
			1ST	2ND	3RD	
Dunn Center	2011	6927 ***	40.6	23.9	15.5	
Fargo NW	2011	8134	12.1	10.5	9.5	
Lostwood NWR	2011	8607	118.1	84.5	72.3	
TRNP - NU	2011	8694	298.6 **	67.7 **	20.3	

\* No Standard is currently in effect:

\*\*\* Less than 80% of the possible samples (data) were collected.

\*\* Qualified prescribed burn

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 its peak activity. 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 were 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.

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.

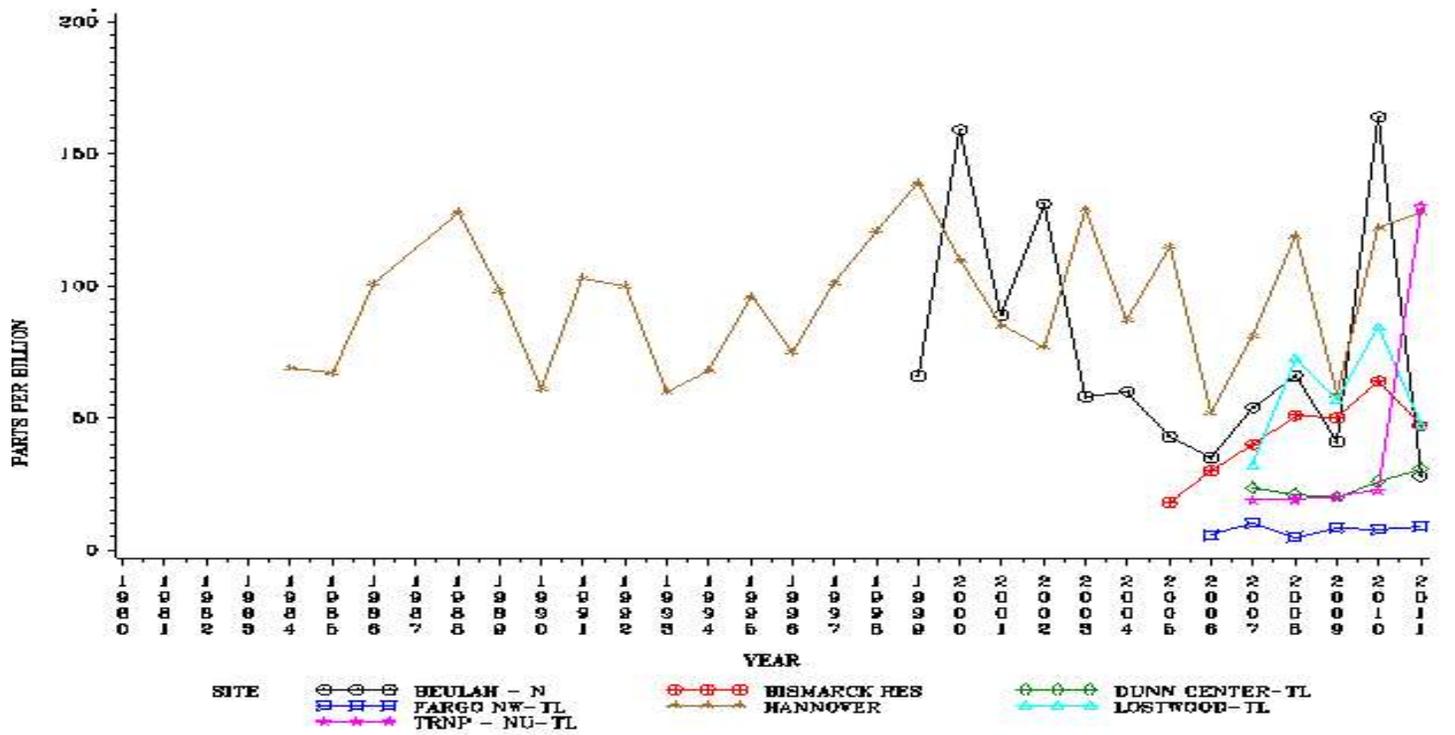


Figure 3 SO<sub>2</sub> Maximum 1-Hour Concentrations

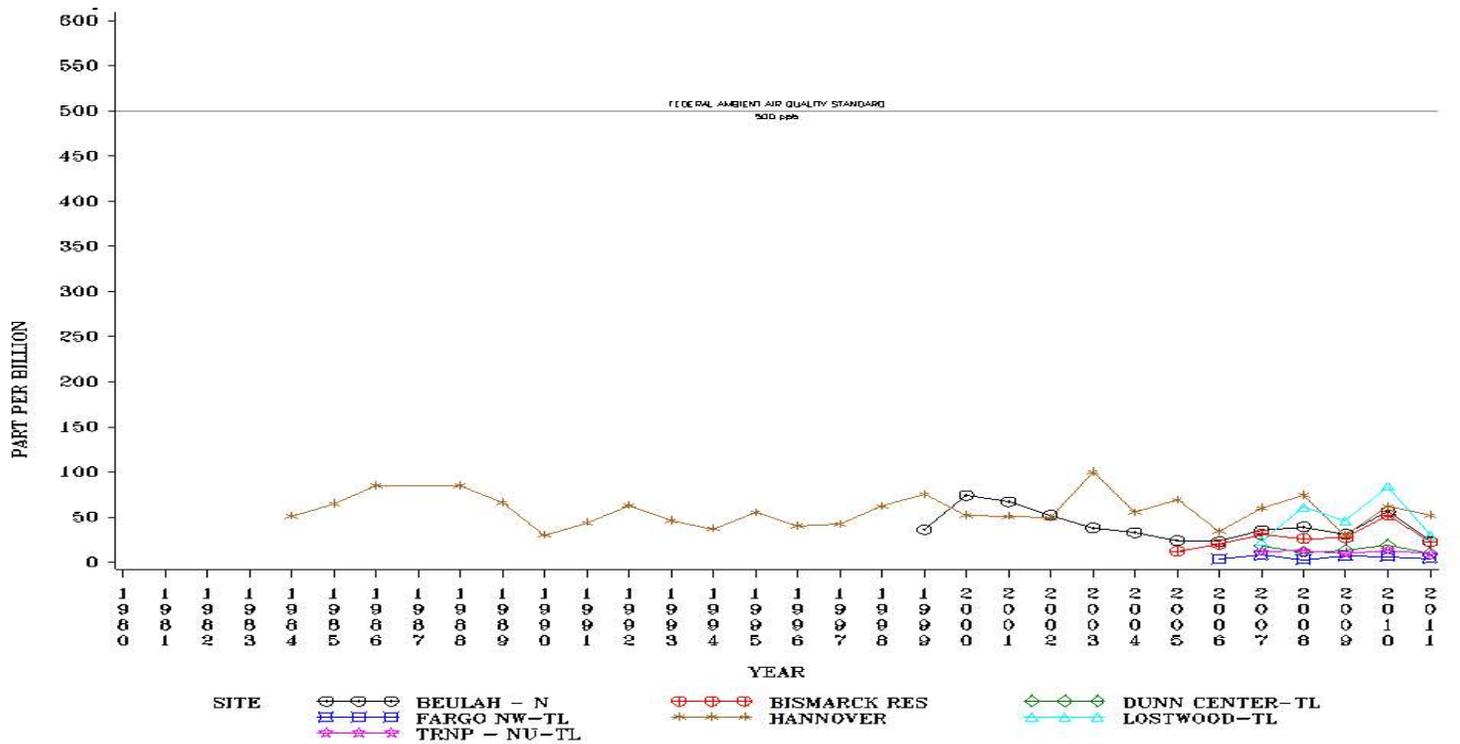


Figure 4 SO<sub>2</sub> Maximum 3-Hour Concentrations

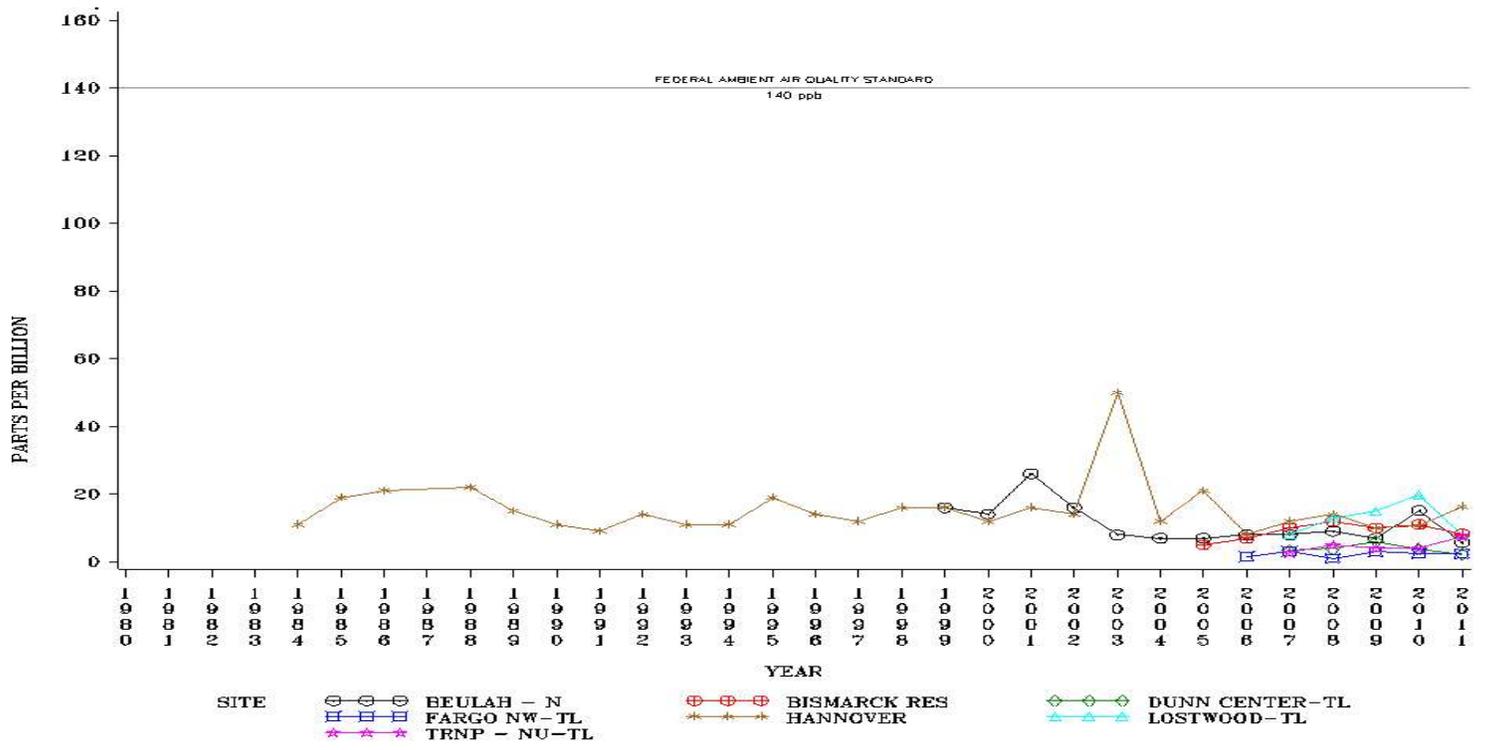


Figure 5 SO<sub>2</sub> Maximum 24-Hour Concentrations

6049L-09

## 2.2 Oxides of Nitrogen

“Oxides of Nitrogen” ( $\text{NO}_x$ ) is the term used to represent nitric oxide (NO) plus nitrogen dioxide ( $\text{NO}_2$ ).  $\text{NO}_2$  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  $\text{NO}_x$  stationary point sources (>100 TPY) are listed in Table 5, along with their emissions as calculated from the most recent emission inventories reported to the department. Figure 6 shows the approximate locations of these facilities (the numbers correspond to the site and source tables). The larger  $\text{NO}_x$  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 6A shows the contribution of point sources to the total  $\text{NO}_x$  emissions. The “Point Sources” category consists of utility boilers (power plant boilers) and oil and gas wells.

### 2.2.2 Area Sources

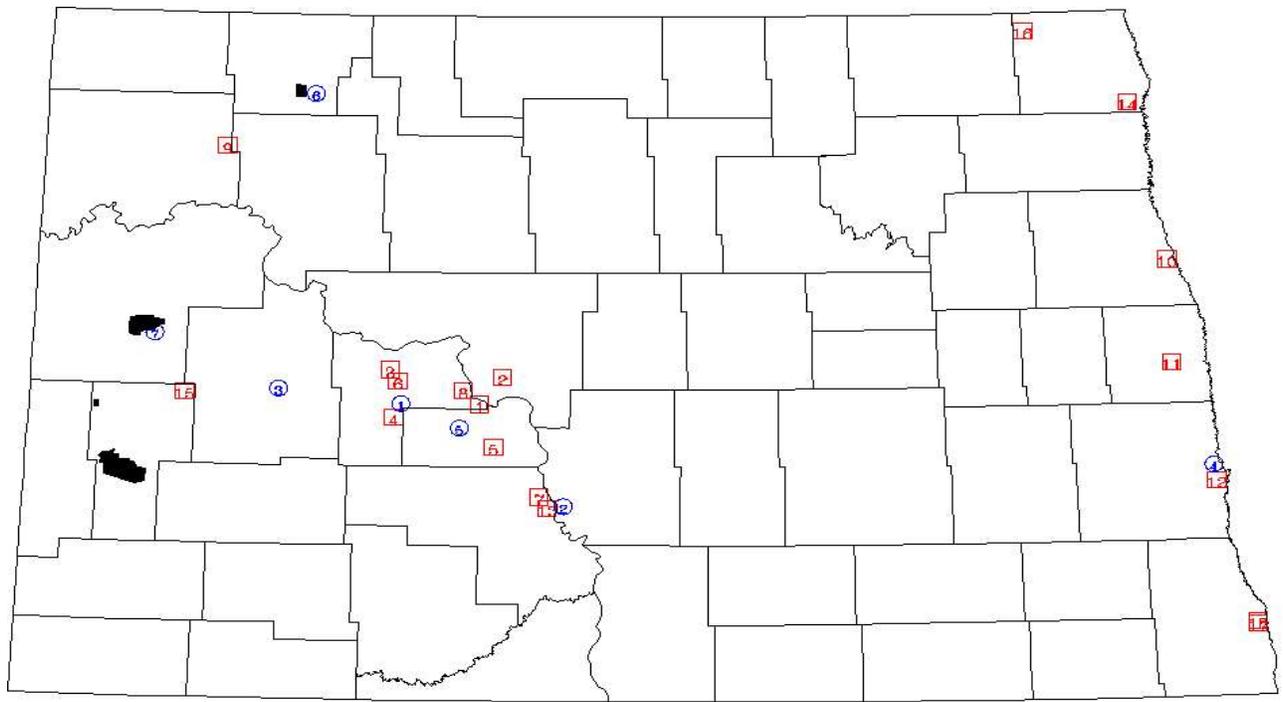
Another source of  $\text{NO}_x$  is automobile emissions. North Dakota has no significant urbanized areas with regard to oxides of nitrogen; the entire population of the state is less than 1,000,000 people. However, currently operating NO analyzers cannot be terminated without EPA Region 8 administrator permission. Figure 6A shows the contribution of “Other Point Sources” and “Utility Boilers.” The “Other Point Sources” category consists of DGC, oil refineries, natural gas processing plants and agricultural processing plants.

### 2.2.3 Monitoring Network

The Department currently operates seven NO/ $\text{NO}_2$ / $\text{NO}_x$  analyzers. Table 6 shows the 2011  $\text{NO}_2$  data summaries. The measured  $\text{NO}_2$  values are quite low. From Figure 6 it can be seen that NO/ $\text{NO}_2$ / $\text{NO}_x$  analyzers, except for Dunn Center and TRNP - NU, are well placed with respect to the major  $\text{NO}_x$  sources: TRNP - NU is defined as a background and long-range transport/welfare-related site.

TABLE 5  
Major NO<sub>x</sub> Sources  
(> 100 TPY)

#	COMPANY	SOURCE	Facility ID
1	Ottertail Power Company	Coyote Station	3805700012
2	Minnkota Power Cooperative, Inc.	Milton R. Young Station	3806500001
3	Basin Electric Power Cooperative	Antelope Valley Station	3805700011
4	Great River Energy	Coal Creek Station	3805500017
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	Tesoro Refining and Marketing Company	Mandan Refinery	3805900003
12	American Crystal Sugar Company	Drayton Plant	3806700003
13	Minn-Dak Farmers Cooperative	Wahpeton Plant	3807700026
14	University of North Dakota	UND Heating Plant	3803500003
15	ONEOK Rockies Midstream, L.L.C	Fort Buford Compressor Station	3805300028
16	Red Trail Energy, L.L.C.	Richardton Ethanol Plant	3808900058
17	North Dakota State University	NDSU Heating Plant	3801700005
18	Cavalier AFS	Cavalier AFS Power Plant	3806700005
19	Alliance Pipeline, L.P.	Wimbledon Compressor Station	3800300013
20	Alliance Pipeline, L.P.	Towner Compressor Station	3804900006
21	Northern Border Pipeline Company	Compressor Station #8	3805100001
22	Northern Border Pipeline Company	Compressor Station #6	3805900007



□ Major NO<sub>x</sub> Sources      ■ Class 1 Areas  
○ Monitoring Sites

Figure 6 Major Oxides of Nitrogen Sources

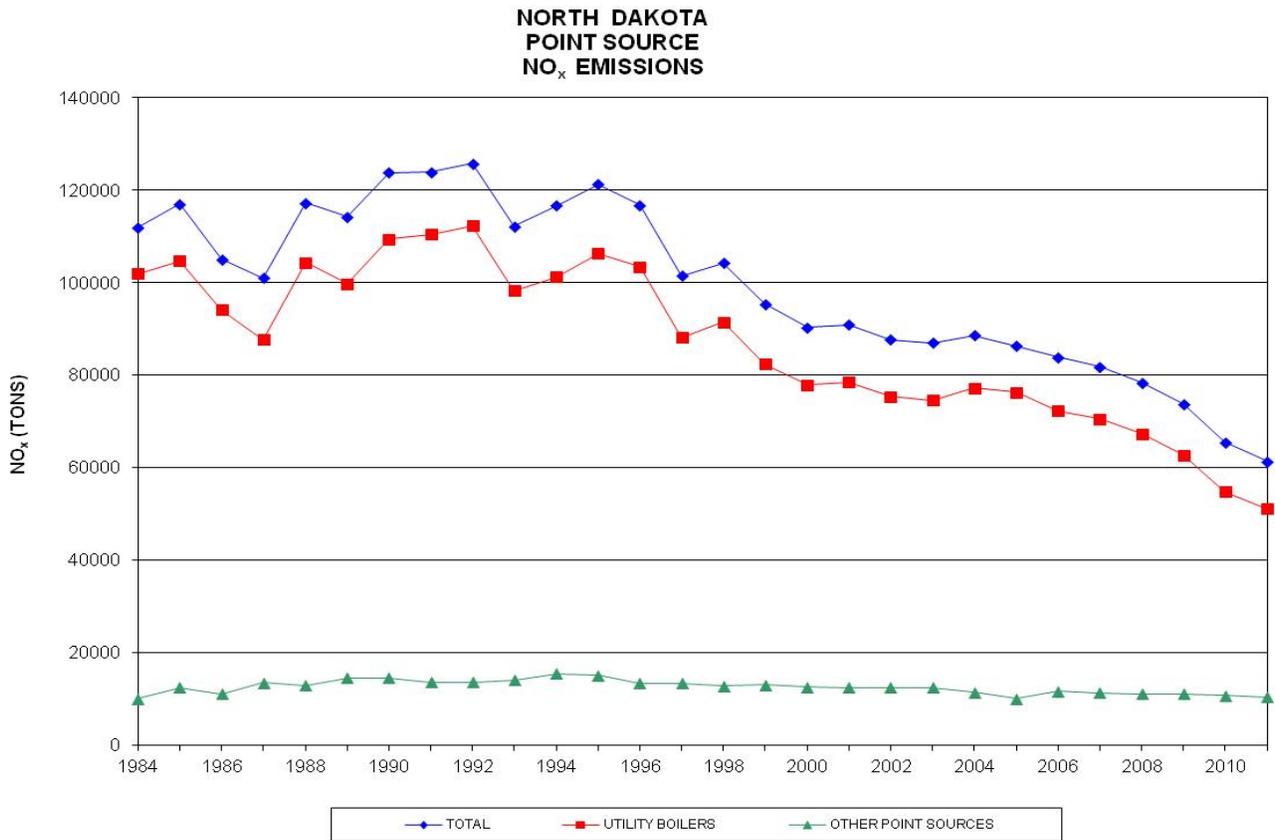


Figure 6A Annual Oxides of Nitrogen Emissions

TABLE 6

COMPARISON OF AIR QUALITY DATA WITH  
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS \*

POLLUTANT : NITROGEN DIOXIDE (ppb)

LOCATION	YEAR	NUM OBS	M A X I M A			ARITH MEAN	3yr Avg
			1 - 1ST	HOUR 2ND	98TH PCTL		
Beulah - North	2011	8354	36	30	22	2.30	25
Bismarck Residential	2011	8213	53	48	37	4.85	38
Dunn Center	2011	6912 ***	12	10	10	1.38	11
Fargo NW	2011	8085	55	45	40	4.45	42
Hannover	2011	8292	21	18	13	1.29	17
Lostwood NWR	2011	8597	22	20	14	1.78	17
TRNP - NU	2011	8042	229 **	18	10	1.12	9

\*The air quality standards are:

STATE Standards -

- 1) 100 ppb Three year average of the annual 98<sup>th</sup> percentile (8<sup>th</sup> highest) of the daily maximum 1-hour average concentration in a year.
- 2) 53 ppb annual arithmetic mean.

FEDERAL Standards -

- 1) 100 ppb Three year average of the annual 98<sup>th</sup> percentile (8<sup>th</sup> Highest) of the daily maximum 1-hour average concentration in a year.
- 2) 53 ppb annual arithmetic mean.

- \*\*\* Less than 80% of the possible samples (data) were collected.  
\*\* Qualified prescribed burn

## 2.2.4 Network Analysis

Nine of the 10 largest NO<sub>x</sub> sources in the state are within 45 miles of the Beulah and Hannover monitoring sites. Figure 7 shows the annual average concentrations for the department-operated sites for 1980 - 2011.

There were no significant changes made to the NO<sub>x</sub> network in 2011. There are no changes planned for 2012 or 2013.

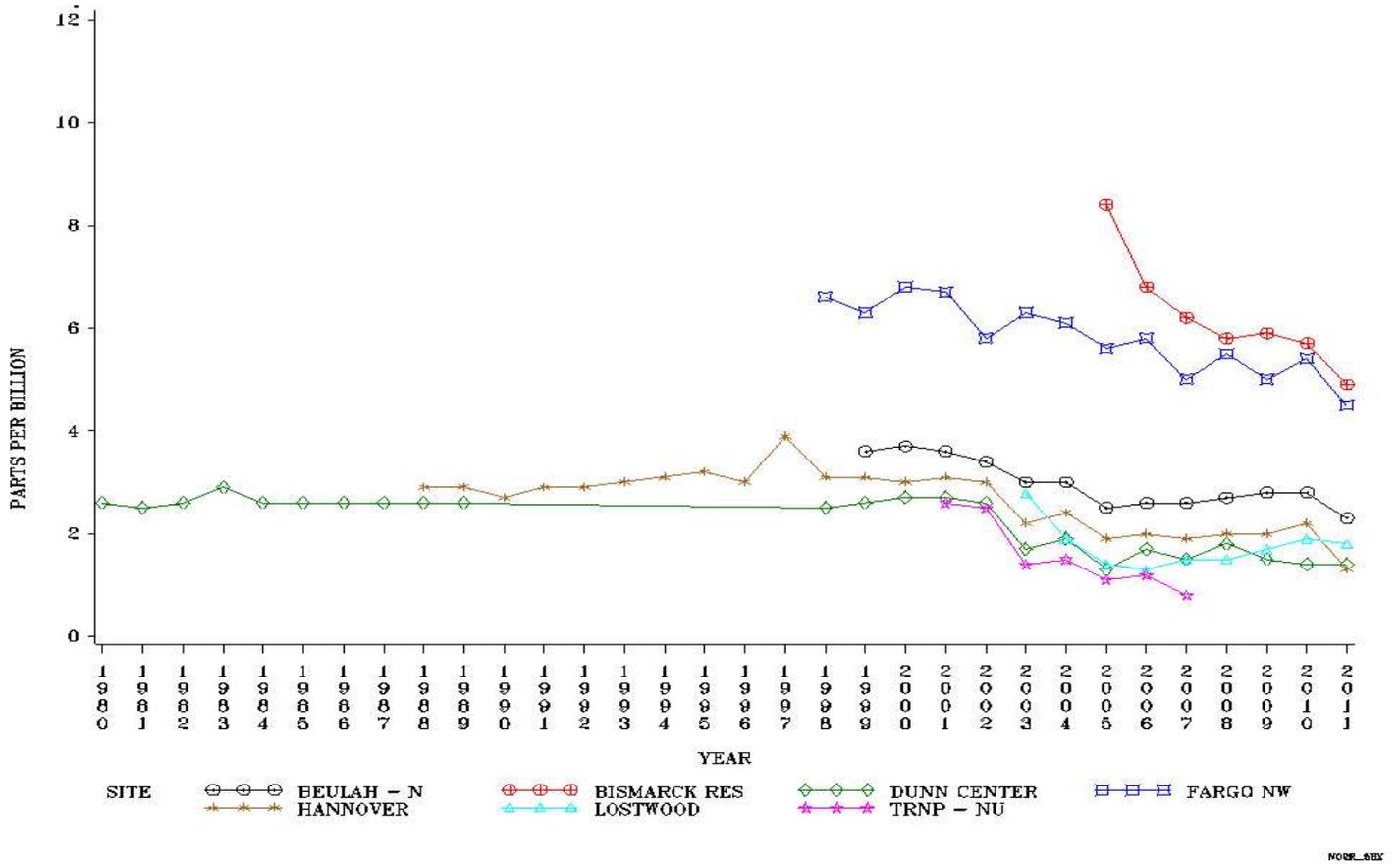


Figure 7 NO<sub>2</sub> Annual Average Concentrations

## 2.3 Ozone

Unlike most other pollutants, ozone (O<sub>3</sub>) is not emitted directly into the atmosphere but results from a complex photochemical reaction between volatile organic compounds (VOC), oxides of nitrogen (NO<sub>x</sub>), and solar radiation. Both VOC and NO<sub>x</sub> are emitted directly into the atmosphere. Since solar radiation is a major factor in O<sub>3</sub> production, O<sub>3</sub> concentrations are known to peak in summer months. 40 CFR 58 defines the O<sub>3</sub> 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 7. Figure 8 shows the approximate locations of these facilities.

### 2.3.2 Area Sources

Point sources contribute only part of the total VOC and NO<sub>x</sub> 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<sub>3</sub> 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 4<sup>th</sup> highest 8-hour average concentration must be at least 68 parts per billion.

### 2.3.3 Monitoring Network

The department currently has eight continuous ozone analyzers in operation. The department has set up an Ozone monitoring station in Williston. The site contains an ozone monitor as well as a meteorological equipment set consisting of wind speed, wind direction, ambient temperature, and particulate monitors. This site is to ascertain the impacts of oil development on the ozone levels in the state as they pertain to the national ambient air quality standards. See Figure 8 for locations. Table 8 presents the 2011 8-hour data summaries.

TABLE 7

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	Minnkota Power Cooperative, Inc.	Milton R. Young Station	3806500001
4	ADM Processing	Velva Facility	3804900005
5	Northern Sun (Division of ADM)	Enderlin Facility	3807300001
6	Great River Energy	Coal Creek Station	3805500017
7	Basin Electric Power Cooperative	Leland Olds Station	3805700001
8	American Crystal Sugar Company	Hillsboro Plant	3809700019
9	Trinity Containers, L.L.C.	Trinity Containers, L.L.C.	3801700122
10	Minn-Dak Farmers Cooperative	Wahpeton Plant	3807700026
11	Cargill Corn Milling	Wahpeton Facility	3807700110
12	Tharaldson Ethanol Plant I, LLC	Tharaldson Ethanol Plant I, LLC	3801700134

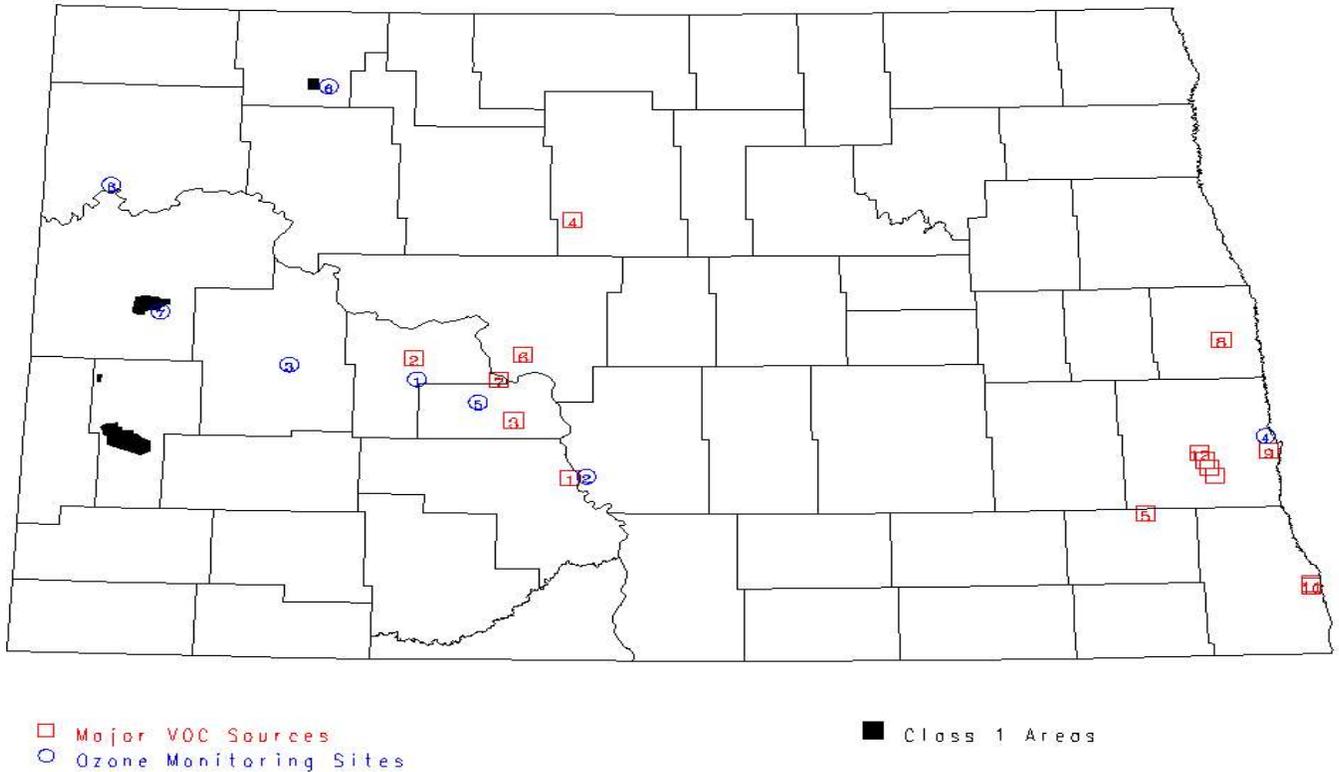


Figure 8 Major VOC Sources

TABLE 8

COMPARISON OF AIR QUALITY DATA WITH  
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS \*

POLLUTANT : Ozone (ppb)

LOCATION	YEAR	VAL DAYS	1 - 1ST	M HOUR 2ND	A X 1ST	I M 2ND	A 8 - HOUR 3RD	4TH	3yr Avg	1HR #>120	8HR #>75
Beulah North	2011	153	66	64	62	62	59	59	58		
Bismarck Residential	2011	147	63	63	62	60	58	56	57		
Dunn Center	2011	152	60	60	58	57	54	54	55		
Fargo NW	2011	129	66	64	61	60	58	57	59		
Hannover	2011	140	78	65	62	62	60	58	58		
Lostwood NWR	2011	149	68	65	65	62	61	60	60		
TRNP - NU	2011	144	327 **	65	62	62	60	59	58		

\* The air quality standards for ozone are:

STATE - 75ppb Three year average of the annual 4<sup>th</sup> highest daily maximum 8-hour concentrations.

FEDERAL Standards - 75 ppb Three year average of the annual 4<sup>th</sup> highest daily maximum 8-hour concentrations.

\*\* Qualified prescribed burn

### 2.3.4 Network Analysis

Only three of the eight monitoring sites are in an area not significantly influenced by VOC sources (see Figure 8). 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 9 shows a significant similarity among the 4<sup>th</sup> 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 4<sup>th</sup> highest average is 6 ppb (see Table 8).

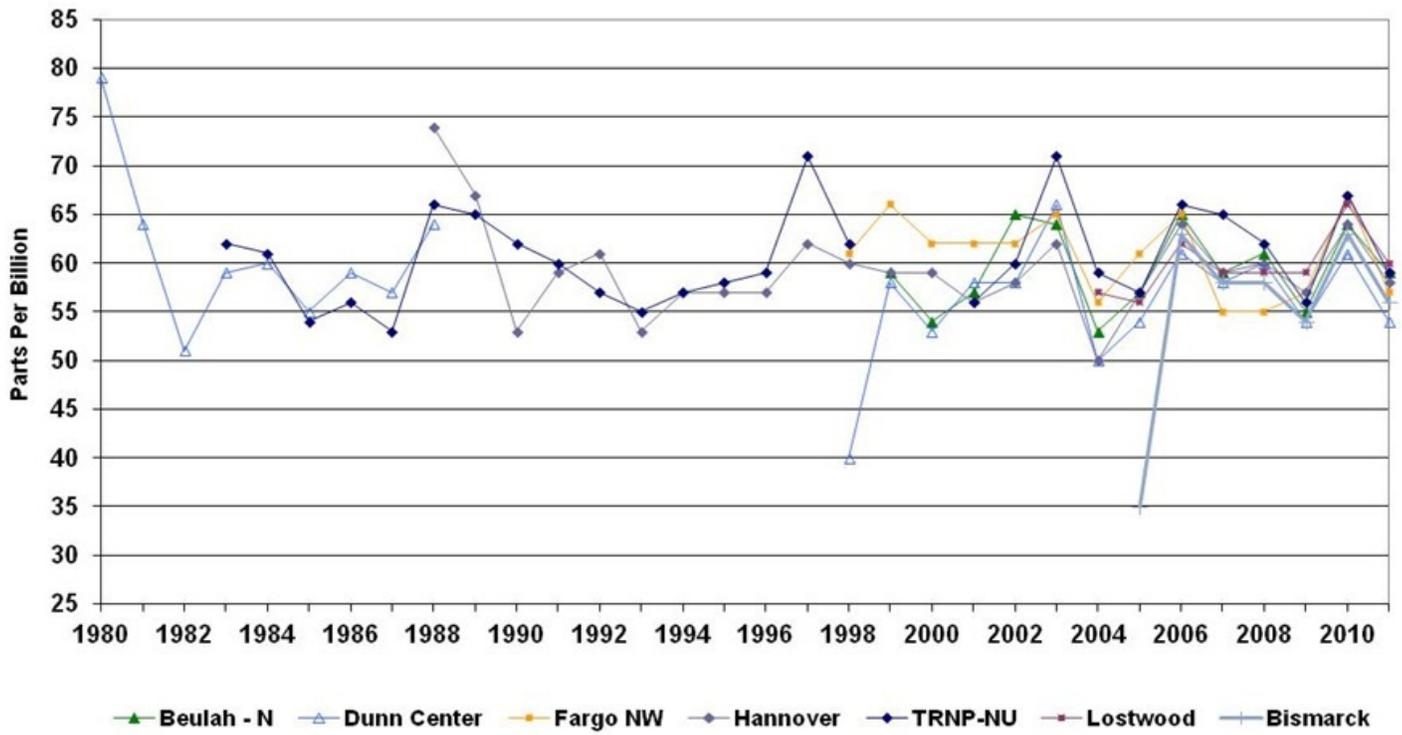


Figure 9 Annual 4<sup>th</sup> Highest 8-HR Ozone Concentrations

## 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<sub>10</sub> and PM<sub>2.5</sub>. The PM<sub>10</sub> particulates have an aerodynamic diameter less than or equal to a nominal 10 microns and are designated as PM<sub>10</sub>. The PM<sub>2.5</sub> particulates have an aerodynamic diameter less than or equal to a nominal 2.5 microns. The EPA has defined a new PM subgroup of particles called “coarse fraction,” or PM<sub>coarse</sub>. This subgroup is made up of PM<sub>10</sub> – PM<sub>2.5</sub>. Specific health effects have been identified for both the PM<sub>coarse</sub> and PM<sub>2.5</sub> groups.

### 2.4.1 Sources

The major PM<sub>10</sub> point sources (>100 TPY) are listed in Table 9. Figure 10 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<sub>10</sub> 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 10A shows the contribution of point sources to the total PM<sub>10</sub> emissions. The “Utility Boilers” category consists of power plant boilers. The “Other Point Sources” category consists of DGC, oil refineries, natural gas processing plants and agricultural processing plants.

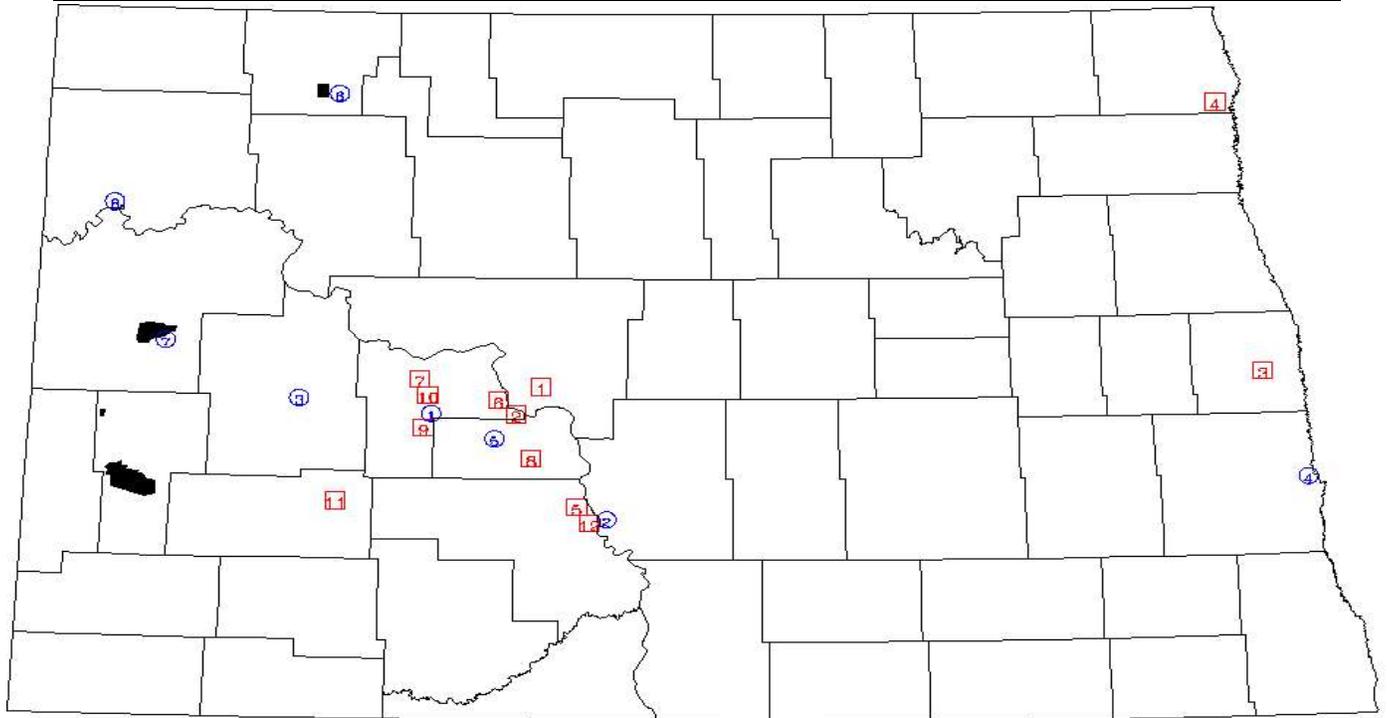
### 2.4.2 Monitoring Network

The Department operated seven continuous PM<sub>10</sub> analyzers, three manual PM<sub>2.5</sub> samplers, seven FEM continuous PM<sub>2.5</sub> analyzers, and one speciation sampler. Table 10 shows the manual FRM and continuous FEM PM<sub>2.5</sub> data summaries. Table 11 shows the continuous PM<sub>10</sub> particulate data summary.

TABLE 9

Major PM<sub>10</sub> Sources  
(> 100 TPY)

#	COMPANY	SOURCE	Facility ID
1	Great River Energy	Coal Creek Station	3805500017
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	Montana Dakota Utilities Company	RM Heskett Station	3805900001
6	Great River Energy	Stanton Station	3805700004
7	Basin Electric Power Cooperative	Antelope Valley Station	3805700011
8	Minnkota Power Cooperative, Inc.	Milton R. Young Station	3806500001
9	Otter Tail Power Company	Coyote Station	3805700012
10	Dakota Gasification Company	Great Plains Synfuels Facility	3805700013
11	Red Trail Energy, L.L.C.	Richardton Ethanol Plant	3808900058
12	Tesoro Refining and Marketing Company	Mandan Refinery	3805900003



□ Major PM<sub>10</sub> Sources  
○ PM Monitoring Sites

■ Class 1 Areas

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Figure 10 Major PM<sub>10</sub> Sources

**NORTH DAKOTA  
POINT SOURCE  
FILTERABLE PM EMISSIONS**

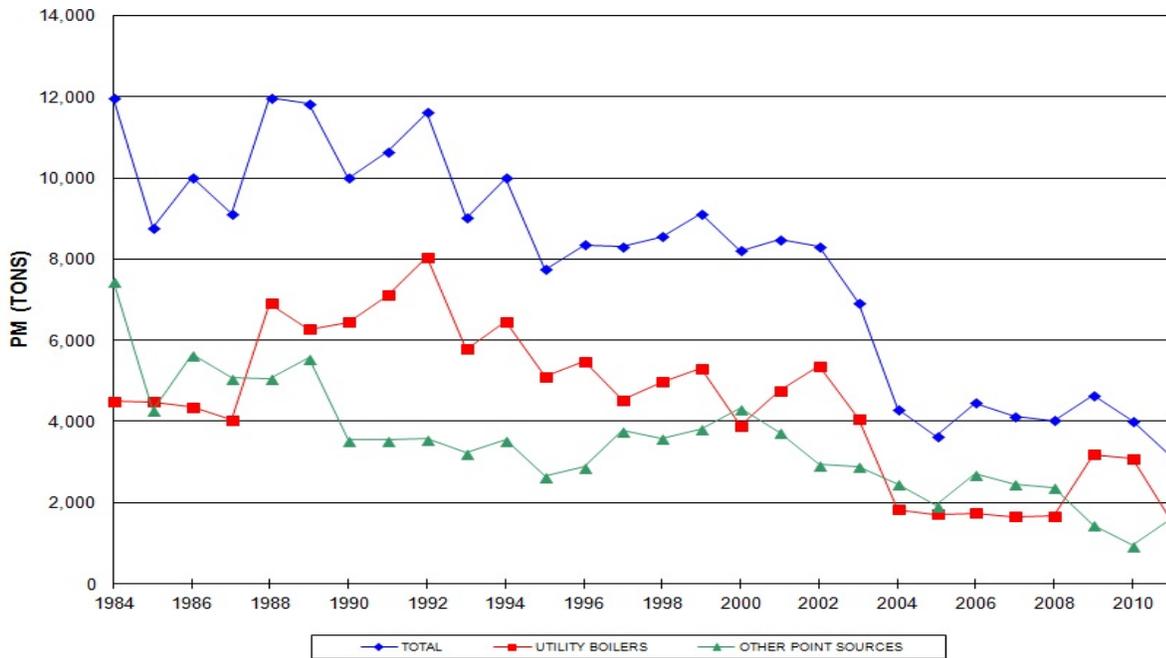


Figure 10A Annual PM Emissions

**TABLE 10**

COMPARISON OF AIR QUALITY DATA WITH  
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS \*

POLLUTANT : FRM and FEM PM<sub>2.5</sub> Particulates (µg/m<sup>3</sup>)

LOCATION	YEAR	VAL DAYS	MIN	M A X I M A 24 - HOUR			24-HR 98th%	24-HR 3yr Avg	WTD MEAN	Annual 3yr Avg	#>35	AM>15
				1ST	2ND	3RD						
Beulah - North	2011	59		11.0	10.9	10.8	10.9	(NA)	5.08	(NA)		
Beulah - North (BAMM)	2011	353		21.6	18.3	18.1	15.3	15.0	6.88	6.3		
Bismarck Residential	2011	116		12.3	12.2	12.2	12.2	(NA)	5.67	(NA)		
Bismarck Residential (BAMM)	2011	291		22.5	22.5	19.2	15.0	16.0	6.80	6.9		
Dunn Center (BAMM)	2011	96 ***		17.1	13.9	13.8	13.9	14.0	6.39	6.4		
Fargo NW	2011	110		23.5	21.6	21.3	21.3	(NA)	7.73	(NA)		
Fargo NW (BAMM)	2011	337		22.5	20.2	18.9	18.0	21.0	7.11	8.1		
Hannover (BAMM)	2011	43 ***		16.8	9.1	8.9	16.8	17.0	3.91	3.9		
Lostwood NWR (BAMM)	2011	354		2.04	19.5	19.5	13.7	15.0	7.38	7.7		
TRNP - NU (BAMM)	2011	345		29.3	23.1	18.6	17.0	18.0	8.80	8.7		

\* The ambient air quality standards are:

FEDERAL Standards -

1) 24-hour: 3-year average of 98th percentiles not to exceed 35 µg/m<sup>3</sup>.

2) Annual: 3-year average not to exceed 15 µg/m<sup>3</sup>.

\*\*\* Less than 80% of the possible samples (data) were collected.

Table 11

COMPARISON OF AIR QUALITY DATA WITH  
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS \*

POLLUTANT : Inhalable Continuous PM<sub>10</sub> (µg/m<sup>3</sup>)

LOCATION	YEAR	NUM OBS	M A X I M A 24 - HOUR				24HR	
			1ST	2ND	3RD	4TH	MEAN	#>150 AM>50
Beulah - North	2011	8550	53.0	46.0	43.0	37.0	10.7	
Bismarck Residential	2011	8545	74.0	62.0	55.0	48.0	14.1	
Dunn Center	2011	6811 ***	96.0	74.0	61.0	57.0	13.9	
Fargo NW	2011	8020	98.0	89.0	85.0	81.0	17.7	
Hannover	2011	963 ***	14.0	14.0	13.0	11.0	7.4	
Lostwood NWR	2011	8567	63.0	52.0	48.0	45.0	11.0	
TRNP - NU	2011	8490	35.0	30.0	25.0	25.0	7.9	

\* The STATE and FEDERAL air quality standards are:

1) 150 µg/m<sup>3</sup> maximum averaged over a 24-hour period with no more than one expected exceedance per year.

\*\*\* Less than 80% of the possible samples (data) were collected.

### 2.4.3 PM<sub>10</sub> Network Analysis

PM<sub>10</sub> and smaller particles are of concern mainly because of their health effects. The primary purpose for the continuous PM<sub>10</sub> analyzers is to be used with the continuous PM<sub>2.5</sub> analyzers to determine the PM<sub>coarse</sub> fraction. The data also is compared to both the data and federal ambient air quality standards.

### 2.4.4 PM<sub>2.5</sub> Network

The manual PM<sub>2.5</sub> network currently has three sites. Bismarck, Fargo and Beulah are non-CORE required sites. Bismarck and Fargo operate on a 1-in-3 day schedule, while Beulah operates on a 1-in-6 day schedule. FEM Continuous PM<sub>2.5</sub> analyzers have been installed at all sites in the network.

### 2.4.5 Speciation Network

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

## 2.5 Carbon Monoxide

Many large urban areas in the United States have problems attaining the NAAQS 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 12. Figure 11 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<sub>2</sub> and NO<sub>x</sub>. However, the corresponding CO levels from these sources are considerably lower.

### 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.

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

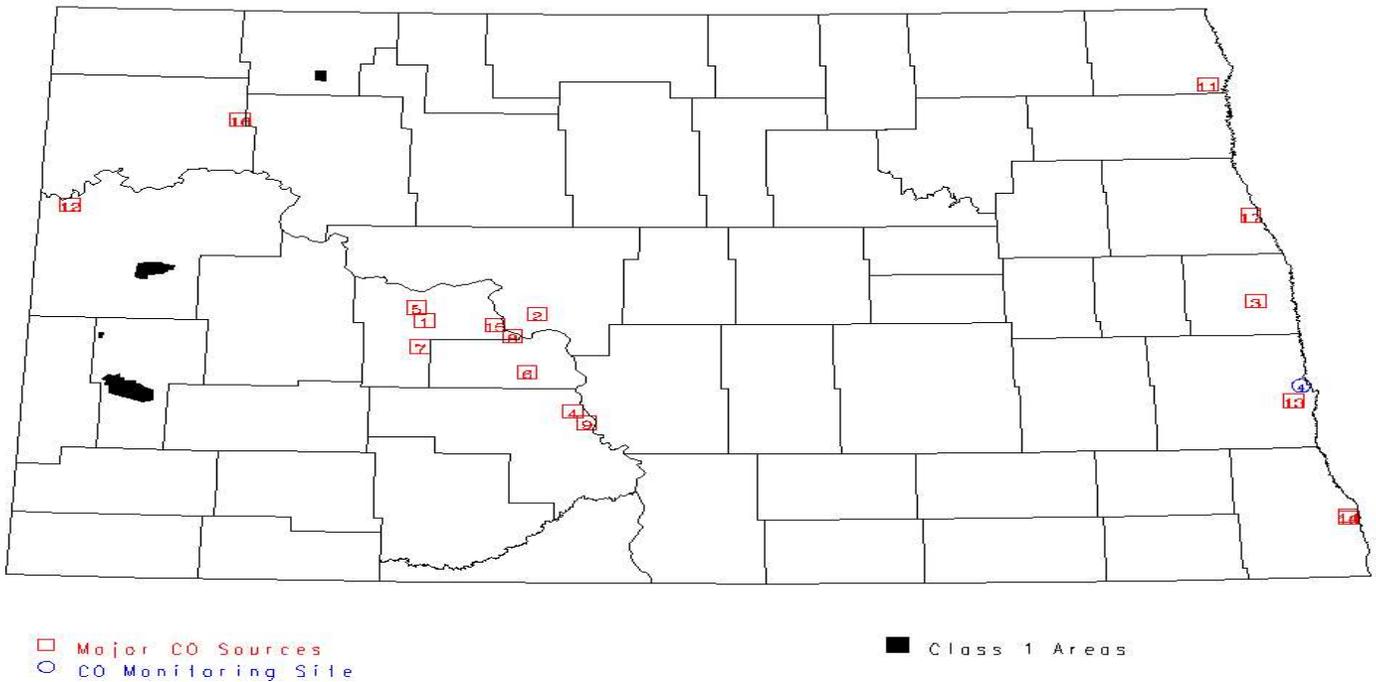


Figure 11 Major CO Sources

## TABLE 13

COMPARISON OF AIR QUALITY DATA WITH  
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS \*

POLLUTANT : **CARBON MONOXIDE** (PPB)

LOCATION	YEAR	NUM OBS	M A X I M A		8 - HOUR		1HR	8HR
			1ST	2ND	1ST	2ND	#>35000	#>9000
Fargo NW	2011	8137	682.0	674.0	400.0	400.0		

\* The STATE and FEDERAL air quality standards are:

- 1) The maximum allowable 1-hour concentration is 35000 ppb not to be exceeded more than once per year.
- 2) The maximum allowable 8-hour concentration is 9000 ppb not to be exceeded more than once per year.

## 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 requirement for a NAMS network only in urbanized areas, resulted in terminating the lead monitoring program effective Dec. 31, 1983. Along with the low monitored concentrations, lead has been completely removed from gasoline since lead monitoring began in 1979.

## 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.

### 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 or industry  $H_2S$  monitoring sites.

## 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 15 and Figure 12 shows the approximate locations of these facilities (the numbers correspond to the source table).

### 2.8.2 Monitoring Network

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

Table 15  
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	Northern Sun (Division of ADM)	Enderlin Facility	3807300001
4	LM Wind Power Blades	Grand Forks Facility	3803500067

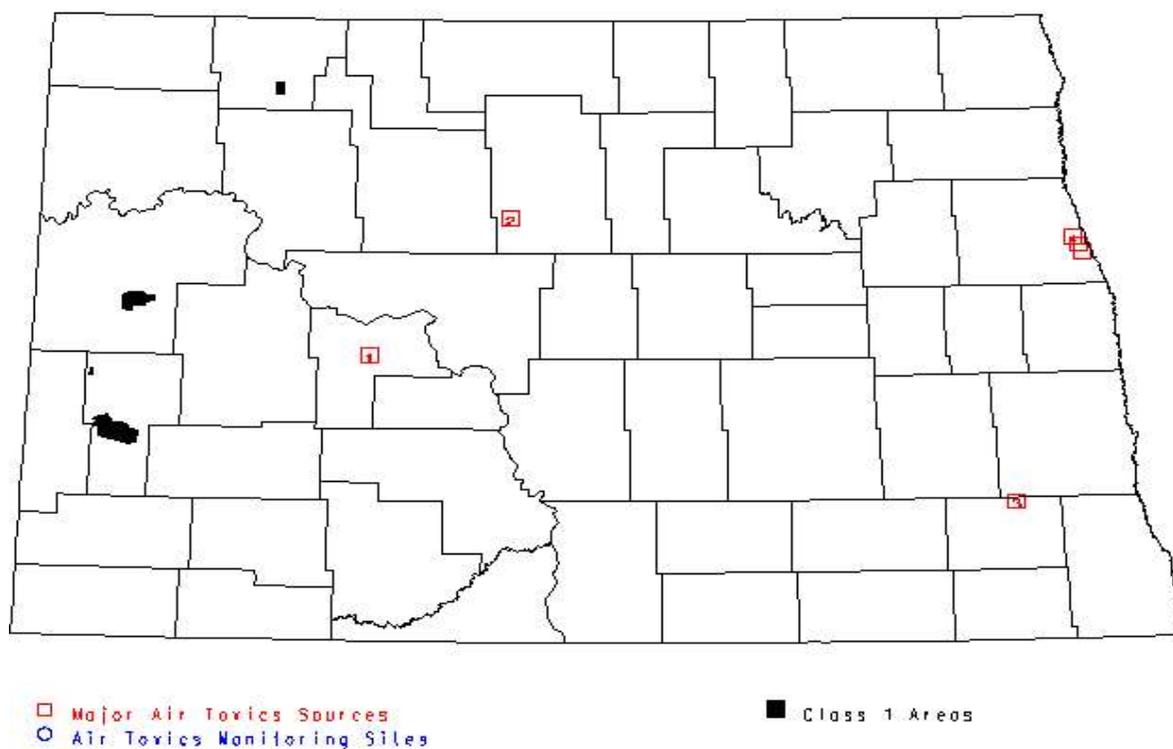


Figure 12 Major Air Toxics Sources

### 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<sub>2</sub>)

Neither the state nor federal standards were exceeded at any monitoring site. The maximum concentrations were as follows: 3-year average 1-hour 99<sup>th</sup> percentile – 70ppb; 3-hour – 104.6 ppb; 24-hour – 29.3 ppb; annual 1.56 ppb.

There is no SO<sub>2</sub> 5-minute standard currently in effect. The maximum 5-minute average was 358 ppb.

#### 3.2 Nitrogen Dioxide (NO<sub>2</sub>)

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 98<sup>th</sup> percentile 1-hour average concentrations – 40 ppb; annual – 4.85 ppb.

#### 3.3 Ozone (O<sub>3</sub>)

Neither the state nor federal standard was exceeded during the year. The maximum fourth-highest 8-hour concentration was 60 ppb.

### 3.4 Inhalable Particulates

Neither the state nor federal PM<sub>10</sub> standards were exceeded during the year. The maximum concentration was: 24-hour – 98.0 µg/m<sup>3</sup>.

The federal PM<sub>2.5</sub> standards were not exceeded during the year. The maximum concentrations are as follows: 24-hour – 29.3 µg/m<sup>3</sup>; annual – 8.7 µg/m<sup>3</sup>.

### 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 – 682 ppb; 8-hour – 400 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 is a condensation of Appendices B and C, combined with a site description and any information relating to specific analyzer or sampler. 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 that has ever reported data to EPA, you may go to [www.epa.gov/air/data/aqsdb.html](http://www.epa.gov/air/data/aqsdb.html). The site is very easy to use and with a little experimenting, site and monitor selections can be made very specific. Also available at this site are air quality summary data and emissions data.

Another useful tool is Google Earth<sup>TM</sup>. (<http://free.download.earth.googlepages.com/>) With this tool, one can enter latitude and longitude to get either an expanded view or close-up view of each monitoring site.

For both of these tools, a high-speed Internet connection is highly recommended. They can be used with a dial-up connection, but it is not recommended.



Site Pictures: **Beulah North**



North



South



East



West



Looking Northeast



Looking Northwest



**Site:** Bismarck Residential  
**AQS#:** 38-015-0003  
**Address:** 1810 N 16<sup>th</sup> Street, Bismarck  
**Latitude:** +46.825425

**Station Type:** SLAMS  
**MSA:** 1010  
**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:**

<b>Parameter</b>	<b>Sampling &amp; Analysis Method</b>	<b>Operating Schedule</b>	<b>Monitoring Objective</b>	<b>Spatial Scale</b>
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 <sub>2.5</sub>	24-hour Gravimetric	1/6	Population Exposure	Urban
PM <sub>2.5</sub>	FEM PM <sub>2.5</sub> BAMM	Continuous	Population Exposure	Urban
PM <sub>10</sub>	PM <sub>10</sub> TEOM Gravimetric 50° Celsius	Continuous	Population Exposure	Urban

**Meteorological parameters:**

<b>Parameter</b>	<b>Sampling &amp; Analysis Method</b>	<b>Operating Schedule</b>	<b>Tower Height</b>	<b>Spatial Scale</b>
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



**Site:** Dunn Center

**AQS#:** 38-025-0003

**Address:** 9610 Seventh Street SW, Dunn Center

**Latitude:** +47.313200

**Station Type:** SLAMS

**MSA:** 0000

**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<sub>2.5</sub> 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 <sub>2.5</sub>	PM <sub>2.5</sub> SCC W/ No Correction TEOM Gravimetric 40 deg. Celsius	Continuous	General/Background	Urban
PM <sub>10</sub>	PM <sub>10</sub> 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



**Site Name:** Fargo NW

**AQS#:** 38-017-1004

**Address:** 4266 40<sup>th</sup> Avenue North, Fargo

**Latitude:** +46.933754

**Station Type:** SLAMS (required)

**MSA:** 2520

**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 is used in dispersion modeling for input, calibration and validation. An NCORE site is required to have trace level analyzers for sulfur dioxide, carbon monoxide, and NO<sub>y</sub> (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	Gas Filter Correlation	Continuous	Population Exposure	Urban
NO <sub>y</sub>	Instrumental Chemiluminescence	Continuous	Population Exposure	Urban
Ozone	Instrumental Ultra Violet	Continuous	Population Exposure	Urban
PM <sub>2.5</sub>	24-hour Gravimetric	1/3	Population Exposure	Urban
PM <sub>2.5</sub>	FEM PM <sub>2.5</sub> BAMM	Continuous	Population Exposure	Urban
PM <sub>10</sub>	PM <sub>10</sub> TEOM Gravimetric 50° Celsius	Continuous	Population Exposure	Urban
PM <sub>fine</sub> 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



**Site Name:** Hannover  
**AQS#:** 38-065-0002  
**Address:** 1575 Highway 31, Stanton  
**Latitude:** +47.185833

**Station Type:** SLAMS  
**MSA:** 0000  
**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 is used to supplement ambient data collected at Beulah – North and TRNP – NU.

**Gas/Particulate parameters:**

<b>Parameter</b>	<b>Sampling &amp; Analysis Method</b>	<b>Operating Schedule</b>	<b>Monitoring Objective</b>	<b>Spatial Scale</b>
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 <sub>2.5</sub>	PM <sub>2.5</sub> SCC W/ No Correction TEOM Gravimetric 40 deg. Celsius	Continuous	Source Oriented	Urban

**Meteorological parameters:**

<b>Parameter</b>	<b>Sampling &amp; Analysis Method</b>	<b>Operating Schedule</b>	<b>Tower Height</b>	<b>Spatial Scale</b>
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



**Site Name:** Lostwood NWR  
**AQS#:** 38-013-0004  
**Address:** 8315 Highway 8, Kenmare  
**Latitude:** +48.641930

**Station Type:** SLAMS  
**MSA:** 0000  
**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, this data is 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. This 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
PM <sub>2.5</sub>	FEM PM <sub>2.5</sub> BAMM	Continuous	Regional Transport	Regional
PM <sub>10</sub>	PM <sub>10</sub> 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



**Site Name:** TRNP-NU

**AQS#:** 38-053-0002

**Address:** 229 Service Road, Watford City

**Latitude:** +47.581200

**Station Type:** SLAMS(required)

**MSA:** 0000

**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 is used for model calibration/validation.

**Gas/Particulate parameters:**

<b>Parameter</b>	<b>Sampling &amp; Analysis Method</b>	<b>Operating Schedule</b>	<b>Monitoring Objective</b>	<b>Spatial Scale</b>
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 <sub>2.5</sub>	FEM PM <sub>2.5</sub> BAMB	Continuous	General/Background Regional Transport	Regional
PM <sub>10</sub>	PM <sub>10</sub> TEOM Gravimetric 50° Celsius	Continuous	General/Background Regional Transport	Regional

**Meteorological parameters:**

<b>Parameter</b>	<b>Sampling &amp; Analysis Method</b>	<b>Operating Schedule</b>	<b>Tower Height</b>	<b>Spatial Scale</b>
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



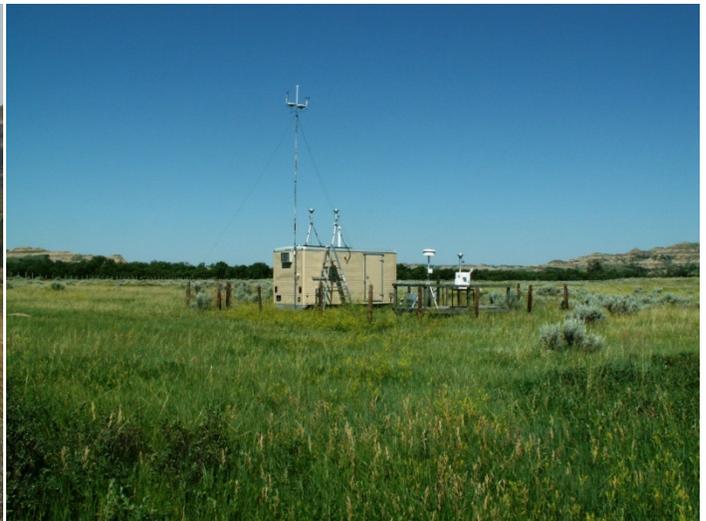
North



South



East



West



Looking Northwest



Looking Northeast



## Appendix B

### Detailed Site Descriptions

This appendix is a listing printed from the EPA's Air Quality System (AQS) database. Please note that if the latitude and longitude are used in Google Earth™, the display generated may not exactly match the display in Appendix A. This is a problem with Google Earth™, not the coordinates in AQS.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
 AIR QUALITY SYSTEM  
 SITE DESCRIPTION REPORT

May. 18, 2007

Site ID: 38-013-0004	Site Name: <b>LOSTWOOD NWR</b>	Local ID:
Street Address: 8315 HIGHWAY 8, KENMARE		City: Not in a city
State: North Dakota	Zip Code: 58721	County: Burke
Location Description: MONITORING POINT		Location Setting: RURAL
Coll. Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL		Land Use: AGRICULTURAL
Date Established: 19990101	Date Terminated:	Last Updated: 20060814
Regional Eval. Date:	HQ Eval. Date:	AQCR : NORTH DAKOTA
MSA: Not in a MSA	CMSA: Not in a CMSA	Direct Met Site: Met. Site ID:
Type Met Site: ON-SITE MET EQUIP	Dist to Met. Site(m):	Local Region:
Urban Area: NOT IN AN URBAN AREA		EPA Region: DENVER
City Population: 1	Dir. to CBD:	Dist. to City(km):
Census Block:	Block Group:	Census Tract:
Congressional District:		Class 1 Area: Lostwood National Wildlife Refuge
Site Latitude: +48.641930	Site Longitude: -102.401800	Time Zone: CENTRAL
UTM Zone: 13	UTM Northing: 5390691.44	UTM Easting: 691395.29
Accuracy: .01	Datum: WGS84	Scale: 24000 Point/Line/Area: POINT
Vertical Measure(m): 696.0		Vert Accuracy: .01
Vert Datum NAVD88		Vert Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL

ACTIVE MONITOR TYPES		AGENCY ROLES			
Monitor Type	# of Monitors	Role	Agency Desc	Begin Date	End Date
SLAMS	5	SUPPORTING	North Dakota State Department Of Health	20031027	
OTHER	12				
IMPROVE	59				

Road		TANGENT ROADS				Compass	
Number	Road Name	Traffic Count	Traffic Year	Traffic Volume Source	Road Type	Sector	
1	90TH STREET NW	10	2002	DOT	LOCAL ST OR	N	
2	ND HIGHWAY 8	100	2002	DOT	THRU ST OR HY	E	
3	NDHIGHWAY 8	100	2002	DOT	THRU ST OR HY	S	
4	COUNTY ROAD 11	10	2002	DOT	LOCAL ST OR	W	

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
AIR QUALITY SYSTEM  
SITE DESCRIPTION REPORT

May. 18, 2007

Site ID: 38-015-0003	Site Name: <b>BISMARCK RESIDENTIAL</b>	Local ID:
Street Address: 1810 N 16TH STREET		City: Bismarck
State: North Dakota	Zip Code: 58501	County: Burleigh
Location Description: MONITORING POINT		Location Setting: SUBURBAN
Coll. Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL		Land Use: RESIDENTIAL
Date Established: 19950501	Date Terminated:	Last Updated: 20060814
Regional Eval. Date:	HQ Eval. Date:	AQCR : NORTH DAKOTA
MSA: Bismarck,ND	CMSA:	Direct Met Site: S      Met. Site ID:
Type Met Site: NWS	Dist to Met. Site(m): 3200	Local Region:
Urban Area: BISMARCK, ND		EPA Region: DENVER
City Population: 55532	Dir. to CBD: N	Dist. to City(km): 2
Census Block:	Block Group:	Census Tract:
Congressional District:		Class 1 Area:
Site Latitude: +46.825425	Site Longitude: -100.768210	Time Zone: CENTRAL
UTM Zone: 14	UTM Northing: 5187064	UTM Easting: 365130.78
Accuracy: .03	Datum: WGS84	Scale: 0      Point/Line/Area: POINT
Vertical Measure(m): 580.0		Vert Accuracy: .03
Vert Datum      NAVD88		Vert Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL

ACTIVE MONITOR TYPES		AGENCY ROLES			
Monitor Type	# of Monitors	Role	Agency Desc	Begin Date	End Date
SUPPLMNTL	134	SUPPORTING	North Dakota State Department Of Health	19950501	
SPECTAT	18				
OTHER	16				
SLAMS	16				

		TANGENT ROADS				
Road Number	Road Name	Traffic Count	Traffic Year	Traffic Volume Source	Road Type	Compass Sector
1	16TH AVE.	10650	1991		LOCAL ST OR	S
2	15TH ST	150	1994		uv LOCAL ST OR	W
3	17TH ST	100	1994		uv LOCAL ST OR	E
4	SPALDING AVE.	20	1994		uv LOCAL ST OR	N

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
AIR QUALITY SYSTEM  
SITE DESCRIPTION REPORT

May. 18, 2007

Site ID: 38-017-1004	Site Name: <b>FARGO NW</b>	Local ID:
Street Address: 4266 40TH AVE NORTH		City: Fargo
State: North Dakota	Zip Code: 58102	County: Cass
Location Description: MONITORING POINT		Location Setting: SUBURBAN
Coll. Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL		Land Use: AGRICULTURAL
Date Established: 19980513	Date Terminated:	Last Updated: 20060814
Regional Eval. Date:	HQ Eval. Date:	AQCR : METROPOLITAN FARGO-MOORHEAD
MSA: Fargo-Moorhead,ND-MN	CMSA:	Direct Met Site: Met. Site ID:
Type Met Site: ON-SITE MET EQUIP	Dist to Met. Site(m):	Local Region:
Urban Area: FARGO-MOORHEAD, ND-MN		EPA Region: DENVER
City Population: 90599	Dir. to CBD: N	Dist. to City(km): 4
Census Block:	Block Group:	Census Tract:
Congressional District: 1		Class 1 Area:
Site Latitude: +46.933754	Site Longitude: - 96.855350	Time Zone: CENTRAL
UTM Zone: 14	UTM Northing: 5199816.62	UTM Easting: 663252.17
Accuracy: .03	Datum: WGS84	Scale: 0 Point/Line/Area: POINT
Vertical Measure(m): 275.0		Vert Accuracy: .03
Vert Datum NAVD88		Vert Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL

ACTIVE MONITOR TYPES		AGENCY ROLES			
Monitor Type	# of Monitors	Role	Agency Desc	Begin Date	End Date
TRENDS SPECIATION	67	SUPPORTING	North Dakota State Department Of Health	19980513	
OTHER	23		Air Toxics		
SLAMS	6				

		TANGENT ROADS				
Road Number	Road Name	Traffic Count	Traffic Year	Traffic Volume Source	Road Type	Compass Sector
1	19TH AVE N.	550	1989		THRU ST OR HY	S
2	INTERSTATE 94	8790	1989		ARTERIAL	E
3	COUNTY 20	975	1989		THRU ST OR HY	N

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
 AIR QUALITY SYSTEM  
 SITE DESCRIPTION REPORT

May. 18, 2007

Site ID: 38-025-0003	Site Name: <b>DUNN CENTER</b>	Local ID:
Street Address: 9610 SEVENTH STREET SW		City: Not in a city
State: North Dakota	Zip Code: 58626	County: Dunn
Location Description: MONITORING POINT		Location Setting: RURAL
Coll. Method: GPS CARRIER PHASE STATIC RELATIVE POSITION		Land Use: AGRICULTURAL
Date Established: 19750701	Date Terminated:	Last Updated: 20060814
Regional Eval. Date:	HQ Eval. Date:	AQCR : NORTH DAKOTA
MSA: Not in a MSA	CMSA: Not in a CMSA	Direct Met Site: Met. Site ID:
Type Met Site: ON-SITE MET EQUIP	Dist to Met. Site(m):	Local Region:
Urban Area: NOT IN AN URBAN AREA		EPA Region: DENVER
City Population: 1	Dir. to CBD:	Dist. to City(km):
Census Block:	Block Group:	Census Tract:
Congressional District: 1		Class 1 Area:
Site Latitude: +47.313200	Site Longitude: -102.527300	Time Zone: MOUNTAIN
UTM Zone: 13	UTM Northing: 5242716.42	UTM Easting: 686888.26
Accuracy: .03	Datum: WGS84	Scale: 0 Point/Line/Area: POINT
Vertical Measure(m): 683.0		Vert Accuracy: .03
Vert Datum NAVD88		Vert Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL

SITE COMMENTS
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\* \*

ACTIVE MONITOR TYPES		AGENCY ROLES			
Monitor Type	# of Monitors	Role	Agency Desc	Begin Date	End Date
INDEX SITE	1	SUPPORTING	North Dakota State Department Of Health	19750701	
OTHER	10				
SLAMS	7				

Road		TANGENT ROADS				Road Type	Compass Sector
Road Number	Road Name	Traffic Count	Traffic Year	Traffic Volume Source			
1	SEVENTH STREET SW	10	2004	DOT		LOCAL ST OR	N

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
AIR QUALITY SYSTEM  
SITE DESCRIPTION REPORT

May. 18, 2007

Site ID: 38-053-0002	Site Name: <b>TRNP-NU</b>	Local ID:
Street Address: 229 SERVICE RD., WATFORD CITY		City: Not in a city
State: North Dakota	Zip Code: 58854	County: McKenzie
Location Description: MONITORING POINT		Location Setting: RURAL
Coll. Method: GPS CARRIER PHASE STATIC RELATIVE POSITION		Land Use: AGRICULTURAL
Date Established: 19781201	Date Terminated:	Last Updated: 20060814
Regional Eval. Date:	HQ Eval. Date:	AQCR : NORTH DAKOTA
MSA: Not in a MSA	CMSA: Not in a CMSA	Direct Met Site: Met. Site ID:
Type Met Site: ON-SITE MET EQUIP	Dist to Met. Site(m):	Local Region:
Urban Area: NOT IN AN URBAN AREA		EPA Region: DENVER
City Population: 1	Dir. to CBD:	Dist. to City(km):
Census Block:	Block Group:	Census Tract:
Congressional District:		Class 1 Area: T. Roosevelt Park (North)
Site Latitude: +47.581200	Site Longitude: -103.299500	Time Zone: MOUNTAIN
UTM Zone: 13	UTM Northing: 5270936.38	UTM Easting: 627875.21
Accuracy: .03	Datum: NAD83	Scale: 0 Point/Line/Area: POINT
Vertical Measure(m): 624.0		Vert Accuracy: 0
Vert Datum NAVD88		Vert Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL

SITE COMMENTS

LOCATED IN THE THOEDORE ROOSEVELT NATIONAL PARK APPROXIMATELY 10 KM INSIDE THE PARK ENTRANCE.

ACTIVE MONITOR TYPES		AGENCY ROLES			
Monitor Type	# of Monitors	Role	Agency Desc	Begin Date	End Date
SLAMS	6	SUPPORTING	North Dakota State Department Of Health	19781201	
SUPPLMNTL SPECIAT	67				
OTHER	9				

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
AIR QUALITY SYSTEM  
SITE DESCRIPTION REPORT

May. 18, 2007

Site ID: 38-057-0004	Site Name: <b>BEULAH NORTH</b>	Local ID:
Street Address: 6024 HIGHWAY 200		City: Beulah
State: North Dakota	Zip Code: 58571	County: Mercer
Location Description: MONITORING POINT		Location Setting: RURAL
Coll. Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL		Land Use: AGRICULTURAL
Date Established: 19981213	Date Terminated:	Last Updated: 20031212
Regional Eval. Date:	HQ Eval. Date:	AQCR : NORTH DAKOTA
MSA: Not in a MSA	CMSA: Not in a CMSA	Direct Met Site: Met. Site ID:
Type Met Site: ON-SITE MET EQUIP	Dist to Met. Site(m):	Local Region:
Urban Area: NOT IN AN URBAN AREA		EPA Region: DENVER
City Population: 3152	Dir. to CBD:	Dist. to City(km):
Census Block:	Block Group:	Census Tract:
Congressional District:		Class 1 Area:
Site Latitude: +47.298611	Site Longitude: -101.766944	Time Zone: MOUNTAIN
UTM Zone: 14	UTM Northing: 5241843	UTM Easting: 290816
Accuracy: .03	Datum: WGS84	Scale: 0 Point/Line/Area: POINT
Vertical Measure(m): 630.0		Vert Accuracy: .03
Vert Datum NAVD88		Vert Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL

ACTIVE MONITOR TYPES		AGENCY ROLES			
Monitor Type	# of Monitors	Role	Agency Desc	Begin Date	End Date
SLAMS	10	SUPPORTING	North Dakota State Department Of Health	19981213	
OTHER	78		Air Toxics		

TANGENT ROADS						
Road Number	Road Name	Traffic Count	Traffic Year	Traffic Volume Source	Road Type	Compass Sector
1	HIGHWAY 200	1000	1998		THRU ST OR HY	N
2	COUNTY ROAD	100	1998		LOCAL ST OR	W
3	CITY STREET	250	1998		<sup>HY</sup> THRU ST OR HY	S

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
 AIR QUALITY SYSTEM  
 SITE DESCRIPTION REPORT

May. 18, 2007

Site ID: 38-065-0002	Site Name: <b>HANNOVER</b>	Local ID:
Street Address: 1575 HIGHWAY 31		City: Not in a city
State: North Dakota	Zip Code:	County: Oliver
Location Description: MONITORING POINT		Location Setting: RURAL
Coll. Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL		Land Use: AGRICULTURAL
Date Established: 19841004	Date Terminated:	Last Updated: 20050304
Regional Eval. Date:	HQ Eval. Date:	AQCR : NORTH DAKOTA
MSA: Not in a MSA	CMSA: Not in a CMSA	Direct Met Site: Met. Site ID:
Type Met Site: ON-SITE MET EQUIP	Dist to Met. Site(m):	Local Region:
Urban Area: NOT IN AN URBAN AREA		EPA Region: DENVER
City Population: 1	Dir. to CBD: S	Dist. to City(km): 7
Census Block:	Block Group:	Census Tract:
Congressional District: 1		Class 1 Area:
Site Latitude: +47.185833	Site Longitude: -101.428056	Time Zone: MOUNTAIN
UTM Zone: 14	UTM Northing: 5228457	UTM Easting: 316045
Accuracy: .01	Datum: WGS84	Scale: 0 Point/Line/Area: POINT
Vertical Measure(m): 697.0		Vert Accuracy: .01
Vert Datum NAVD88		Vert Method: GPS CODE (PSEUDO RANGE) DIFFERENTIAL

SITE COMMENTS
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ACTIVE MONITOR TYPES		AGENCY ROLES			
Monitor Type	# of Monitors	Role	Agency Desc	Begin Date	End Date
OTHER	6	SUPPORTING	North Dakota State Department Of Health	19841004	
SLAMS	5				

Road		TANGENT ROADS			Road Type		Compass Sector
Road Number	Road Name	Traffic Count	Traffic Year	Traffic Volume Source			Sector
1	STATE HIGHWAY 31	350	2000	DOT	LOCAL ST OR rv		E

## Appendix C

### Detailed Monitor Descriptions

This appendix is a listing printed from the AQS database for only the gaseous parameters for each site.



MONITOR DESCRIPTION REPORT

May. 18, 2007

North Dakota

Monitor ID: 38-057-0004-42604-1  
 Date of Latest Collection: 20070331  
 Owner: North Dakota  
 Street Address: 6024 HIGHWAY 200  
 Site Name: **BEULAH NORTH**  
 County: Mercer  
 Project Type: POPULATION-ORIENTED SURVEILLANCE  
 Meas. Scale: REGIONAL SCALE  
 Probe Location: TOP OF BUILDING  
 Probe Height (m): 4.0  
 Sample Residence Time:

Parameter Measured: **Ammonia**  
 Last Updated: 20070430  
 City: Beulah  
 MSA: Not in a MSA  
 UAR: NOT IN AN URBAN AREA  
 Dominant Source: AREA  
 Location Setting: RURAL  
 Horizontal Distance (m):  
 Vertical Distance (m):  
 Unrestricted Air Flow?: Y

DATES OF OPERATION		AGENCY ROLES			
Begin Date	End Date	Agency Role	Agency Name	Begin Date	End Date
20001103		ANALYZING	North Dakota State Department Of Health	20001103	
		COLLECTING	North Dakota State Department Of Health	20001103	
		REPORTING	North Dakota State Department Of Health	20001103	

MONITOR TYPE INFORMATION				
Monitor Type	Begin Date	End Date	Action Type	Action Reason
OTHER	20001114			
SLAMS	20001103	20001113		

REGULATION INFORMATION

Regulation	Met?	Date Met
Quality Assurance Criteria Met	Y	20001103
Reference Method Used	Y	20001101
Siting Criteria Met	Y	20001101

TANGENT ROAD INFORMATION

Street Name	Type Road	Traff Count	Traff Yr	Dist. to Road (m)
HIGHWAY 200	THRU ST OR HY	1000	1998	32
COUNTY ROAD	LOCAL ST OR HY	100	1998	1000
CITY STREET	THRU ST OR HY	250	1998	3200

MONITORING OBJECTIVES

Monitor Objective Type	UAR Name	MSA Name	CMSA Name
GENERAL/BACKGROUND	NOT IN AN URBAN AREA		











MONITOR DESCRIPTION REPORT

May. 18, 2007

North Dakota

Monitor ID: 38-025-0003-42602-1  
 Date of Latest Collection: 20070331  
 Owner: North Dakota  
 Street Address: 9610 SEVENTH STREET SW  
 Site Name: **DUNN CENTER**  
 County: Dunn  
 Project Type: BACKGROUND SURVEILLANCE  
 Meas. Scale: REGIONAL SCALE  
 Probe Location: TOP OF BUILDING  
 Probe Height (m): 4.0  
 Sample Residence Time:

Parameter Measured: **Nitrogen Dioxide**  
 Last Updated: 20070430  
 City: Not in a city  
 MSA: Not in a MSA  
 UAR: NOT IN AN URBAN AREA  
 Dominant Source: AREA  
 Location Setting: RURAL  
 Horizontal Distance (m):  
 Vertical Distance (m):  
 Unrestricted Air Flow?:

MONITOR COMMENT

\*

DATES OF OPERATION		AGENCY ROLES			
Begin Date	End Date	Agency Role	Agency Name	Begin Date	End Date
19791001	19890331	ANALYZING	North Dakota State Department Of Health	19791001	
19981214		COLLECTING	North Dakota State Department Of Health	19791001	
		REPORTING	North Dakota State Department Of Health	19791001	

MONITOR TYPE INFORMATION				
Monitor Type	Begin Date	End Date	Action Type	Action Reason
OTHER	19791001	19791231		
SLAMS	19800101			

REGULATION INFORMATION

Regulation	Met?	Date Met
Quality Assurance Criteria Met	Y	19800101
Reference Method Used	Y	19800101
Siting Criteria Met	Y	19800101

MONITORING OBJECTIVES

Monitor Objective Type	UAR Name	MSA Name	CMSA Name
GENERAL/BACKGROUND	NOT IN AN URBAN AREA		











MONITOR DESCRIPTION REPORT

May. 18, 2007

North Dakota

Monitor ID: 38-025-0003-88501-3	Parameter Measured: <b>PM-Fine</b>
Date of Latest Collection: 20070331	Last Updated: 20070430
Owner: North Dakota	City: Not in a city
Street Address: 9610 SEVENTH STREET SW	
Site Name: <b>DUNN CENTER</b>	MSA: Not in a MSA
County: Dunn	UAR: NOT IN AN URBAN AREA
Project Type: BACKGROUND SURVEILLANCE	Dominant Source: AREA
Meas. Scale: REGIONAL SCALE	Location Setting: RURAL
Probe Location: TOP OF BUILDING	Horizontal Distance (m): 0.0
Probe Height (m): 4.0	Vertical Distance (m): 1.0
Surrogate?:	Unrestricted Air Flow?: Y
Sample Residence Time:	

MONITOR COMMENT

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DATES OF OPERATION		AGENCY ROLES			
Begin Date	End Date	Agency Role	Agency Name	Begin Date	End Date
20040908		ANALYZING	North Dakota State Department Of Health	20040908	
		COLLECTING	North Dakota State Department Of Health	20040908	
		REPORTING	North Dakota State Department Of Health	20040908	

MONITOR TYPE INFORMATION				
Monitor Type	Begin Date	End Date	Action Type	Action Reason
INDEX SITE	20040908			
OTHER	20040908			
SLAMS	20040908			

MONITORING OBJECTIVES

Monitor Objective Type	UAR Name	MSA Name	CMSA Name
GENERAL/BACKGROUND	NOT IN AN URBAN AREA		

MONITOR DESCRIPTION REPORT

May. 18, 2007

North Dakota

Monitor ID: 38-053-0002-44201-1	Parameter Measured: <b>Ozone</b>
Date of Latest Collection: 20070331	Last Updated: 20070430
Owner: North Dakota	City: Not in a city
Street Address: 229 SERVICE RD., WATFORD CITY	
Site Name: <b>TRNP-NU</b>	MSA: Not in a MSA
County: McKenzie	UAR: NOT IN AN URBAN AREA
Project Type: BACKGROUND SURVEILLANCE	Dominant Source: AREA
Meas. Scale: REGIONAL SCALE	Location Setting: RURAL
Probe Location: TOP OF BUILDING	Horizontal Distance (m):
Probe Height (m): 4.0	Surrogate?:
Sample Residence Time:	Vertical Distance (m):
	Unrestricted Air Flow?: Y

MONITOR COMMENT

SITE RESTARTED ON AUG 8, 2001

DATES OF OPERATION		AGENCY ROLES			
Begin Date	End Date	Agency Role	Agency Name	Begin Date	End Date
19821105	19980630	ANALYZING	North Dakota State Department Of Health	19821105	
20010801		REPORTING	North Dakota State Department Of Health	19821105	
		COLLECTING	North Dakota State Department Of Health	19821105	

MONITOR TYPE INFORMATION				
Monitor Type	Begin Date	End Date	Action Type	Action Reason
SLAMS	19821105			

REGULATION INFORMATION

Regulation	Met?	Date Met
Quality Assurance Criteria Met	Y	19821101
Reference Method Used	Y	19821101
Siting Criteria Met	Y	19821101

MONITORING OBJECTIVES

Monitor Objective Type	UAR Name	MSA Name	CMSA Name
GENERAL/BACKGROUND	NOT IN AN URBAN AREA		







MONITOR DESCRIPTION REPORT

May. 18, 2007

North Dakota

Monitor ID: 38-017-1004-88101-1  
 Date of Latest Collection: 20070331  
 Owner: North Dakota  
 Street Address: 4266 40TH AVE NORTH  
 Site Name: **FARGO NW**  
 County: Cass  
 Project Type: POPULATION-ORIENTED SURVEILLANCE  
 Meas. Scale: URBAN SCALE  
 Probe Location: GROUND LEVEL SUPPORT  
 Probe Height (m): 2.0  
 Sample Residence Time:

Parameter Measured: **PM-Fine**  
 Last Updated: 20070507  
 City: Fargo  
 MSA: Fargo-Moorhead,ND-MN  
 UAR: FARGO-MOORHEAD, ND-MN  
 Dominant Source: POINT  
 Location Setting: SUBURBAN  
 Horizontal Distance (m):  
 Vertical Distance (m):  
 Unrestricted Air Flow?: Y

DATES OF OPERATION		AGENCY ROLES			
Begin Date	End Date	Agency Role	Agency Name	Begin Date	End Date
19990101		ANALYZING	Inter-Mountain Laboratory Sheridan, WY	19990101	
		COLLECTING	North Dakota State Department Of Health	19990101	
		REPORTING	North Dakota State Department Of Health	19990101	

MONITOR TYPE INFORMATION				
Monitor Type	Begin Date	End Date	Action Type	Action Reason
SLAMS	19990101			

REGULATION INFORMATION

Regulation	Met?	Date Met
Quality Assurance Criteria Met	Y	19990101
Reference Method Used	Y	19990101
Siting Criteria Met	Y	19990101

COLLOCATION INFORMATION

Begin Date	End Date	Dist.(m)	Primary?
20000101	20011230		Y

MONITORING OBJECTIVES

Monitor Objective Type	UAR Name	MSA Name	CMSA Name
POPULATION EXPOSURE	FARGO-MOORHEAD, ND-MN		
SOURCE ORIENTED	FARGO-MOORHEAD, ND-MN		



















MONITOR DESCRIPTION REPORT

May. 18, 2007

North Dakota

Monitor ID: 38-053-0002-42401-1	Parameter Measured: <b>Sulfur Dioxide</b>
Date of Latest Collection: 20070331	Last Updated: 20070430
Owner: North Dakota	City: Not in a city
Street Address: 229 SERVICE RD., WATFORD CITY	
Site Name: <b>TRNP-NU</b>	MSA: Not in a MSA
County: McKenzie	UAR: NOT IN AN URBAN AREA
Project Type: BACKGROUND SURVEILLANCE	Dominant Source: AREA
Meas. Scale: REGIONAL SCALE	Location Setting: RURAL
Probe Location: TOP OF BUILDING	Horizontal Distance (m):
Probe Height (m): 4.0	Surrogate?:
Sample Residence Time:	Vertical Distance (m):
	Unrestricted Air Flow?: Y

MONITOR COMMENT

SITE RESTARTED AUG 8, 2001

DATES OF OPERATION		AGENCY ROLES			
Begin Date	End Date	Agency Role	Agency Name	Begin Date	End Date
19800101	19980630	ANALYZING	North Dakota State Department Of Health	19800101	19980630
20010801		COLLECTING	North Dakota State Department Of Health	19800101	19980630
		REPORTING	North Dakota State Department Of Health	19800101	
		ANALYZING	North Dakota State Department Of Health	20010801	
		COLLECTING	North Dakota State Department Of Health	20010801	

MONITOR TYPE INFORMATION				
Monitor Type	Begin Date	End Date	Action Type	Action Reason
SLAMS	19800101			

REGULATION INFORMATION

Regulation	Met?	Date Met
Quality Assurance Criteria Met	Y	19800101
Reference Method Used	Y	19800101
Siting Criteria Met	Y	19800101

MONITORING OBJECTIVES

Monitor Objective Type	UAR Name	MSA Name	CMSA Name
GENERAL/BACKGROUND	NOT IN AN URBAN AREA		























## Appendix D

### Public Comments