NORTH DAKOTA
STATE DEPARTMENT OF HEALTH
AND CONSOLIDATED LABORATORIES
State Capitol
600 E. Boulevard Avenue
Bismarck, North Dakota 58505-0200

FILE

ENVIRONMENTAL HEALTH SECTION
1200 Missouri Avenue
P.O. Box 5520
Bismarck, North Dakota 58502-5520

March 28, 1990

Mr. Larry Svoboda
Chief Environmental Monitoring
and Assessment Section
U.S. EPA, Region VIII
P.O. Box 25366
Denver, CO 80225

Re: Annual Network Review

Dear Mr. Svoboda: Larry

The Department has completed its review of the Ambient Air Quality Monitoring Network for 1990. Included in this package are pages 6, 7, 9, 10, 17, 21, 25, 26, 30, 34, 35, and 36 which update information contained in the previous report. Also, included is information on the Special Purpose Monitoring Site at the University of North Dakota. We are having problems with the monitoring equipment at the TRNP-SU SLAMS Site which is owned by the Park Service. The equipment is in need of repair, but the Park Service is reluctant or unable to fund for the needed repairs. As a result, there has been some discussion about closing down that site. You might anticipate receiving such a request in the near future. No other changes are anticipated at this time.

If you have any questions, please feel free to contact Chuck McDonald of this Department.

Sincerely,

Dana K. Mount, P.E.
Director, Division of
Environmental Engineering

DKM/CMM:saj
Enc:

NORTH DAKOTA STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL ENGINEERING

AMBIENT AIR QUALITY MONITORING
ANNUAL NETWORK REVIEW
1990

March 1990

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1.0 INTRODUCTION

The North Dakota State Department of Health, Division of Environmental Engineering, has the primary responsibility of protecting the health and welfare of North Dakotans from the detrimental effects of air pollution. Towards that end, the Division of Environmental Engineering ensures that 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 Environmental Engineering operates and maintains a network of ambient air quality monitors and requires some of the major industrial pollution sources to conduct source specific ambient air quality monitoring.

To evaluate the effectiveness of the State's air quality monitoring effort, the U.S. Environmental Protection Agency (EPA) requires the Division of Environmental Engineering to conduct an annual review of the State's ambient air quality monitoring (AAQM) network. EPA's requirements, as set forth in 40 CFR 58.20, are (1) to determine if the system meets the monitoring objectives defined in Appendix D to 40 CFR 58, and (2) to identify needed modifications to the network such as termination or relocation of unnecessary stations or establishment of new stations which are necessary. 40 CFR

58.25 requires the State to annually develop and implement a schedule to modify the AAQM network to eliminate any unnecessary stations or correct any inadequacies indicated as a result of the annual review required by 40 CFR 58.20(d). This document and subsequent revisions satisfy those annual requirements.

1.1 Network Review Process

The locations of sites in a monitoring program are established to meet certain objectives. The May 10, 1979, Federal Register (40 CFR 58), "Air Quality Monitoring, Data Reporting, and Surveillance Provisions", as amended, has specified a minimum of four basic monitoring objectives. These basic monitoring 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 of sources.

4. To determine the general/background concentration levels.

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 station throughout which actual pollutant concentrations are reasonably similar. The goal in siting stations 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 below:

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 4.0 to 50.0 km. (Usually requires more than one site for definition.)

Regional Scale - rural areas of reasonably homogeneous geography covering from tens to hundreds of km.

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

Monitoring Objective	Appropriate Siting Scales
Highest Concentration	Micro, middle, neighborhood (sometimes urban)
Population	Neighborhood, urban
Source Impact	Micro, middle, neighborhood
General/Background	Neighborhood, regional

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

Criteria Pollutant	Spatial Scales
Inhalable Particulate (PM_{10})	micro, middle, neighborhood, urban, regional
Sulfur Dioxide (SO_2)	middle, neighborhood, urban, regional
Ozone (O_3)	middle, neighborhood, urban regional
Nitrogen Dioxide (NO_2)	middle, neighborhood, urban
Carbon Monoxide (CO)	micro, middle, neighborhood

The use of this physical basis for locating stations allows for an objective approach, ensures compatibility among stations, and provides a physical basis for the interpretation and application of data. The annual review process involves an examination of existing stations to evaluate their monitoring objectives and spatial scale, and sites are deleted, added, or modified accordingly. Further details on network design can be found in Appendix D to 40 CFR 58.

1.2 General Monitoring Needs

As can be gathered from the prior discussion, each air contaminant has certain characteristics which must be accounted for when siting monitoring equipment. These characteristics may result from variations in the number and type of sources and emissions in question, reactivity of a particular pollutant with other constituents in the air, local site influences such as terrain and land use, and climatology. The State AAQM network is currently designed to provide air quality data for two basic conditions: (1) population oriented monitoring and (2) background monitoring.

Population oriented monitoring is not a major consideration in this State because of our relatively

sparse population and becomes a factor mainly in regard to PM_{10} and carbon monoxide (CO) monitoring. All PM_{10} monitoring in populated areas is done on a "neighborhood" spatial scale. The CO monitoring will be conducted on a micro or middle scale. For the remaining pollutants, the primary concern is for background monitoring. (An exception is the monitoring done at the Beulah Site. Because of the concentration of sources in the Beulah area, we are concerned about population exposure to SO_2, NO_2, and O_3.) Background stations are chosen to determine concentrations of air contaminants in areas remote from urban sources and generally are sited according to a "regional" spatial scale. This is true for NO_2 as well despite the fact that the "regional" scale is not normally used for NO_2 monitoring. Once general locations are established, all monitoring stations are sited in accordance with the specific probe siting criteria specified in Appendix E to 40 CFR 58.

1.3 Monitoring Objectives

The monitoring objectives of the Department are to track those pollutants that are judged to have the potential for violating the State and Federal Ambient Air Quality Standards and to ensure that those pollutants do not increase to such a degree as to cause deterioration of

our existing air quality. To accomplish these objectives, the Department operates and maintains 13 AAQM sites around the State. Eleven are fixed SLAMS/NAMS sites, and two are special purpose monitoring (SPM) sites. Table 1 lists the types of stations and parameters monitored, and Map 1 shows the approximate network site locations.

TABLE 1

AAQM NETWORK DESCRIPTION

Site	Type Station	AIRS I.D. No.	Parameter Monitored	Ref/Equiv. Method Designation No.	Operating Schedule	Monitoring Objective	Spatial Scale	Date Site Began	Date Q.A. Began
1 Fargo-Commercial	NAMS	38-017-1001	PM_{10}	RFPS-1287-064	6th Day	Population Exposure	Neighborhood	6/85	6/85
Fargo-Commerical Dup.		38-017-1001	PM_{10}	RFPS-1287-064	6th Day	Collocated SSI	N/A		
2 Beulah-Residential	SLAMS	38-057-0001	SO_2	EQSA-0276-009	cont.	Population Exposure	Neighborhood	4/80	7/80
			NO_2	RFNA-0777-022	cont.	Population Exposure	Neighborhood	6/80	7/80
			O_3	RFDA-1075-003	cont.	Population Exposure	Neighborhood	4/89	4/89
			Met	N/A	cont.	N/A	N/A	4/80	7/80
3 Bismarck-Commercial	SLAMS	38-015-0001	PM_{10}	RFPS-1287-064	6th Day	Population Exposure	Neighborhood	4/85	4/85
4 Dickinson-Residential	SLAMS	38-089-0002	PM_{10}	RFPS-1287-064	6th Day	Population Exposure	Neighborhood	7/89	7/89
5 Dunn Center-Rural	SLAMS	38-025-0003	SO_2	EQSA-0276-009	cont.	General Background	Regional	10/79	5/80
			Met	N/A	cont.	N/A	N/A	10/79	5/80
6 Grand Forks-Commercial	SLAMS	38-035-0001	PM_{10}	RFPS-1287-064	6th Day	Population Exposure	Neighborhood	7/89	7/89
7 Hannover-Rural	SLAMS	38-065-0002	SO_2	EQSA-0276-009	cont.	General Background	Regional	10/84	10/84
			NO_2	RFNA-0777-022	cont.	General Background	Regional	11/85	11/85
			O_3	RFDA-1075-003	cont.	General Background	Regional	5/85	5/85
			Met	N/A	cont.	N/A	N/A	10/84	10/84
8 Lostwood-Rural	SLAMS	38-013-0001	SO_2	EQSA-0276-009	cont.	General Background	Regional	1/86	1/86
			NO_2	None	cont.	General Background	Regional	12/87	12/87
			H_2S	N/A	cont.	N/A	N/A	1/86	1/86
			Met	N/A	cont.	N/A	N/A	1/86	1/86
9 TRNP(NU)-Rural	SLAMS	38-053-0002	SO_2	EQSA-0276-009	cont.	General Background	Regional	2/80	6/80
			O_3	RFDA-1075-003	cont.	General Background	Regional	11/82	11/82
			H_2S	N/A	cont.	N/A	N/A	5/80	6/80
			Met	N/A	cont.	N/A	N/A	2/80	6/80

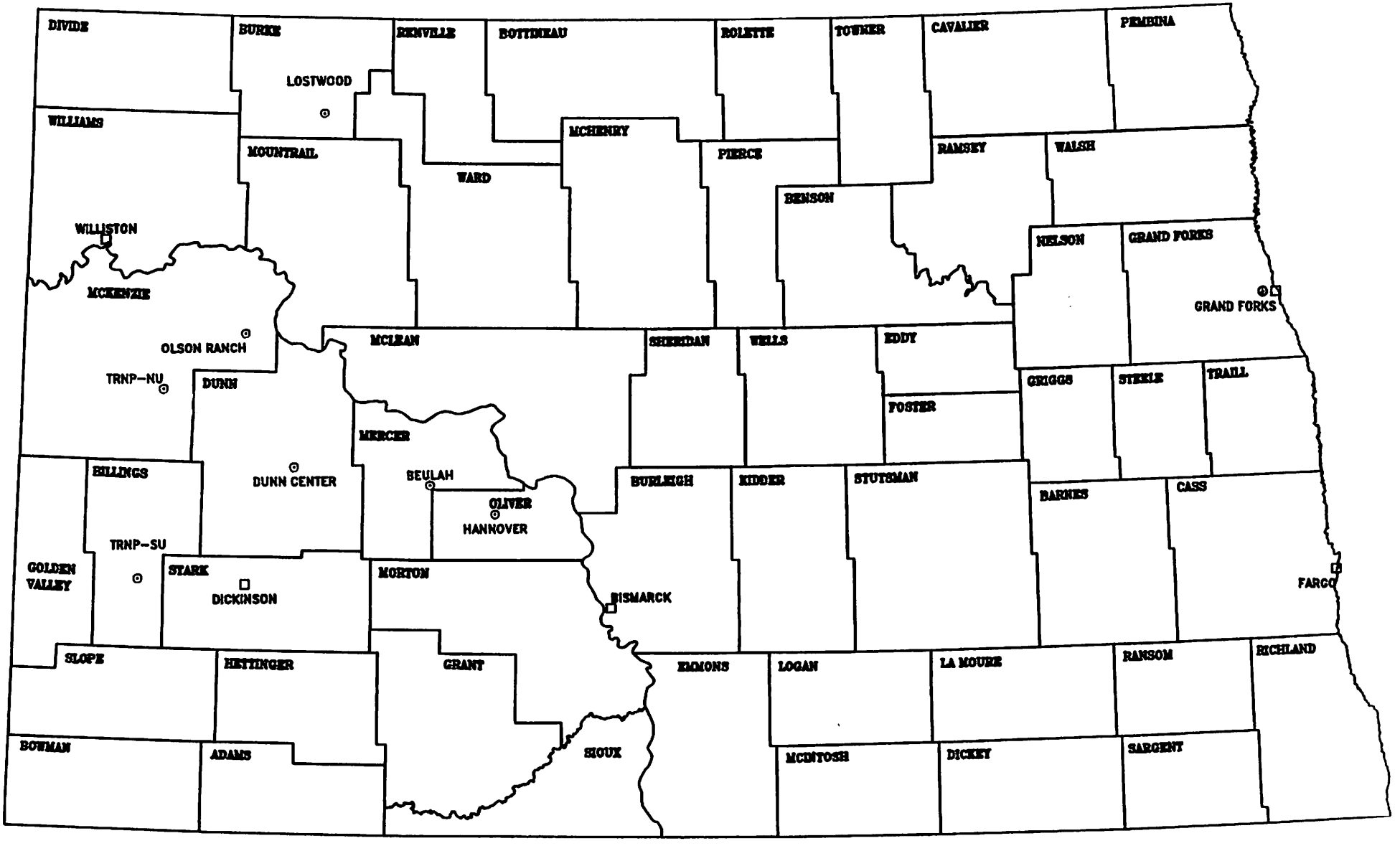
TABLE 1 (Cont.)

AAQM NETWORK DESCRIPTION

Site	Type Station	AIRS I.D. No.	Parameter* Monitored	Ref/Equiv. Method Designation No.	Operating Schedule	Monitoring Objective	Spatial Scale	Date Site Began	Date Q.A. Began
10 TRNP(SU)-Rural	SLAMS	38-007-0002	SO_2	EQSA-0276-009	cont.	General Background	Regional	2/80	6/80
			H_2S	N/A	cont.	N/A	N/A	10/85	10/85
			Met	N/A	cont.	N/A	N/A	3/80	6/80
11 Williston-Commercial	SLAMS	38-105-0001	PM_{10}	RFPS-1287-064	6th Day	Population Exposure	Neighborhood	5/85	5/85
12 Olson Ranch Rural	SPM	38-053-0004	SO_2	EQSA-0276-009	cont.	Source Impact	Neighborhood	7/89	7/89
			H_2S	N/A	cont.	N/A	N/A	7/89	7/89
			Met	N/A	cont.	N/A	N/A	7/89	7/89
13 UND	SPM	38-035-0003	SO_2	EQSA-0276-009	cont.	Source Impact	Middle	1/90	1/90
			NO_2	RFNA-1289-074	cont.	Source Impact	Middle	1/90	1/90
			CO	RFCA-0981-054	cont.	Source Impact	Middle	2/90	2/90
			Met	N/A	cont.	N/A	N/A	1/90	1/90

*Met refers to meteorological and indicates wind speed and wind direction monitoring equipment.

NORTH DAKOTA AMBIENT AIR QUALITY MONITORING NETWORK



⊙ = CONTINUOUS SITES

□ = PM10 SITES

MAP 1

2.0 AMBIENT AIR MONITORING NETWORK COVERAGE

The entire State of North Dakota is attainment for all of the criteria pollutants. As such, there are no "problem areas" in the general sense of the term. There are, however, areas of concern where the Department has established monitoring sites to track the emissions of specific pollutants from area sources.

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 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_2 is one of this Department's major concerns in regard to ambient air quality monitoring.

2.1.1 Point Sources

The major point sources of SO_2 (>1000 TPY) are listed in Table 2 along with their emission rates as calculated from the most recent (1987) emissions inventory. Map 2 shows the approximate locations of these facilities.

TABLE 2

MAJOR SO_2 SOURCES
(> 1000 TPY)

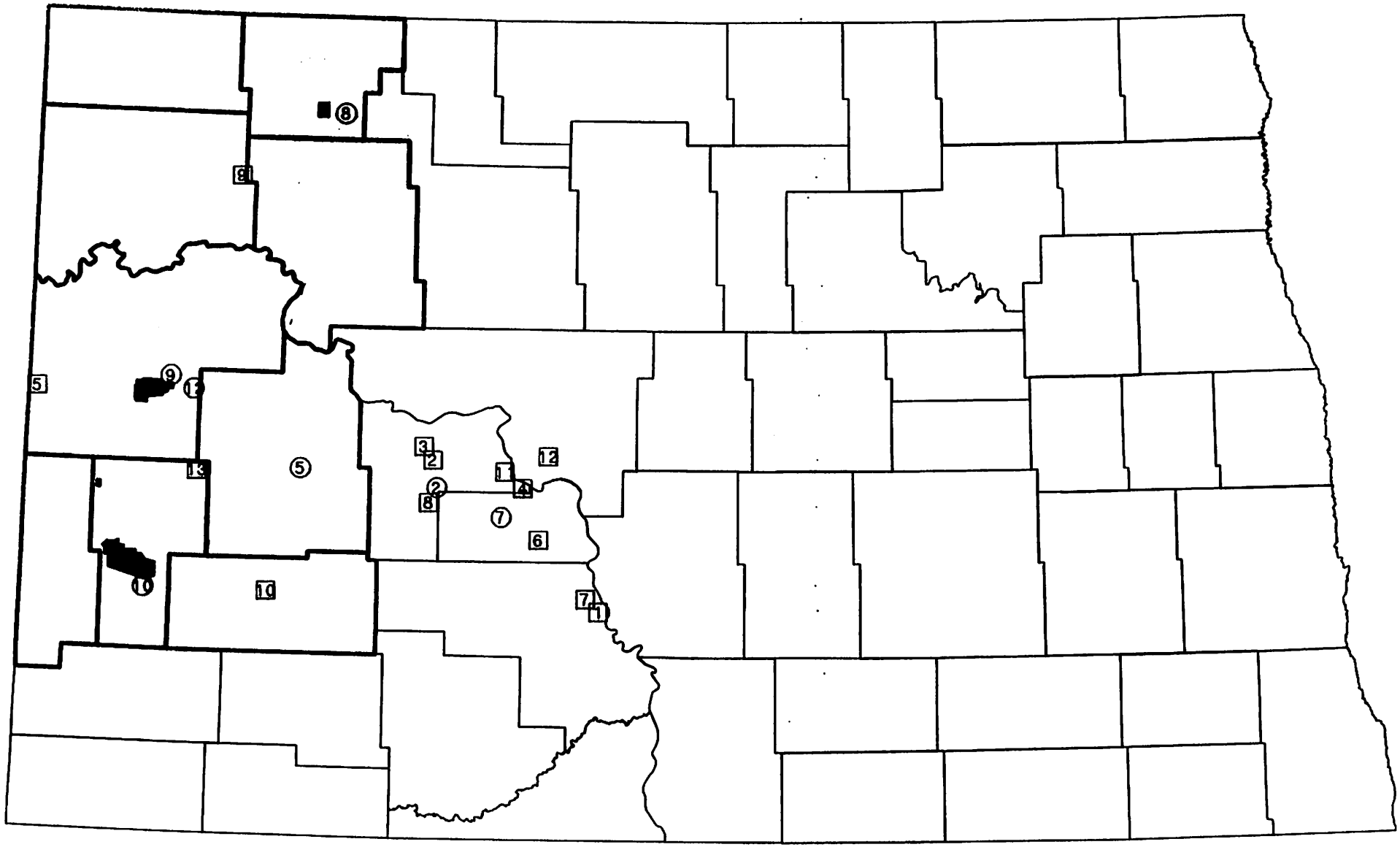
#	Name of Company	Type of Source	Location	County	SO_2 Emissions Ton/Year
1	Amoco Oil Company	Oil Refinery	Mandan	Morton	5518.6
2	ANG Coal Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	34373.3
3	Basin Electric Power Cooperative	Steam Electric Gen. Facility	Beulah	Mercer	13343.0
4	Basin Electric Power Cooperative	Steam Electric Gen. Facility	Stanton	Mercer	17105.0
5	Koch Hydrocarbon Company	Natural Gas Processing Plant	McKenzie Co.	McKenzie	2978.0
6	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	31938.0
7	Montana Dakota Utilities	Steam Electric Gen. Facility	Mandan	Morton	2961.0
8	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Facility	Beulah	Mercer	14700.0
9	Phillips Petroleum Co.	Natural Gas Processing Plant	Tioga	Williams	9266.7
10	Royal Oak Enterprises	Charcoal Briquetting Plant	Dickinson	Stark	3828.2

TABLE 2 (Cont.

MAJOR SO_2 SOURCES
(> 1000 TPY)

#	Name of Company	Type of Source	Location	County	SO_2 Emissions Ton/Year
11	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	7084.0
12	UPA/CPA	Steam Electric Gen. Facility	Underwood	McLean	30489.0
13	Warren Petroleum Company	Natural Gas Processing Plant	Grassy Butte	McKenzie	1870.2

MAJOR SULFUR DIOXIDE SOURCES



□ Major SO2 Sources
○ Monitoring Sites
Major Oil/Gas Producing Counties

■ Class 1 Areas

MAP 2

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2.1.2 Other Sources

The western part of the State has a number of potential sources of SO_2 associated with the development of oil and gas. These sources include individual oil/gas wells, oil storage facilities, and compressor stations. Emissions from such sources can create two problems. First, these sources may directly emit significant amounts of hydrogen sulfide (H_2S) to the ambient air (which will be addressed later); and second, flaring of the H_2S from these sources can create significant concentrations of SO_2 in the ambient air. The counties of primary concern for such sources in western North Dakota are outlined in green on Map 2.

2.1.3 Monitoring Network

The SO_2 monitoring sites are indicated in Table 1 and their approximate locations are shown on Map 2 (the site numbers correspond to the sites listed in Table 1). As can be seen, these monitoring sites are concentrated in the vicinity of the oil and gas development in western North Dakota and the coal-fired steam electrical generating plants in the

central part of the State. The latest SO_2 data for this network are shown in Table 3.

2.2 Nitrogen Oxides

Nitrogen oxides (NO_x) is the term used to represent both nitric oxide (NO) and nitrogen dioxide (NO_2). NO_2 is formed when NO is oxidized in the ambient air.

2.2.1 Point Sources

The larger point sources of NO_x in North Dakota are associated with coal burning steam 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. The major stationary point sources (>1000 TPY) of NO_x, as calculated from the most recent (1987) emission inventory, are listed in Table 4. Map 3 shows the approximate locations of these facilities.

2.2.2 Area Sources

Another source of oxides of nitrogen is automobile emissions. North Dakota has no significant urbanized areas with regard to oxides of nitrogen;

TABLE 3

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

POLLUTANT : SULFUR DIOXIDE (PPB) STATE: NORTH DAKOTA YEAR: 1989

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	MAXIMA 1-HOUR 1ST	1-HOUR 2ND	3-HOUR 1ST	3-HOUR 2ND	24-HOUR 1ST	24-HOUR 2ND	ARITH MEAN	ARITH S.D.	1HR #>273	24HR #>99	ANNL AM>23	% >MDV
BEULAH	1989	JAN-DEC	20	8512	57	46	41	32	13	11	2.3	3.47				30.8
DUNN CENTER	1989	JAN-DEC	20	8691	45	43	35	33	17	9	1.2	1.47				7.2
HANNOVER	1989	JAN-DEC	20	8695	98	88	66	59	15	15	2.4	4.62				26.5
LONE BUTTE - SPM	1989	JAN-JUL	20	4568	158	111	93	81	27	22	***	***				31.3
LOSTWOOD	1989	JAN-DEC	20	8120	26	25	22	19	11	8	1.7	1.84				23.0
OLSON RANCH - SPM	1989	JUL-DEC	20	3798	29	22	19	19	4	4	***	***				9.7
TRNP - NU	1989	JAN-DEC	20	8700	35	32	26	25	12	10	1.3	1.54				10.3
TRNP - SU	1989	JAN-DEC	20	8693	54	52	48	36	14	9	1.2	1.40				8.1

* THE AIR QUALITY STANDARDS FOR SO2 ARE 1) THE MAXIMUM ALLOWABLE 1-HR CONCENTRATION IS 273 PPB (715 µG/M3). 2) THE MAXIMUM ALLOWABLE 24-HOUR CONCENTRATION IS 99 PPB (260 µG/M3). 3) THE MAXIMUM ALLOWABLE ANNUAL MEAN IS 23 PPB (60 µG/M3).

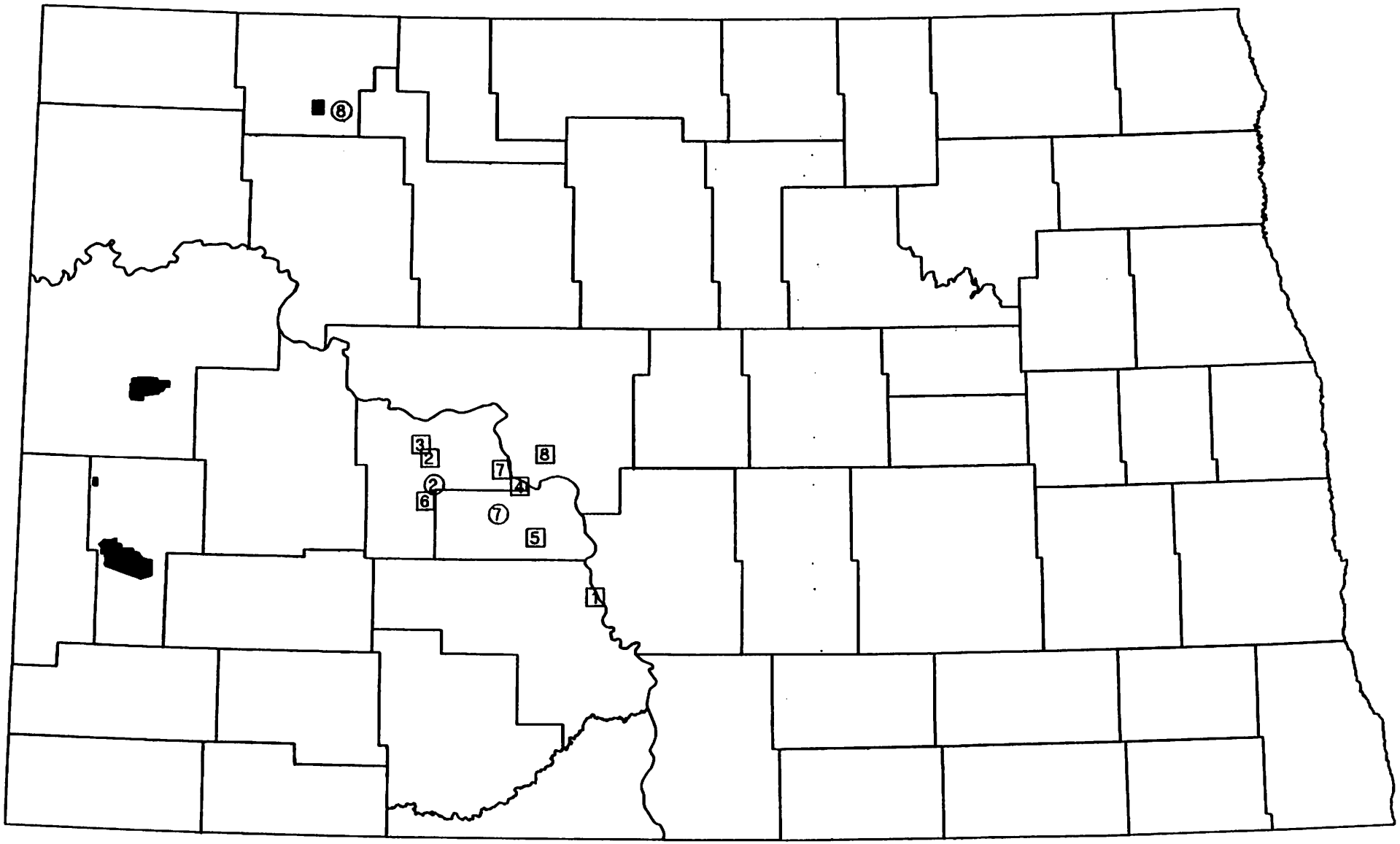
*** LESS THAN 75% OF THE POSSIBLE SAMPLES (DATA) WERE COLLECTED

TABLE 4

MAJOR NO_x SOURCES
(> 1000 TPY)

#	Name of Company	Type of Source	Location	County	NO_x Emissions Ton/Year
1	Amoco Oil Company	Oil Refinery	Mandan	Morton	1431.4
2	ANG Coal Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	3189.9
3	Basin Electric Power Cooperative	Steam Electric Gen. Facility	Beulah	Mercer	13664.0
4	Basin Electric Power Cooperative	Steam Electric Gen. Facility	Stanton	Mercer	9838.0
5	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	29850.4
6	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Facility	Beulah	Mercer	9800.0
7	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	4456.0
8	UPA/CPA	Steam Electric Gen. Facility	Underwood	McLean	19258.0

MAJOR NITROGEN OXIDE SOURCES



□ Major NOX Sources
○ Monitoring Sites
■ Class 1 Areas

MAP 3

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in fact, the entire population of the State is less than the 1,000,000 population figure that EPA specifies in their requirement for NO_2 NAMS monitoring.

2.2.3 Monitoring Network

The Department currently operates three $NO/NO_2/NO_x$ analyzers in the State. These are located at Beulah, Lostwood, and Hannover and are shown on Map 3. The latest summary of NO_2 data is shown in Table 5.

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), oxides of nitrogen (NO_x), and solar radiation. Both VOC and NO_x are emitted directly into the atmosphere from sources within the State. 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 to September 30. However, we operate the O_3 analyzers from April 1 to September 30 in order to collect two full quarters of data.

TABLE 5

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

POLLUTANT : NITROGEN DIOXIDE (PPB) STATE: NORTH DAKOTA YEAR: 1989

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	MAXIMA 1-HOUR 1ST	MAXIMA 1-HOUR 2ND	ARITH MEAN	ARITH S.D.	A.M. > 50	% >MDV
BEULAH	1989	JAN-DEC	14	8607	48	44	4	3.6		27.3
DUNN CENTER	1989	JAN-MAR	14	1716	14	13	***	***		3.0
HANNOVER	1989	JAN-DEC	14	8701	37	31	3	2.0		8.7
LOSTWOOD	1989	JAN-DEC	14	7446	17	13	2	0.8		4.8

* THE AIR QUALITY STANDARDS ARE 50 PPB (100 µG/M3) MAXIMUM ANNUAL ARITHMETIC MEAN AND 100 PPB (200 µG/M3) MAXIMUM 1-HOUR CONCENTRATION NOT TO BE EXCEEDED OVER 1 PERCENT OF THE TIME IN ANY CALENDER QUARTER.

*** LESS THAN 75% OF THE POSSIBLE SAMPLES (DATA) WERE COLLECTED

2.3.1 Point Sources

Table 6 lists the major point sources of VOC emissions in the State (>100 TPY). Map 4 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 are attributed to mobile sources in urban areas. The EPA has specified a design criteria for selecting NAMS locations for O_3 as any urbanized area having a population of more than 200,000. North Dakota has no urbanized areas large enough to warrant monitoring for ozone.

2.3.3 Monitoring Network

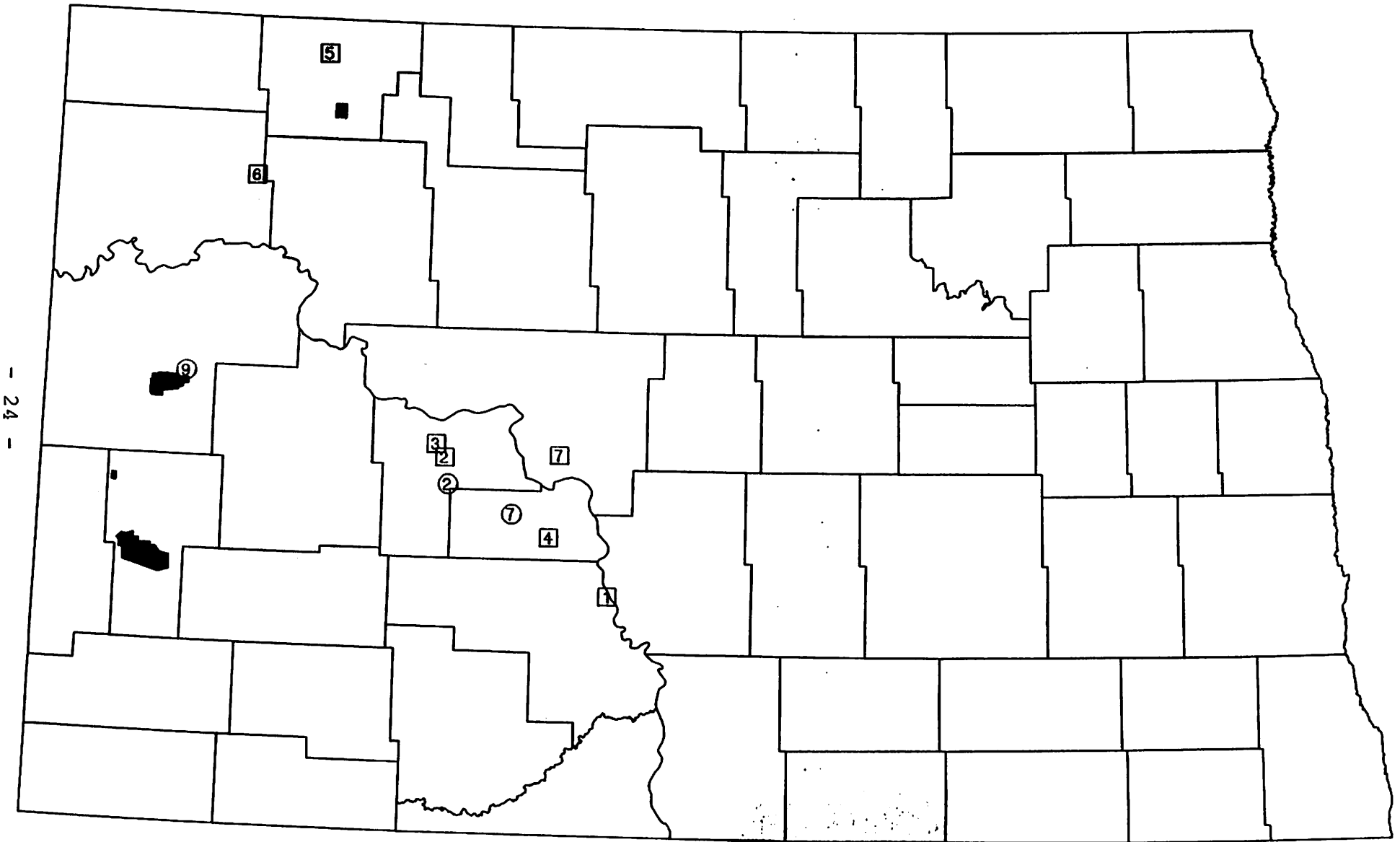
The State currently has three continuous ozone analyzers in operation. These are at Beulah, Hannover and Theodore Roosevelt National Park - North Unit and are shown on Map 4. The latest summary of O_3 data is included in Table 7.

TABLE 6

MAJOR VOC SOURCES
(> 100 TPY)

#	Name of Company	Type of Source	Location	County	VOC Emissions Ton/Year
1	Amoco Oil Company	Oil Refinery	Mandan	Morton	595.3
2	ANG Coal Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	799.7
3	Basin Electric Power Cooperative	Steam Electric Gen. Facility	Beulah	Mercer	259.6
4	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	175.5
5	OXYL NGL, Inc.	Natural Gas Processing Plant	Lignite	Burke	105.2
6	Phillips	Natural Gas Processing Plant	Tioga	Williams	570.6
7	UPA/CPA	Steam Electric Gen. Facility	Underwood	McLean	220.9

MAJOR VOC SOURCES



□ Major VOC Sources
○ Monitoring Sites
■ Class 1 Areas

MAP 4

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TABLE 7

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

POLLUTANT : OZONE (PPB) — STATE: NORTH DAKOTA — YEAR: 1989

LOCATION	YEAR	SAMPLING PERIOD	DAYS SAMPLED	METH	NUM OBS	1-HOUR MAXIMA 1ST	DATE	2ND	DATE	3RD	DATE	#HOURS >120	% >NDV
BEULAH	1989	APR-SEP	166	11	3899	72	7/25	72	8/10	68	6/19	0	99.0
HANNOVER	1989	APR-SEP	183	11	4361	74	7/25	71	7/11	70	6/19	0	100.0
TRNP - NU	1989	APR-SEP	183	11	4206	73	7/25	71	7/30	69	7/11	0	100.0

* THE AIR QUALITY STANDARD FOR OZONE IS 120 (235 µG/M3) PPB MAXIMUM 1-HR CONCENTRATION NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.

2.4 Inhalable Particulates

The inhalable particulate standard is designed to protect against those particulates that can be inhaled deep into the lungs and cause respiratory problems. These particulates have an aerodynamic diameter less than or equal to a nominal 10 micrometers and are designated as PM_{10}.

2.4.1 Sources

Table 8 lists the sources of PM_{10} emissions in the State that are >100 TPY. Most of these sources are large solid fuel burning facilities, and the PM_{10} particles are part of the boiler stack emissions. 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 dirt roads. The major sources of PM_{10} are shown on Map 5.

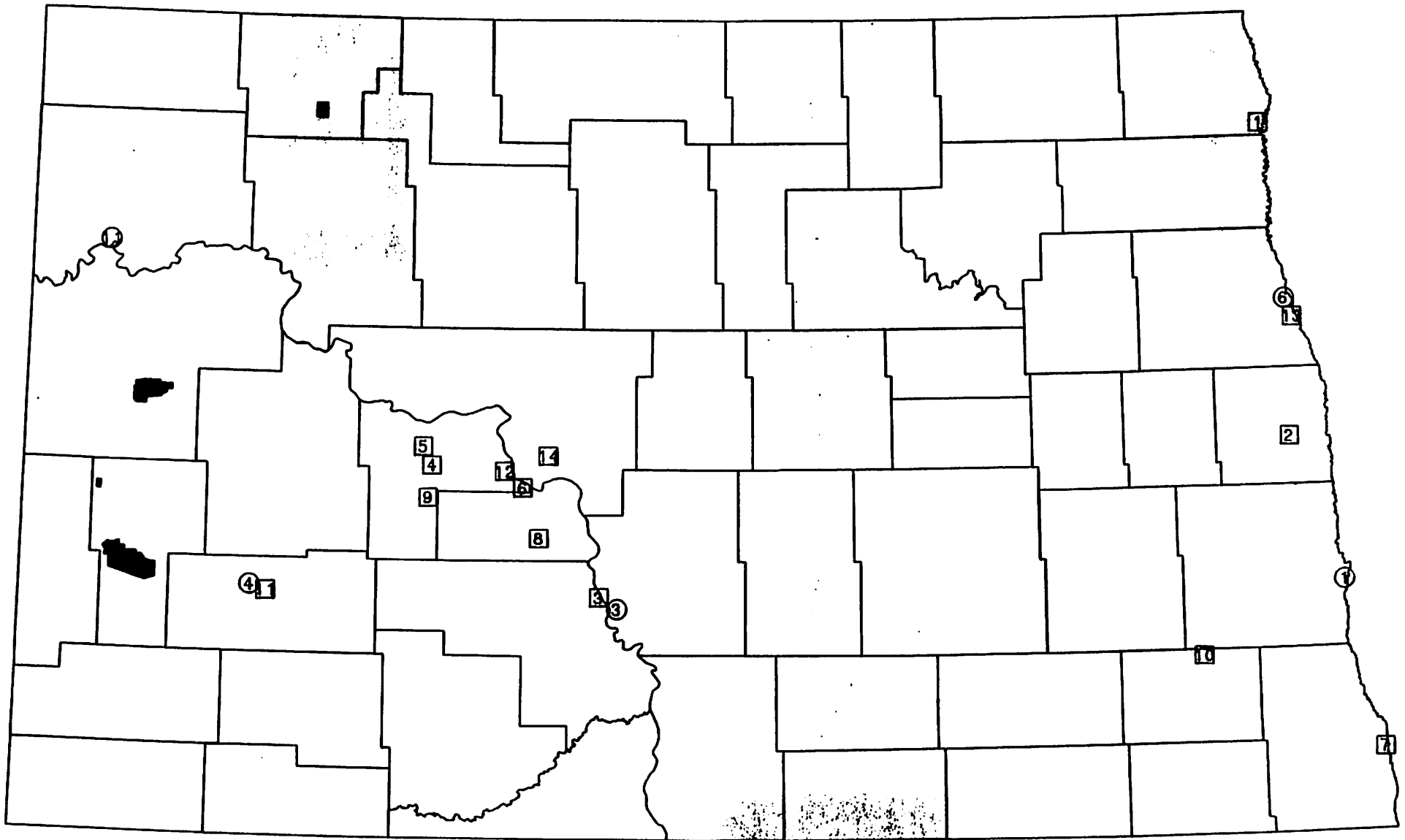
2.4.2 Monitoring Network

The State operates six PM_{10} monitors at the five sites shown on Map 5. The Fargo site has collocated samplers. The monitors in Grand Forks and Dickinson started operating in July 1989.

TABLE 8
MAJOR PM_{10} SOURCES
(> 100 TPY)

#	Name of Company	Type of Source	Location	County	PM_{10} Emissions Ton/Year
1	American Crystal Sugar Co.	Sugar Beet Processing Plant	Drayton	Pembina	157.4
2	American Crystal Sugar Co.	Sugar Beet Processing Plant	Hillsboro	Pembina	108.5
3	Amoco Oil Company	Oil Refinery	Mandan	Morton	518.5
4	ANG Coal Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	632.3
5	Basin Electric Power Cooperative	Steam Electric Gen. Facility	Beulah	Mercer	523.0
6	Basin Electric Power Cooperative	Steam Electric Gen. Facility	Stanton	Mercer	158.0
7	Minn-Dak Farmers Coop.	Sugar Beet Processing Plant	Wahpeton	Richland	153.3
8	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	571.9
9	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Facility	Beulah	Mercer	417.0
10	National Sun Ind., Inc.	Sunflower Processing Plant	Enderlin	Ransom	620.2
11	Royal Oak Enterprises	Charcoal Briquetting Plant	Dickinson	Stark	154.0
12	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	700.0
13	University of North Dakota	Heating Plant	Grand Forks	Grand Forks	143.5
14	UPA/CPA	Steam Electric Gen. Facility	Underwood	McLean	1388.5

MAJOR PM10 SOURCES



MAP 5

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The latest inhalable particulate monitoring data for the network are shown in Table 9.

2.5 Carbon Monoxide

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

2.5.1 Sources

Table 10 lists the major (>100 TPY) stationary sources of CO in the State. Most of these sources are the same sources that are the major emitters of SO_2 and NO_x, but the corresponding levels of CO from these sources is considerably lower. There are no large area sources of CO in the State. The major sources of CO in the State are shown on Map 6.

TABLE 9

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

POLLUTANT : INHALABLE PARTICULATES (µG/M3) STATE: NORTH DAKOTA YEAR: 1989

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAXIMA 1ST	MAXIMA 2ND	MAXIMA 3RD	ARITH MEAN	ARITH S.D	#>150	AM>50	% >MDV
BISMARCK	1989	JAN-DEC	60	5.7	65.0	50.8	44.8	20.0	11.50			100.0
DICKINSON RES	1989	JUL-DEC	30	2.7	34.3	33.3	33.1	***	***			96.7
FARGO	1989	JAN-DEC	61	4.6	50.8	46.3	42.1	20.6	10.33			100.0
FARGO DUPLICATE	1989	JAN-DEC	59	5.8	51.7	47.0	43.2	21.4	10.25			100.0
GRAND FORKS	1989	JUN-DEC	34	4.6	53.8	52.6	48.5	***	***			100.0
LOSTWOOD	1989	JAN-MAY	21	3.7	56.9	37.7	25.0	***	***			95.2
TRNP - SU	1989	JAN-JUN	30	4.2	50.0	26.9	17.0	***	***			100.0
WILLISTON	1989	JAN-DEC	43	3.1	69.2	44.6	26.8	***	***			95.3

* THE STATE AIR QUALITY STANDARDS ARE 50 µG/M3 EXPECTED ANNUAL ARITHMETIC MEAN, AND A MAXIMUM OF 150 µG/M3 AVERAGED OVER A 24-HR PERIOD WITH NO MORE THAN ONE EXPECTED EXCEEDANCE PER YEAR

*** LESS THAN 75% OF THE POSSIBLE SAMPLES (DATA) WERE COLLECTED

TABLE 10

MAJOR CO SOURCES
(> 100 TPY)

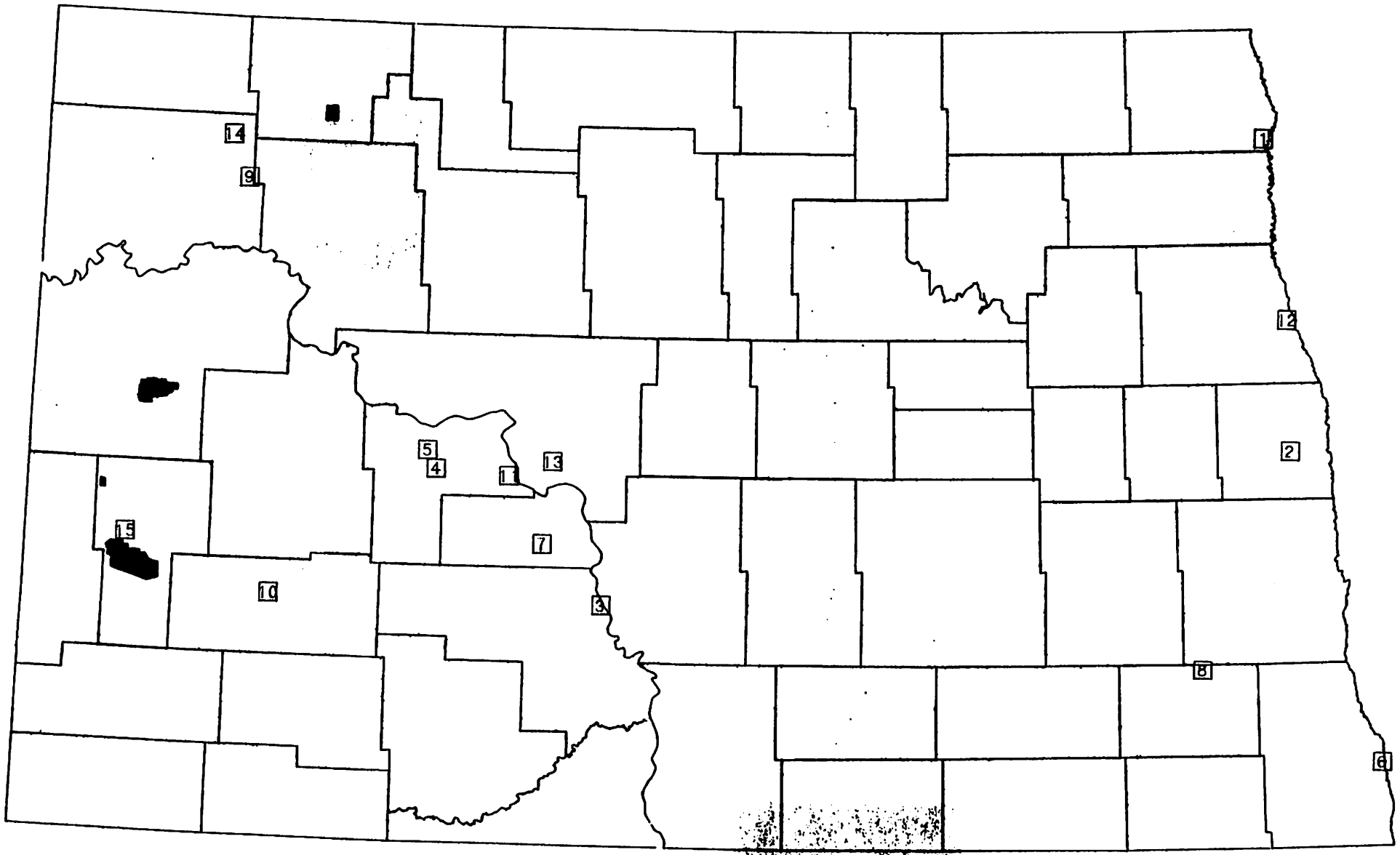
#	Name of Company	Type of Source	Location	County	CO Emissions Ton/Year
1	American Crystal Sugar Co.	Sugar Beet Processing Plant	Drayton	Pembina	341.2
2	American Crystal Sugar Co.	Sugar Beet Processing Plant	Hillsboro	Pembina	298.9
3	Amoco Oil Company	Oil Refinery	Mandan	Morton	120.0
4	ANG Coal Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	1063.6
5	Basin Electric Power Cooperative	Steam Electric Gen. Facility	Beulah	Mercer	1557.0
6	Minn-Dak Farmers Coop.	Sugar Beet Processing Plant	Wahpeton	Richland	417.9
7	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	1054.3
8	National Sun Ind., Inc.	Sunflower Processing Plant	Enderlin	Ransom	173.4
9	Phillips Petroleum Co.	Natural Gas Processing Plant	Tioga	Williams	244.5
10	Royal Oak Enterprises	Charcoal Briquetting Plant	Dickinson	Stark	529.9
11	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	283.0

TABLE 10 (Cont.)

MAJOR CO SOURCES
(> 100 TPY)

#	Name of Company	Type of Source	Location	County	CO Emissions Ton/Year
12	University of North Dakota	Heating Plant	Grand Forks	Grand Forks	170.0
13	UPA/CPA	Steam Electric Gen. Facility	Underwood	McLean	1330.5
14	Western Gas Processors, Ltd.	Natural Gas Processing Plant	Temple	Williams	174.1
15	Western Gas Processors, Ltd.	Compressor Station	Mystery Creek	Billings	256.0

MAJOR CO SOURCES



MAP 6

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2.5.2 Monitoring Network

The Department purchased a CO monitor in 1989 and attempted to establish a CO monitoring site in Fargo. Land lease problems precluded the establishment of that site and the monitor was subsequently moved to UND as part of the monitoring effort at that location. No 1989 data are available.

2.6 Lead

Through prior sampling efforts, the Department has determined that the State of North Dakota does not have any significant sources of lead. This determination, coupled with the Federal requirement for a NAMS network only in urbanized areas with populations greater than 500,000, resulted in the termination of the lead monitoring program effective January 1, 1984.

2.7 Hydrogen Sulfide

Although no Federal Ambient Air Quality Standards exist for hydrogen sulfide (H_2S), the State of North Dakota is in the process of adopting new H_2S standards.

2.7.1 Sources

H_2S emissions in the State stem almost totally from the oil and gas operations in the western part of the State and principally from the green outlined area on Map 2. Flares and treater stacks associated with oil/gas wells, oil storage tanks, compressor stations, pipeline risers, and natural gas processing plants are all potential sources of H_2S emissions.

2.7.2 Monitoring Network

There are four monitoring sites for H_2S emissions. These are the TRNP-NU and TRNP-SU sites, the Lostwood site, and the Olson Ranch site. The latest summary of H_2S data is shown in Table 11.

TABLE 11

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

POLLUTANT : HYDROGEN SULFIDE (PPB) STATE: NORTH DAKOTA YEAR: 1989

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAX 1ST	MAX 2ND	MAX 3RD	ARITH MEAN	ARITH S.D.	#> 50	% >MDV
LONE BUTTE - SPM	1989	JAN-JUL	4567	0	122	90	88	***	***	26	17.1
LOSTWOOD	1989	JAN-DEC	7760	0	47	26	24	2	0.7		0.2
OLSON RANCH - SPM	1989	JUL-DEC	3798	0	88	53	52	***	***	3	3.7
TRNP - NU	1989	JAN-DEC	8320	0	10	9	8	2	0.3		0.4
TRNP - SU	1989	JAN-DEC	8698	0	10	10	7	2	0.2		0.1

* THE STATE AMBIENT AIR QUALITY STANDARD IS 50 PPB (70 µG/M3) MAXIMUM 1-HR CONCENTRATION NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.

*** LESS THAN 75% OF THE POSSIBLE SAMPLES (DATA) WERE COLLECTED