NORTH DAKOTA
STATE DEPARTMENT OF HEALTH
AND CONSOLIDATED LABORATORIES
State Capitol
Bismarck, North Dakota 58505

FILE

ENVIRONMENTAL HEALTH SECTION

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

May 31, 1989

Mr. Marlin Helming
Environmental Services
Division
U.S. EPA, Region VIII
P.O. Box 25366
Denver, CO 80225

Re: Annual Network Review

Dear Marlin:

Here is our first attempt at complying with the new guidelines concerning the Annual Network Review. We recognize that the document is incomplete at this time, but we will be filling in the missing pieces over the course of the next year. You have in your possession some of the documentation that would go into Section 3.

Any suggestions for improving this document would be greatly appreciated.

Sincerely,

Charles M. McDonald, Manager
Air Quality Monitoring Branch
Div. of Environmental Engineering

CMM:saj
Encl:

NORTH DAKOTA STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL ENGINEERING

AMBIENT AIR QUALITY MONITORING
ANNUAL NETWORK REVIEW
1989

May 1989

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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 scale. For the remaining pollutants, the primary concern is for background monitoring. 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 normally is not 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 significant deterioration of our existing air quality. To accomplish these objectives, the Department operates and maintains 12 AAQM sites around the State. Eleven are fixed SLAMS/NAMS sites, and one is a special purpose

monitoring (SPM) site. 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

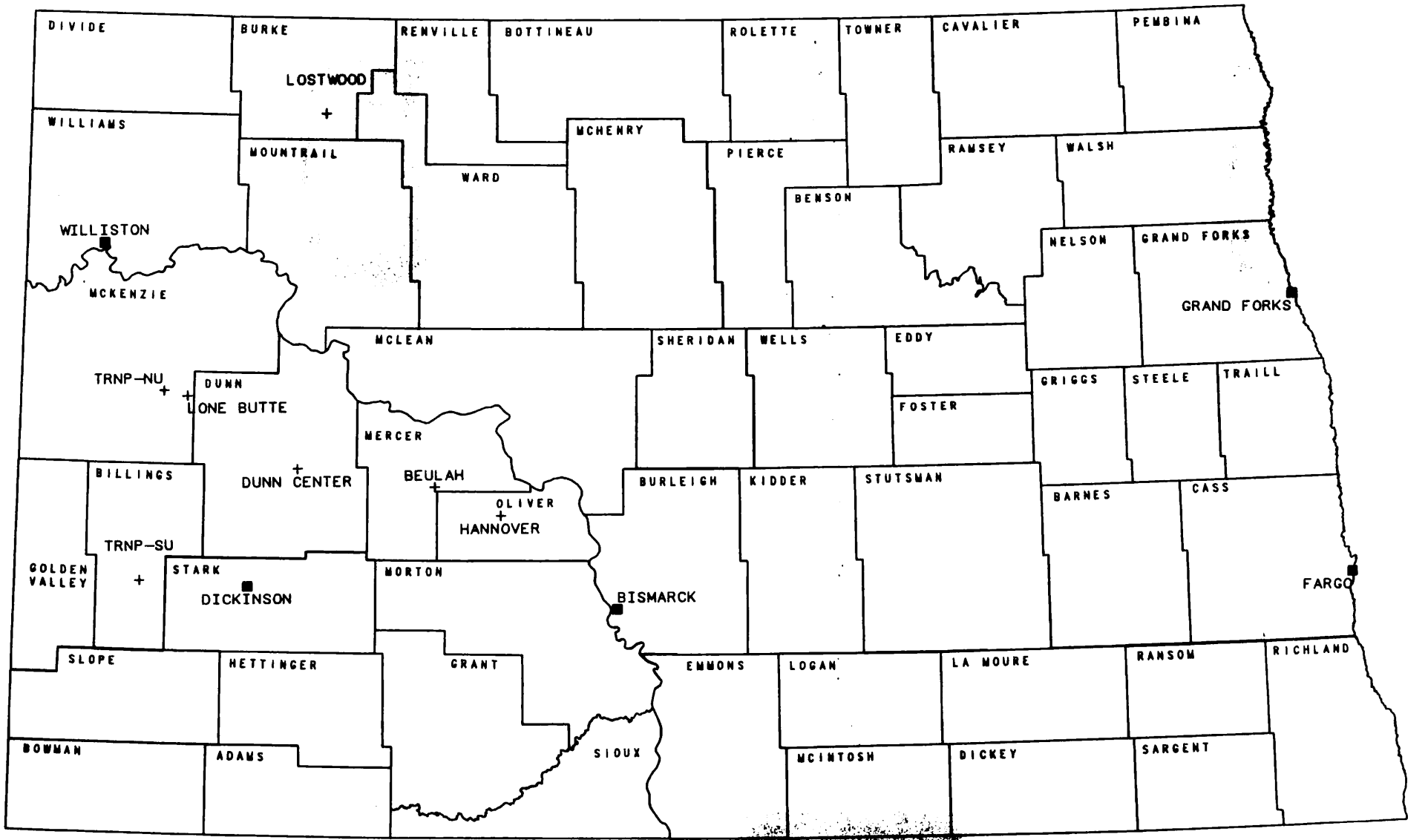
TABLE 1 (Cont.)

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 Lone Butte-Rural	SPM	38-053-0003	SO_2	EQSA-0276-009	cont.	Source Impact	Neighborhood	12/83	12/83
			H_2S	N/A	cont.	N/A	N/A	12/83	12/83
			Met	N/A	cont.	N/A	N/A	12/83	12/83

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

AMBIENT AIR QUALITY MONITORING SITES



+ = CONTINUOUS (24-Hr/DAY) MONITORS

■ = PM10 MONITORS

MAP 1

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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)

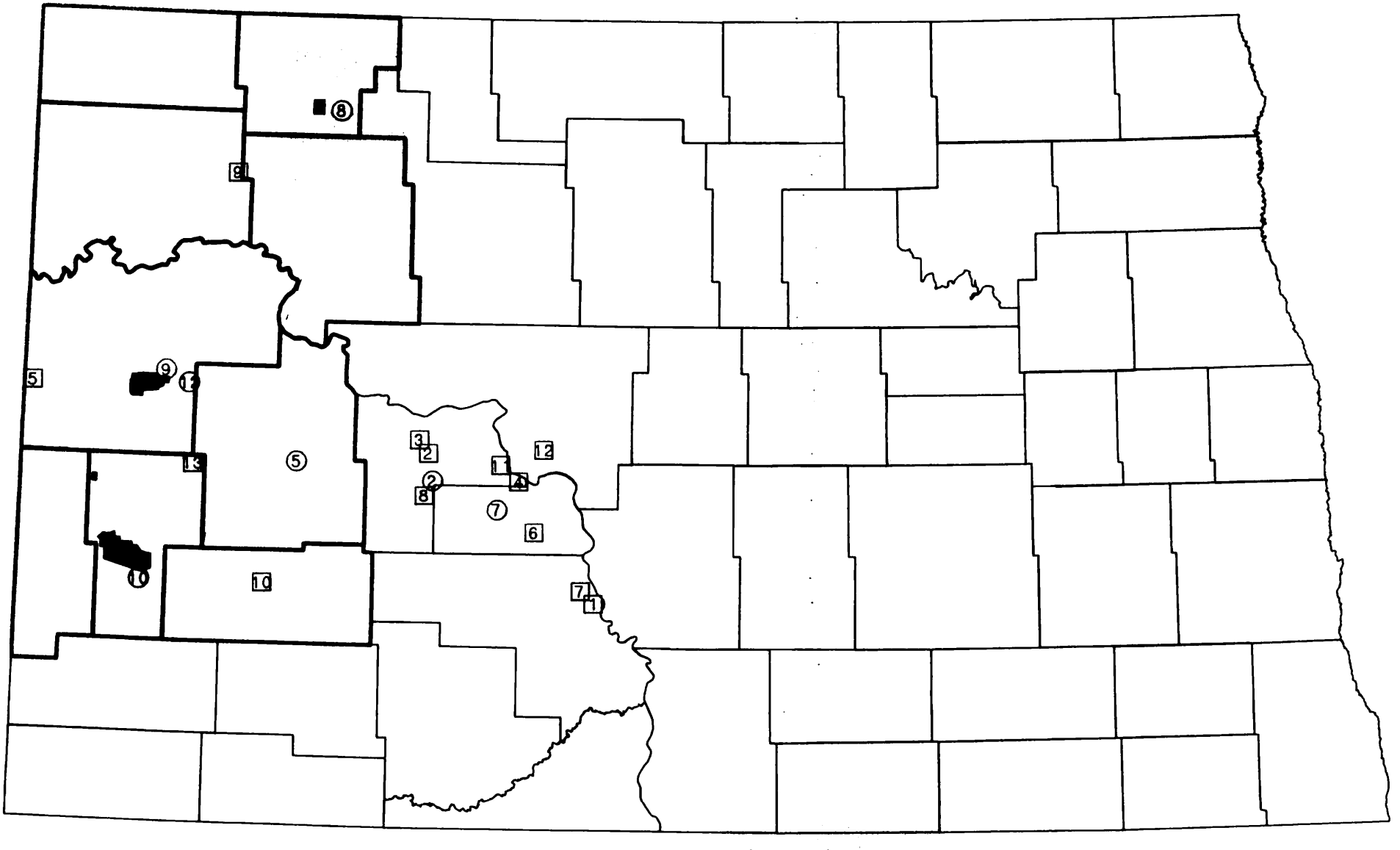
#	Name of Company	Type of Source	Location	County	SO_2 Emissions Ton/Year
1	Amoco Oil Company	Oil Refinery	Mandan	Morton	5518.6
2	ANG Coal Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	34373.3
3	Basin Electric Power Cooperative	Steam Electric Gen. Facility	Beulah	Mercer	13343.0
4	Basin Electric 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

1988 Sulfur Dioxide Monitoring Data

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	MAX 1-HOUR 1ST	MAX 1-HOUR 2ND	MAX 3-HOUR 1ST	MAX 3-HOUR 2ND	MAX 24-HOUR 1ST	MAX 24-HOUR 2ND	ARITH MEAN	ARITH S. D.	1HR #)715	24HR #)260	ANNL AM)60	%)NDV
BEULAH	1988	JAN-DEC	20	8725	327	280	286	225	141	83	6	12.75				26.3
DUNN CENTER	1988	JAN-DEC	20	8187	65	58	56	36	17	12	3	2.66				5.6
HANNOVER	1988	MAR-DEC	20	6448	335	254	222	157	86	56	***	***				19.1
LONE BUTTE - SPM	1988	JAN-DEC	20	8729	495	411	349	326	96	75	13	27.67				38.8
LOSTWOOD	1988	JAN-DEC	20	8724	84	84	67	65	34	19	4	4.73				17.8
TRNP - NU	1988	JAN-DEC	20	8723	110	71	65	56	23	22	3	4.14				9.1
TRNP - SU	1988	JAN-DEC	20	8653	47	47	34	31	17	16	3	2.24				6.9

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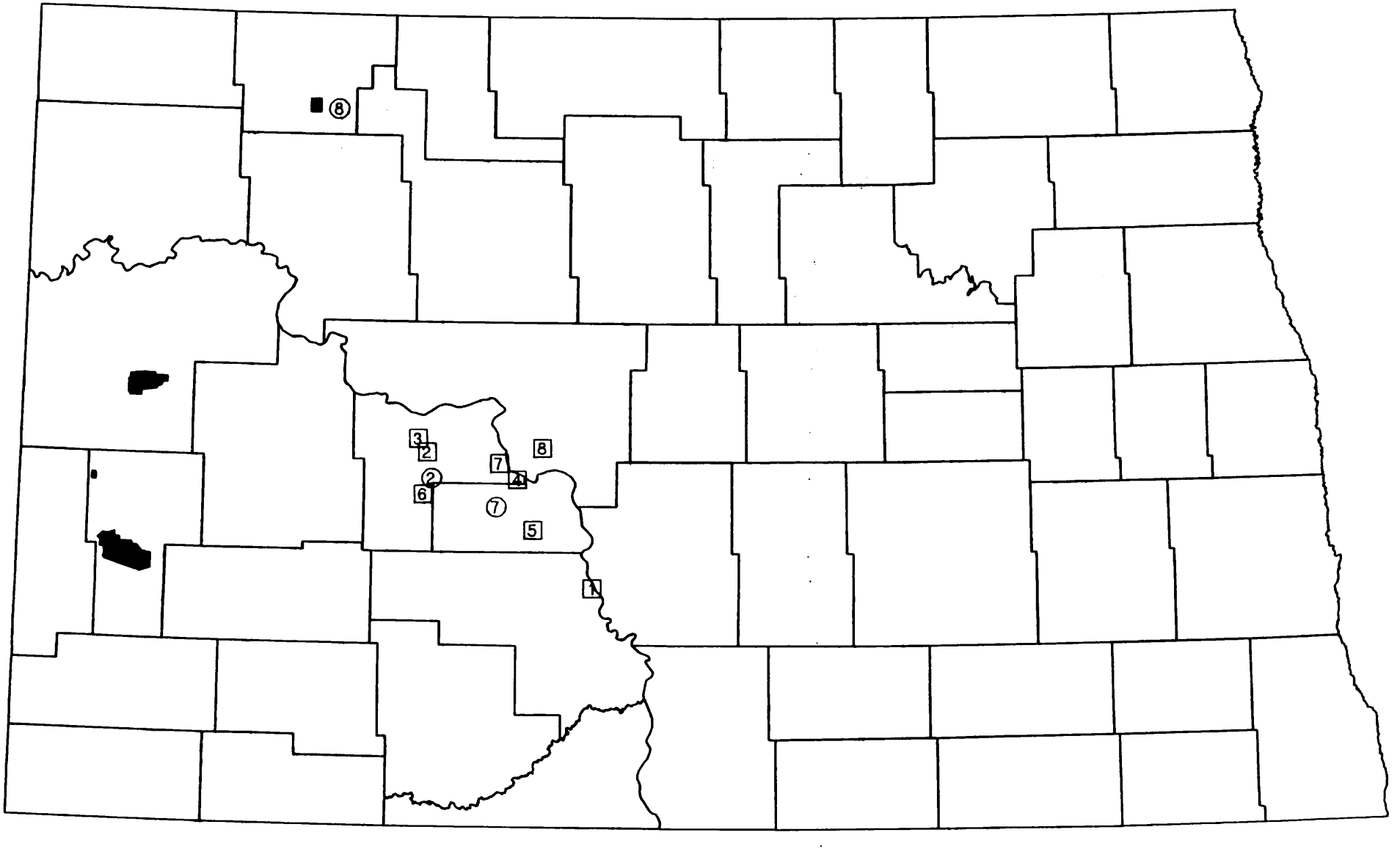
* THE STATE AIR QUALITY STANDARDS FOR SO2 ARE 1) THE MAXIMUM 1-HOUR STANDARD IS 715 UG/M3. 2) THE MAXIMUM 24-HOUR CONCENTRATION IS 260 UG/M3. 3) THE MAXIMUM ANNUAL ARITHMETIC MEAN IS 60 UG/M3.
*** LESS THAN 75% OF THE POSSIBLE SAMPLES (DATA) WERE COLLECTED.

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

1988 Nitrogen Dioxide Monitoring Data

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	MAXIMA 1-HOUR 1ST	MAXIMA 1-HOUR 2ND	ARITH MEAN	ARITH S. D.	A.M.)100	%)NDV
BEULAH	1988	JAN-DEC	14	8722	81	75	7	7.16		26.7
DUNN CENTER	1988	JAN-DEC	14	7292	38	32	4	1.94		5.6
HANNOVER	1988	MAR-DEC	14	6506	75	66	***	***		8.0
LOSTWOOD	1988	JAN-DEC	14	3784	45	43	***	***		6.4

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* THE AIR QUALITY STANDARDS ARE 100 UG/M3 (0.05 PPM) ANNUAL ARITHMETIC MEAN AND 200 UG/M3 (0.1 PPM) MAXIMUM 1-HOUR CONCENTRATION NOT TO BE EXCEEDED OVER 1 PERCENT OF THE TIME IN ANY 3-MONTH PERIOD.

*** 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

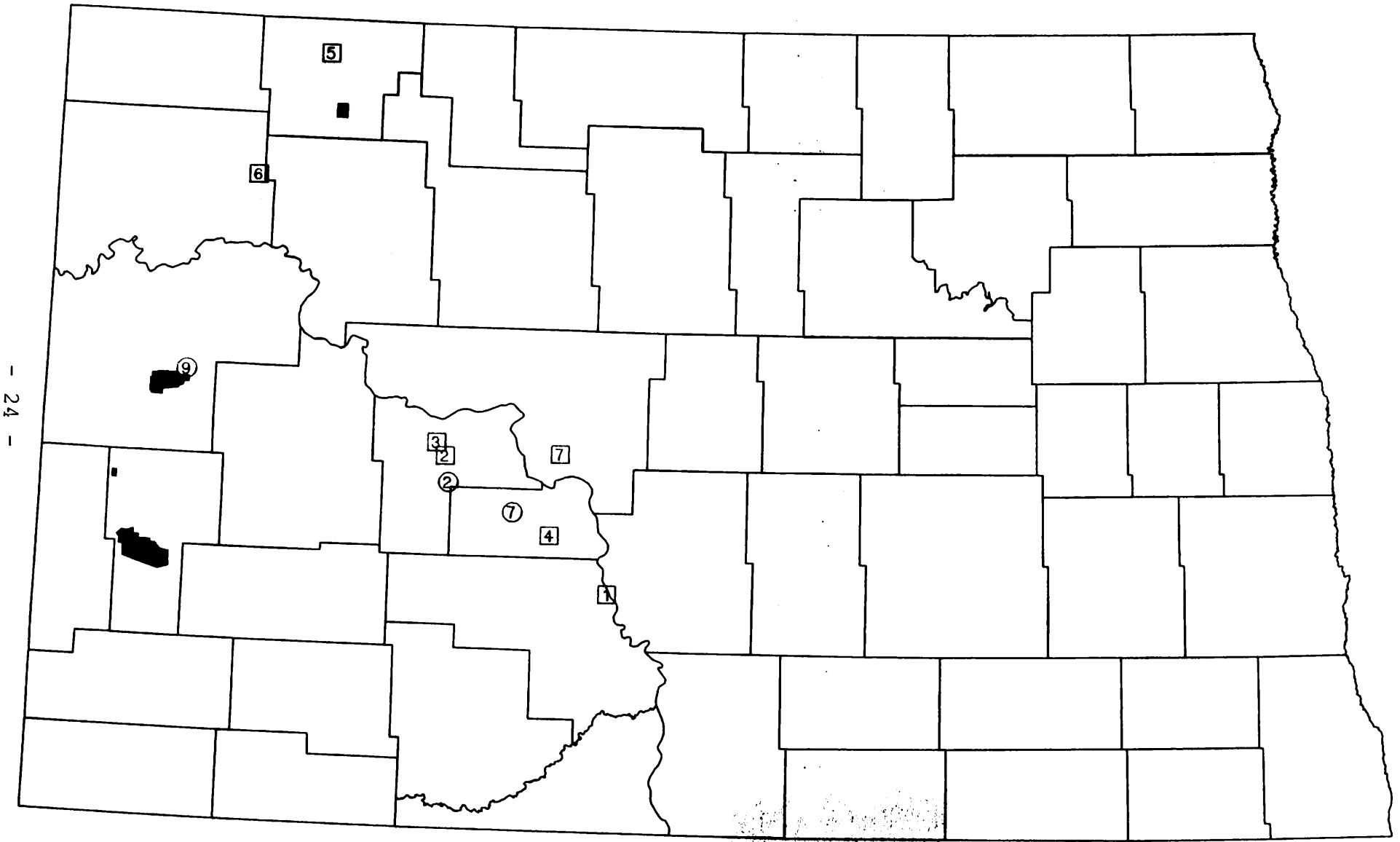
The State currently has three continuous ozone analyzers in operation. These are at Beulah, Hannover and Theodore Roosevelt National Park - North Unit and are shown on Map 4. The latest summary of O_3 data is included in Table 7.

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

1988 Ozone Monitoring Data

LOCATION	YEAR	SAMPLING PERIOD	DAYS SAMPLED	METH	NUM OBS	1 - H O U R M A X I M A 1ST	DATE	2ND	DATE	3RD	DATE	#HOURS).12	%)NDV
DUNN CENTER	1988	JAN-DEC	364	11	4149	0.08	7/ 5	0.08	7/14	0.07	6/ 8		99.4
HANNOVER	1988	MAR-DEC	302	11	4219	0.09	6/ 8	0.08	6/ 7	0.08	5/28		99.9
TRNP - NU	1988	JAN-DEC	366	11	2826	0.08	6/ 8	0.07	6/ 7	0.07	5/23		99.9

---

* THE AIR QUALITY STANDARD FOR OZONE IS 0.12 PPM (235 UG/M3) 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.

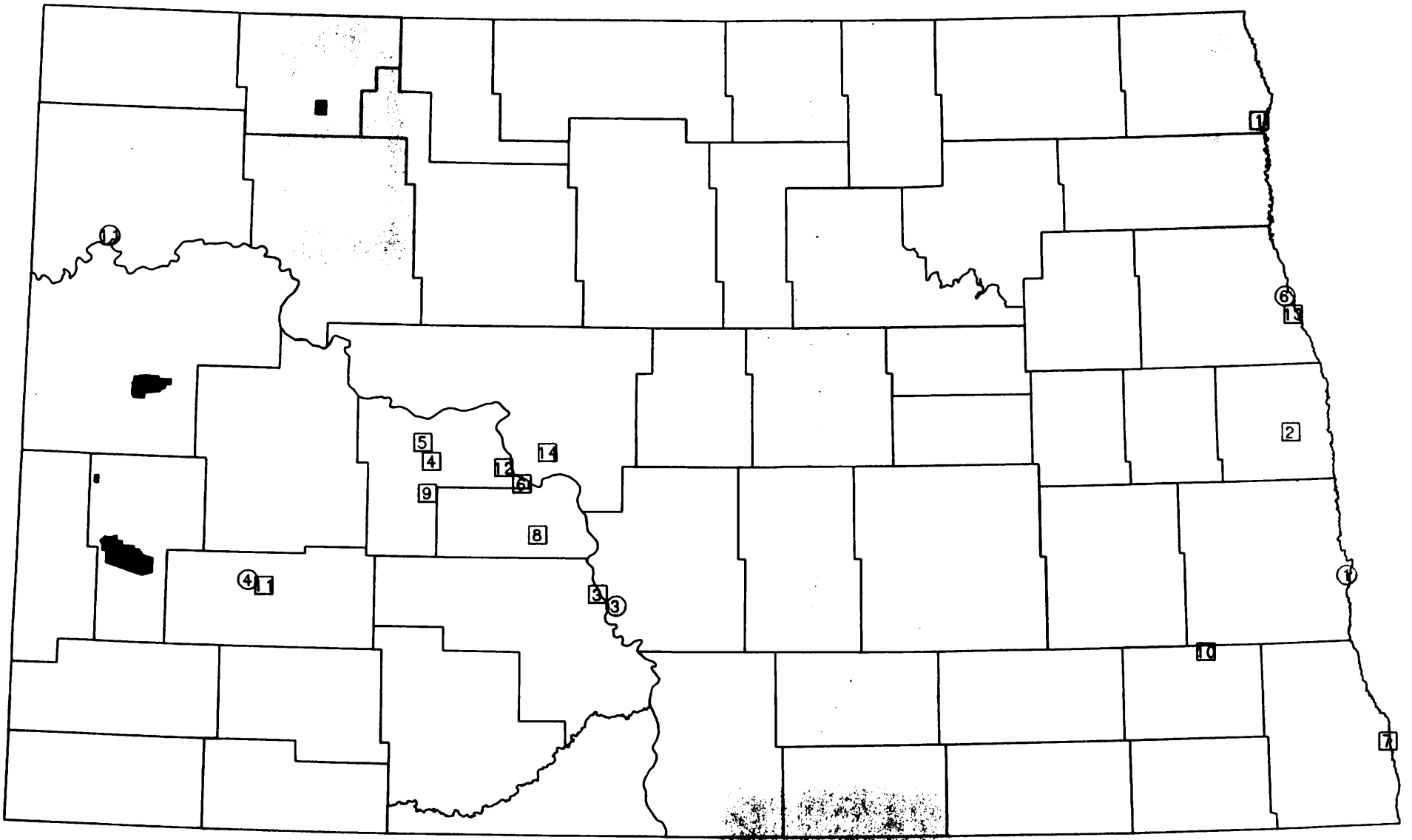
2.4.2 Monitoring Network

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 will start 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

1988 Inhalable Particulate Monitoring Data

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAXIMA 1ST	2ND	3RD	ARITH MEAN	ARITH S.D.	#)150	AM)50	%)NDV
BISMARCK	1988	JAN-DEC	61	2	56	43	33	19.2	9.63			98.4
FARGO	1988	JAN-DEC	60	4	57	45	43	21.1	10.66			100.0
FARGO DUPLICATE	1988	JAN-DEC	57	4	56	42	41	21.0	10.10			98.2
LOSTWOOD	1988	JAN-DEC	55	3	44	41	34	13.0	9.12			89.1
TRNP - NU	1988	JAN-SEP	28	3	44	24	20	***	***			92.9
TRNP - SU	1988	JAN-DEC	61	1	37	33	29	12.1	7.41			93.4
WILLISTON	1988	JAN-DEC	45	3	57	56	36	17.9	11.68			97.8

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* THE FEDERAL AMBIENT AIR QUALITY STANDARDS ARE 50 UG/M3 ANNUAL ARITHMETIC MEAN, AND A MAXIMUM OF 150 UG/M3 AVERAGED OVER A 24-HOUR PERIOD NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR. (NORTH DAKOTA HAS NOT YET ADOPTED ANY STANDARDS).
*** LESS THAN 75% OF THE POSSIBLE SAMPLES (DATA) WERE COLLECTED.

TABLE 10

MAJOR CO SOURCES
(> 100 TPY)

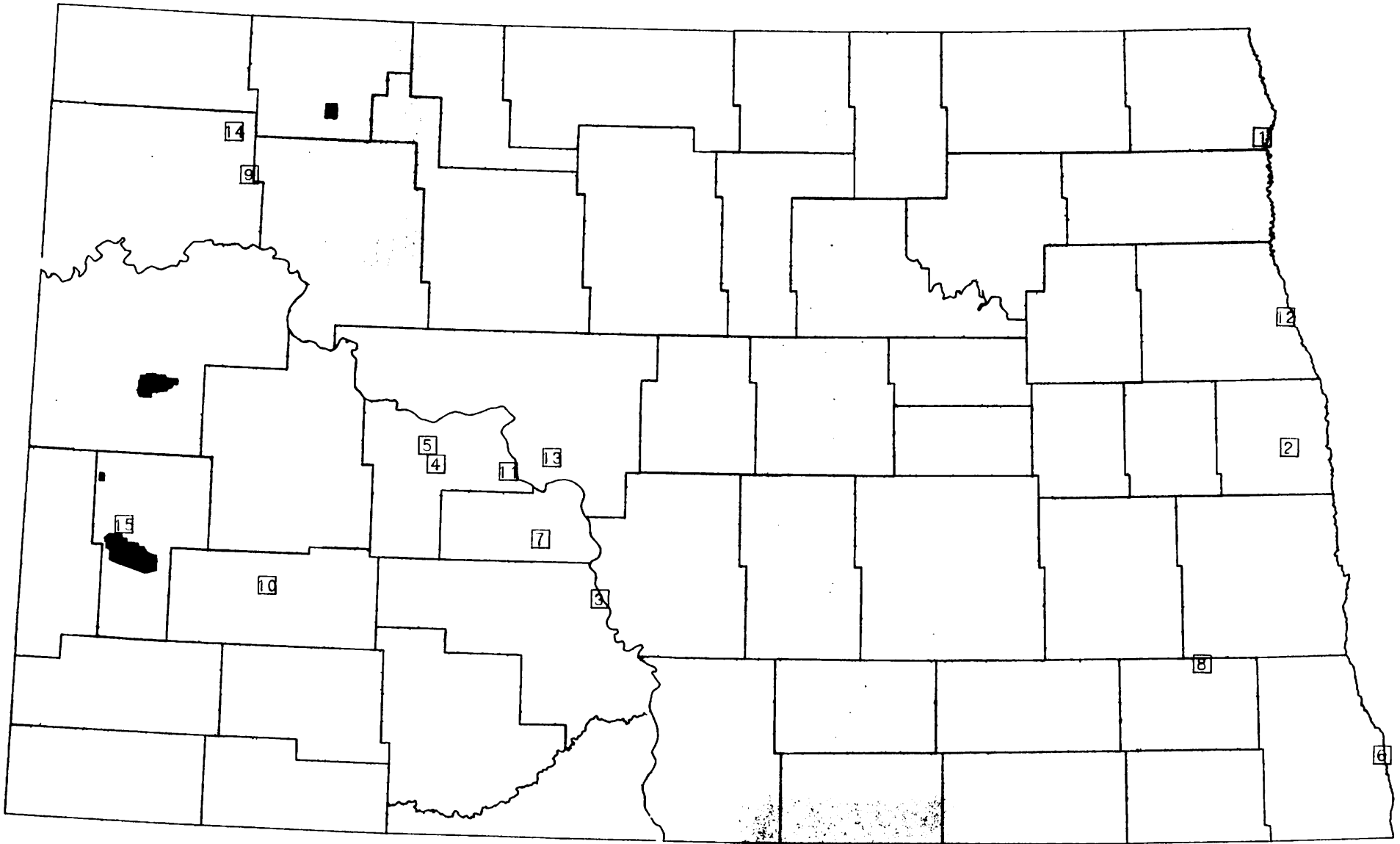
#	Name of Company	Type of Source	Location	County	CO Emissions Ton/Year
1	American Crystal Sugar Co.	Sugar Beet Processing Plant	Drayton	Pembina	341.2
2	American Crystal Sugar Co.	Sugar Beet Processing Plant	Hillsboro	Pembina	298.9
3	Amoco Oil Company	Oil Refinery	Mandan	Morton	120.0
4	ANG Coal Gasification 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

22MAY89 14.36

2.5.2 Monitoring Network

The State currently does not have a CO monitoring network. However, we are planning on purchasing a CO monitor and establishing a special purpose monitoring site in the Fargo area to check for CO levels near some of the major traffic areas late in 1989.

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 has adopted a 1-hour H_2S standard.

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 Lone Butte site. The latest summary of H_2S data is shown in Table 11.

TABLE 11

1988 Hydrogen Sulfide Monitoring Data

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAXIMA 1ST	2ND	3RD	ARITH MEAN	ARITH S.D.	#)75	#)45	%)MDV
LONE BUTTE - SPM	1988	JAN-DEC	8516	0	2121	862	561	13	38.63	305	579	32.5
LOSTWOOD	1988	JAN-DEC	8388	0	64	60	60	3	2.45		9	1.3
TRNP - NU	1988	JAN-DEC	8600	0	39	28	28	3	1.31			2.4
TRNP - SU	1988	JAN-DEC	8653	0	13	11	11	3	.33			0.5

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* THE STATE AMBIENT AIR QUALITY STANDARD IS 70 UG/M3 NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.