NORTH DAKOTA
STATE DEPARTMENT OF HEALTH
AND CONSOLIDATED LABORATORIES

ENVIRONMENTAL HEALTH SECTION

1200 Missouri Avenue
P.O. Box 5520
Bismarck, North Dakota 58502-5520
Fax #701-221-5200

FILE

July 28, 1993

Mr. Marshall Payne
U.S. EPA - Region VIII
One Denver Place
999 18th Street, Suite 500
Denver, CO 80202-2405

Re: 1992 North Dakota Network Review Comments

Dear Mr. Payne: Marshall

The following are responses to your comments on the subject report:

Comment 1: The AIRS site numbers were not included in tables 1 and 2 because of a format change in the tables and the site numbers are available in the AIRS system. The Coteau Mining Co. site numbers could not have been included at the time the network review was written because the formal site information had not yet been submitted to us. The formal information was received on July 14 and assigned and added to the AIRS system on July 28, 1993. The site numbers are as follows: Coteau #5 - 380570119, Coteau#6 - 380570120, Coteau #7 - 380570121 (dup. sampler), Coteau #8 - 380570122.

Comment 2: The UND PM_{10} sampler was marked as "Not Needed" in Table 14 because the modifications to the heating plant and the surrounding area have, in our opinion, resolved the problem. The following table presents a summary of the data in the AIRS system:

Year	Mean	Maximum
1990	40.7	149
1991	30.4	113
1992 (Except. Event)	29.2 33.3	90 167
1993	19.7	44

The data would seem to confirm our opinion; however, at your request the site is scheduled to run at least one more heating season.

Comment 4: Enclosed is a reprint of Table 4 (2 pages).

Comment 5: Enclosed is a reprint of Table 2.

Sincerely,

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

DKM/DEH:saj
Enc:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

JUL 23 1993

Ref: 8ART-AP

Dana Mount, Director
Division of Environmental Engineering
1200 Missouri Avenue, Room 304
P.O. Box 5520
Bismarck, North Dakota 58502-5520

SUBJECT: 1992 North Dakota Network Review

Dear Mr. ~~Mount~~: Dana

I would like to thank you for the opportunity of reviewing your very thorough and comprehensive 1992 Network Review. I have a few minor comments, as follows:

1) The format of tables 1 and 2 has changed from previous years and no longer includes AIRS site identification (I.D.) numbers. Please submit the AIRS I.D. numbers for the new industrial site: the Coteau Mining Company.

2) Section 2.4.2, PM_{10} Monitoring Network, Page 36, states that the University of North Dakota (UND) PM_{10} station will operate the PM_{10} monitor for at least one more heating season. Table 14 does not seem to be consistent with this, since PM_{10} has been placed in the "not needed" column.

   I have not yet received analytical results from the UND PM_{10} filters submitted to Research Triangle Institute (RTI). We expect to receive the results by July 30, 1993, and will at that time make a determination on whether or not the April 30, 1992 exceedence was an exceptional event.

3) The explanations provided for the hydrogen sulfide (H_2S) exceedences described in section 2.7 are adequate. Since the Plaza Special Purpose Monitoring site and the Western industrial sites have been discontinued, only the Hunt industrial sites remain a concern as far as H_2S emissions. Since the network review indicates that the cause of the H_2S emissions at the Hunt stations has been corrected, and that no SO_2 exceedences were reported, the situation is satisfactory.

4) The far right column of Table 4 did not print out; another copy would be appreciated.

5) In Table 2, the parameters are missing for the Tioga #2 and #3 stations.

Once again the quality of your Network Review was excellent. Please continue to keep us updated as far as future network modifications and site evaluations. If you have any questions or comments, please call Sara Summers at (303) 293-0966.

Sincerely,

Marshall

Marshall Payne, Chief
Technical Operations Branch
Air, Toxics and Radiation Division

cc: Chuck McDonald

Good work, thanks to you and your staff.

M.

NORTH DAKOTA
STATE DEPARTMENT OF HEALTH
AND CONSOLIDATED LABORATORIES

FILE

ENVIRONMENTAL HEALTH SECTION

1200 Missouri Avenue
P.O. Box 5520
Bismarck, North Dakota 58502-5520
Fax #701-221-5200

May 24, 1993

Ms. Sara Summers
Technical Operations Branch
U.S. EPA - Region VIII
One Denver Place
999 18th Street, Suite 500
Denver, CO 80202-2405

Dear Ms. Summers:

Enclosed are two copies of the North Dakota Network Review for 1993. This submittal is in response to Action Item C. under the Monitoring Activity Section of the Air Quality Media Workplan. You will note that we have rearranged some of the sections from previous submittals. The "prioritized equipment needs list" has been deleted because we now submit an Equipment Replacement Plan to you as a separate submittal. We also have moved the Summary and Conclusions from Section 5.0 to Section 3.0. Old Section 3.0 (new Section 4.0) consisted of our current and past network modification requests which had already been submitted to you and, therefore, were not part of this package. This change makes this submittal an integral package. I hope you will concur with these changes.

If you have any questions, please contact me.

Sincerely,

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

CMM:saj
Enc:

NORTH DAKOTA STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL ENGINEERING

AMBIENT AIR QUALITY MONITORING
ANNUAL NETWORK REVIEW
1993

May 1993

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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 seven 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 40 CFR 58, Appendix D, and (2) to identify network modifications such as termination or relocation of unnecessary sites or establishment of new sites 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 sites 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 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 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 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 Exposure	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 sites allows for an objective approach, ensures compatibility among sites, and provides a common basis for the interpretation and application of data. The annual review process involves an examination of existing sites 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 40 CFR 58, Appendix D.

1.2 General Monitoring Needs

As can be gathered from the prior discussion, each air pollutant has certain characteristics which must be considered when establishing a monitoring site. These characteristics may result from 1) variations in the number and type 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 State AAQM network is designed to monitor air quality data for three basic conditions: 1) highest concentration, 2) population oriented monitoring, and 3) background monitoring. The industrial AAQM network sites are designed to monitor air quality data for source specific impacts on a neighborhood scale.

Population oriented monitoring is not a major consideration, except for PM_{10}, because of our relatively sparse population. Population exposure monitoring is conducted at Beulah because of the large sources in the area. Carbon monoxide (CO) is the only parameter for which highest concentration monitoring is done. All PM_{10} monitoring in populated areas is population exposure on a neighborhood scale except for UND. The CO monitoring is conducted on a micro scale. For the remaining pollutants at state sites, the objective is background monitoring.

Background 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_2 despite the fact that the regional spatial scale is not normally used for NO_2 monitoring. Once general locations are established, all monitoring sites are established in accordance with the specific probe siting criteria specified in 40 CFR 58, Appendix E.

Since all industrial AAQM network sites are source specific, all the pollutants at industry sites are source oriented.

1.3 Monitoring Objectives

The monitoring objectives of the Department are to track those pollutants that are judged to have the potential for violating either State or Federal Ambient Air Quality Standards and to ensure that those pollutants do not cause significant deterioration of our existing air quality. To accomplish these objectives, the Department operates and maintains 11 AAQM sites around the State. Nine are fixed SLAMS/NAMS sites, and two are special purpose monitoring (SPM) sites. There are also seven industries that report ambient air quality data to this Department. Tables 1 and 2 list each site's type and the parameters monitored. Figure 1 shows the approximate site locations.

TABLE 1

STATE AAQM NETWORK DESCRIPTION

Site Name	Type Station	Parameter Monitored[1]	Operating Schedule	Monitoring Objective	Spatial Scale	Date Site Began
1 Fargo - Commercial Fargo - Commercial Dup.	NAMS	PM_{10} PM_{10}	6th Day 6th Day	Population Exposure Collocated SSI	Neighborhood N/A	6/85
2 Fargo - Commercial	SPM	CO, O_3, MET	cont.	Highest Concentration	Micro	11/90
3 Beulah - Residential	SLAMS	SO_2, NO_2, O_3, Met	cont.	Population Exposure	Urban	4/80
4 Bismarck - Commercial	SLAMS	PM_{10}	6th Day	Population Exposure	Neighborhood	4/85
5 Dickinson - Residential	SLAMS	PM_{10}	6th Day	Population Exposure	Neighborhood	7/89
6 Dunn Center - Rural	SLAMS	SO_2, Met	cont.	General Background	Regional	10/79
7 Grand Forks - Commercial	SLAMS	PM_{10}	6th Day	Population Exposure	Neighborhood	7/89
8 Hannover - Rural	SLAMS	SO_2, NO_2, O_3, Met	cont.	General Background	Regional	10/84
9 TRNP(NU) - Rural	SLAMS	SO_2, O_3, H_2S, Met	cont.	General Background	Regional	2/80
10 Williston - Commercial	SLAMS	PM_{10}	6th Day	Population Exposure	Neighborhood	5/85
11 UND - Residential	SPM	PM_{10}	3rd Day	Source Impact	Middle	1/90

1. MET refers to meteorological and indicates wind speed and wind direction monitoring equipment.

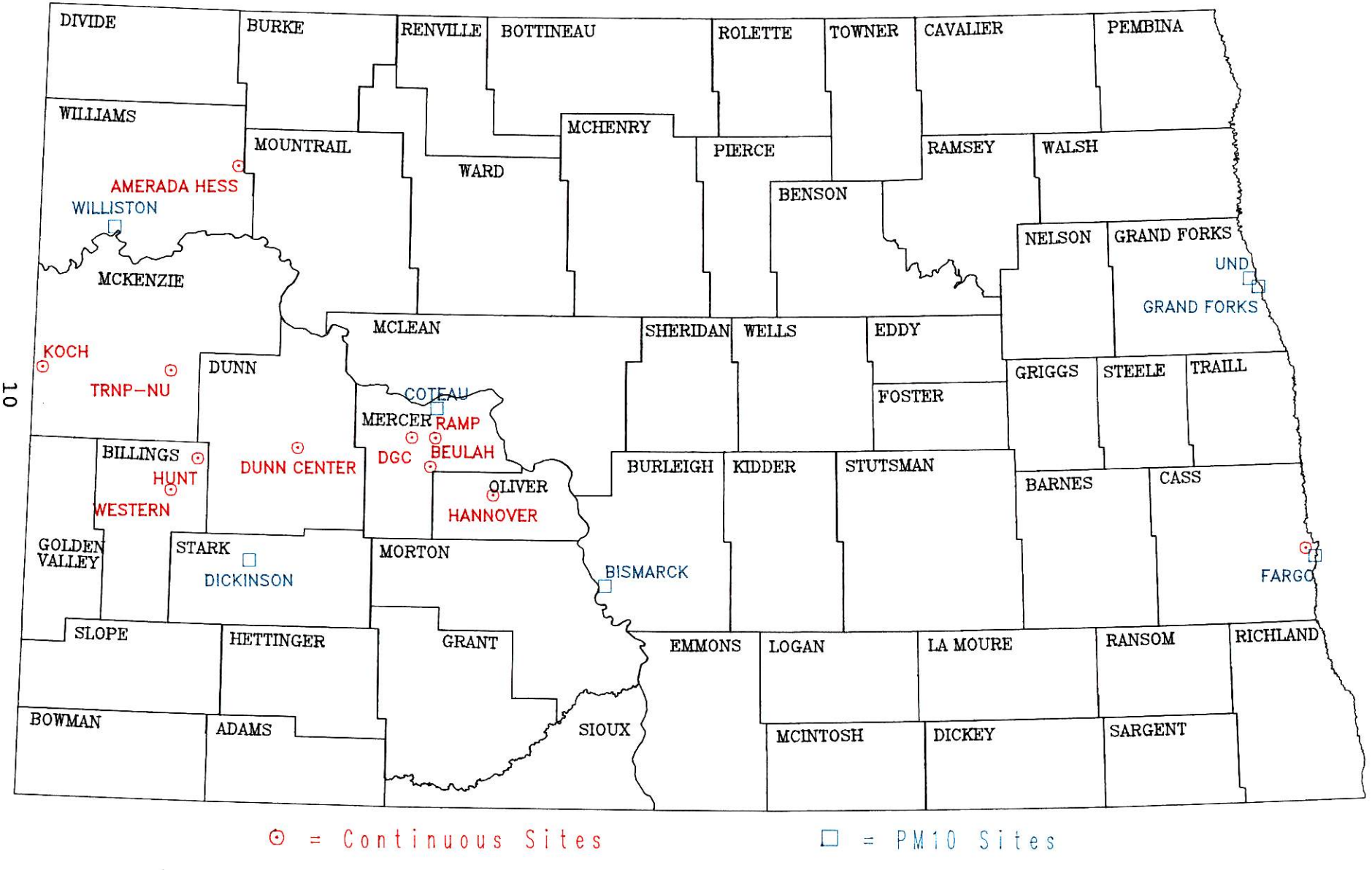
TABLE 2

INDUSTRY AAQM NETWORK DESCRIPTION

Company	Site Name	Parameter Monitored[1]	Operating Schedule	Monitoring Objective	Spatial Scale	Date Site Began
12 Amerada Hess Corporation	TIOGA #1 TIOGA #2 TIOGA #3	SO_2	cont.	Source	Neighborhood	7/87
13 Coteau Mining Co.	Coteau #5 Coteau #6 Coteau #7 Coteau #8	PM_{10} PM_{10} PM_{10} PM_{10}	6^{th} day 6^{th} day 6^{th} day 6^{th} day	Source Source Source Source	Neighborhood Neighborhood Neighborhood Neighborhood	5/93 5/93 5/93 5/93
14 Dakota Gasification Company	DGC SO_2 #1 DGC #2 DGC SO_2 #4	SO_2 H_2S SO_2	cont. cont. cont.	Source Source Source	Neighborhood Neighborhood Neighborhood	7/84 2/85 1/89
15 Koch Hydrocarbon Company	KOCH #1 KOCH #3A	SO_2, H_2S, Met SO_2, Met	cont. cont.	Source Source	Neighborhood Neighborhood	10/81 7/87
16 RAMP	RAMP #1 RAMP #2 RAMP #3 RAMP #5	SO_2 SO_2, NO_2, O_3, Met SO_2, NO_2 SO_2, NO_2	cont. cont. cont. cont.	Source Source Source Source	Neighborhood Neighborhood Neighborhood Neighborhood	1/80 1/80 1/80 1/80
17 W. H Hunt Estate	HUNT #4[2] HUNT #5	SO_2, H_2S, Met SO_2, H_2S, Met	cont. cont.	Source Source	Neighborhood Neighborhood	11/89 11/92
18 Western Gas Processors	WESTERN #2 WESTERN #3	H_2S, MET SO_2	cont. cont.	Source Source	Neighborhood Neighborhood	3/88 3/88

1. Met refers to meteorological and indicates wind speed and wind direction monitoring equipment.
2. Terminated November, 1992.

Figure 1. North Dakota Air Quality Monitoring Network



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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. However, there are areas of concern where the Department has established monitoring sites to track the emissions of specific pollutants from area sources. Also, seven major sources maintain monitoring networks in the vicinity of their plants (see Figure 1).

2.1 Sulfur Dioxide

Energy development in the west and west-central portions of North Dakota has produced a number of sources of sulfur dioxide (SO_2). These sources include coal-fired steam-powered electrical generating facilities, a coal gasification plant, natural gas processing plants, 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 (>100 TPY) are listed in Table 3 along with their emission rates as calculated from the most recent emissions

TABLE 3

MAJOR SO_2 SOURCES
(> 100 TPY)

1992

#	Name of Company	Type of Source	Location	County	SO_2 Emissions Ton/Yr
1	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	Mc Lean	50454
2	Dakota Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	40477
3	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	38304
4	Basin Electric Power Cooperative (Leland Olds)	Steam Electric Gen. Facility	Stanton	Mercer	30958
5	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Facility	Beulah	Mercer	17600
6	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	13659
7	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	9250
8	Amoco Oil Company	Oil Refinery	Mandan	Morton	7895
9	W. H. Hunt Trust Estate	Natural Gas Processing Plant	---	Billings	2545
10	Amerada-Hess Corporation (Tioga Gas Plant)	Natural Gas Processing	Tioga	Williams	2155
11	Montana Dakota Utilities (Heskett)	Steam Electric Gen. Facility	Mandan	Morton	2001

TABLE 3 (cont)

MAJOR SO_2 SOURCES
(> 100 TPY)

1992

#	Name of Company	Type of Source	Location	County	SO_2 Emissions Ton/Year
12	American Crustal Sugar Co.	Sugar Beet Processing Plant	Drayton	Pembina	889
13	Minn-Dak Farmers Cooperative	Sugar Beet Processing Plant	Wahpeton	Richland	664
14	Koch Hydrocarbon	Natural Gas Processing Plant	---	Mc Kenzie	580
15	American Crystal Sugar	Sugar Beet Processing Plant	Hillsboro	Traill	570
16	Western Gas Resources	Natural Gas Processing Plant	---	Billings	444
17	Interenergy Sheffield	Natural Gas Processing Plant	Lignite	Burke	401
18	Univ. of North Dakota	Steam Heat	Grand Forks	Grand Forks	381
19	North Dakota State	Steam Heat	Fargo	Cass	242

inventory. Figure 2 shows the approximate locations of these facilities (the numbers correspond to the respective positions of the source/site in the tables).

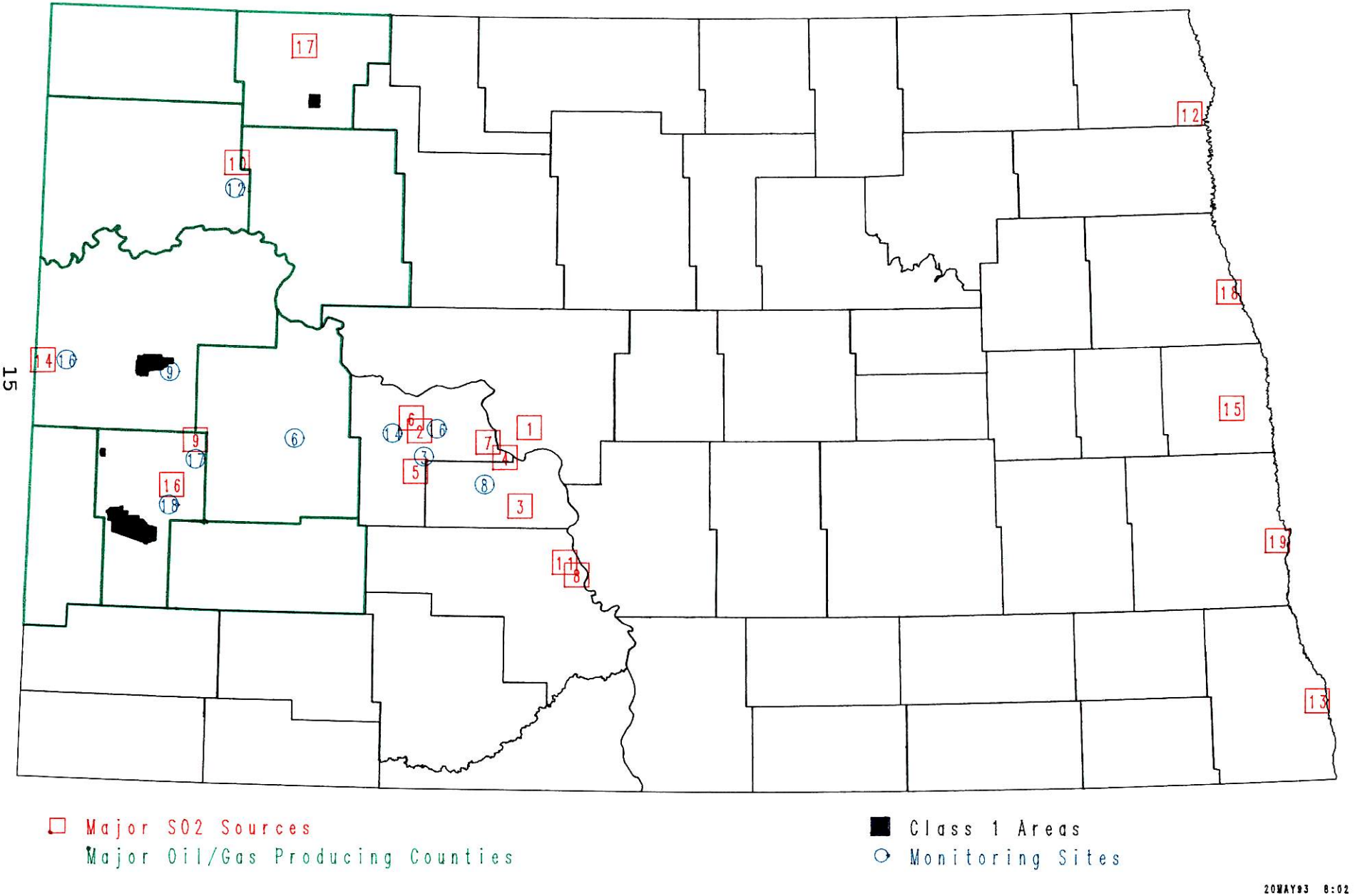
2.1.2 Other Sources

The western part of the State has a number of potential SO_2 sources 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 is addressed later); and second, flaring of the H_2S from these sources can create significant concentrations of SO_2 in the ambient air. The primary counties for such sources in western North Dakota are outlined in green on Figure 2.

2.1.3 Monitoring Network

The SO_2 monitoring sites are shown on Figure 2. As can be seen, these monitoring sites are concentrated in the vicinity of the oil and gas

Figure 2. Major Sulfur Dioxide Sources



development in western North Dakota and the coal-fired steam electrical generating plants in the central part of the State. Table 4 shows the latest SO_2 data summaries for these sites. There were no exceedances of either State or Federal SO_2 standards.

The site at Grand Forks - UND has accomplished the purpose for which it was established; respond to a complaint and provide a foundation for enforcement action if required. Action was required by UND to modify the heating plant design and operations to reduce the impact on the community. The primary plant design change was venting the three coal-fired boilers through a common 160' stack and the addition of bag filters to control particulate emissions. The short individual stacks were causing a downwash problem. The plant design modifications are expected to be completed and tested before the 1993-1994 heating season. In addition, the plant switched to low sulfur coal. As a result of these changes, the 1-hour maximum ground-level concentrations for SO_2, have been reduced to less then the applicable ambient standard. The following table shows the before and

TABLE 4

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

POLLUTANT : SULFUR DIOXIDE (PPB)

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	MAXIMA 1-HOUR 1ST MM/DD/HH	MAXIMA 1-HOUR 2ND MM/DD/HH	MAXIMA 3-HOUR 1ST MM/DD/HH	MAXIMA 3-HOUR 2ND MM/DD/HH	24-HOUR 1ST MM/DD	24-HOUR 2ND MM/DD	ARITH MEAN	1HR #>273	24HR #>99	% >MDV
AMERADA HESS - TIOGA #1	1992	JAN-DEC	39	7284	24 01/28/01	22 10/01/14	10 01/28/02	9 12/17/20	3 09/24	3 12/17	1.1			6.0
AMERADA HESS - TIOGA #3	1992	JAN-DEC	60	8745	244 09/27/17	149 09/27/16	160 09/27/17	63 09/16/11	31 01/12	25 09/27	2.4			22.3
BEULAH	1992	JAN-DEC	9	8735	128 05/19/11	71 05/19/12	62 05/19/11	42 08/28/11	13 05/19	12 11/03	2.6			33.4
DGC SO2 #1	1992	JAN-DEC	9	8650	168 05/19/14	104 05/29/14	72 05/19/14	55 05/29/14	17 05/25	14 12/12	2.9			45.2
DGC SO2 #4	1992	JAN-DEC	9	8572	130 09/19/10	119 03/18/15	67 09/19/11	49 04/01/17	15 04/01	12 09/19	2.5			35.0
DUNN CENTER	1992	JAN-DEC	9	8532	28 12/29/13	23 10/06/09	20 12/29/14	17 12/29/11	8 12/29	4 03/02	1.2			7.2
GRAND FORKS UND-SPM	1992	JAN-DEC	9	3662	121 10/21/08	118 10/21/07	109 10/21/08	88 04/04/14	44 10/21	41 11/07	4.4 ***			34.4
HANNOVER	1992	JAN-DEC	9	8328	100 04/09/07	77 09/04/07	63 01/06/02	57 04/09/08	14 07/10	12 07/11	2.6			34.3
HUNT #4	1992	JAN-NOV	60	7650	103 09/20/19	24 09/20/20	43 09/20/20	10 02/01/08	6 09/20	4 02/01	1.2			6.9
HUNT #5	1992	NOV-DEC	60	1035	23 11/27/08	19 12/29/14	14 12/29/14	11 12/31/02	6 12/29	5 12/31	1.4 ***			14.7
KOCH - MGP #1	1992	JAN-DEC	9	8579	46 05/18/07	43 06/18/15	25 03/26/11	22 05/18/08	7 03/26	5 06/10	1.4			11.8
KOCH - MGP #3A	1992	JAN-DEC	9	8265	43 12/31/10	41 01/04/19	15 01/04/20	15 12/31/11	4 01/04	4 12/31	1.2			9.1
PLAZA - SPM	1992	JAN-SEP	9	6523	43 01/21/07	27 04/02/01	25 03/21/23	23 04/02/02	11 01/21	8 04/02	2.2 ***			30.2
RAMP #1	1992	JAN-DEC	9	8635	227 05/15/07	89 06/14/08	85 05/15/08	66 06/14/08	22 06/14	22 07/12	3.0			39.7
RAMP #2	1992	JAN-DEC	9	8680	156 05/19/10	135 05/29/08	104 05/19/11	67 09/11/11	15 05/19	15 12/01	4.2			58.6
RAMP #3	1992	JAN-DEC	9	8723	119 05/19/12	101 04/25/08	56 08/16/11	49 05/19/11	14 05/19	11 08/16	2.3			27.6
RAMP #5	1992	JAN-DEC	9	8666	102 09/23/10	97 06/07/09	73 04/13/11	68 04/13/14	22 04/13	18 09/22	2.7			37.9

TABLE 4 (cont.)

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

POLLUTANT : SULFUR DIOXIDE (PPB)

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	MAX 1-HOUR 1ST MM/DD/HH	MAX 1-HOUR 2ND MM/DD/HH	MAX 3-HOUR 1ST MM/DD/HH	MAX 3-HOUR 2ND MM/DD/HH	24-HOUR 1ST MM/DD	24-HOUR 2ND MM/DD	ARITH MEAN	1HR #>273	24HR #>99	% >MDV
TRNP - NU	1992	JAN-DEC	9	8722	20 01/06/11	20 01/06/12	13 01/06/14	11 03/02/14	4 01/06	4 12/29	1.2			7.7
WESTERN #3	1992	JAN-DEC	9	8679	68 03/15/19	64 02/01/15	23 03/15/20	23 05/20/14	6 03/15	5 01/27	1.2			5.6

* THE AIR QUALITY STANDARDS ARE: 1) THE MAXIMUM ALLOWABLE 1-HOUR CONCENTRATION IS 273 PPB (715 $\mu g/m^3$). 2) THE MAXIMUM ALLOWABLE 24-HOUR CONCENTRATION IS 99 PPB (260 $\mu g/m^3$). 3) THE MAXIMUM ALLOWABLE ANNUAL MEAN IS 23 PPB (60 $\mu g/m^3$).

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

after 1-hour maximum ground-level concentrations for SO_2 based on computer modeling.

Pollutant	Before ($\mu g/m^3$)	After ($\mu g/m^3$)
SO_2	11,022	354

Based on these results and recent ambient air quality data, the SO_2 monitoring was terminated on May 18, 1993.

The Plaza - SPM site was terminated September 30, 1992 because the oil field problems causing the complaints from the residents of Plaza had been resolved. The oil companies tied the wells into gas and crude oil pipelines greatly reducing the flaring at the well sites which was the major source of the problems.

We also are looking at establishing at least one new site in the vicinity of the Milton R. Young power plant near Center, North Dakota this summer. This site will evaluate the operation of the plant in regard to our State 1-hour standard. The monitoring trailer from the UND site will likely be used for this effort.

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. There are no ambient air quality standards for NO.

2.2.1 Point Sources

The larger point sources of NO_x 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. The major stationary point sources (>100 TPY) of NO_x, as calculated from the most recent emission inventory, are listed in Table 5. Figure 3 shows the approximate locations of these facilities.

2.2.2 Area Sources

Another source of 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 the 1,000,000

TABLE 5

MAJOR NO_x SOURCES
(> 100 TPY)

1992

#	Name of Company	Type of Source	Location	County	NO_x Emissions Ton/Yr
1	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	30094
2	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	Mc Lean	29125
3	Basin Electric Power Cooperative (Leland Olds)	Steam Electric Gen. Facility	Stanton	Mercer	23888
4	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	13116
5	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Facility	Beulah	Mercer	11730
6	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	5502
7	Dakota Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	3424
8	Amerada Hess Corporation (Tioga Gas Plant)	Natural Gas Processing Plant	Tioga	Williams	1824
9	Amoco Oil Company	Oil Refinery	Mandan	Morton	1548

TABLE 5 (cont)

MAJOR NO_x SOURCES
(> 100 TPY)

1992

#	Name of Company	Type of Source	Location	County	NO_x Emissions Ton/Yr
10	American Crystal - Drayton	Sugar Beet Processing	Drayton	Pembina	880
11	MINN-DAK Farmers	Sugar Beet Processing	Wahpeton	Richland	826
12	MDU - Heskett	Steam Electric Gen. Facility	Mandan	Morton	786
13	American Crystal - Hillsboro	Sugar Beet Processing	Hillsboro	Traill	465
14	Interenergy Sheffield Processing Co.	Natural Gas Processing	Lignite	Burke	303
15	Amerada Hess - Hawkeye	Compressor Station	---	Mc Kenzie	236
16	Northern Border Pipline - CS #8	Compressor Station	---	Mc Intosh	177
17	Northern Border Pipline - CS #4	Compressor Station	---	Mc Kenzie	151
18	UND	Heating Plant	Grand Forks	Grand Forks	147

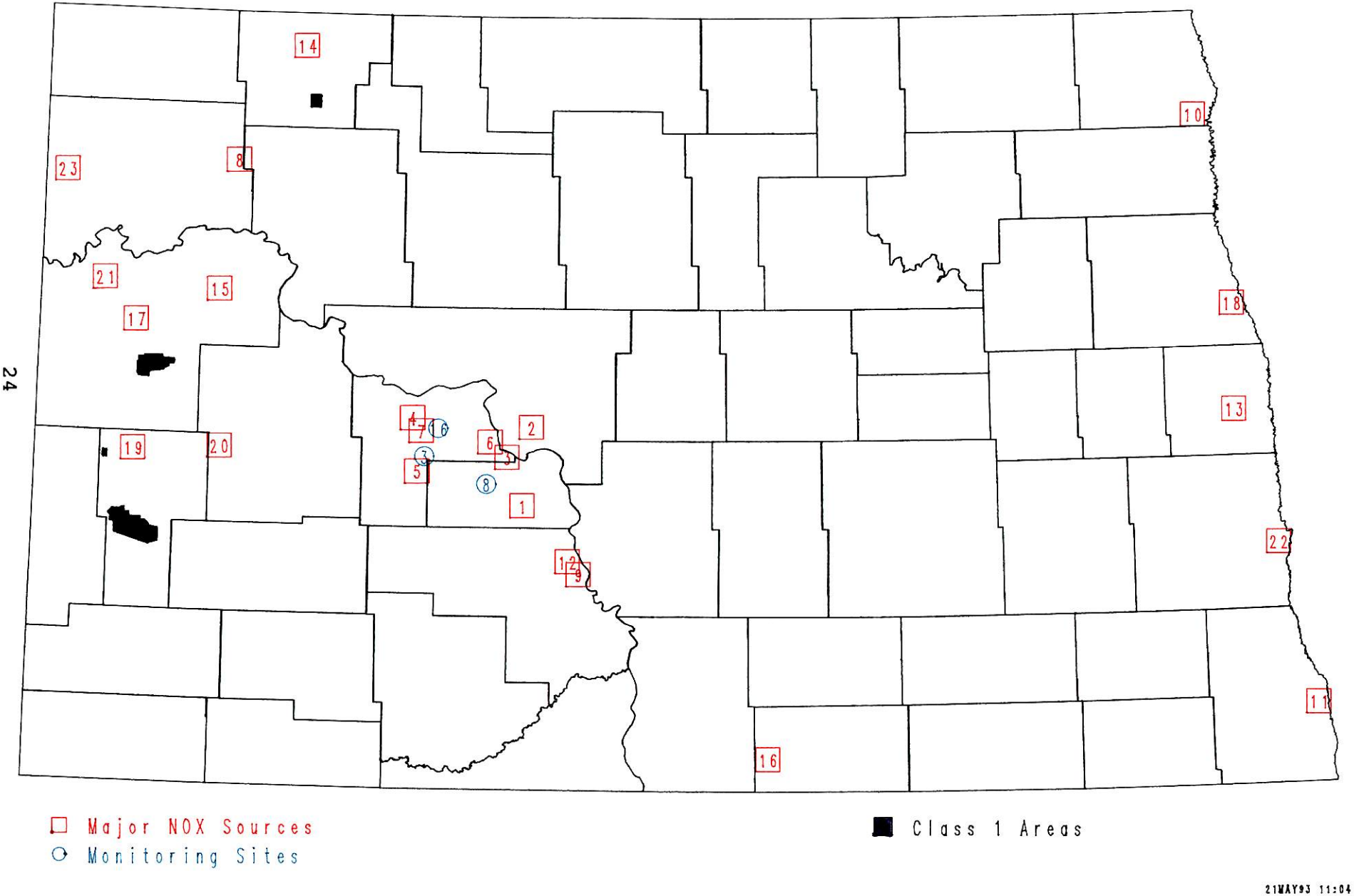
TABLE 5 (cont)

MAJOR NO_x SOURCES
(> 100 TPY)

1992

#	Name of Company	Type of Source	Location	County	NO_x Emissions Ton/Yr
19	Koch Hydrocarbon Goats Pass	Compressor Station	---	Billings	130
20	Western Gas Resources - Mystery Creek	Compressor Station	---	Billings	129
21	Koch Hydrocarbon - Alexander	Compressor Station	---	Mc Kenzie	115
22	NDSU	Heating Plant	Fargo	Cass	107
23	Koch Hydrocarbon - Cow Creek	Compressor Station	---	Williams	104

Figure 3. Major Nitrogen Oxide Sources



population figure that EPA specifies in the NO2 requirement for NAMS monitoring.

2.2.3 Monitoring Network

The Department currently operates two $NO/NO_2/NO_x$ analyzers in the State. These are located at Beulah, and Hannover. The UND site was terminated on May 18, 1993, when the SO_2 site was shutdown. The RAMP network also operates three analyzers. The latest NO_2 data summary is shown in Table 6. The measured NO_2 values are quite low, particularly the annual means. From Figure 3 it can be seen that $NO/NO_2/NO_x$ analyzers are well placed with respect to the major emitting sources.

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

TABLE 6

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

POLLUTANT : NITROGEN DIOXIDE (PPB)

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	MAXIMA 1 - HOUR 1ST MM/DD/HH	MAXIMA 1 - HOUR 2ND MM/DD/HH	ARITH MEAN	% >MDV
BEULAH	1992	JAN-DEC	22	8727	33 10/01/18	31 10/01/17	3.5	27.2
GRAND FORKS UND-SPM	1992	APR-DEC	22	2989	61 09/30/18	57 09/30/19	8.6 ***	69.9
HANNOVER	1992	JAN-APR	22	7054	24 01/06/01	24 04/01/20	2.5 ***	9.9
RAMP #2	1992	JAN-DEC	35	8653	48 10/27/06	33 01/13/20	3.4	30.1
RAMP #3	1992	JAN-DEC	35	8682	29 08/07/14	25 09/15/14	2.6	14.1
RAMP #5	1992	JAN-DEC	35	8265	71 10/21/22	70 10/21/23	3.7	27.3

* THE AIR QUALITY STANDARDS ARE: 1) 50 PPB (100 $\mu g/m^3$) MAXIMUM ANNUAL ARITHMETIC MEAN. 2)100 PPB (200 $\mu g/m^3$) MAXIMUM 1-HOUR CONCENTRATION NOT TO BE EXCEEDED OVER 1 PERCENT OF THE TIME IN ANY CALENDAR QUARTER.

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

monitoring season for North Dakota as May 1 through September 30. However, we operate the O_3 analyzers from April 1 through September 30 to collect two full quarters of data. The RAMP O_3 monitor operates all four quarters.

2.3.1 Point Sources

Table 7 lists the major point sources of VOC emissions in the State (>100 TPY). Figure 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 four continuous ozone analyzers in operation. These are at Beulah,

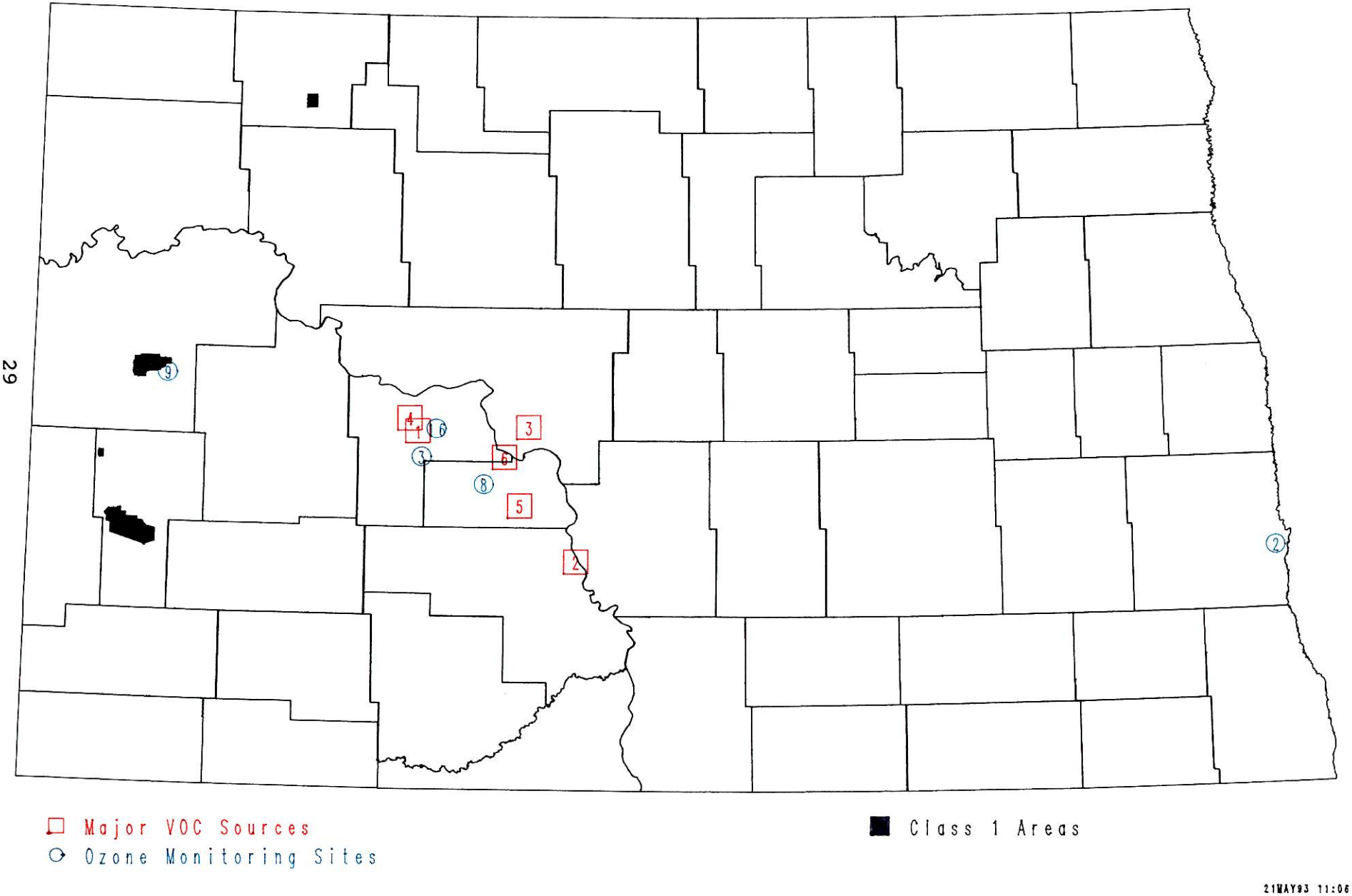
TABLE 7

MAJOR VOC SOURCES
(> 100 TPY)

1992

#	Name of Company	Type of Source	Location	County	VOC Emissions Ton/Year
1	Dakota Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	1277
2	Amoco Oil Company	Oil Refinery	Mandan	Morton	282
3	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	Mc Lean	255
4	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	181
5	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	147
6	Basin Electric Power Cooperative (Leland Olds)	Steam Electric Gen. Facility	Stanton	Mercer	103

Figure 4. Major VOC Sources



Hannover, Theodore Roosevelt National Park -North Unit, and Fargo. The RAMP network has one monitor. The latest O_3 data summary is in Table 8. The maximum O_3 values are less than or equal to 77 ppb. Figure 4 shows that the monitoring network is fairly well placed with respect to the major sources. However, most of the O_3 we monitor seems to be unrelated to these sources as the values are quite consistent regardless of the monitoring location. The O_3 site at Fargo will be evaluated at the completion of this season to determine its future operation.

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 9 lists the sources of PM_{10} emissions in the State that are >100 TPY. Most of these sources are

TABLE 8

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

POLLUTANT : OZONE (PPB)

LOCATION	YEAR	SAMPLING PERIOD	DAYS SAMPLED	METH	NUM OBS	1 - H O U R M A X I M A 1ST	DATE MM/DD/HH	2ND	DATE MM/DD/HH	3RD	DATE MM/DD/HH	#HOURS >120	% >MDV
BEULAH	1992	APR-SEP	183	3	4355	77	6/ 2/10	71	5/ 7/16	71	5/19/15	0	98.6
HANNOVER	1992	APR-SEP	183	3	3814	72	6/12/11	68	5/ 9/12	67	6/ 2/10	0	100.0
RAMP #2	1992	JAN-DEC	366	17	8350	74	6/12/12	69	10/ 4/14	68	6/ 2/10	0	99.9
TRNP - NU	1992	APR-SEP	183	4	4332	63	6/13/10	62	7/24/16	61	5/ 7/13	0	100.0

* THE AIR QUALITY STANDARD IS 120 PPB (235 $\mu g/m^3$) MAXIMUM 1-HOUR CONCENTRATION NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.

TABLE 9

MAJOR PM_{10} SOURCES
(> 100 TPY)

1992

#	Name of Company	Type of Source	Location	County	PM_{10} Emissions Ton/Year
1	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	Mc Lean	4212
2	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	1058
3	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Facility	Beulah	Mercer	773
4	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	722
5	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	480
6	Basin Electric Power Cooperative (Leland Olds)	Steam Electric Gen. Facility	Stanton	Mercer	414
7	Amoco Oil Company	Oil Refinery	Mandan	Morton	340
8	Dakota Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	329
9	Minn-Dak Farmers Coop.	Sugar Beet Processing Plant	Wahpeton	Richland	166
10	American Crystal Sugar Co.	Sugar Beet Processing Plant	Drayton	Pembina	131
11	Montana Dakota Utilities (Heskett Plant)	Steam Electric Gen. Facility	Mandan	Morton	127

large coal-fired facilities, and the PM_{10} particles are part of the boiler stack emissions; however, some of the emissions are the result of processing operations. Not included in this table are sources of fugitive dust such as coal mines, gravel pits, agricultural fields, and unpaved roads. The major sources of PM_{10} are shown on Figure 5.

2.4.2 Monitoring Network

The State operates seven PM_{10} monitors at six sites (see Figure 5); the Fargo site has collocated samplers. Since PM_{10} is mainly of concern because of its effects on people, we concentrate our monitoring efforts in the population centers of the State. There is one industrial network located at the Coteau Mine which began operation May 19, 1993. The latest inhalable particulate monitoring data for the network are shown in Table 10.

The highest 24-hour PM_{10} concentration, 166.7 $\mu g/m^3$, was recorded at the Grand Forks UND-SPM Site on April 30, 1992. The concentration exceeded the 24-hour standard and was attributed to campus grounds-keeping activities in the immediate vicinity of the sampler, fugitive dust from the heating plant's

Figure 5. Major PM10 Sources

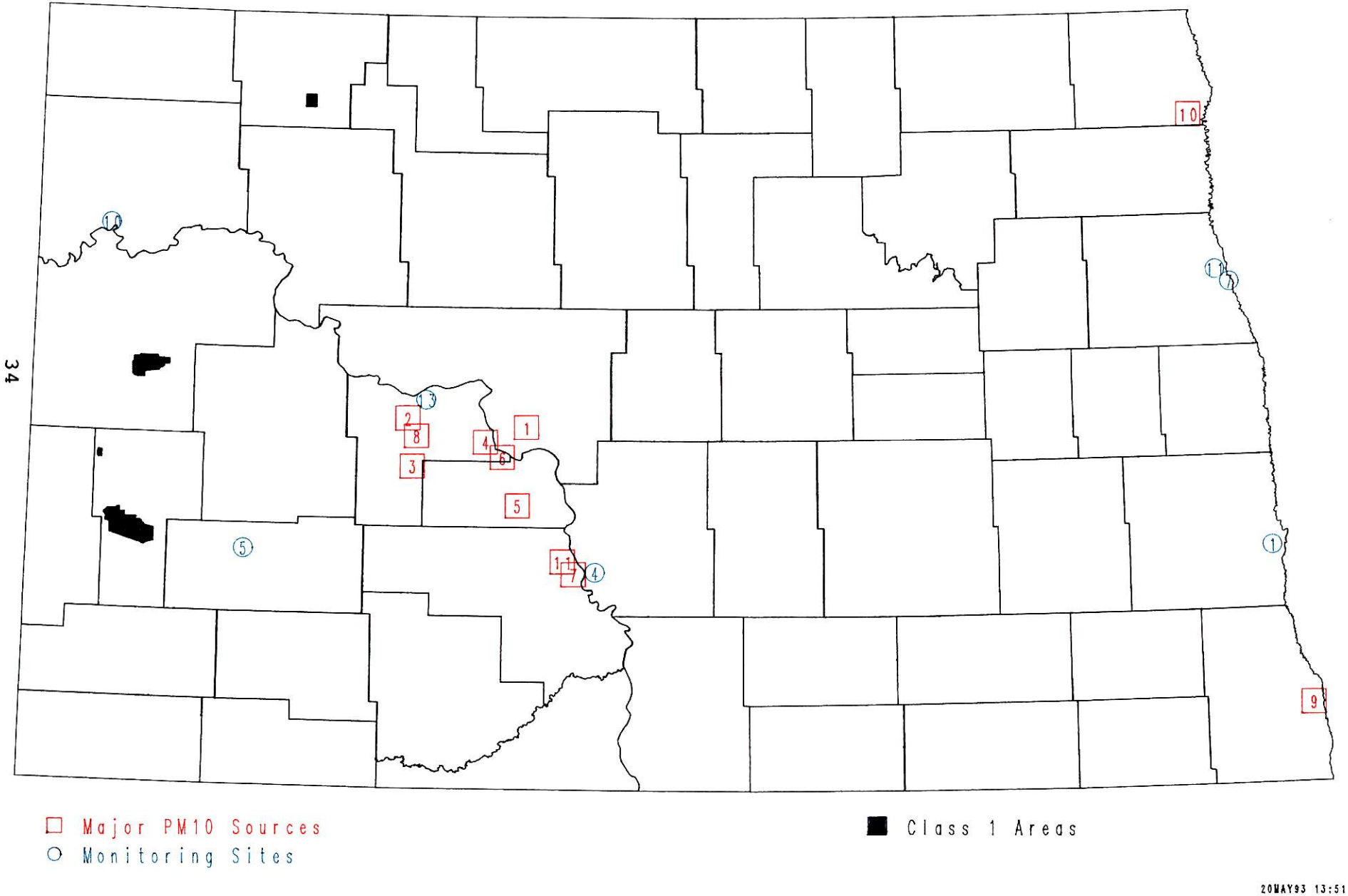


TABLE 10

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

POLLUTANT : INHALABLE PARTICULATES ($\mu g/m^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAX 1ST MM/DD	MAX 2ND MM/DD	MAX 3RD MM/DD	ARITH MEAN	#>150	AM>50	% >MDV
BISMARCK	1992	JAN-DEC	60	4.8	85.7 03/01	44.8 12/02	42.7 06/11	21.3			100.0
DICKINSON RES	1992	JAN-DEC	60	3.3	34.1 10/21	25.5 05/06	23.5 04/30	12.3			96.6
FALKIRK #6A	1992	JAN-DEC	58	3.3	35.9 04/30	35.9 05/06	31.3 08/16	13.3			94.8
FALKIRK #10	1992	JAN-DEC	60	3.6	71.4 09/27	67.7 04/30	67.0 09/21	23.2			98.3
FARGO	1992	JAN-DEC	59	5.7	58.2 07/05	54.0 04/30	53.8 07/11	21.3			100.0
GRAND FORKS	1992	JAN-DEC	60	3.1	64.1 10/09	56.7 04/30	50.3 06/11	18.1			98.3
GRAND FORKS UND - SPM	1992	JAN-DEC	57	6.7	166.7 04/30	90.1 10/21	78.4 10/09	28.1 ***	1		100.0
WILLISTON	1992	JAN-DEC	61	3.9	26.9 10/21	26.4 08/16	25.8 04/30	12.5			98.3

* THE STATE AIR QUALITY STANDARDS ARE: 1) 50 $\mu g/m^3$ EXPECTED ANNUAL ARITHMETIC MEAN. 2) A MAXIMUM OF 150 $\mu g/m^3$ AVERAGED OVER A 24-HOUR PERIOD WITH NO MORE THAN ONE EXPECTED EXCEEDANCE PER YEAR

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

coal pile, and nearby construction activity. We feel that exceptional circumstances led to this exceedance and have forwarded documentation for evaluation. The UND PM_{10} site will operate for at least one more heating season.

We are considering moving the PM_{10} samplers at Fargo to a roof area one story below their present location. This move would greatly improve the accessibility to the samplers and will lower the sampling height by about three meters, thereby, making it a bit more representative.

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 11 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. The major sources of CO in the State are shown on Figure 6 .

2.5.2 Monitoring Network

The CO monitor is located in Fargo near the busiest traffic intersection in the State and is operated only during the cold weather quarters (first and fourth). The monitoring results are shown in Table 12. The observed concentrations are well below the standards. The CO monitor would not seem to be well placed with respect to the major sources. However, these sources are relatively small, and we have concentrated on mobile sources and major population centers.

The Fargo - SPM site is being reviewed for possible termination. CO levels monitored over the last three winters have been well below standards. An

TABLE 11

MAJOR CO SOURCES
(> 100 TPY)

1992

#	Name of Company	Type of Source	Location	County	CO Emissions Ton/Year
1	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	Mc Lean	2184
2	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	1552
3	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	1259
4	Basin Electric Power Coop. (Leland Olds)	Steam Electric Gen. Plant	Stanton	Mercer	887
5	Montana Dakota Utilities (Heskett Plant)	Steam Electric Gen. Plant	Mandan	Morton	854
6	Dakota Gasification Co.	Synthetic Fuel Gen. Plant	Beulah	Mercer	686
7	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Plant	Beulah	Mercer	635
8	American Crystal Sugar Co.	Sugar Beet Processing Plant	Hillsboro	Pembina	402
9	American Crystal Sugar Co.	Sugar Beet Processing Plant	Drayton	Pembina	402
10	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	338

TABLE 11 (cont)

MAJOR CO SOURCES
(> 100 TPY)

1992

#	Name of Company	Type of Source	Location	County	SO_2 Emissions Ton/Year
11	MINN-DAK Farmers Cooperative	Sugar Beet Processing Plant	Wahpeton	Richland	295
12	Amerada Hess	Natural Gas Processing	Tioga	Williams	197
13	Amoco Oil Company	Oil Refinery	Mandan	Morton	130
14	Western Gas Resources Mystery Creek	Compressor Station	---	Billings	129
15	Amerada Hess Hawkeye Station	Compressor station	---	Mc Kenzie	120
16	Univ. of North Dakota	Steam Heat	Grand Forks	Grand Forks	112

Figure 6. Major CO Sources

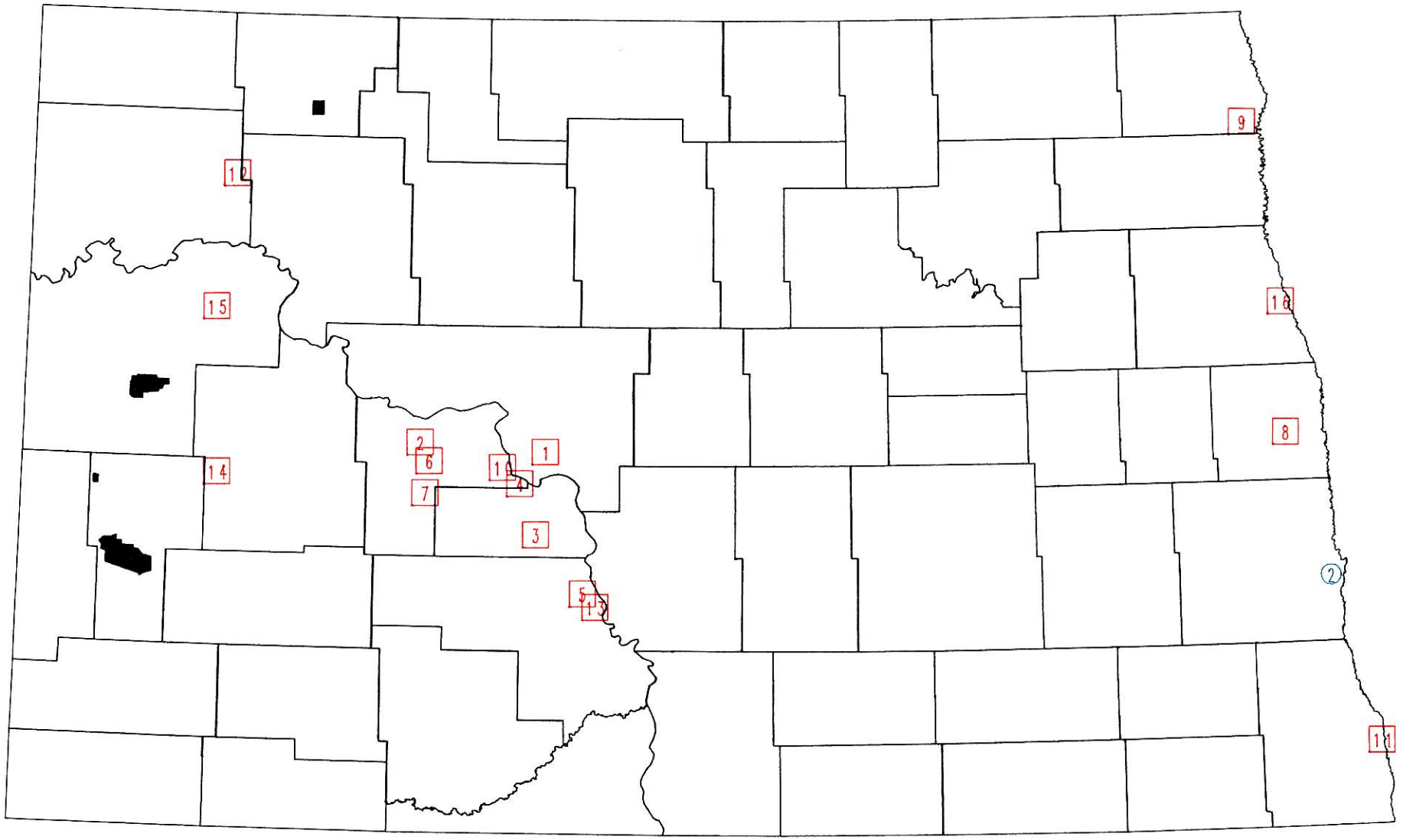


TABLE 12

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

POLLUTANT : CARBON MONOXIDE (PPM)

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	MIN	MAX 1 - HOUR 1ST MM/DD/HH	MAX 1 - HOUR 2ND MM/DD/HH	MAX 8 - HOUR 1ST MM/DD/HH	MAX 8 - HOUR 2ND MM/DD/HH	1HR #>35	8HR #>9	% >MDV	
FARGO - SPM	1992	JAN-DEC	54	3723	0.0	5.4 10/23/17	5.4 10/28/20	2.9 03/06/21	2.8 10/28/23			48.0	***

* THE AIR QUALITY STANDARDS ARE: 1) THE MAXIMUM ALLOWABLE 1-HOUR CONCENTRATION IS 35 PPM (40 mg/m^3). 2) THE MAXIMUM ALLOWABLE 8-HOUR CONCENTRATION IS 9 PPM (10 mg/m^3).

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

ozone monitor became operational April 6, 1993. We will evaluate the results of the ozone monitoring at the completion of the ozone season. If additional ozone monitoring appears warranted; then, we will also continue to operate the CO monitor at that location. If additional ozone monitoring is not warranted, we will submit a termination request for the site.

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 developed H_2S standards.

2.7.1 Sources

H_2S emissions of concern stem almost totally from the oil and gas operations in the western part of the State and principally from the green outlined area on Figure 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 currently is only one State-operated monitoring site for H_2S emissions. This is the TRNP-NU site. There are five industry-operated H_2S monitoring sites. The latest H_2S data summary is shown in Table 13.

There were 16 exceedances of the 1-hour H_2S standard (200 ppb). Of the 16 exceedances, eight were violations and occurred as follows: two at Hunt #4, one at Hunt #5, one at Plaza - SPM, and four at Western #2. The maximum 1-hour concentration was 574 ppb at Western #2.

TABLE 13

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

POLLUTANT : HYDROGEN SULFIDE (PPB)

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	1 - HOUR MAXIMA 1ST MM/DD/HH	1 - HOUR MAXIMA 2ND MM/DD/HH	24 - HOUR MAXIMA 1ST MM/DD	24 - HOUR MAXIMA 2ND MM/DD	3 - MONTH MAXIMA 1ST MM	3 - MONTH MAXIMA 2ND MM	ARITH MEAN	1HR #>200	24HR #>100	% >MDV
AMERADA HESS - TIOGA #2	1992	JAN-DEC	20	8743	64 07/29/02	58 10/17/22	7 07/26	7 07/29	2 01	2 12	2.2			2.3
DGC #2	1992	JAN-DEC	20	8675	63 07/05/20	43 07/05/21	9 05/02	9 09/22	3 01	3 12	2.8			23.1
HUNT #4	1992	JAN-NOV	20	7698	395 10/06/02	302 10/17/19	40 09/25	32 10/01	9 10	9 11	7.2	5		37.4
HUNT #5	1992	NOV-DEC	20	1035	296 12/07/09	223 12/20/10	27 12/12	23 11/24	***	***	10.2 ***	3		58.8
KOCH - MGP #1	1992	JAN-DEC	20	7562	13 03/16/07	11 02/01/21	3 03/16	3 03/31	2 01	2 03	2.1			2.0
PLAZA - SPM	1992	JAN-SEP	20	6520	269 01/11/04	210 01/11/03	43 01/11	26 01/10	5 01	4 03	3.1 ***	2		9.5
TRNP - NU	1992	JAN-DEC	20	8730	9 03/14/23	9 08/21/05	3 08/21	3 12/20	2 01	2 12	2.0			0.5
WESTERN #2	1992	JAN-DEC	20	8686	574 12/15/04	522 06/25/01	54 06/24	47 06/25	3 02	3 12	2.7	6		6.1

* THE AIR QUALITY STANDARDS ARE: 1) THE MAXIMUM INSTANTANEOUS (CEILING) CONCENTRATION IS 10 PPM (14 Mg/m^3).
2) THE MAXIMUM 1-HOUR CONCENTRATION IS 200 PPB (280 $\mu g/m^3$) NOT TO BE EXCEEDED MORE THAN ONCE PER MONTH.
3) THE MAXIMUM 24-HOUR CONCENTRATION IS 100 PPB (140 $\mu g/m^3$) NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR.
4) THE MAXIMUM 3-MONTH CONCENTRATION IS 20 PPB (28 $\mu g/m^3$) AVERAGED OVER 3 CONSECUTIVE MONTHS.

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

The exceedances at Hunt #4 and Hunt #5 resulted from inadequately defined salt water handling procedures. The procedures have been updated to prevent any further exceedances from this operation.

The violation at Plaza - SPM was the result of a compressor station's shutdown causing the field gas to be vented to the oil well/tank battery flare stack. The ignitor on the flare stack malfunctioned, venting the raw gas to the atmosphere.

The four violations at Western #2 occurred while the gas processing plant was shut down for major maintenance. During the maintenance process, several storage vessels were opened that contained H_2S gas. Procedures have been implemented to prevent future occurrences during plant maintenance.

3.0 SUMMARY AND CONCLUSIONS

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

3.1 SULFUR DIOXIDE (SO_2)

None of the State or Federal SO_2 standards were exceeded at any of the monitoring sites. The Air Quality Media Workplan for 1993 contains a requirement for an analysis of SO_2 air quality in the State. The maximum concentrations and the maximum concentrations expressed as a percentage of the applicable standard are as follows: 1-hour - 244 ppb (89.4%); 3-hour - 160 ppb (32.0%); 24-hour - 44 ppb (44.4%); and, annual (partial year) - 4.4 ppb (19.1%) annual (full year) - 4.2 ppb (18.2%). We feel these numbers demonstrate that the concentrations of SO_2 in our air are low and we are committing the proper level of resources to monitoring this pollutant.

The SO_2 SPM site at UND was terminated in May 1993. A new monitoring site will be established this summer in the vicinity of the Milton R. Young power plant. We also will be evaluating the State 1-hour SO_2 standard to determine its need to remain as an ambient standard.

3.2 NITROGEN DIOXIDE (NO_2)

None of the State or Federal NO_2 standards were exceeded at any of the monitoring sites. The maximum concentrations and the maximum concentrations expressed as a percentage of the applicable standard are as follows: 1-hour - 71 ppb (71%); annual (partial year) - 8.6 ppb (17.2%); annual (full year) - 3.7 ppb (7.4%). The State 1-hour NO_2 standard also will be evaluated to determine its need to remain an ambient air quality standard.

3.3 HYDROGEN SULFIDE (H_2S)

Sixteen exceedances of the H_2S 1-hour State standard resulted in eight violations. No direct enforcement action was taken because the violations were a result of maintenance or equipment malfunctions and corrective action was taken in a timely manner. The maximum 1-hour average was 574 ppb at the Western #2 Site. There were no exceedances of the 24-hour or 3-month State standards. The maximum concentrations and the maximum concentrations

expressed as a percentage of the applicable standard are as follows: 1-hour - 574 ppb (287%); 24-hour - 54 ppb (54%); 3-month - 9 ppb (45%).

3.4 OZONE (O_3)

Neither the State nor Federal standard was exceeded during the year. The maximum concentration and the maximum concentration expressed as a percentage of the applicable standard is 77 ppb (64.2%). A new O_3 site was established at Fargo.

3.5 CARBON MONOXIDE (CO)

Neither the State nor Federal standards were exceeded during the year. The maximum concentrations and the maximum concentrations expressed as a percentage of the applicable standard are as follows: 1-hour - 5.4 ppb (15.4%); 8-hour - 2.9 ppm (32.2%).

3.6 INHALABLE PARTICULATES (PM_{10})

There was one exceedance of the PM_{10} standard during the year. The maximum 24-hour concentration was 166.7 $\mu g/m^3$ at Grand Forks UND - SPM. The maximum concentrations and the maximum concentrations expressed as a percentage of the applicable standard are as follows: 24-hour - 166.7 $\mu g/m^3$ (111.1%); annual(partial year) - 28.1 $\mu g/m^3$ (56.2%); annual (full year) - 23.2 $\mu g/m^3$ (46.4%). The

Air Quality Medial Workplan for 1993 contained a requirement to include a PM_{10} monitoring network design review in this report. We have observed that PM_{10} levels are higher in urban areas than in rural areas and have concentrated our monitoring, therefore, in urban areas. We are sampling in all the major urban areas in the State except for Minot. We operated a PM_{10} sampler in Minot for several years and did not note any aberrant readings. We are reasonably confident that our current sampling configuration is representative and accurate.

Table 14 summarizes the evaluations for each of the sites in the State network.

TABLE 14
MONITORING SITE EVALUATION

Site	Parameter*	Meets Needs	Modification Needed	New Site Needed	Parameter Not Needed	Date Deleted
Beulah Residential	SO_2	X				
	NO_2	X				
	O_3	X				
	MET	X				
Bismarck Commercial	PM_{10}	X				
Dickinson Residential	PM_{10}	X				
Dunn Center Rural	SO_2	X				
	MET	X				
Fargo Commercial	PM_{10}		X			
(SPM)	CO	X			?	
	MET	X				
	O_3	X			?	
Grand Forks Commercial	PM_{10}	X				
Hannover Rural	SO_2	X				
	NO_2	X				
	O_3	X				
	MET	X				
Portable Unit (SPM)	SO_2				X	9/92
(Western ND oil/gas Area	H_2S				X	9/92
Network)	MET				X	9/92
University of North Dakota	SO_2				X	5/93
(SPM)	NO_2				X	5/93
	MET				X	5/93
	PM_{10}				X	
TRNP-NU	SO_2	X				
	O_3	X				
	H_2S	X				
	MET	X				
Williston Commercial	PM_{10}	X				

* MET refers to meteorology and indicates wind speed and wind direction data are available from those sites.