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

AUG 2 4 1992

Ref: 8ART-TO

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

Dear Dana Mount:

Thank you for your response to our comments on the 1992 Network Review and for enclosing the 1990 census data for North Dakota. Our response to your comments is as follows:

COMMENT 1:

Please send us a copy of the modeling results that determined the emissions be reduced from 1074 lbs of SO_2/hour to 575 lbs/hour (24-hour average), with a maximum one-hour emission rate of 671 lbs/hour.

COMMENT 2:

By stating that the PM_{10} monitor was not referred to in Section 2.4.2, I meant that it was not included in the total number of PM_{10} monitors in the 1992 Network Review. I was referring to an error in the first sentence of Section 2.4.2: "...six PM_{10} monitors at five sites," should read, "seven PM_{10} monitors at six sites," in keeping with the change made in Table 1. It is my understanding that SPM stations are considered part of the State network.

COMMENT 3:

Thank you for the documentation and comments regarding the H_2S emissions at the Plaza and Warren Petroleum #4 site.

If you have any questions or further comments, please feel free to contact Sara Summers at (303) 293 0966.

Sincerely,

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

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

July 27, 1992

Marshall Payne, Chief
Technical Operations Branch
US EPA - Region VIII
One Denver Place
999 18th Street Suite 500
Denver CO 80202-2405

Dear Mr. Payne:

Thank you for the timely and thorough review of our 1992 Network Review. The following responses are provided to your comments:

Comment 1: The Tioga Gas Plant has been and currently is permitted to emit 1074 lbs of SO_2 per hour from the incinerator stack. We are in the process of issuing a new permit which will limit the incinerator stack SO_2 emissions to 575 lbs/hour (24 hour average) with a maximum 1-hour emission rate of 671 lbs/hour. These emission rates were based on computer modeling of the stack emissions. There will be no change in the operation of the three ambient air quality monitoring sites at the plant from their current schedule (continuous operation).

Comment 2: A corrected Table 1 is enclosed. We see no need to have commented on the UND site in Section 2.4.2 as the only other site-specific discussion in the text was in reference to exceedances of the standards. The maximum PM_{10} concentration recorded at the UND site (113.1 $\mu g/m^3$) was not an exceedance. Our Annual 1991 Report does discuss the UND PM_{10} highest concentration.

Comment 3: The problems at Plaza were traced to oil wells belonging to Duncan Energy Company. An NOV was issued October 31, 1991, citing specific items of noncompliance with the North Dakota Air Pollution Control Rules. The consent agreement was signed in June 1992, and Duncan Energy Company developed an operation and maintenance plan that should preclude non-malfunction related releases and greatly reduce the occurrence of malfunctions. Copies of pertinent correspondence relating to this matter are enclosed. Two H_2S exceedances occurred on

January 11, 1992, which preceded any corrective action. Since that time, no exceedances of the State H_2S Standards have been recorded at the Plaza site.

The situation at the Warren Petroleum Plant is considerably different. No specific source has been confirmed as the cause of the excess H_2S emissions. There are three emissions sources in the vicinity of the monitoring site. While wind data would point to the gas plant as the most likely source of many of the exceedances, plant personnel would deny any knowledge of plant malfunctions or upsets that could be responsible for the ambient air quality exceedances. We had the plant install a realtime readout of the H_2S ambient monitor in their control room so that control room personnel would be aware of the excess emissions at the time of their occurrence. The control room operators were then supposed to notify appropriate personnel who would try to determine the source of the emissions and enter their findings in a log. A letter of apparent noncompliance (LOAN) was sent to Chevron U.S.A., Inc. (the parent company of Warren Petroleum and the operator of the other two sources) on September 19, 1990, for violations of the State one-hour H_2S standard, and an NOV was issued to Warren Petroleum on June 10, 1991, for failure to operate their ambient air monitoring system in compliance with the conditions of their Air Pollution Control Permit to Operate, their quality assurance plan, and Department guidance documents (copies of these documents and related correspondence are enclosed). While no specific cause or source of the exceedances has ever been identified, the procedures put in place by Chevron/Warren seem to have been effective. No violations of the H_2S standards have been recorded at the Warren #4 Site since September 1, 1990. Chevron has since sold all of its North Dakota interests to the William Herbert Hunt Trust Estate effective July 15, 1992.

Emission data, per se, would seem to be irrelevant in both situations since there are multiple sources at both locations most of which either do not have "stack" emissions or the stacks do not have the instrumentation necessary to monitor emission rates. Additionally, many of the problems associated with H_2S result from fugitive emissions which are extremely difficult to quantify. The important point from our perspective is that the

number of violations has decreased significantly at both monitoring sites. If you want to see the data from the ambient air quality monitors, they are available from AIRS.

Comment 5 (there was no Comment 4 in the letter):

1. The correct AIRS number for the Fargo CO Site is included in the enclosed Table 1 (see reply to Comment 2)

2. I am enclosing the 1990 census data for North Dakota by county and incorporated city. We see no need to include this information in subsequent network reviews as it likely will not change until the 2000 census. We dropped population information after the 1987 network review because we felt it didn't serve any useful purpose.

3. We have used and will continue to use computer modeling to help us determine the appropriate locations for our monitoring sites. However, it is not always possible from a practical standpoint to locate the monitors in the exact locations of the computer-predicted maximum concentrations. Also, one sometimes has to use their intuition in siting these monitors. If we had relied entirely on computer modeling results, the Tioga Site #3 would never have been established, and the downwash problem at that location would never have been discovered.

If you have any questions please feel free to contact Chuck McDonald of my staff at (701)221-5188.

Sincerely,

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

DKM/CMM:jf

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 29, 1992

Marshall Payne, Chief
Technical Operations Branch
US EPA - Region VIII
One Denver Place
999 18th Street Suite 500
Denver, CO 80202-2405

Dear Mr. Payne: Marshall

Enclosed is a copy of the North Dakota Network Review for 1992 which satisfies Item C under the Ambient Monitoring Activities of the Air Quality Media Workplan in the SEA. You will note that there are no submittals for Section 3.0 (Network Modifications) of the review, as this part of the review consists of previously submitted items.

If you have any questions, please feel free to contact Chuck McDonald of my staff.

Sincerely,

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

DKM/CMM:gsh
Enc:

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

JUL 16 1992

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.~~ Dana Mount:

I would like to thank you for the opportunity of reviewing the 1991 North Dakota Network Review. EPA is also formally responding to the 1990 Network Review by incorporating comments where appropriate. The Network Reviews have been evaluated by EPA Region VIII (Technical Operations Branch) and our comments are given below for your review. In addition to addressing non-attainment issues, the purpose of a network review process is to describe the adequacy of a network and to demonstrate the maintenance of the National Ambient Air Quality Standards (NAAQS). Since there are no non-attainment areas in North Dakota, the comments will generally address the latter concern. We have no specific comments regarding the nitrogen dioxide (NO_2), carbon monoxide (CO) and ozone networks.

The 1990 and 1991 Network Reviews are almost identical, but there are some significant differences between the 1989 and 1990 Network Reviews, notably: Lostwood and Teddy Roosevelt National Park, South Unit (TRNP, SU), both State and Local Air Monitoring Stations (SLAMS), were shut down; a Special Purpose Monitoring Station (SPM) site was established at the University of North Dakota (UND) on January 30, 1990, for sulfur dioxide (SO_2); the Olson Ranch SPM station was replaced by the Plaza station; Fargo established an SPM station in November 1990 to monitor for Carbon Monoxide (CO).

COMMENT 1: SULFUR DIOXIDE (SO_2)

A review of the sulfur dioxide data for North Dakota shows generally low concentrations, particularly at the Dunn SLAMS and Plaza SPM stations.

Both the 1990 and 1991 network reviews reported exceedances of the State one-hour SO_2 standard at the Amerada Hess - Tioga site. The State indicated that changes are being made to the

facility to correct the problem. Please send EPA the documentation describing SO_2 emission limits and monitoring requirements as a result of these changes.

COMMENT 2: INHALABLE PARTICULATES (PM_{10})

The PM_{10} monitor at the Falkirk Site #9 was shut down in 1990 due to the problems explained in the 1991 Network Review. Site #10 was established as as replacement, and no exceedences have been reported since. The highest concentrations of PM_{10} during 1991 occurred at the Grand Forks UND (SPM) site (Table 9). This site, however, is not listed in Table 1, nor referred to in the text (Section 2.4.2).

COMMENT 3: HYDROGEN SULFIDE (H_2S)

Please explain the measures being taken to decrease the level of H_2S emissions at the Plaza and Warren Petroleum #4 sites and include documentation of emissions resulting from these changes.

COMMENT 5: GENERAL

The AIRS I.D.number for Fargo-Commercial (SPM) should be 38-017-1002, and not 38-017-1003.

Please send some state-wide population data at your convenience, and continue to enclose updated population data with subsequent network reviews.

Modeling was briefly mentioned in Section 5.0 pertaining to ambient air monitoring at the UND station. We would encourage you to use these and other modeling results available to you to analyze, as appropriate, North Dakota's ambient air quality network.

I appreciate the quality of your network review. It satisfies the criteria in 40 CFR 58.20(d), and also fulfills part of the monitoring activities listed in the State/EPA agreement. If you have any questions or comments, please call Sara Summers at (303) 293-0966.

Sincerely,

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

cc: Chuck McDonald

NORTH DAKOTA STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL ENGINEERING

AMBIENT AIR QUALITY MONITORING
ANNUAL NETWORK REVIEW
1992

May 1992

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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 three basic conditions: (1) highest concentration, (2) population oriented monitoring and (3) 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}. However, population exposure monitoring is also conducted at Beulah, because of the large sources in the area, and at Plaza, because of complaints (mainly H_2S odors). Carbon monoxide (CO) is the only parameter for which highest concentration monitoring is done. All PM_{10} monitoring in populated areas is done on a "neighborhood" spatial scale. The CO monitoring is conducted on a micro scale. For the remaining pollutants, the primary concern is for background monitoring except as noted above. 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. The industrial sites all monitor "source impact" on a "neighborhood" scale.

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 12 AAQM sites around the State. Nine are fixed SLAMS/NAMS sites, and three are special purpose monitoring (SPM) sites. There are also seven industries that report environmental data to this Department. 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 Fargo-Commercial	SPM	38-017-1002	CO	RFCA-0981-054	cont.	Highest Concentration	Micro	11/90	11/90
3 Beulah-Residential	SLAMS	38-057-0001	SO_2	EQSA-0276-009	cont.	Population Exposure	Urban	4/80	7/80
			NO_2	RFNA-0777-022	cont.	Population Exposure	Urban	6/80	7/80
			O_3	RFDA-1075-003	cont.	Population Exposure	Urban	4/89	4/89
			Met	N/A	cont.	N/A	N/A	4/80	7/80
4 Bismarck-Commercial	SLAMS	38-015-0001	PM_{10}	RFPS-1287-064	6th Day	Population Exposure	Neighborhood	4/85	4/85
5 Dickinson-Residential	SLAMS	38-089-0002	PM_{10}	RFPS-1287-064	6th Day	Population Exposure	Neighborhood	7/89	7/89
6 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
7 Grand Forks-Commercial	SLAMS	38-035-0001	PM_{10}	RFPS-1287-064	6th Day	Population Exposure	Neighborhood	7/89	7/89
8 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
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.	General Background	Regional	5/80	6/80
			Met	N/A	cont.	N/A	N/A	2/80	6/80
10 Williston-Commercial	SLAMS	38-105-0001	PM_{10}	RFPS-1287-064	6th Day	Population Exposure	Neighborhood	5/85	5/85
11 Plaza-Residential	SPM	38-061-0002	SO_2	EQSA-0276-009	cont.	Population Exposure	Neighborhood	9/90	9/90
			H_2S	N/A	cont.	Population Exposure	Neighborhood	9/90	9/90
			Met	N/A	cont.	N/A	N/A	9/90	9/90
12 UND-Residential	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
			PM_{10}	RFPS-1287-063	3rd Day	Highest Concentration	Middle	11/90	11/90
			Met	N/A	cont.	N/A	N/A	1/90	1/90
13 Amerada Hess Corporation	INDUS	38-105-0103	SO_2	EQSA-0276-009	cont.	Source Impact	Neighborhood	7/87	7/87
		33-105-0104	SO_2	EQSA-0779-039	cont.	Source Impact	Neighborhood	7/87	7/87
		38-105-0105	H_2S	N/A	cont.	Source Impact	Neighborhood	7/87	7/87
			Met	N/A	cont.	N/A	N/A	11/87	11/87
14 Dakota Gasification Company	INDUS	38-057-0113	SO_2 (2)	EQSA-0276-009	cont.	Source Impact	Neighborhood	7/84	7/84
		38-057-0114	H_2S	N/A	cont.	Source Impact	Neighborhood	5/83	5/83
		38-057-0118							
15 Falkirk Mining Company	INDUS	38-055-0110	PM_{10}	RFPS-0389-071	6th Day	Source Impact	Neighborhood	8/88	8/88
		33-055-0112	PM_{10}	RFPA-1087-062	6th Day	Source Impact	Neighborhood	8/88	8/88
			Met	N/A	~~cont.~~ 6th Day	N/A	N/A	7/90	7/90

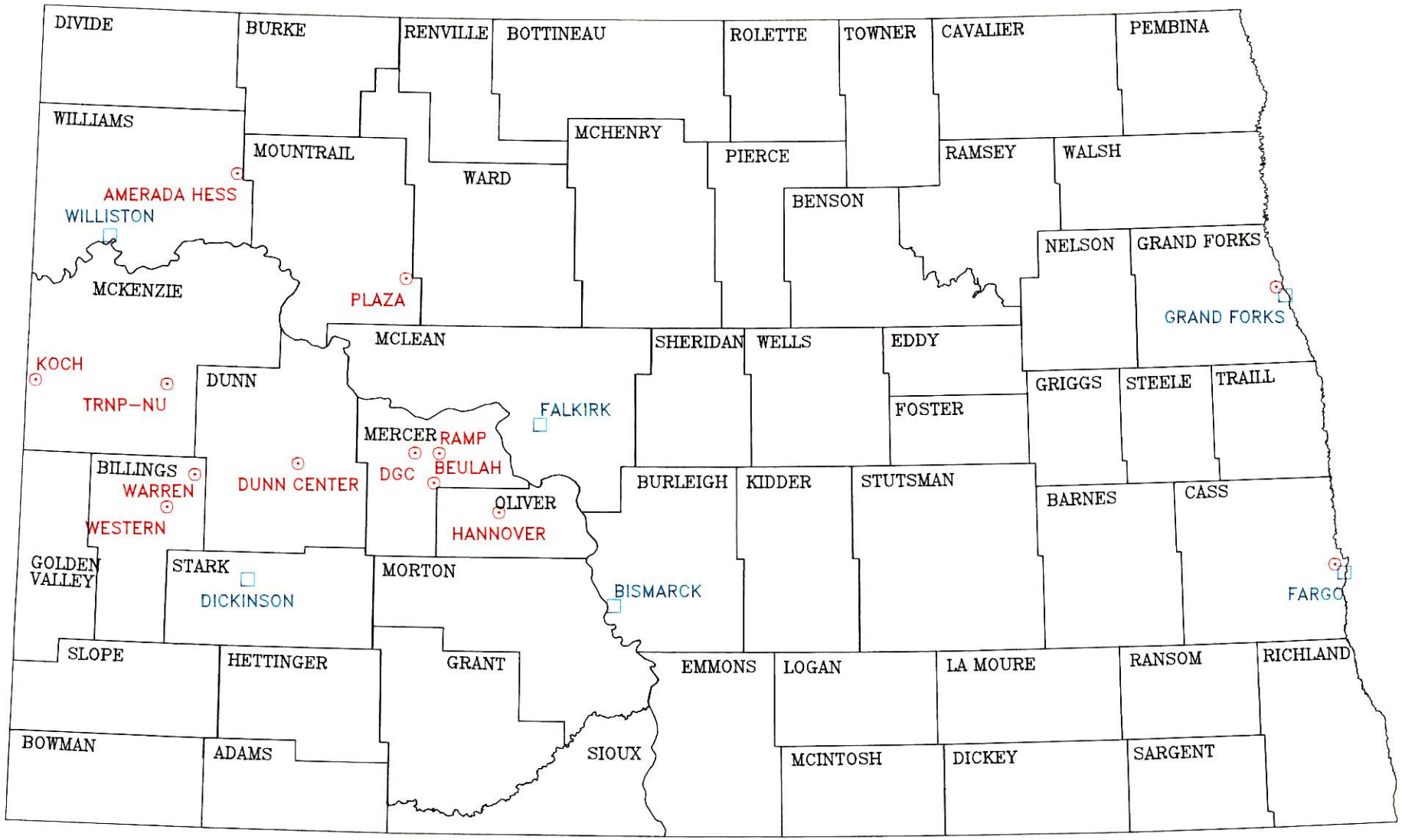
TABLE 1 (Cont.)

AAQM NETWORK DESCRIPTION

Site	Type Station	AIRS I.D. No.	Parameter* Monitored	Ref/Equiv. Method Designation	Operating No. Schedule	Monitoring Objective	Spatial Scale	Date Site Began	Date Q.A. Began
16 Koch Hydrocarbon Company	INDUS	38-053-0101	SO_2 (2)	EQSA-0276-009	cont.	Source Impact	Neighborhood	7/81	7/81
		38-053-0109	H_2S	N/A	cont.	Source Impact	Neighborhood	10/81	10/81
			Met	N/A	cont.	N/A	N/A	7/81	7/81
17 RAMP	INDUS	38-057-0101	SO_2 (4)	EQSA-0276-009	cont.	Source Impact	Neighborhood	8/79	8/79
		38-057-0102	NO_2 (3)	RFNA-0179-035	cont.	Source Impact	Neighborhood	8/79	8/79
		38-057-0103	O_3	RFOA-1176-017	cont.	Source Impact	Neighborhood	8/79	8/79
		38-057-0104	Met	N/A	cont.	N/A	N/A	8/79	8/79
18 Warren Petroleum Company	INDUS	38-007-0110	SO_2	EQSA-0486-060	cont.	Source Impact	Neighborhood	10/78	10/78
			H_2S	N/A	cont.	Source Impact	Neighborhood	10/78	10/78
			Met	N/A	cont.	N/A	N/A	10/78	10/78
19 Western Gas Processors	INDUS	38-007-0108	SO_2	EQSA-0276-009	cont.	Source Impact	Neighborhood	7/81	7/81
		38-007-0109	H_2S	N/A	cont.	Source Impact	Neighborhood	3/88	3/88
			Met	N/A	cont.	N/A	N/A	7/81	7/81

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

NORTH DAKOTA AMBIENT AIR QUALITY MONITORING SITES



⊙ = Continuous Sites □ = PM10 Sites

MAP 1

12MAY92 13:07

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. Also, several major industries maintain monitoring networks in the vicinity of their plants (see Map 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 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 emissions inventory. Map 2 shows the approximate locations of these facilities (the numbers correspond to the

TABLE 2

MAJOR SO_2 SOURCES
(> 1000 TPY)

1990

#	Name of Company	Type of Source	Location	County	SO_2 Emissions Ton/Year
1	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	McLean	48174.7
2	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	37540.9
3	Basin Electric Power Cooperative (Leland Olds)	Steam Electric Gen. Facility	Stanton	Mercer	27487.0
4	Dakota Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	25814.6
5	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Facility	Beulah	Mercer	14460.0
6	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	13611.0
7	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	12325.0
8	Amoco Oil Company	Oil Refinery	Mandan	Morton	6714.1
9	Amerada-Hess Corporation (Tioga Gas Plant)	Natural Gas Processing Plant	Tioga	Williams	3734.1
10	Royal Oak Enterprises	Charcoal Briquetting Plant	Dickinson	Stark	2878.4

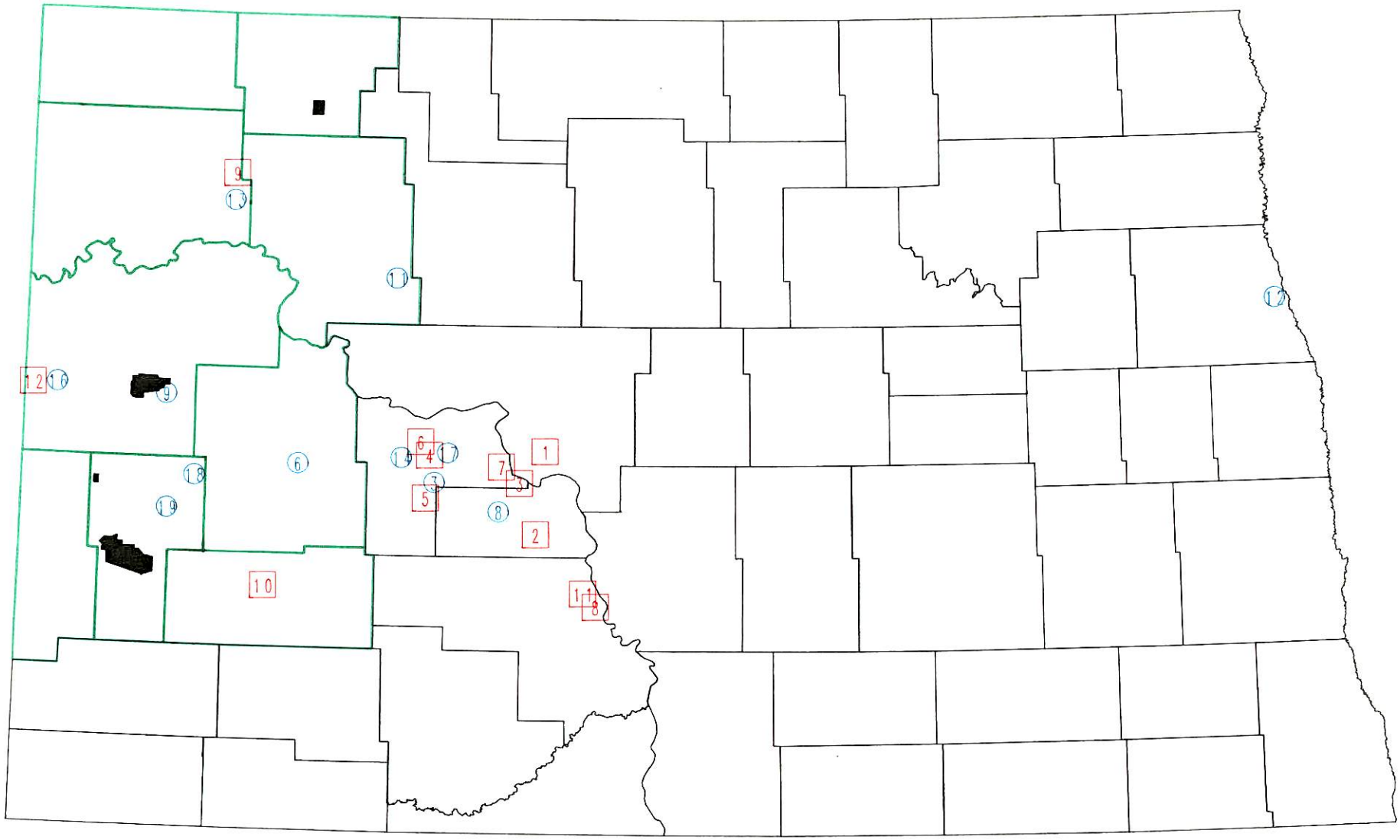
TABLE 2 (Cont.)

MAJOR SO_2 SOURCES
(> 1000 TPY)

1990

#	Name of Company	Type of Source	Location	County	SO_2 Emissions Ton/Year
11	Montana Dakota Utilities (Heskett)	Steam Electric Gen. Facility	Mandan	Morton	2549.0
12	Koch Hydrocarbon Company	Natural Gas Processing Plant	McKenzie Co.	McKenzie	1075.3

MAJOR SULFUR DIOXIDE SOURCES



MAP 2

13MAY92 13:59

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 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 shown on Map 2. 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. Table 3 shows the latest SO_2 data for

TABLE 3

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	MAXIMA 24 - HOUR 1ST MM/DD	MAXIMA 24 - HOUR 2ND MM/DD	ARITH MEAN	1HR #>273	24HR #>99	% >MDV
AMERADA HESS - TIOGA #1	1991	JAN-DEC	20	7857	223 01/29/18	187 11/12/01	126 02/02/02	92 02/07/05	32 01/29	30 02/02	2.3			12.1
AMERADA HESS - TIOGA #3	1991	JAN-DEC	20	8631	343 09/08/22	296 11/02/14	273 04/29/23	259 01/22/20	83 04/29	80 01/22	6.7	3		25.7
BEULAH	1991	JAN-DEC	9	8173	75 03/31/09	72 09/27/09	54 03/31/11	32 05/22/11	12 03/31	12 11/24	2.3			29.3
DGC SO2 #1	1991	JAN-DEC	20	8665	67 04/19/14	67 09/05/11	48 09/05/11	46 04/19/14	16 01/08	14 09/05	2.9			41.8
DGC SO2 #4	1991	JAN-DEC	20	8666	128 10/18/14	95 08/21/11	76 10/18/14	57 08/21/11	15 01/29	14 10/18	2.6			38.4
DUNN CENTER	1991	JAN-DEC	9	7986	45 09/16/09	17 05/17/02	16 09/16/11	12 03/02/08	6 11/24	4 08/26	1.1			5.9
GRAND FORKS UND - SPM	1991	JAN-DEC	9	4456	161 11/17/02	149 11/08/14	127 12/19/02	122 12/18/20	62 12/19	60 11/17	4.3 ***			31.4
HANNOVER	1991	JAN-DEC	9	7866	103 08/22/07	75 02/12/15	44 08/22/08	34 02/12/17	9 03/20	9 11/24	2.3			27.4
KOCH - MGP #1	1991	JAN-DEC	20	8665	116 04/23/12	100 04/23/11	41 04/23/14	37 07/09/14	12 04/23	11 07/09	1.5			12.7
KOCH - MGP #3A	1991	JAN-DEC	20	8617	134 09/12/08	83 11/06/14	47 09/12/08	33 11/06/14	10 09/12	7 11/06	1.4			11.5
PLAZA - SPM	1991	JAN-DEC	9	7943	41 11/14/22	33 01/24/02	29 01/24/02	21 11/07/05	12 01/12	10 11/07	2.3			34.0
RAMP #1	1991	JAN-DEC	20	8709	97 10/19/09	83 05/22/08	60 10/19/11	53 05/22/08	14 04/18	14 04/19	1.9			20.4
RAMP #2	1991	JAN-DEC	20	8620	110 10/22/09	81 10/10/11	68 10/22/11	65 10/10/11	30 10/17	24 10/22	1.8			24.6
RAMP #3	1991	JAN-DEC	20	8704	64 12/22/12	55 07/29/10	35 07/29/11	34 10/08/14	9 06/17	9 07/09	2.2			31.9
RAMP #5	1991	JAN-DEC	20	8647	78 04/02/15	75 03/29/10	47 07/28/14	45 04/02/17	17 05/20	16 07/28	3.1			49.1

TABLE 3 (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	1991	JAN-DEC	9	8700	40 11/14/09	22 11/14/10	26 11/14/11	11 02/10/20	6 11/14	5 02/10	1.2			8.7
WARREN #4	1991	JAN-NOV	16	7911	29 06/23/14	23 02/09/06	12 02/09/08	10 06/23/14	3 02/09	3 06/10	1.1			2.0
WARREN #4	1991	NOV-DEC	20	772	8 12/17/12	5 12/02/12	4 12/03/20	3 12/23/05	2 12/03	1 12/31	1.1 ***			5.2
WESTERN #3	1991	JAN-DEC	20	8187	53 08/19/04	32 08/19/03	32 08/19/05	11 08/25/08	5 08/19	4 08/25	1.2			7.4

* THE AIR QUALITY STANDARDS FOR SO2 ARE 1) THE MAXIMUM ALLOWABLE 1-HR 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

these sites. There were three exceedances of the State 1-hour SO_2 standard at the Amerada Hess - Tioga #1 site. These were the result of strong northwesterly winds causing a downwash condition from the incinerator stack. They are on a compliance schedule to reduce emissions from the stack.

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 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 emission inventory, are listed in Table 4. Map 3 shows the approximate locations of these facilities.

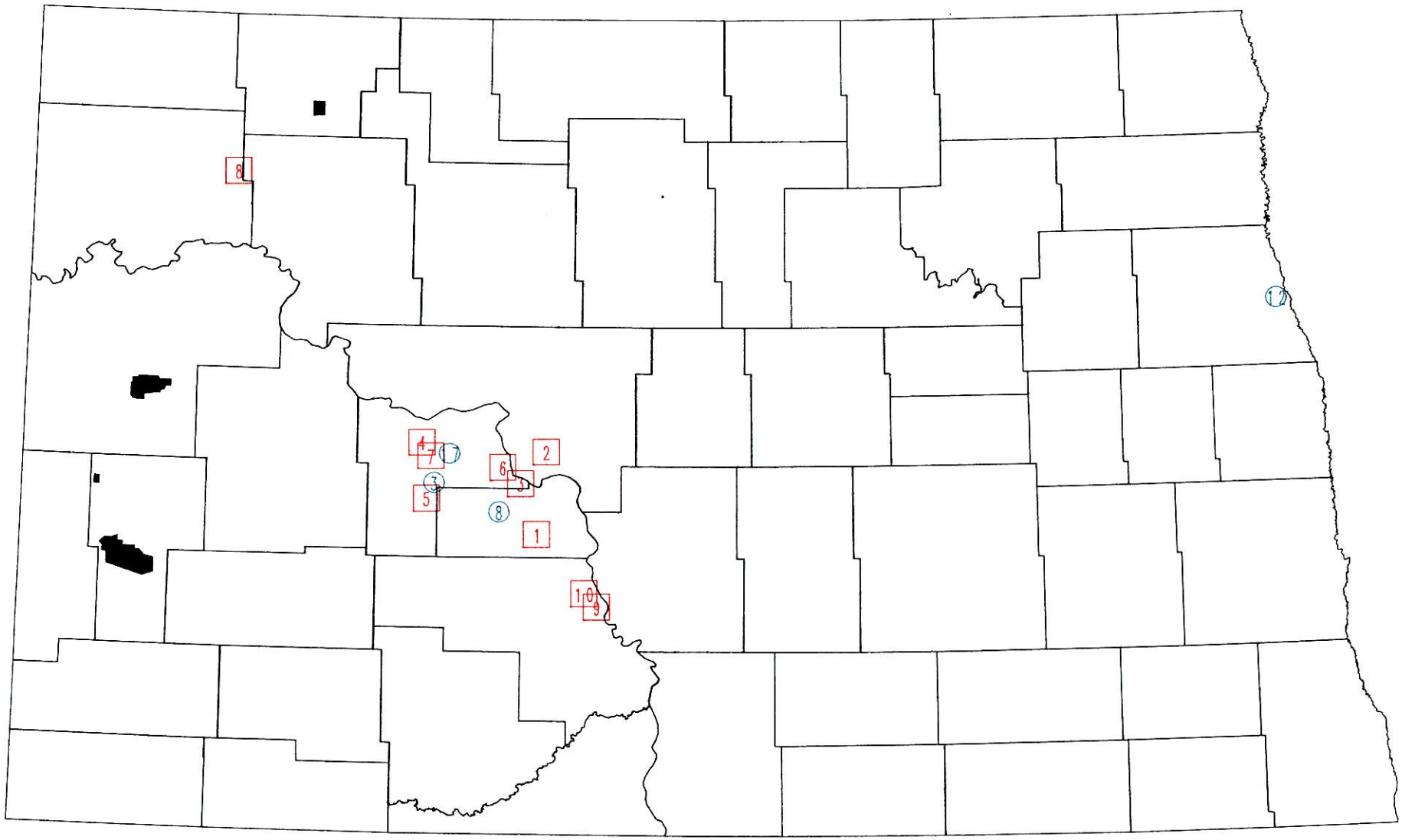
TABLE 4

MAJOR NO_x SOURCES
(> 1000 TPY)

1990

#	Name of Company	Type of Source	Location	County	NO_x Emissions Ton/Year
1	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	31464.1
2	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	McLean	27257.9
3	Basin Electric Power Cooperative (Leland Olds)	Steam Electric Gen. Facility	Stanton	Mercer	22221.0
4	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	10540.0
5	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Facility	Beulah	Mercer	9460.0
6	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	7237.0
7	Dakota Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	3365.0
8	Amerada Hess Corporation (Tioga Gas Plant)	Natural Gas Processing Plant	Tioga	Williams	2654.4
9	Amoco Oil Company	Oil Refinery	Mandan	Morton	1486.2
10	Montana Dakota Utilities (Heskett)	Steam Electric Gen. Facility	Mandan	Morton	1032.0

MAJOR NITROGEN OXIDE SOURCES



☐ Major NOX Sources
○ Monitoring Sites

☐ Class 1 Areas

MAP 3

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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; 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, UND, and Hannover. The RAMP network also operates three analyzers. The latest summary of NO_2 data is shown in Table 5. The measured NO_2 values are quite low, particularly the annual means. From Map 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.

TABLE 5

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	1991	JAN-DEC	22	7190	43 10/30/18	39 11/03/18	3.5	24.9
GRAND FORKS UND - SPM	1991	JAN-DEC	74	3671	47 11/16/13	44 11/12/06	7.6 ***	63.9
HANNOVER	1991	JAN-DEC	22	6475	27 10/17/12	26 04/02/12	2.4 ***	8.2
RAMP #2	1991	JAN-DEC	14	8582	39 04/02/23	32 10/08/20	3.3	29.9
RAMP #3	1991	JAN-DEC	14	8529	28 07/29/10	27 03/02/04	2.6	15.3
RAMP #5	1991	JAN-DEC	14	8383	47 04/02/22	43 04/02/21	3.1	21.4

* THE AIR QUALITY STANDARDS ARE 50 PPB (100 $\mu g/m^3$) MAXIMUM ANNUAL ARITHMETIC MEAN AND 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

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. The RAMP O_3 monitor operates all four quarters.

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.

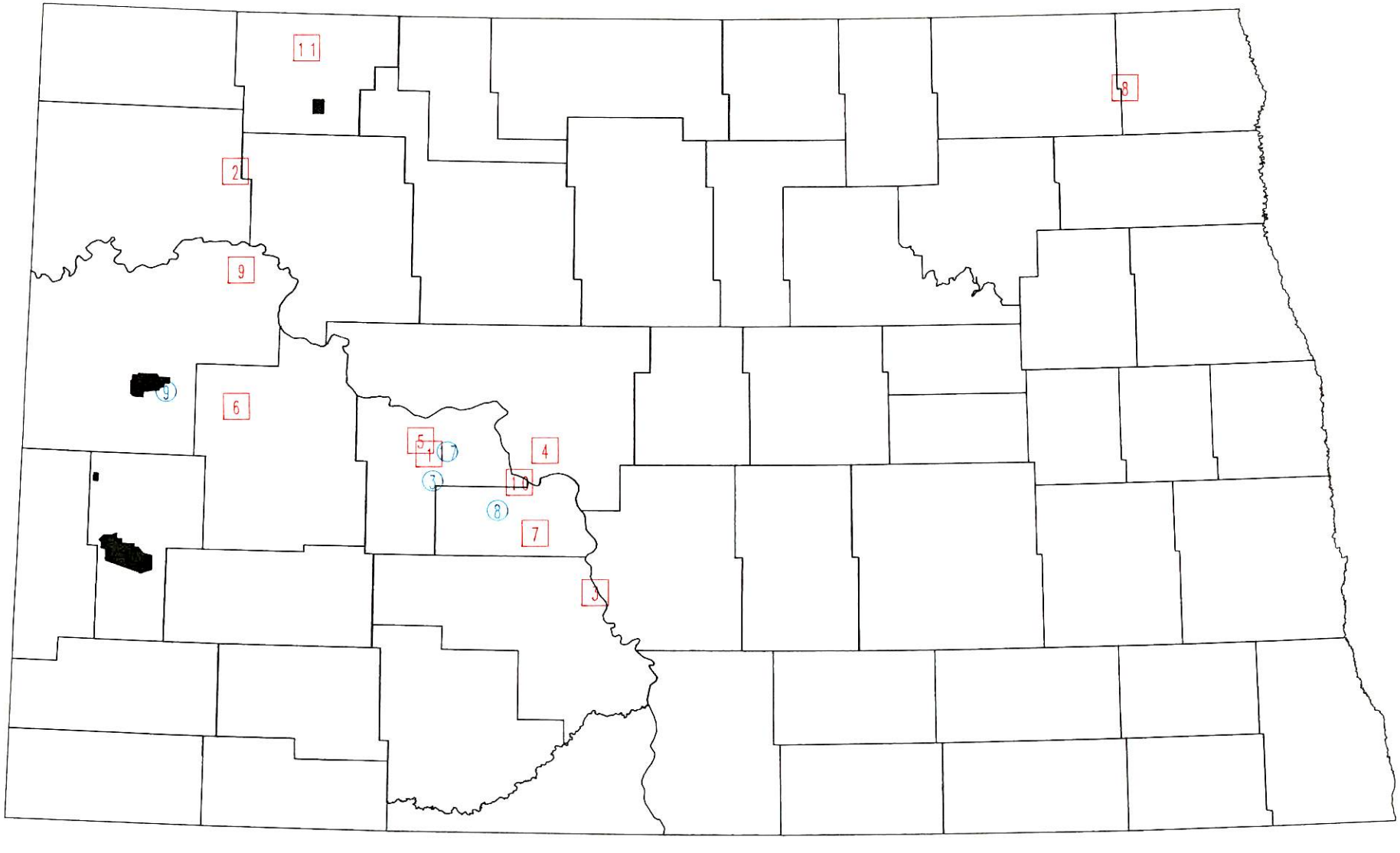
TABLE 6

MAJOR VOC SOURCES
(> 100 TPY)

1990

#	Name of Company	Type of Source	Location	County	VOC Emissions Ton/Year
1	Dakota Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	1254.8
2	Amerada Hess Corp. (Tioga Gas Plant)	Natural Gas Processing Plant	Tioga	Williams	675.8
3	Amoco Oil Company	Oil Refinery	Mandan	Morton	401.9
4	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	McLean	340.6
5	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	237.0
6	Amerada Hess Corp. (Hawkeye Station)	Gas Compressor	----	Dunn	236.4
7	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	201.9
8	Cavalier Air Force Station	Power Plant	Concrete	Pembina	165.0
9	Amerada Hess Corp. (Blue Buttes Station)	Gas Compressor	----	McKenzie	157.8
10	Basin Electric Power Cooperative (Leland Olds)	Steam Electric Gen. Facility	Stanton	Mercer	137.0
11	OXY USA, Inc.	Natural Gas Processing Plant	Lignite	Burke	121.5

MAJOR VOC SOURCES



MAP 4

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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. The RAMP network has one monitor. The latest summary of O_3 data is included in Table 7. The maximum O_3 values are less than or equal to 70 ppb. Map 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.

TABLE 7

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 - HOUR MAXIMA 1ST	DATE MM/DD/HH	2ND	DATE MM/DD/HH	3RD	DATE MM/DD/HH	#HOURS >120	% >NDV
BEULAH	1991	APR-SEP	183	4	4362	67	7/16/14	64	7/15/14	64	7/21/13	0	99.1
HANNOVER	1991	APR-SEP	183	3	4349	64	7/15/15	64	7/17/12	64	8/27/15	0	100.0
RAMP #2	1991	APR-SEP	183	11	4366	65	7/16/14	63	7/15/13	61	7/21/13	0	100.0
TRNP - NU	1991	APR-SEP	183	4	3631	70	9/ 7/15	68	7/16/13	64	5/31/14	0	100.0

* THE AIR QUALITY STANDARD FOR OZONE IS 120 PPB (235 $\mu g/m^3$) 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; 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 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 five sites (see Map 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

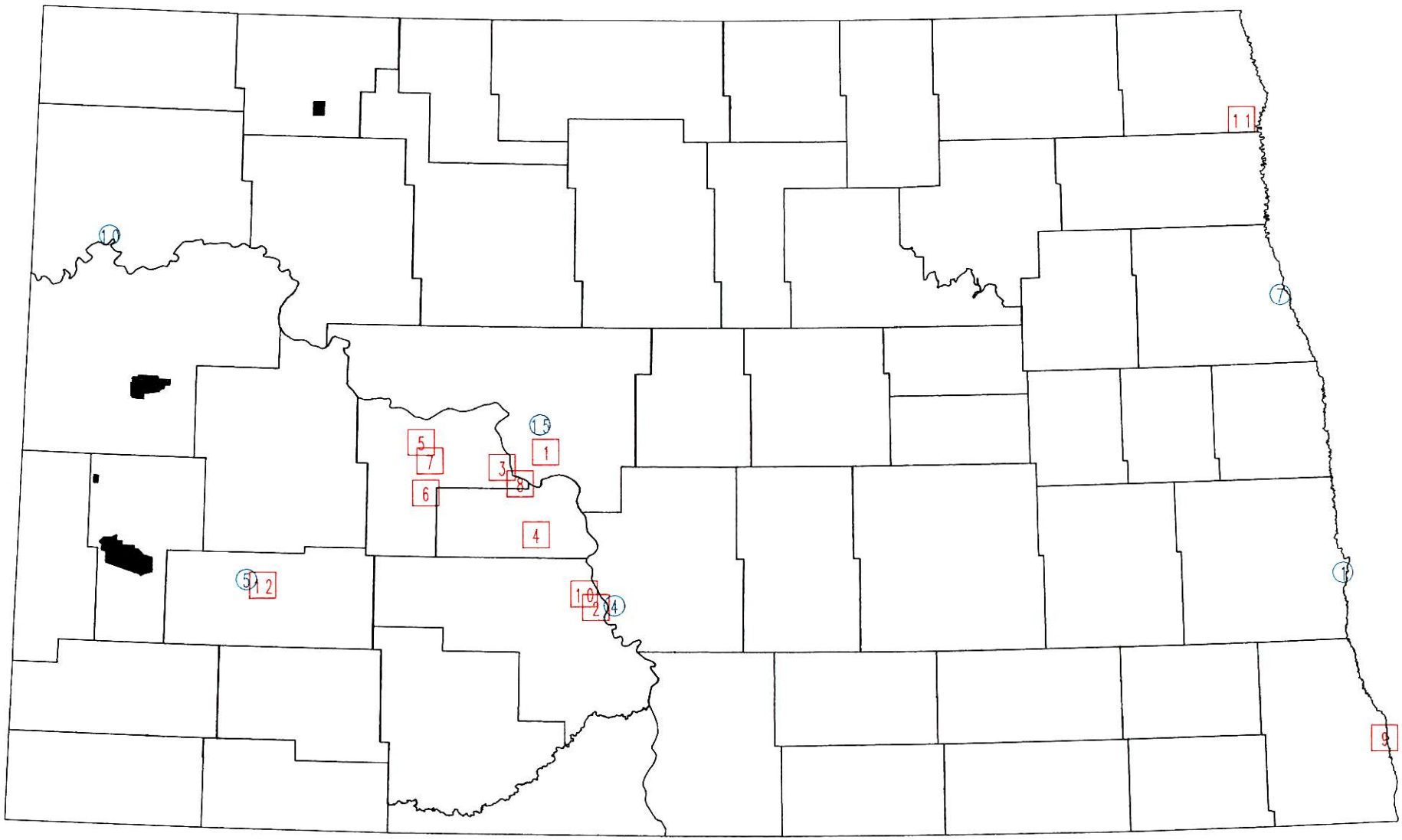
TABLE 8
MAJOR PM_{10} SOURCES

(> 100 TPY)

1990

#	Name of Company	Type of Source	Location	County	PM_{10} Emissions Ton/Year
1	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	McLean	3576.7
2	Amoco Oil Company	Oil Refinery	Mandan	Morton	935.2
3	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	718.0
4	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	517.9
5	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	470.4
6	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Facility	Beulah	Mercer	408.0
7	Dakota Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	380.1
8	Basin Electric Power Cooperative (Leland Olds)	Steam Electric Gen. Facility	Stanton	Mercer	352.5
9	Minn-Dak Farmers Coop.	Sugar Beet Processing Plant	Wahpeton	Richland	160.6
10	Montana Dakota Utilities (Heskett Plant)	Steam Electric Gen. Facility	Mandan	Morton	147.3
11	American Crystal Sugar Co.	Sugar Beet Processing Plant	Drayton	Pembina	139.5
12	Royal Oak Enterprises	Charcoal Briquetting Plant	Dickinson	Stark	109.7

MAJOR PM10 SOURCES



Major PM10 Sources
Monitoring Sites
Class 1 Areas

MAP 5

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State. There is one reporting industrial network located at the Falkirk Mine. The latest inhalable particulate monitoring data for the network are shown in Table 9. No concentrations exceeding the standards were measured during 1991.

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. 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 ($\mu g/m^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAXIMA 1ST MM/DD	MAXIMA 2ND MM/DD	MAXIMA 3RD MM/DD	ARITH MEAN	#>150	AM>50	% >MDV
BISMARCK	1991	JAN-DEC	55	5.3	84.2 11/20	50.5 10/09	38.7 12/02	21.5			100.0
DICKINSON RES	1991	JAN-DEC	56	3.4	38.3 02/11	35.3 10/09	28.4 03/19	13.7			96.4
FALKIRK #10	1991	JAN-DEC	56	7.9	101.5 09/21	81.1 10/09	80.8 01/24	27.5			100.0
FALKIRK #6A	1991	JAN-DEC	59	5.0	86.9 04/24	39.8 07/17	34.5 12/02	16.6			100.0
FARGO	1991	JAN-DEC	58	5.2	59.4 08/28	44.9 10/09	36.9 12/02	18.5			100.0
GRAND FORKS	1991	JAN-DEC	54	5.6	84.1 12/02	57.4 08/29	46.0 10/09	20.4			100.0
GRAND FORKS UND - SPM	1991	JAN-DEC	60	6.9	113.1 12/02	67.4 04/03	60.4 01/21	28.3			100.0
WILLISTON	1991	JAN-DEC	58	3.7	39.6 01/24	34.4 10/09	32.6 04/12	14.7			98.2

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

TABLE 10

MAJOR CO SOURCES
(> 100 TPY)

1990

#	Name of Company	Type of Source	Location	County	CO Emissions Ton/Year
1	CPA/UPA (Coal Creek)	Steam Electric Gen. Facility	Underwood	McLean	2044.2
2	Basin Electric Power Cooperative (AVS)	Steam Electric Gen. Facility	Beulah	Mercer	1424.0
3	Minnkota Power Coop.	Steam Electric Gen. Facility	Center	Oliver	1211.4
4	Montana Dakota Utilities (Heskett Plant)	Steam Electric Gen. Plant	Mandan	Morton	1042.0
5	Basin Electric Power Coop. (Leland Olds)	Steam Electric Gen. Plant	Stanton	Mercer	818.0
6	Montana Dakota Utilities (Coyote Station)	Steam Electric Gen. Plant	Beulah	Mercer	523.0
7	Dakota Gasification Co.	Synthetic Fuel Plant	Beulah	Mercer	497.2
8	Royal Oak Enterprises	Charcoal Briquetting Plant	Dickinson	Stark	398.4
9	United Power Association	Steam Electric Gen. Facility	Stanton	Mercer	333.0
10	American Crystal Sugar Co.	Sugar Beet Processing Plant	Drayton	Pembina	312.9

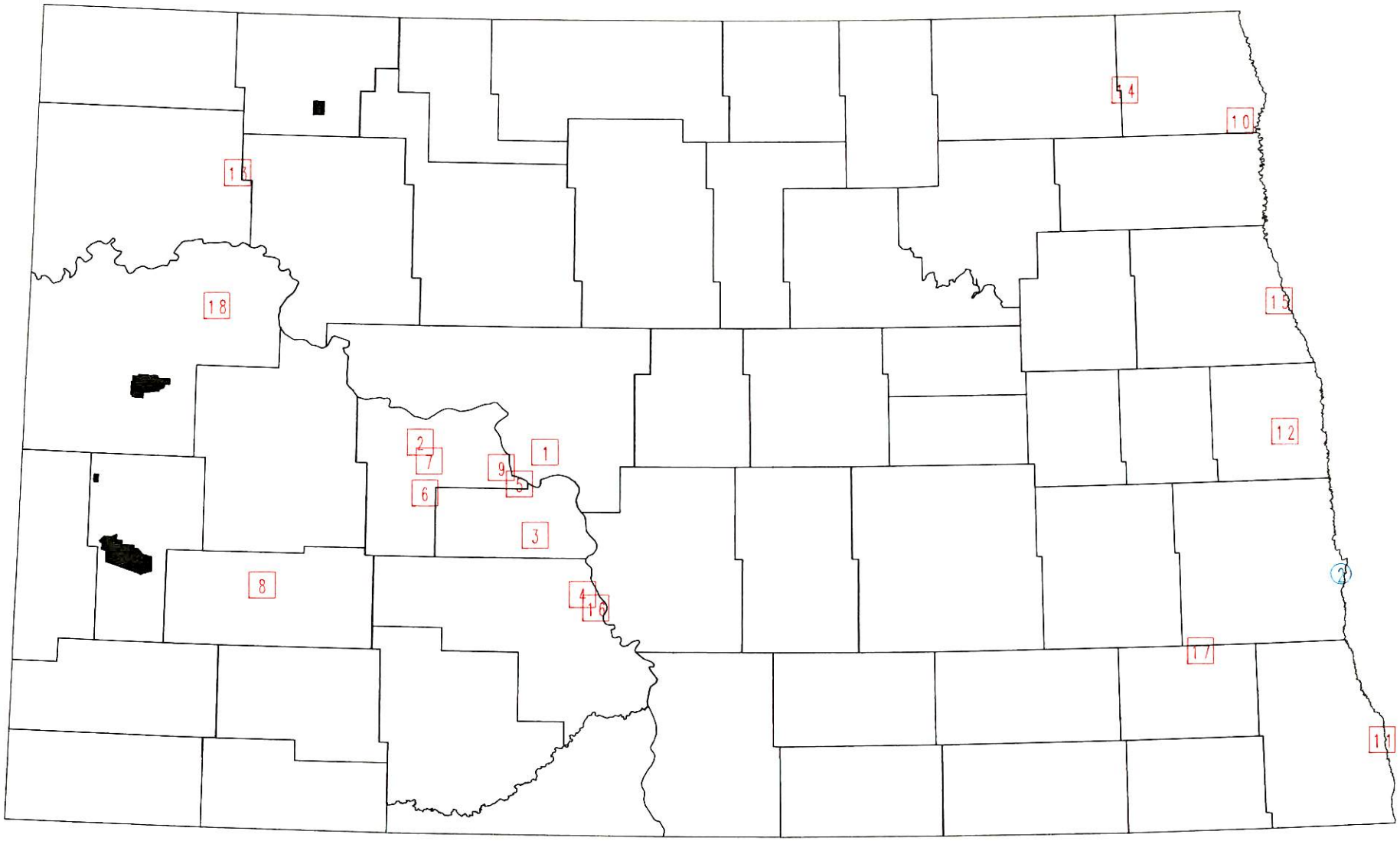
TABLE 10 (Cont.)

MAJOR CO SOURCES
(> 100 TPY)

1990

#	Name of Company	Type of Source	Location	County	CO Emissions Ton/Year
11	Minn-Dak Farmers Coop.	Sugar Beet Processing Plant	Wahpeton	Richland	287.1
12	American Crystal Sugar Co.	Sugar Beet Processing Plant	Hillsboro	Pembina	284.8
13	Amerada Hess Corp. (Tioga Gas Plant)	Natural Gas Processing Plant	Tioga	Williams	227.4
14	Cavalier Air Force Station	Power Plant	Concrete	Pembina	156.0
15	University of North Dakota	Heating Plant	Grand Forks	Grand Forks	125.2
16	Amoco Oil Company	Oil Refinery	Mandan	Morton	125.0
17	National Sun Industries, Inc.	Sunflower Processing Plant	Enderlin	Ransom	111.4
18	Western Gas Processors, Ltd.	Compressor Station	Demmick Lake	Williams	106.9

MAJOR CO SOURCES



MAP 6

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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 11. 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.

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.

TABLE 11

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	1991	JAN-DEC	54	3662	0.0	6.0 01/11/17	6.0 01/31/17	3.7 01/31/22	3.3 01/31/21			40.5	***

* THE AIR QUALITY STANDARDS FOR CO ARE 1) THE MAXIMUM ALLOWABLE 1-HR CONCENTRATION IS 35 PPM (40 $\mu g/m^3$). 2) THE MAXIMUM ALLOWABLE 8-HOUR CONCENTRATION IS 9 PPM (10 $\mu g/m^3$).

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

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 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 currently are two State-operated monitoring sites for H_2S emissions. These are the TRNP-NU and the Plaza sites. There are five industry-operated H_2S monitoring sites. The latest summary of H_2S data is shown in Table 12. One exceedance of the 1-hour standard was measured at the Plaza Site and also at the Warren #4 Site. Neither of these constituted violations as one exceedance per month is allowed.

TABLE 12

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

POLLUTANT : HYDROGEN SULFIDE (PPB)

LOCATION	YEAR	SAMPLING PERIOD	METH	NUM OBS	MAXIMUM 1-HOUR 1ST MM/DD/HH	MAXIMUM 1-HOUR 2ND MM/DD/HH	MAXIMUM 24-HOUR 1ST MM/DD	MAXIMUM 24-HOUR 2ND MM/DD	MAXIMUM 3-MONTH 1ST MM	MAXIMUM 3-MONTH 2ND MM	ARITH MEAN	1HR #>200	24HR #>100	% >MDV
AMERADA HESS - TIOGA #2	1991	JAN-DEC	20	8694	171 07/13/20	102 10/11/19	10 07/13	8 10/11	2 01	2 12	2.2			1.9
DGC #2	1991	JAN-DEC	20	8667	42 05/22/01	38 08/13/21	14 10/23	13 10/25	5 10	4 12	3.1			23.9
KOCH - MGP #1	1991	JAN-DEC	20	8642	23 01/31/04	20 01/06/07	5 01/06	3 10/07	2 01	2 12	2.0			1.2
PLAZA - SPM	1991	JAN-DEC	20	7786	358 07/31/03	196 07/31/05	29 07/31	17 03/09	4 04	4 12	3.5	1		15.0
TRNP - NU	1991	JAN-DEC	20	8709	32 10/21/07	21 10/21/06	5 01/12	5 10/21	2 03	2 12	2.0			0.3
WARREN #4	1991	JAN-DEC	16	5807	324 03/12/18	186 08/26/06	38 02/27	35 03/12	7 11	6 10	5.3 ***	1		24.0
WARREN #4	1991	DEC-DEC	20	699	149 12/31/07	100 12/31/17	20 12/31	14 12/06	7 12	***	7.1 ***			47.2
WESTERN #2	1991	JAN-DEC	20	8641	157 10/04/09	152 10/04/10	61 10/04	30 05/15	3 05	3 12	2.5			4.1

* THE AIR QUALITY STANDARDS FOR H2S ARE 1) THE MAXIMUM INSTANTANEOUS (CEILING) CONCENTRATION IS 10 PPM (14 Mg/m^3). 2) THE MAXIMUM 1-HR CONCENTRATION IS 200 PPB (280 $\mu g/m^3$) NOT TO BE EXCEEDED MORE THAN ONCE PER MONTH. 3) THE MAXIMUM 24-HR CONCENTRATION IS 100 PPB (140 $\mu g/m^3$) NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR. 4) THE MAXIMUM CONCENTRATION IS 20 PPB (28 $\mu g/m^3$) AVERAGED OVER 3 CONSECUTIVE MONTHS.

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

4.0 PRIORITIZED EQUIPMENT NEEDS LIST

Equipment Priority List

1. 1 - Wind set (wind speed/wind direction) with recorders ($5000) (FY92)

2. 1 - NO_x analyzer ($10,000) (FY92)

3. 1 - SO_2 analyzer ($9500) (FY93)

4. 2 - Wind sets (wind speed/wind direction) with recorders ($5000/each) (FY93)

5. 3 - Ultraviolet radiation detectors ($2500/each) (FY93)

6. 1 - O_3 analyzer ($5000) (FY93)

5.0 SUMMARY AND CONCLUSIONS

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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.

As can be seen by the data summaries, there were a few air pollution problems in the State. The Amerada Hess Tioga Gas Plant continues to experience downwash problems with strong winds which cause the SO_2 plume to impact the ground near the source. Changes are being made to the facility which should correct the problems.

No PM_{10} exceedances were measured during 1991.

No problems with CO have been detected at the Fargo Site. We will be looking at relocating this system because of the low values we have been measuring.

The only H_2S sites showing any exceedances were the Warren Petroleum Site #4 and the Plaza Site. We are working with sources in the vicinity of both sites to improve the situation.

Table 13 summarizes the evaluations for each of the sites in the State network. All of the current State sites meet our monitoring needs. However, we will be evaluating the Fargo CO Site for possible relocation and all of the PM_{10} sites have to be reevaluated next year per the SEA. If the UND stack construction project is completed this year, we may discontinue the continuous AAQ monitoring at that site since modeling shows the maximum impact points to be well off campus and very low concentrations.

TABLE 13

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			(?)	
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				
(Western ND oil/gas	H_2S	X				
Area Network)	MET	X				
University of North	SO_2	X			(?)	
Dakota (SPM)	NO_2	X			(?)	
	Met	X			(?)	
	PM_{10}	X				
TRNP-NU Rural	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 locations.