UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80295

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ENVIRONMENTAL ENGINEERING

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Ref: 8ES-FO

Mr. Charles McDonald
North Dakota State Department of Health
1200 Missouri Avenue
Bismarck, North Dakota 58501

Dear Chuck:

I have reviewed the Annual Network Review for North Dakota submitted in December 1984. This submittal meets the requirement of the SEA for FY 84. I have comments on the Review, but do not expect a response. Rather, I would like to see them incorporated into the next Network Review due to EPA Region VIII in April 1985.

The Annual Network Review for the last several years has presented good rationale to justify establishing new monitoring or to continue existing sites. However, the existing data has seldom been analyzed and the results used as a part of this rationale. There is a need to analyze the data generated from all sites, by pollutant, to determine if continued monitoring is justified.

The section on Network Revision for Particulates (2.0.1.7) indicates that three Hi-Vol sites were shut down in 1984. The next sentence states that three more Hi-Vol will be established. WHY? There does not seem to be any reason for the new sites. It is not necessary to replace all sites that are shut down.

Two consecutive annual SLAMS reports shows the arithmetic mean for NO_2 at Dunn Center to be 0.000 ppm and 100% of the data is in the range of 0.00 to 0.04 ppm. Your network review indicates that this analyzer and the NO_2 analyzer at Beulah will continue to operate and a third will be installed at Hanover, North Dakota. This network review does not justify the need to continue the existing site much less add a third NO_2 analyzer to your network.

Baseline data

The review indicates two ozone analyzers are currently operating and a third will be added. Is the addition of the third analyzer consistent with the NDSDH Air Quality Wish List #5 described in the 1984/1985 State/EPA Agreement? Has there been any analysis of the ozone data from Dunn Center and Beulah?

I could ask more WHY questions, but I would rather see changes in the Network Review process; i.e., there is a need to analyze data from the existing sites to justify the continued operation of the monitors. Also, when a new site is established it should have a monitoring objective and a time frame set to achieve that objective.

Part 58.25 of 40 CFR states that you can make changes to your SLAMS network "with the approval of the Regional Administrator." Your Network Review is under document control, so when there is a change in your SLAMS network, just update the appropriate pages and send them to EPA Region VIII. This will keep us informed and meet the requirement of 40 CFR 58.25. If there is a new site established, please send in the SAROAD site identification form.

The intent of these comments is to guide the thinking in North Dakota toward more analysis of the data to justify existing monitoring. If you have any questions, please call me at (303) 236-5102.

Sincerely yours,

Marlin D. Helming

Marlin D. Helming
Air Operations Section
Field Operations Branch
Environmental Services Division

December 19, 1984

Mr. Marlin Helming
U.S. Environmental
Protection Agency
Region VIII
1860 Lincoln Street
Denver, CO 80295

Re: Annual Network Review

Dear Mr. Helming:

Attached is the Annual Network Review for North Dakota. It was due in April 1984. We sincerely apologize for the delay. The delay, however, did give us an opportunity to include the siting information for the new PM_{10} samplers.

The format of this report lends itself to easily making changes. As a result, we anticipate that future submittals will be on time.

If you have any questions, please feel free to contact me.

Sincerely,

Charles M. McDonald
Manager
Air Quality Services Branch
Air Pollution Control Program

CMM:saj
Attach:

NORTH DAKOTA STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL ENGINEERING

AMBIENT AIR QUALITY MONITORING
ANNUAL NETWORK REVIEW
1984

December 18, 1984

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1.0 INTRODUCTION

1.0.1 Background

The North Dakota State Department of Health, Division of Environmental Engineering, has the primary goal of protecting the health and welfare of North Dakotans from the detrimental effects of air pollution. As such, the Division of Environmental Engineering has the responsibility to ensure 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) Regulations. To carry out this responsibility, the Division of Environmental Engineering operates and maintains a network of ambient air quality monitors and requires 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 inadequancies indicated as a result of the annual review required by 40 CFR 58.20(d). This document satisfies that annual requirement.

1.0.2 Goals and Objectives

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[1/] 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

1/ "Pollutant" is used interchangeably with "air contaminant" in this document.

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 are as shown below:

Criteria Pollutant	Spatial Scales
Total Suspended Particulate (TSP)	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

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 intrepretation and application of data. During the process of the first network review in 1979, existing stations were evaluated for their monitoring objectives and spatial scale and, if necessary, sites were deleted, added, or modified. These same criteria are used to evaluate the network during the annual review. Further details on network design can be found in Appendix D to 40 CFR 58.

1.0.3 Siting

As can be gathered from the prior discussion, each air contaminant has certain characteristics which must be taken into account when siting monitoring equipment. These characteristics may result from variations in the number and type of sources and emissions in question, reactivity of a particular pollutant with other constituents in the air, local site influences such as terrain and land

use, and climatology. The State AAQM network is currently designed to provide air quality data for two basic conditions: (1) urban, population oriented monitoring and (2) background monitoring.

Population oriented monitoring comes into play primarily in regard to total suspended particulate (TSP) monitoring. We have determined that population areas on the order of 10,000 people or larger should be monitored for TSP. On the other hand, background stations are chosen to determine concentrations of air contaminants in areas remote from manmade sources and generally are sited according to a "regional" spatial scale. Once general locations are established, all monitoring stations are sited in accordance with the specific probe siting criteria specified in Appendix E to 40 CFR 58.

1.0.4 Monitoring Methods

All sampler/analyzers used by the North Dakota Department of Health for TSP, SO_2, NO_2 and O_3

monitoring are reference equivalent equipment as listed below:

Parameter	Sampler/Analyzer
TSP	High-Volume sampler
SO_2	EQSA-0276-009 "Thermo Electron Model 43 Pulsed Fluorescence SO_2 Analyzer"
NO_2	RFNA-0777-022 "Bendix Model 8101-C Oxides of Nitrogen Analyzer"
O_3	RFOA-1075-004 "Meloy Model OA350-2R Ozone Analyzer" or RFOA-1075-003 "Meloy Model OA325-2R Ozone Analyzer"

In addition to the parameters measured above, the Department also conducts monitoring for hydrogen sulfide (H_2S) as well as suspended sulfates (SO_4) and suspended nitrates (NO_3). The samplers/ analyzers used for the determination of these parameters are noted below:

Parameter	Sampler/Analyzer
H_2S	Thermo Electron Model 43/340 converter - automated H_2S to SO_2 conversion with pulsed fluorescence analysis

Parameter	Sampler/Analyzer
	Meloy SA185-2A - automated flame photometric detection with sulfur oxides scrubber
SO_4	High volume method (40 CFR 50) for collection - colorimetric automated methylthymol blue, auto analyzer II analysis
NO_3	High volume method (40 CFR 50) for collection - colorimetric automated cadminum reduction, auto analyzer II analysis

1.0.5 PSD Class I Areas and Air Quality Maintenance Areas

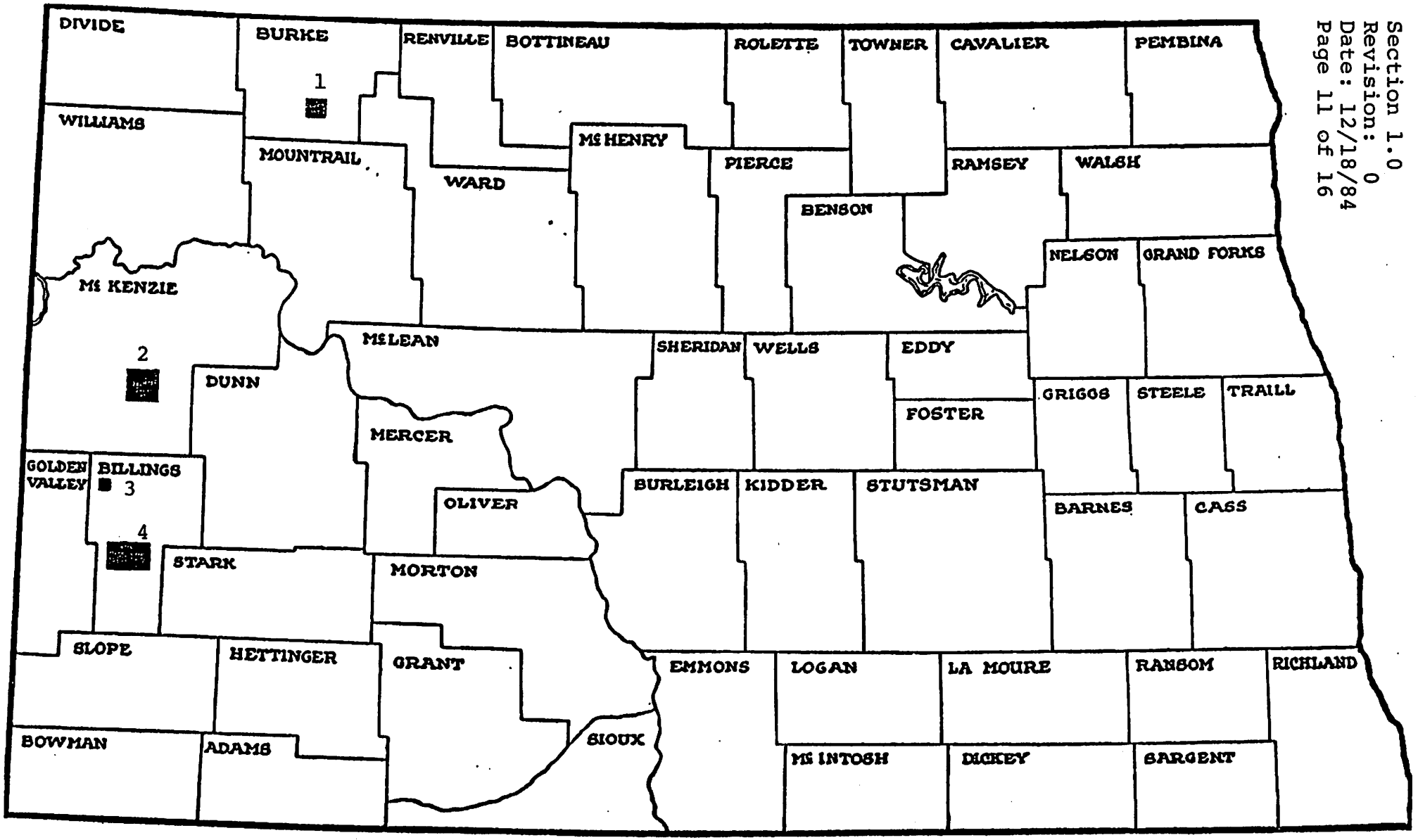
On December 5, 1974, the U.S. EPA, promulgated the Prevention of Significant Deterioration of Air Quality (PSD) Regulations to prevent deterioration of air quality in areas of any state where the air is cleaner than the National Ambient Air Quality Standards. Subsequently, the entire State of North Dakota was designated a Class II PSD area. However, with regard to the known and anticipated types of air contaminants and their predicted effects on specific geographical areas, special emphasis is placed on PSD Class I areas and Air Quality Maintenance Areas (AQMA).

The Clean Air Act Amendments of 1977 established a list of Federally mandated Class I PSD areas. The areas in North Dakota which were included on this list were the Theodore Roosevelt National Park (TRNP) (North Unit, South Unit and Elkhorn Ranch) and the Lostwood National Wilderness Area. These areas are shown on Map 1.

The State Implementation Plan for North Dakota designated two air quality maintenance areas (AQMA). As shown on Map 2, the areas are the Cass County AQMA and the McLean-Mercer-Oliver County AQMA. Because of current air quality and projected population growth, Cass County was designated an AQMA for TSP only. The McLean-Mercer-Oliver County area was designated an AQMA for TSP, SO_2, NO_2, and O_3 because of the lignite coal related industrial growth for that area. (Note Study by PEDCO - EPA 908 1-76-009, June 1976: North Dakota Air Quality Maintenance Area Analysis.)

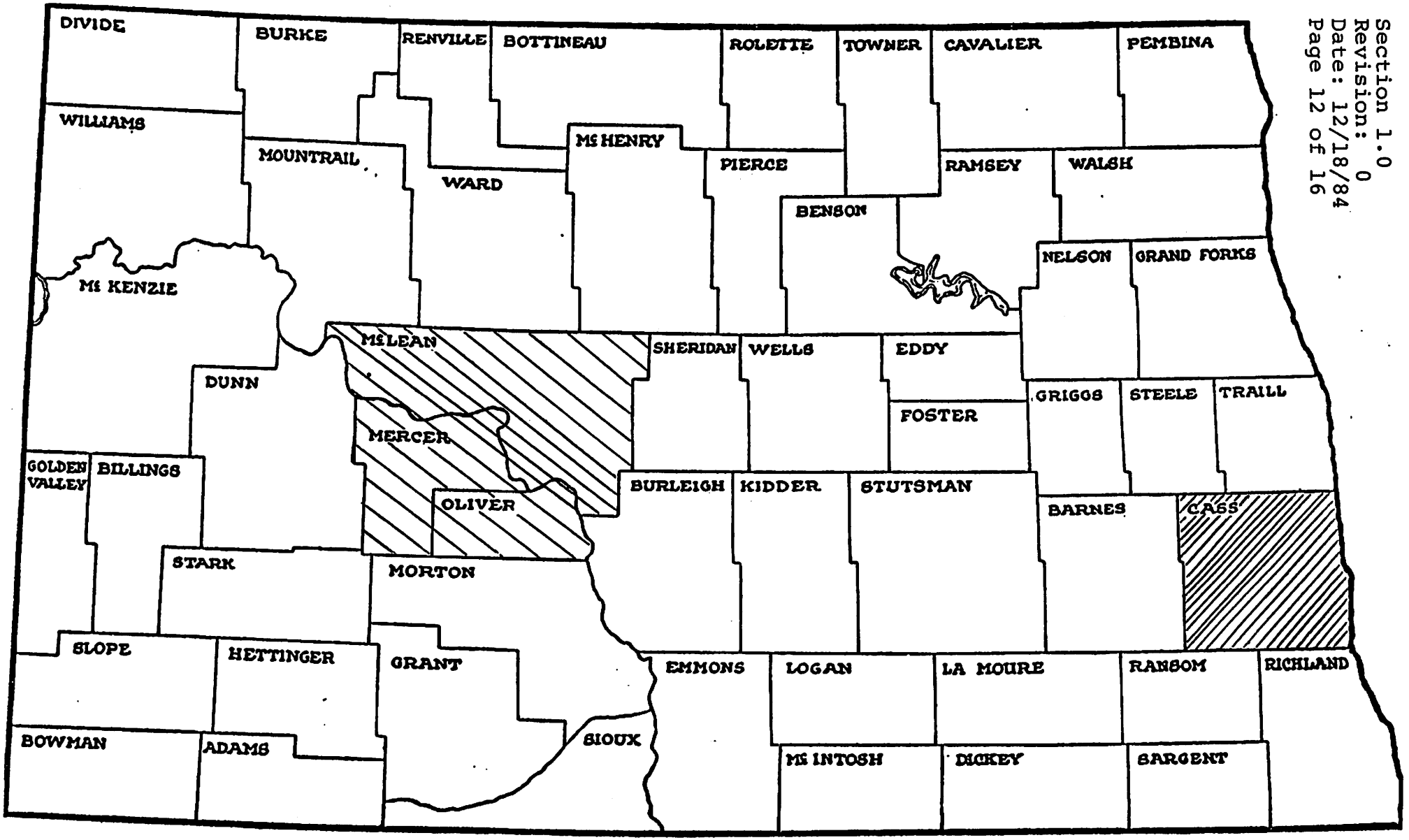
1.0.6 North Dakota AAQM Network

Currently, the Department operates and maintains 23 AAQM sites around the State. Nineteen are



MAP 1
Prevention of Significant Deterioration of Air Quality
Mandatory Class I Areas

1 Lostwood National Wilderness Area
2 Theodore Roosevelt Natinal Park - North Unit
3 Theodore Roosevelt National Park- Elkhorn Ranch
4 Theodore Roosevelt National Park - South Unit



MAP 2
Designated Air Quality Maintenance Areas (AQMA)

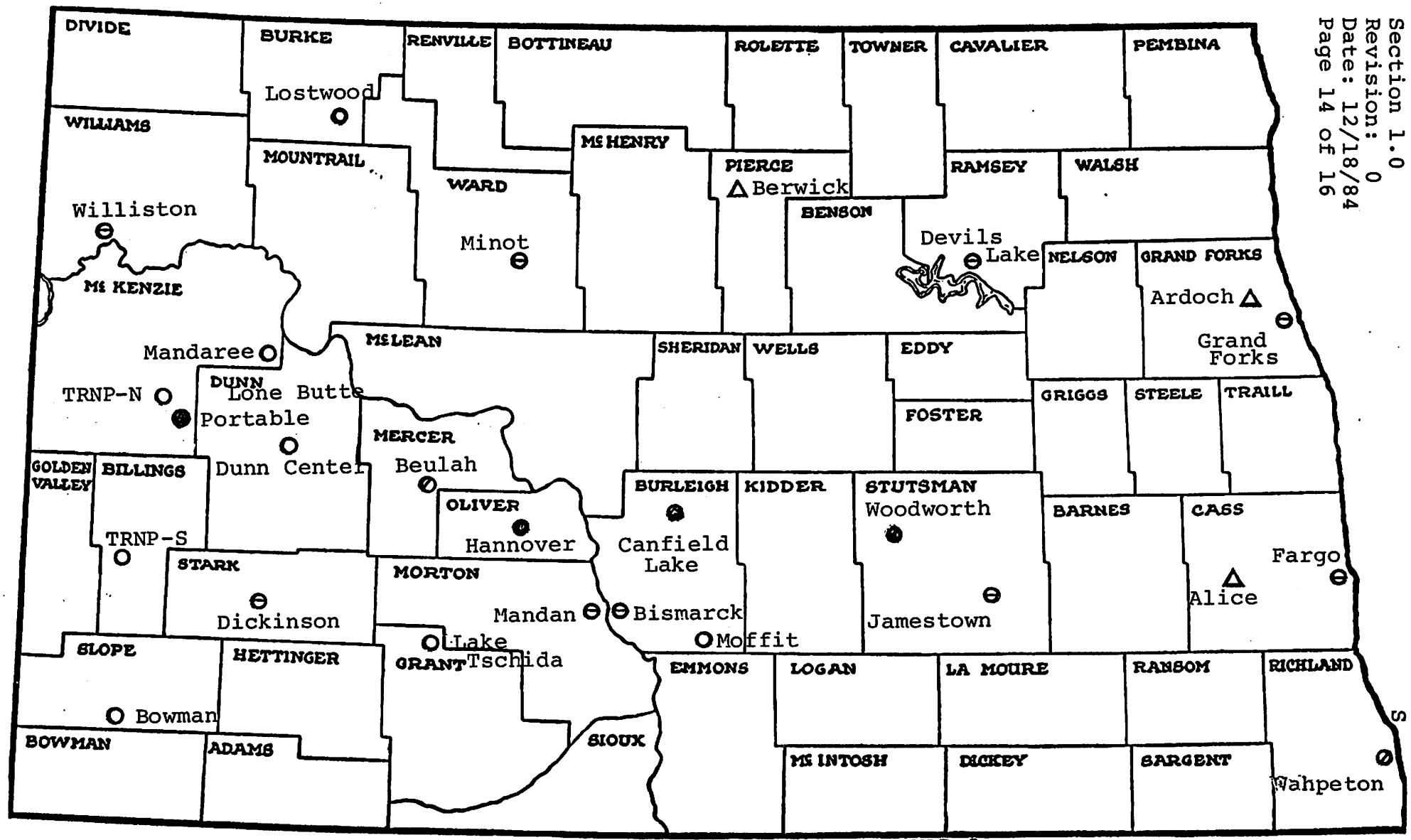
Cass County AQMA

McLean-Mercer-Oliver County AQMA

fixed SLAMS/NAMS sites (8 rural and 11 urban sites). In addition, two short-term special purpose monitoring (SPM) sites were operated in western and central North Dakota and two SPM sites were devoted to research (one near Canfield Lake NWR near Regan, North Dakota and the other at the U.S. Fish and Wildlife Service field station near Woodworth, North Dakota). Map 3 shows the network site locations and Table 1 lists the type of stations and parameters monitored.

1.0.7 Industrial Monitoring

Industrial sources which are required to implement source specific monitoring programs must develop the scope of each monitoring program in cooperation with the Department. Parameters to be monitored are governed by expected pollutant emissions. Specific locations for the various monitors are based upon computer generated air dispersion modeling predictions, published guidelines and agency judgments. To ensure quality data, all industrial air quality monitoring networks in the State must meet the requirements



● = Special Purpose Monitor(s)
⊖ = commercial } urban
⊘ = residential } locations
○ = rural locations
△ = proposed rural locations

MAP 3
North Dakota State Department of Health
Ambient Air Quality Monitoring Network (10/12/84)

TABLE 1

North Dakota State Department of Health
Ambient Air Quality Monitoring Network Description

Site	Type Station	SAROAD I.D. No.	Parameters1/ Monitored	Ref/Equiv Method Designation No.	Operating Schedule	Monitoring Objective	Spatial Scale	Date Site Began or is Expected to Begin Operation	Date O.A. Procedures Began or are Expected to Begin
1 Fargo-Commercial	NAMS	350400001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/64	5/80
Fargo-Commercial Dup.		350400001F09	TSP	Hi-vol	6th day	Co-located hi-vol		4/80	5/80
2 Beulah-Residential	SLAMS	350760001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	4/74	5/80
			SO_2	EQSA-0276-009	cont	Population Exposure	Neighborhood	4/80	7/80
			NO_2	RFNA-0777-022	cont	Population Exposure	Neighborhood	6/80	7/80
			Met	N/A	cont	N/A	N/A	4/80	7/80
3 Bismarck-Commercial	SLAMS	350100001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/57	5/80
Bismarck-Commercial Dup.		350100003F09	TSP	Hi-vol	6th day	Co-located hi-vol		10/79	5/80
4 Bowman-Rural	SLAMS	350160001F03	TSP	Hi-vol	6th day	General Background	Regional	9/74	5/80
5 Devils Lake-Commercial	SLAMS	350260001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/70	5/80
6 Dickinson-Commercial	SLAMS	350300001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/70	5/80
7 Dunn Center-Rural	SLAMS	350340003F03	TSP	Hi-vol	6th day	General Background	Regional	10/79	5/80
			SO_2	EQSA-0276-009	cont	General Background	Regional	10/79	5/80
			NO_2	RFNA-0777-022	cont	General Background	Regional	10/79	5/80
			O_3	RFDA-1075-003	cont	General Background	Regional	10/79	5/80
			Met	N/A	cont	N/A	N/A	10/79	5/80
8 Grand Forks-Commercial	SLAMS	350480001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/70	5/80
9 Jamestown-Residential	SLAMS	350580001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/72	5/80
10 Lake Tschida-Rural	SLAMS	350520001F03	TSP	Hi-vol	6th day	General Background	Regional	9/76	5/80
11 Lostwood-Rural	SLAMS	350180001F03	TSP	Hi-vol	6th day	General Background	Regional	10/79	5/80
12 Mandan-Commercial	SLAMS	350740001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	10/70	5/80
13 Mandaree-Rural	SLAMS	350340001F03	TSP	Hi-vol	6th day	General Background	Regional	8/76	5/80
14 Minot-Commercial	SLAMS	350780001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	4/67	5/80
15 Moffit-Rural	SLAMS	350200002F03	TSP	Hi-vol	6th day	General Background	Regional	7/80	7/80
16 TRNP(N)-Rural	SLAMS	350700002F03	TSP	Hi-vol	6th day	General Background	Regional	12/78	5/80
			SO_2	EQSA-0276-009	cont	General Background	Regional	2/80	6/80
			O_3	RFDA-1075-003	cont	General Background	Regional	11/82	11/82
			H_2S	N/A	cont	N/A	N/A	5/80	6/80
			Met	N/A	cont	N/A	N/A	3/80	6/80
17 TRNP(S)-Rural	SLAMS	350080001F03	TSP	Hi-vol	6th day	General Background	Regional	9/74	5/80
			SO_2	EQSA-0276-009	cont	General Background	Regional	2/80	6/80
			Met	N/A	cont	N/A	N/A	3/80	6/80
18 Wahpeton-Residential	SLAMS	351260001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	10/70	5/80
19 Williston-Commercial	SLAMS	351360001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	5/70	5/80
20 Canfield Lake	SPM	350200003F05	TSP	Hi-vol	6th day	General Background	Regional	5/84	5/84
21 Hannover-Rural	SPM	350860002F05	TSP	Hi-vol	6th day	General Background	Regional	10/84	10/84
			SO_2	EQSA-0276-009	cont	General Background	Regional	10/84	10/84
			NO_2	RFNA-0777-022	cont	General Background	Regional	10/84	10/84
			O_3	RFDA-1075-004	cont	General Background	Regional	5/85	5/85
			Met	N/A	cont	N/A	N/A	10/84	10/84
22Portable Unit-	SPM	350700004F05	SO_2	EQSA-0276-009	cont	Source Impact	Neighborhood	12/83	12/83
			H_2S	N/A	cont	N/A	N/A	12/83	12/83
			Met	N/A	cont	N/A	N/A	12/83	12/83
23 Woodworth-Rural	SPM	351180002F05	TSP	Hi-vol	6th day	General Background	Regional	3/82	3/82

1/ Sulfate and nitrate analysis are performed on all hi-vol filters.

of Appendix B of 40 CFR 58. As manpower and resources allow, systems and/or performance audits are conducted by this Department on each industrial monitoring network to assure the quality of the data.

Specific information on industrial ambient air quality monitoring sites is included in Appendix A.

2.0 MONITORED POLLUTANTS

2.0.1 Total Suspended Particulate

To establish and maintain an effective total suspended particulate (TSP) monitoring program, consideration must be given to population centers, point sources, area sources, background monitoring, and collocated sampling.

2.0.1.1 Population Centers

A primary factor in establishing a TSP air monitoring network is to determine which urban areas will require air quality monitoring based on population size. The following table (Table 2) ranks the cities of largest population in the State. The location of these cities is shown on Map 4.

During the 1982 review, an air quality monitoring "population breakpoint" of 10,000 was established. As a result, special emphasis is placed on conducting population exposure

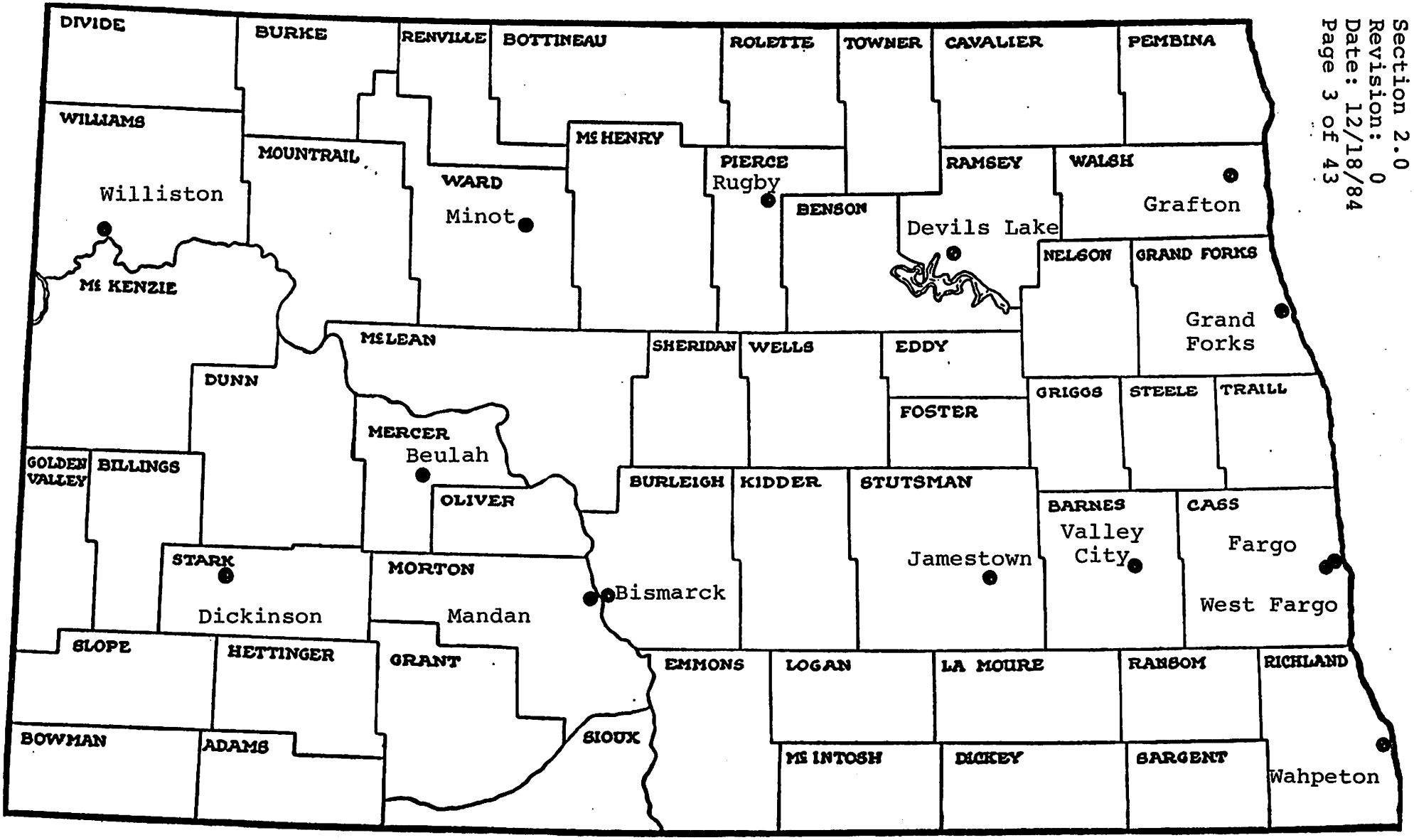
TABLE 2

Rank	City	1970 Population	1980[1/] Population	Monitoring Objective	Spatial Scale
1	Fargo	56,308	61,308	Population exposure	Neighborhood
2	Bismarck	38,378	44,485	"	"
3	Grand Forks	41,909	43,765	"	"
4	Minot	32,790	32,843	"	"
5	Jamestown	15,330	16,280	"	"
6	Dickinson	12,492	15,924	"	"
7	Mandan	12,560	15,513	"	"
8	Williston	11,364	13,336	"	"
9	West Fargo	-	10,099	N/A	N/A
10	Wahpeton	8,183	9,064	Population exposure	Neighborhood
11	Valley City[2/]	6,939	7,774	"	"
12	Devils Lake	7,391	7,442	"	"
13	Grafton	-	5,293	N/A	N/A
14	Rugby	-	3,335	N/A	N/A
15	Beulah[3/]	-	2,878	Population exposure	Neighborhood

1/ Population based on April 1, 1980, estimates as reported in Memorandum from U.S. Dept. of Commerce, Bureau of Census, to Office of Statistical Services, NDSDH.

2/ Valley City site was closed down effective July 30, 1984.

3/ A population-oriented TSP monitoring site was established at Beulah, despite its low population, due to growth associated with significant coal-related industrial development in that area.



MAP 4

Major North Dakota Cities[2/]

monitoring in urban areas approaching a population of 10,000. As can be seen from Tables 1 and 2, all cities meeting this criteria, with the exception of West Fargo, have TSP monitors. The Department has decided that the conditions at West Fargo are not significantly different enough from Fargo to warrant establishing a separate site at this time.

2.0.1.2 Point Sources

The major in-State point sources for TSP (emissions >100 TPY) are listed in Table 3 along with emission rates as calculated from the most recent emission inventory. Map 5 indicates the approximate location of these facilities.

In addition to the point sources located within North Dakota, major TSP point sources located outside the State must also be considered. The only out-of-state TSP point

TABLE 3

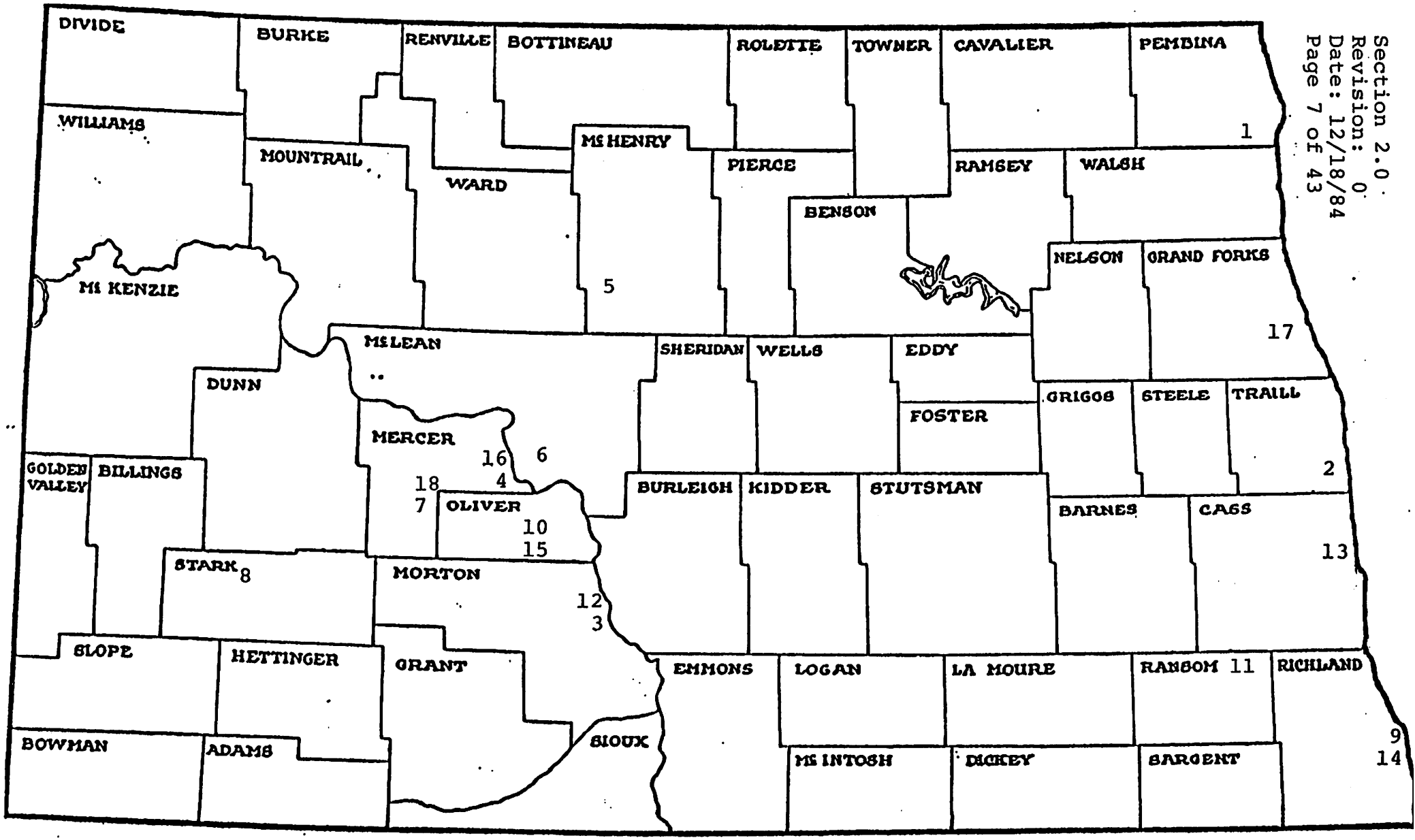
MAJOR TSP SOURCES

#	Name of Company	Type of Source	Location	Particulate Emis. Ton/Year
1	American Crystal Sugar Company	Sugar Beet Processing	Drayton Pembina Co.	199.0
2	American Crystal Sugar Company	Sugar Beet Processing	Hillsboro Traill Co.	112.5
3	American Oil Co.	Oil Refinery	Mandan Morton Co.	266.0
4	Basin Electric Unit 1 & 2 (216mw/440mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	81/411[1/]
5	Basin Electric Units 1 & 2 (25mw/25mw)	Steam Elec. Gen. Facility	Velva McHenry Co.	19/19[1/]
6	UPA/CPA Units 1 & 2 (550mw/550mw)	Steam Elec. Gen. Facility	Underwood McLean Co.	781/861[1/]
7	Coyote Station Unit 1 (440mw)	Steam Elec. Gen. Facility	Beulah Mercer Co.	464.0
8	Husky Industries	Charcoal Briquetting Plant	Dickinson Stark Co.	3842.7
9	Minn-Dak Farmers Coop	Sugar Beet Processing	Wahpeton Richland Co.	351.0

Table 3 Cont.

#	Name of Company	Type of Source	Location	Particulate Emis. Ton/Year
10	Minnkota Power Coop Unit 1 (235mw)	Steam Elec. Gen. Facility	Center Oliver Co.	316.4
11	National Sun Ind., Inc.	Sunflower Processing	Enderlin Ransom Co.	884.8
12	MDU Units 1 & 2 (25mw/66mw) (Heskett Station)	Steam Elec. Gen. Facility	Mandan Morton Co.	36/45[1/]
13	NDSU	Heating Plant	Fargo Cass Co.	153.5
14	NDSSS	Heating Plant	Wahpeton Richland Co.	74.9
15	Square Butte Unit 1 (440mw)	Steam Elec. Gen. Facility	Center Oliver Co.	511.5
16	UPA Stanton Units 1 & 2 (172mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	653.8
17	UND	Heating Plant	Grand Forks Grand Forks Co.	316.8
18	Montana Dakota Utilities	Steam Elec. Gen. Facility	Beulah Mercer Co.	233.1

1/ Emissions from Unit 1/Emissions from Unit 2



MAP 5

Major Point Sources of TSP

source that currently warrants attention is the Boundary Dam Power Plant complex located near Estevan, Saskatchewan.

2.0.1.3 Area Sources

Apart from the point sources of TSP noted above, the development of large lignite coal reserves in west central North Dakota has created a number of large strip mines generally referred to as "area" sources of TSP.

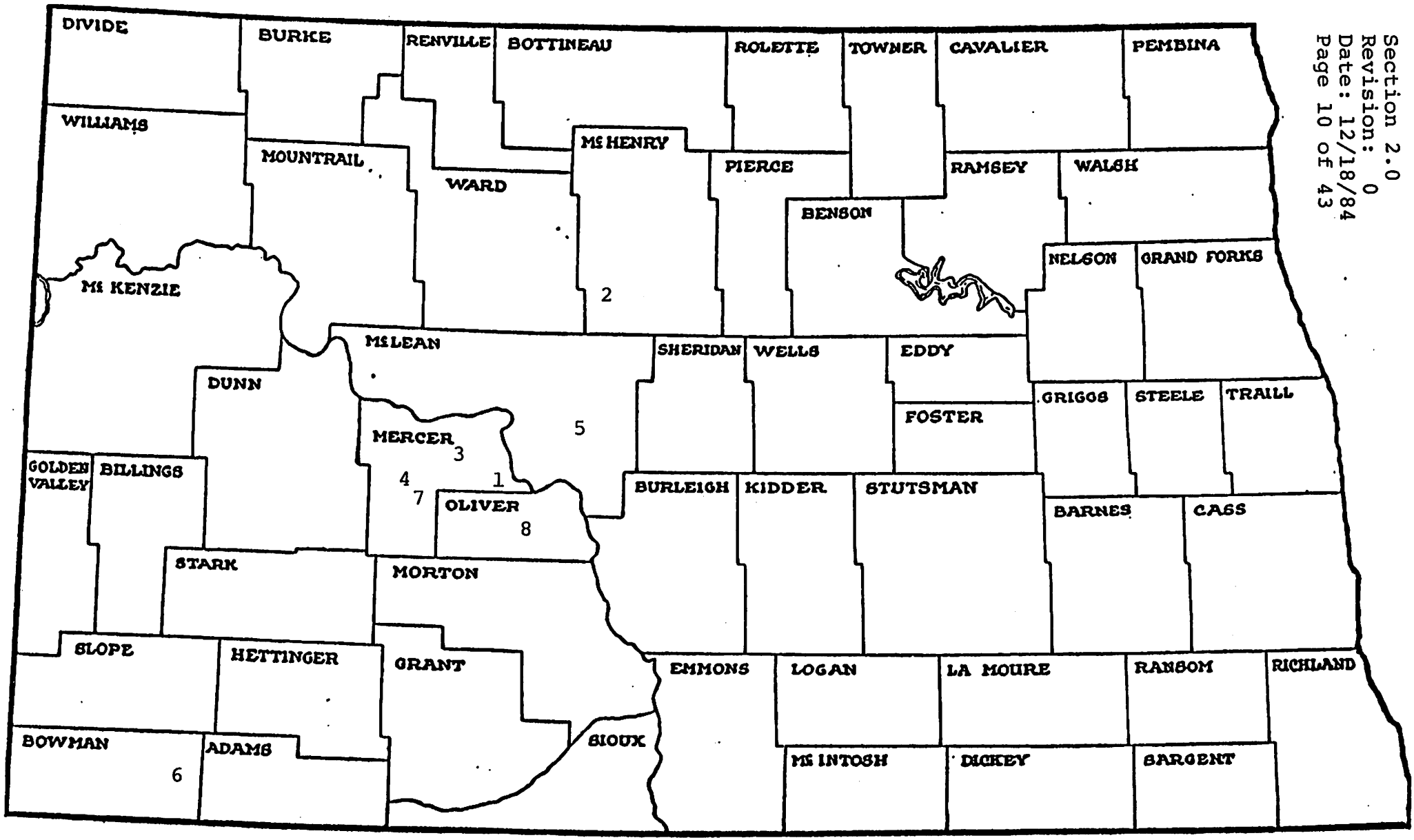
Total suspended particulates (TSP) are considered to be the major pollutant associated with mining activity. Mining related TSP is attributed to such operations as blasting, overburden removal, coal removal, coal transfer and handling, and vehicular travel on unpaved haul roads.

Major lignite coal mines are listed in Table 4. Map 6 shows the approximate locations of these mines.

TABLE 4

MAJOR LIGNITE COAL MINES

#	Name of Company	Name of Source	Location	Permit #
1	Basin Co-op Services	Glen Harold	Stanton Mercer Co.	081001
2	Consolidation Coal Co.	Velva Coal Mine	Velva Ward Co.	M76001
3	Coteau Properties Co.	Freedom Mine	Beulah Mercer Co.	Pending
4	North American Coal	Indian Head Coal Mine	Zap Mercer Co.	079013
5	Falkirk Mining Co.	Falkirk Mine	Underwood McLean Co.	079002
6	Knife River Coal Mine	Peerless Coal Mine	Gascoyne Bowman Co.	079011
7	Knife River Coal Mine	Knife River Coal Mine	Beulah Mercer Co.	079012
8	Baukol-Noonan	Baukol-Noonan Mine	Center Oliver Co.	079004



MAP 6

Lignite Coal Mines

2.0.1.4 Background Monitoring

For TSP background monitoring purposes, the State of North Dakota has several distinct areas that require background measurements. These are the Red River Valley farming area in the easternmost portion of the State, the farming/ranching mixed operations in the central and western portion of the State, and the coal development area in the west-central portion of the State. Additional emphasis is also placed on the monitoring of TSP in Class I areas and AQM areas within the State.

2.0.1.5 Collocated Sampling

As per 40 CFR 58, at least two sites must be selected for duplicate sampling and two samplers must be collocated at each site. The two sampling sites with collocated samplers are located at Bismarck and Fargo.

2.0.1.6 Monitoring Network

The TSP monitoring sites are all listed in Table 1 and shown on Map 3.

2.0.1.7 Network Revisions

Past reviews have questioned the significance of Hi-volume sampling at Lake Tschida, Mandaree, and Valley City. The Valley City site was closed effective July 30, 1984 and the Lake Tschida and Mandaree sites will be closed at the end of 1984. To replace these sites, two rural sites will be established in the eastern part of the State. One will be near Alice, North Dakota in Cass County and the other near Ardoch, North Dakota in Grand Forks County. One additional site will be established near Berwick, North Dakota in Pierce County (see Map 3). These latter three sites will all be run in conjunction with precipitation chemistry sites recently established by the Division of Hazardous Waste Management and Special Studies of the North Dakota State Health Department.

In addition, the Hi-volume sampler at Jamestown is going to be relocated. This relocation is being done to facilitate the servicing of the sampler by the operator, because the current site is very difficult to access, and the representativeness of the location is questionable.

2.0.2 Inhalable Particulates

Due to potential health effects of fine and inhalable particulates (IP) and also because finer particulates cause a greater impairment to visibility, EPA recently proposed a fine particulate standard and sampling procedure. The Notice of Proposed Rule Making for Revision of the AAQ Standards for Particulate Matter (Ambient Air Quality Surveillance for Particulate Matter, and Ambient Air Monitoring Reference and Equivalent Methods) was presented in the Tuesday, March 20, 1984, Federal Register (Volume 49, No. 55 - 10408). The proposal addresses only those particles that are 10 micrometers or smaller in size and are designated as PM_{10}.

2.0.2.1 Sources

The sources that produce inhalable particulates (IP) are essentially the same ones that produce TSP. However, because of a higher number of sources in the urban areas, it is expected that IP concentration will be greater in the urban areas than in the rural areas.

2.0.2.2 Monitoring Network

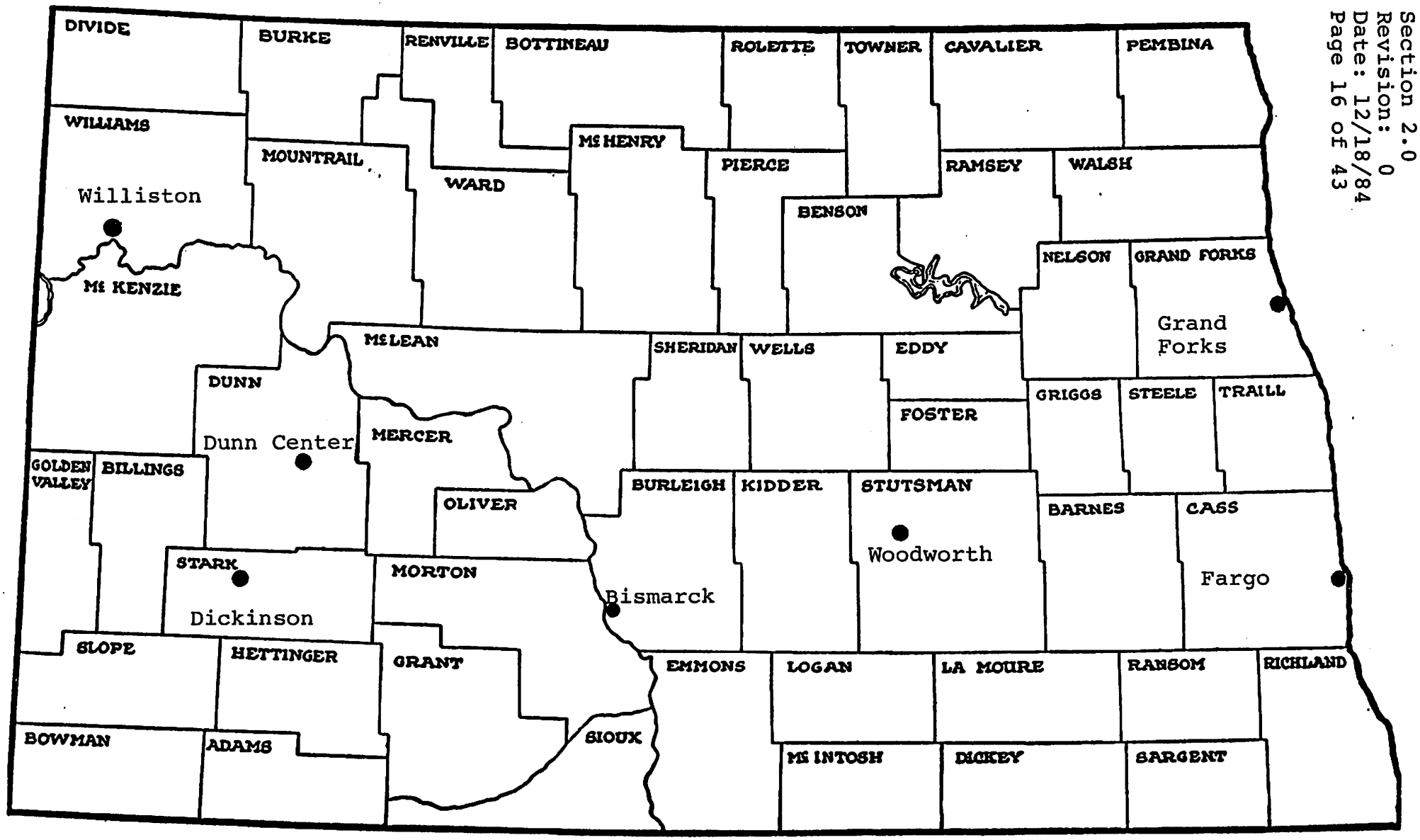
The latest information from EPA, Region VIII, is that we will be receiving 14 PM_{10} samplers. These PM_{10} samplers will all be located at existing TSP monitoring sites. The selected sites and the number of PM_{10} samplers to be located at those sites are listed in Table 5, and the approximate locations are shown on Map 7. The network, as defined, will leave us with one extra PM_{10} which will be used for training and as a spare.

TABLE 5

PM_{10} SITES

Name	No. of Samplers
Bismarck	3*
Dickinson	2
Dunn Center	1
Fargo	2
Grand Forks	2
Williston	2
Woodworth	1

*Two of these will be collocated.



MAP 7

PM_{10} Monitoring Locations

2.0.2.3 Site Certification

The sites have all been inspected to certify that they meet the siting criteria as specified in the proposed regulations. The Bismarck, Fargo, Dickinson, Dunn Center and Woodworth sites all meet the siting criteria. The site at Williston will have to be relocated due to some recent construction on the courthouse roof. A suitable site on the northern portion of the courthouse roof was identified, but access stairs will have to be built and power provided. The Grand Forks site is minimally acceptable. The water plant is being expanded and a better location may be available by the time the PM_{10} system is ready to become operational.

2.0.3 Sulfur Dioxide

Recent coal, oil, and gas development in the west and west-central portions of North Dakota have produced a number of sources of sulfur dioxide (SO_2). These sources include coal-fired steam

electrical generating facilities, natural gas processing plants, oil refineries, and flaring oil/ gas wells. As a result, SO_2 has become one of this Department's major concerns in regard to ambient air quality monitoring.

2.0.3.1 Major Point Sources

The major point sources of SO_2 (>100 TPY) are listed in Table 6 along with their emission rates as calculated from the most recent emissions inventory. Map 8 shows the approximate locations of these facilities. In addition to these facilities, there are several major SO_2 sources located near the borders with Montana and Saskatchewan that must be accounted for when considering background levels.

2.0.3.2 Other Sources

The western part of the State has a number of additional sources of SO_2 associated with the development of oil and gas. These sources

TABLE 6

MAJOR SOURCES OF SO_2

#	Name of Company	Type of Source	Location	SO_2 Emissions Ton/Year
1	American Crystal Sugar Company	Sugar Beet Processing	Drayton Pembina Co.	1591.2
2	American Crystal Sugar Company	Sugar Beet Processing	Hillsboro Traill Co.	1731.7
3	American Oil Co. (AMOCO)	Oil Refinery	Mandan Morton Co.	9516.0
4	Aminoil, USA	Natural Gas Processing	Tioga Williams	2920.7
5	Basin Electric Units 1&2 (215 mw/440 mw)	Steam Elec. Gen. Facility (Leland Olds)	Stanton Mercer Co.	8134/22140
6	Basin Electric Units 1&2 (25 mw/25 mw)	Steam Elec. Gen. Facility	Velva McHenry Co.	549/549
7	Grand Forks AFB	Heating Plant	Grand Forks Grand Forks Co.	112.0

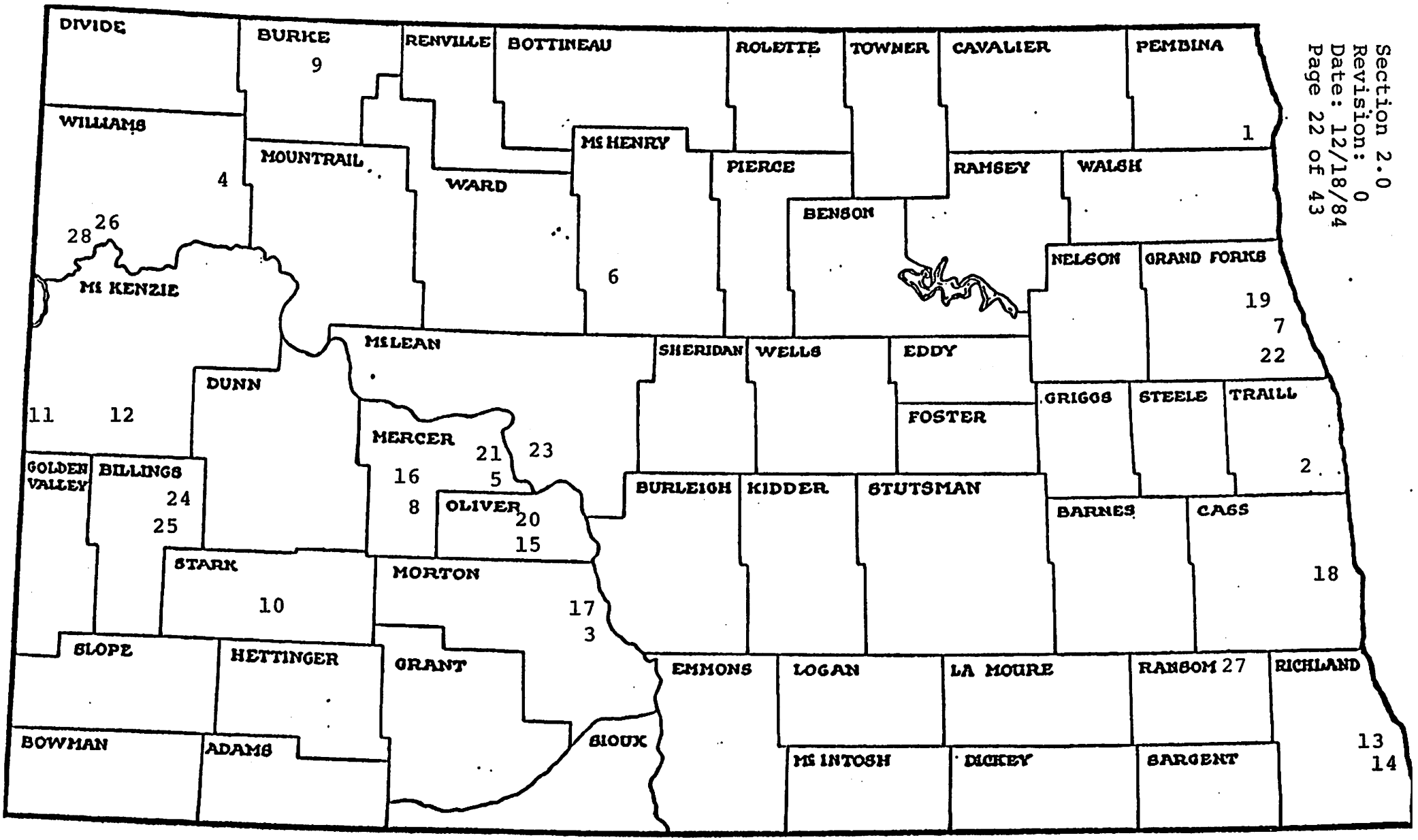
TABLE 6 (Cont.)

#	Name of Company	Type of Source	Location	SO_2 Emissions Ton/Year
8	Coyote Station Unit 1 (440 mw)	Steam Elec. Gen. Facility	Beulah Mercer Co.	16380
9	Cities Service	Natural Gas Processing	Lignite Burke Co.	3347
10	Husky Industries	Charcoal Briquetting Plant	Dickinson Stark Co.	1200.8
11	Koch Hydrocarbon	Natural Gas Processing	Sidney, MT McKenzie Co.	620.5
12	Kerr McGee	Gas Processing Plant	McKenzie Co.	141.1
13	ND State School of Science	Heating Plant	Wahpeton Richland Co.	199.2
14	Minn-Dak Farmers Co-op	Sugar Beet Processing	Wahpeton Richland	600.0
15	Minnkota Power Coop Unit 1 (235 mw)	Steam Elec. Gen. Facility	Center Oliver Co.	10780.0
16	Montana Dakota Utilities	Steam Elec. Gen. Facility	Beulah Mercer Co.	459.9
17	Montana Dakota Utilities Units 1&2 (25 mw/66 mw) (Heskett Station)	Steam Elec. Gen. Facility	Mandan Morton Co.	1694/3518.4[1/]

TABLE 6 (Cont.)

#	Name of Company	Type of Source	Location	SO_2 Emissions Ton/Year
18	NDSU	Heating Plant	Fargo Cass Co.	388.6
19	Simplot Company	Potato Processing	Grand Forks Grand Forks Co.	440.0
20	Square Butte Unit 2 (440 mw)	Steam Elec. Gen. Facility	Center Oliver Co.	17389.6
21	United Power Assoc. Units 1&2 (172 mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	6261
22	UND	Heating Plant	Grand Forks Grand Forks Co.	412.5
23	UPA/CPA Units 1&2 (550 mw/550mw)	Steam Elec. Gen. Facility	Underwood McLean Co.	17201/18946[1/]
24	Warren Petroleum	Natural Gas Processing	Little Knife Field Billings Co.	1057.5
25	Western Gas Processing	Natural Gas Processing	Fairfield Billings Co.	954.2
26	Westland Oil Co.	Oil Refinery	Williston Williams Co.	Not operated
27	National Sun, Ind., Inc.	Sunflower Processing	Enderlin Ransom	211.7
28	Phillips Petroleum	Natural Gas Processing	Williston Williams Co.	2519.1

1/Emissions from Unit 1/emissions from Unit 2

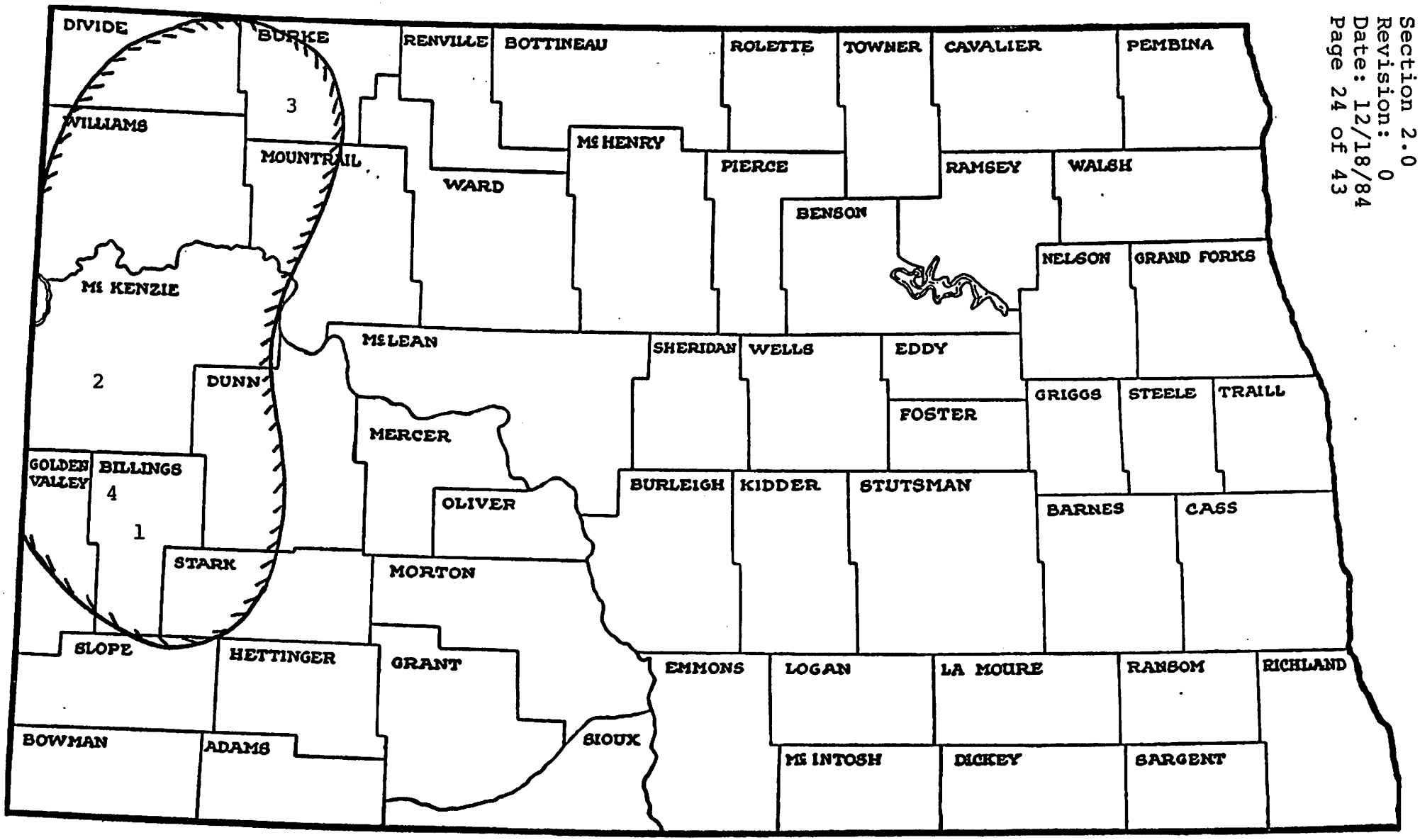


MAP 8
Major Sources of SO_2

include individual oil/gas wells, oil storage facilities, and compressor stations. Emissions from such sources create two potential 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 H_2S can create significant concentrations of SO_2 in the ambient air. Map 9 indicates the area of primary concern for such sources in western North Dakota.

2.0.3.3 Monitoring Network

The SO_2 monitoring sites are listed in Table 7 and Map 10 shows their approximate location. As can be seen, these monitoring sites are concentrated in the vicinity of the oil and gas development in western North Dakota and the coal-fired steam electrical generating plants in the central part of the State. The SO_2 network does not address the multiple sources located in the Red River Valley of eastern North Dakota, but these sources are



MAP 9

Major Oil/Gas Development Area:

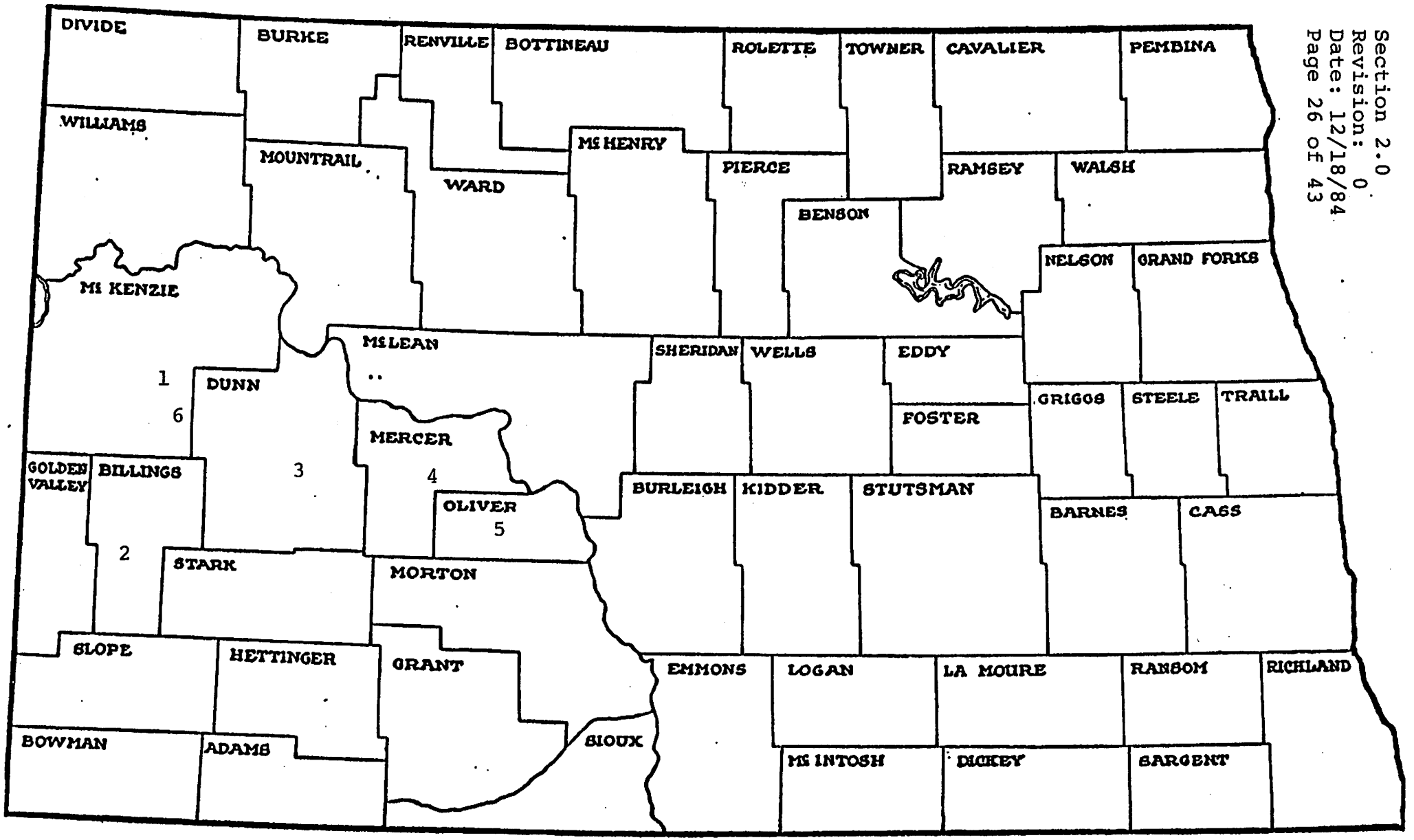
1 Theodore Roosevelt National Park - South Unit
2 Theodore Roosevelt National Park - North Unit
3 Lostwood National Wilderness Area
4 Theodore Roosevelt National Park - Elkhorn Ranch Unit

TABLE 7

CONTINUOUS MONITORING SITES*

Name	Pollutant Monitored	Type Station
1. Theodore Roosevelt National Park - North Unit	SO_2 H_2S O_3	SLAMS
2. Theodore Roosevelt National Park - South Unit	SO_2	SLAMS
3. Dunn Center	SO_2 NO/NO_2 O_3	SLAMS
4. Beulah	SO_2 NO/NO_2	SLAMS
5. Hannover**	SO_2	SPM
6. Lone Butte (Portable)	SO_2 H_2S	SPM

*All continuous sites have wind measuring equipment.
**Established 10/4/84.



MAP 10
Continuous Monitoring Sites

relatively small (the sum of their SO_2 emissions is approximately equal to the SO_2 output of the Heskett Station (source #17 - Table 6) which is one of the smallest coal-fired steam electrical generating plants in the state).

2.0.3.4 Network Revisions

The SO_2 monitor at the Hannover site was moved from the Falkirk site in McLean County on September 25, 1984 and began monitoring on October 4, 1984. The Falkirk site had been operated for about one year and the monitoring results were deemed insignificant. The new site near Hannover was chosen on the basis of computer generated dispersion modeling analyses and is centrally located in respect to several electrical generating plants and the Great Plains Coal Gasification plant near Beulah, North Dakota.

The SO_2 monitor currently located in the South Unit of the Theodore Roosevelt National

Park is not in a good location. There are terrain features nearby that severely affect its representativeness. As a result, the SO_2 monitoring site at the South Unit will be moved to a location near the Painted Canyon Visitor's Center. The Department is negotiating with the National Park Service to have them install and operate their own SO_2 monitor and wind equipment at the new Painted Canyon location. This would make available the Department's SO_2 monitor, which is located in a portable trailer, for use in pinpointing trouble spots around the perimeter of the Park. The Park Service has responded favorably to this proposal, but final details still have to be worked out. In any case, relocation of the monitoring site will be completed in the Spring of 1985.

2.0.4 Hydrogen Sulfide

Although no Federal Ambient Air Quality Standards exist for hydrogen sulfide (H_2S), the State of North Dakota has adopted a half-hour H_2S standard.

H_2S emissions in the State stem almost totally from the oil and gas operations in the western part of the State and principally from the area outlined on Map 9. Individual oil/gas wells, oil storage tanks, compressor stations, and natural gas processing plants are all potential sources of H_2S emissions.

2.0.4.1 Monitoring Network

There are only two monitoring sites for H_2S emissions. These are the TRNP-NU and the portable site at Lone Butte (locations 1 and 6 in Table 7 and on Map 10).

2.0.4.2 Network Revisions

If the monitoring trailer currently at the South Unit of Theodore Roosevelt National Park becomes available as a portable unit, it is the Department's intention to also equip it with an H_2S monitor. No other revisions are foreseen in the near future.

2.0.5 Nitrogen Oxides

Nitrogen oxide (NO_x) is the term used to represent both nitric oxide (NO) and nitrogen dioxide (NO_2). In North Dakota the primary sources of NO_x are the coal-fired steam electrical generating plants, and automobiles and other internal combustion engine sources. NO_2 is formed when NO is oxidized.

2.0.5.1 Point Sources

Most major point sources of NO_x in North Dakota are associated with the development of large reserves of lignite coal in the west-central portion 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 8. Map 11 shows the approximate locations of these facilities.

In addition to the major sources of NO_x located within the State, impact on air quality from certain sources located outside

TABLE 8

MAJOR SOURCES OF NO_X

#	Name of Company	Type of Source	Location	NO_X Emissions Ton/Year
1	American Crystal Sugar Company	Sugarbeet Processing	Hillsboro Traill Co.	341.5
2	American Oil Company (Amoco)	Oil Refinery	Mandan Morton Co.	3876.0
3	Aminoil, USA	Natural Gas Processing	Tioga Williams Co.	2553.0
4	Basin Electric Units 1 & 2 (216mw/440mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	6544/9777[1/]
5	Basin Electric Units 1 & 2 (25mw/25mw)	Steam Elec. Gen. Facility	Velva McHenry Co.	804/804
6	Coyote Station Unit 1 (440mw)	Steam Elec. Gen. Facility	Beulah Mercer Co.	10920
7	Minnkota Power Coop Unit 1 (235mw)	Steam Elec. Gen. Facility	Center Oliver Co.	10780.0
8	Montana Dakota Utilities Units 1 & 2 (25mw/66mw)	Steam Elec. Gen. Facility	Mandan Morton Co.	452/938.2[1/]
9	Square Butte Unit 1 (440mw)	Steam Elec. Gen. Facility	Center Oliver Co.	17389.6

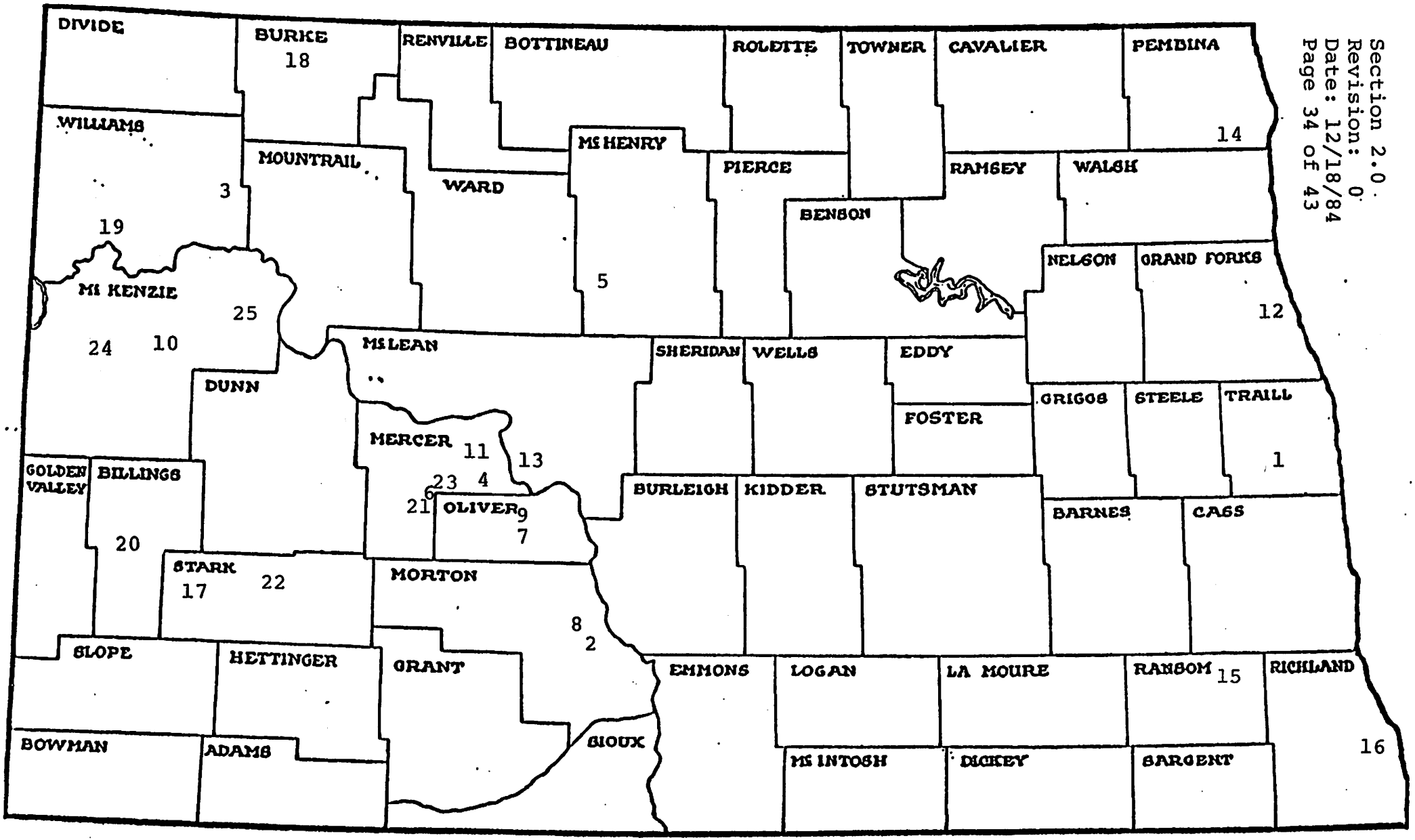
TABLE 8 Cont.

#	Name of Company	Type of Source	Location	NO_x Emissions Ton/Year
10	True Oil Company	Gas Processing Plant	Watford City McKenzie Co.	243.4
11	UPA Stanton Units 1 & 2 (172mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	10361
12	UND	Heating Plant	Grand Forks Grand Forks Co.	165
13	UPA/CPA Units 1 & 2 (550mw/550mw)	Steam Elec. Gen. Facility	Underwood McLean Co.	12509/13780[1/]
14	American Crystal Sugar Company	Sugar Beet Processing	Drayton Pembina Co.	473.1
15	National Sun Industries, Inc.	Sunflower Processing	Enderlin Ransom Co.	432.7
16	Minn-Dak Farmers Coop	Sugar Beet Processing	Wahpeton Richland Co.	600.0
17	Montana Dakota Utilities Belfield (2-1100 hp station compressors)	Compressor Station	Stark Co.	228.2
18	Cities Service	Natural Gas Processing	Lignite Burke Co.	364.0
19	Phillips Petroleum	Natural Gas Processing	Trenton Williams Co.	172.3
20	Western Gas Processors, Ltd.	Mystery Creek Compressor Station	Billings Co.	280.7

TABLE 8 Cont.

#	Name of Company	Type of Source	Location	NO_x Emissions Ton/Year
21	Basin Electric Power Coop AVS Beulah Unit 1	Steam Elec. Gen. Facility	Beulah Mercer Co.	2757
22	Husky Industries	Charcoal Briquetting Plant	Dickinson Stark Co.	110.5
23	Montana Dakota Utilities	Steam Elec. Gen. Facility	Beulah Mercer Co.	122.6
24	Koch Hydrocarbon Company	12 Compressor Stations		750.1
25	Aminoil USA, Inc.	Compressor Stations:		
		Hawkeye		205.3
		Blue Butte		160.0
		Cherry Creek		174.2

1/Emissions from Unit 1/emissions from Unit 2



MAP 11
Major Sources of Nitrogen Oxides

the State have also drawn attention. The Boundary Dam power complex located near Estevan, Saskatchewan is one such source.

2.0.5.2 Area Sources

As indicated earlier, a second major source of oxides of nitrogen is attributed to sources in urban areas, specifically automobile emissions. The EPA has specified a design criteria requiring nitrogen dioxide monitoring in urbanized areas with populations greater than 100,000. North Dakota has no significant urbanized areas with regard to oxides of nitrogen.

2.0.5.3 Monitoring Network

The Department currently operates two NO/NO_2/NO_x analyzers in the State. These are located at Dunn Center and Beulah (sites 3 and 4 in Table 7 and on Map 10).

2.0.5.4 Network Revisions

An additional $NO/NO_2/NO_x$ analyzer is being procured and will be installed at the new Hannover site (#5 - Table 7) when it arrives.

2.0.6 Ozone

Unlike most other pollutants, ozone (O_3) is not emitted directly into the atmosphere but results from a complex photochemical reaction between organic compounds (HC), oxides of nitrogen (NO_x), and solar radiation. Both HC 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. Under proposed revisions to 40 CFR 58, the O_3 monitoring season for North Dakota would be May 1 to September 30.

2.0.6.1 Point Sources

Table 9 lists the major point sources of HC emissions in the State (>100 TPY). Map 12 shows the approximate locations of these facilities.

2.0.6.2 Area Sources

Point sources generally contribute only a fraction of the total HC 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.

2.0.6.3 Monitoring Network

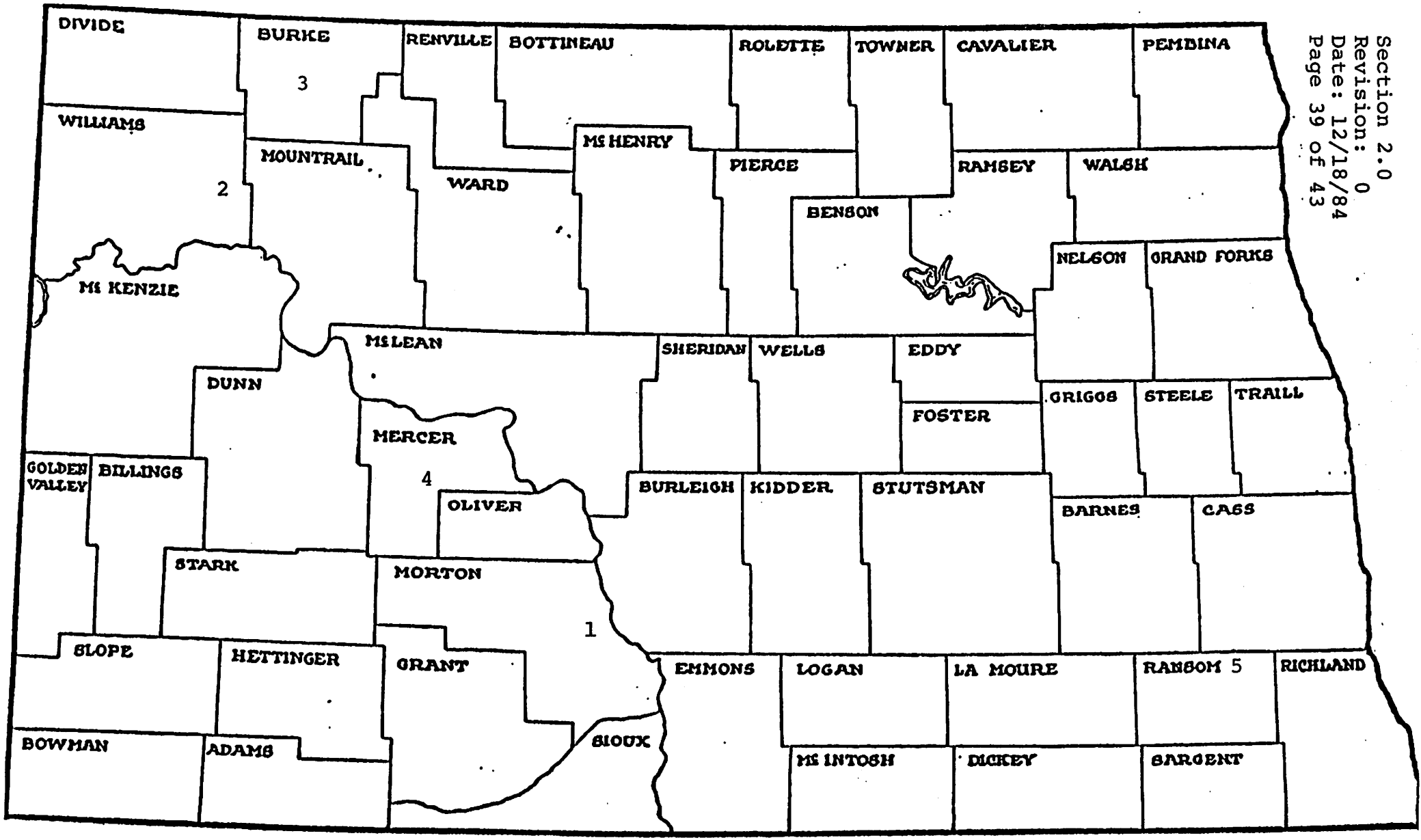
The State currently has two continuous ozone analyzers in operation. One analyzer is at Dunn Center (#3 - Table 7) and the other is

TABLE 9

MAJOR HC SOURCES

#	Name of Company	Type of Source	Location	HC Emissions Ton/Year
1	American Oil Company (Amoco)	Oil Refinery	Mandan Morton Co.	21,695.0
2	Aminoil, USA	Natural Gas Processing	Tioga Williams Co.	811.8
3	Cities Service	Natural Gas Processing	Lignite Burke Co.	144.0
4	Montana Dakota Utilities Coyote Station	Steam Elec. Gen.	Beulah Mercer Co.	970.0
5	National Sun Industries, Inc.	Sunflower Processing	Enderlin Ransom Co.	461.7
	*Koch Hydrocarbon Company	12 Compressor Stations		309.0

*Not shown on map because of wide geographical distribution.



MAP 12

Major HC Emitting Facilities

at Theodore Roosevelt National Park - North Unit (#1 - Table 7).

2.0.6.4 Network Revisions

We currently have an O_3 analyzer in for repair. Upon its return, we will put that analyzer at the new Hannover site (#5 - Table 7) for the beginning of the 1985 ozone monitoring season (May 1, 1985).

2.0.7 Carbon Monoxide

Carbon monoxide (CO) has been determined to be generated chiefly by automotive sources. As such, high CO concentrations are generally found near major roadways and intersections which exhibit traffic flow problems and where atmospheric ventilation is poor.

2.0.7.1 Monitoring Network

Due to the fact that computer dispersion modeling has shown no problems with regard to compliance with the Ambient Air Quality

Standards, and the EPA has specified an urban area with a population density of 500,000 or greater as the primary criteria for identifying and establishing a CO monitoring network, no air quality monitoring for CO is currently being conducted.

2.0.7.2 Network Revisions

No changes are deemed necessary at this time.

2.0.8 Lead

The Federal Register provides regulatory guidelines for the establishment of a NAMS/SLAMS ambient lead monitoring network for urbanized areas with a population of over 500,000. North Dakota has no urbanized areas of 500,000 or greater, and we have determined that we do not have any significant point sources of lead. As a result, analysis of the TSP filters for lead was ceased effective January 1, 1984.

2.0.9 Suspended Sulfates and Nitrates

Although there are no Federal Ambient Air Quality Standards for either suspended sulfates (SO_4) or suspended nitrates (NO_3), both pollutants continue to be a concern to the Division of Hazardous Waste Management and Special Studies of the North Dakota State Health Department. Their concern primarily stems from the relationship of these pollutants to precipitation chemistry. In addition, North Dakota does have an ambient air quality standard for SO_4.

2.0.9.1 Monitoring Network

Because SO_4 and NO_3 are analyzed from the same filters as are used for TSP monitoring, monitoring for both of these pollutants has been incorporated into the TSP monitoring schedule and is conducted at each of the TSP monitoring sites discussed in Section 2.0.1.

2.0.9.2 Network Revisions

The same network changes that were discussed in regard to TSP in Section 2.0.1.7 apply to SO_4 and NO_3.

In addition, because of the controversy regarding artifact formation on glass fiber filters and the asserted invalidity of SO_4 and NO_3 data, the Department will be establishing three collocated samplers at Dunn Center, TRNP-N, and Hannover in 1985. These duplicate samplers will be equipped with quartz fiber filters which will be analyzed concurrently with the glass fiber filters to try to quantify artifact development in North Dakota. These sites were selected because they also have continuous SO_2 analyzers.

3.0 MONITORING SITE EVALUATION

The following table (Table 10) presents an evaluation of the monitoring sites discussed in this review:

TABLE 10

MONITORING SITE EVALUATION

Site	Parameter	Meets Needs	Modification Needed	New Site Needed	Parameter Not Needed
Alice Rural	TSP			X	
	SO_4			X	
	NO_3			X	
Ardoch Rural	TSP			X	
	SO_4			X	
	NO_3			X	
Berwick Rural	TSP			X	
	SO_4			X	
	NO_3			X	
Beulah Residential	TSP	X			
	SO_4	X			
	NO_3	X			
	SO_2	X			
	NO_2	X			
	MET	X			
Bismarck Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
	PM_{10}	X			
Bowman Rural	TSP	X			
	SO_4	X			
	NO_3	X			
Canfield Lake (SPM)	TSP	X			
	SO_4	X			
	NO_3	X			
Devils Lake Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
Dickinson Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
Dunn Center Rural	TSP	X			
	SO_4*	X			
	NO_3*	X			
	PM_{10}	X			
	SO_2	X			
	NO_2	X			
	O_3	X			
	MET	X			

*Artifact study using collocated sampler with Quartz filter.

TABLE 10 Cont.

Site	Parameter	Meets Needs	Modification Needed	New Site Needed	Parameter Not Needed
Fargo Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
	PM_{10}	X			
Grand Forks Commercial	TSP		X		
	SO_4		X		
	NO_3		X		
	PM_{10}		X		
Hannover (SPM)	TSP	X			
	SO_4*	X			
	NO_3*	X			
	SO_2	X			
	NO_2		X Add		
	O_3		X Analyzers		
	MET	X			
Jamestown Residential	TSP			X	
	SO_4			X	
	NO_3			X	
Lake Tschida Rural	TSP				X
	SO_4				X
	NO_3				X
Lostwood Rural	TSP	X			
	SO_4	X			
	NO_3	X			
Mandan Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
Mandaree Rural	TSP				X
	SO_4				X
	NO_3				X
Minot Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
Moffit Rural	TSP	X			
	SO_4	X			
	NO_3	X			

*Artifact study using collocated sampler with Quartz filter.

TABLE 10 Cont.

Site	Parameter	Meets Needs	Modification Needed	New Site Needed	Parameter Not Needed
Portable Unit (SPM) (Western ND oil/gas Area Network)	SO_2		X Additional		
	H_2S		X Sites Needed		
	MET		X		
TRNP-N Rural	TSP	X			
	SO_4*	X			
	NO_3*	X			
	SO_2	X			
	O_3	X			
	H_2S	X			
	MET	X			
TRNP-S Rural	TSP			X	
	SO_4			X	
	NO_3			X	
	SO_2			X	
	MET			X	
Valley City Residential	TSP				X
	SO_4				X
	NO_3				X
Wahpeton Residential	TSP	X			
	SO_4	X			
	NO_3	X			
Williston Commercial	TSP		X		
	SO_4		X		
	NO_3		X		
	PM_{10}		X		
Woodworth (SPM)	TSP	X			
	SO_4	X			
	NO_3	X			
	Pb	X			
	PM_{10}	X			

*Artifact study using collocated sampler with Quartz filter.

APPENDIX A

Industrial AAQM Networks

As was previously mentioned, the State's air quality monitoring network presently does not include source specific monitoring. The Department, in issuing Permits to Construct and Permits to Operate to new major sources, requires industry to establish air quality monitoring networks to assess each source's impact on air quality. The scope of each industrial monitoring plan is developed on a case-by-case basis between the source and the Department. Parameters to be measured are determined by analysis of expected pollutant emissions. The location(s) of the various monitors are based on computer generated air dispersion modeling predictions of maximum (worst-case) ground level concentrations and a comparison of these values with the various Ambient Air Quality Standards and PSD increments.

A detailed description of each industrial monitoring program is provided in Table A. Map A shows the general locations of these industries.

TABLE A

CURRENT INDUSTRIAL AAQM SITES (OCT 1984)

Industry	Site No.	Comments	Parameters Monitored	Started Monitoring	Stopped Monitoring	Ref./Equiv. Method Designation	Representative
WARREN PETROLEUM (GRI)[1] (PSD)	1		SO_2	9-28-78		SO_2 - Meloy SA285E H_2S - Meloy SA285E MET - Weathertronics	Ms. Lynn Reed Box 1589 Tulsa, OK 74102 (918)560-4119
	2		SO_2	10-27-78			
	3	(MET moved to Site 3 on 9-81 from Plant)	SO_2, H_2S, WS, WD, Bar.P., TEMP	10-28-78 10-29-78			
RAMP - Antelope Valley Coyote ANG (GRI)[1] (PSD)	1		TSP,Sulfates,Nitrates SO_2,NO/NO_2,O_3	8-1-79		TSP-Hi-Vol SO_2-TECO 43 NO/NO_x-Mon.Labs 8440 O_3-Mon.Labs 8410 MET-Climatronics - - - - - - - - - - - NOTE: Fluorides, Part.ΔPh,Sulfuric Acid mist, & Sulfation Rate Stopped on 6-30-81	Keith Ganzer Basin Elec. Power Co-op. 1717 E. Interstate Ave. Bismarck, ND 58501 (701)223-0441
	2	Collocated	TSP,Sulfates,Nitrates SO_2,NO/NO_2,WD,WS, TEMP,Bar.P.,Solar Rad, ΔT,SIGMA WD	8-1-79			
	3		TSP,Sulfates,Nitrates SO_2,NO/NO_2	8-1-79			
	4		TSP,Sulfates,Nitrates SO_2,NO/NO_2,O_3	8-1-79			
	5		TSP,Sulfates,Nitrates SO_2,NO/NO_2	8-1-79			
FALKIRK MINE (Roach Entr)[1] (PSD)	1	Collocated	TSP	9-79		TSP-Hi-Vol Dustfall terminated 9-30-81	Ms. Andrea Stomberg Kirkwood Office Tower Bismarck, ND 58501 (701)258-2200
	2		TSP	9-79	1-31-83		
	3		TSP	9-79	12-20-80		
	3A		TSP	3-1-81			
	4		TSP	9-79			
	5		TSP	9-1-81			
	6		TSP	5-1-83			

TABLE A (Cont.)

CURRENT INDUSTRIAL AAQM SITES (OCT 1984)

Industry	Site No.	Comments	Parameters Monitored	Started Monitoring	Stopped Monitoring	Ref./Equiv. Method Designation	Representative
COTEAU MINE (Roach Entr)[1]	1		TSP	2-21-80		TSP-Hi-Vol	Ms. Andrea Stomberg
	2	(Collocated) (thru 1-31-83)	TSP	2-21-80	1-31-83	dustfall from 4-1-80 to 6-30-81	Kirkwood Office Tower
(PSD)	2A		TSP	5-1-83			Bismarck, ND 58501 (701)258-2200
	3	(Collocated) (Starting 5-1-83)	TSP	7-14-80			
KNIFE RIVER MINE (WEATHER MOD. INC.)[1]	1	North-Collocated	TSP	6-20-80		TSP-Hi-Vol	Douglas Davison 1915 N. Kavaney Bismarck, ND 58501 (701)223-1771
	2	West	TSP	8-7-80	12-27-83		
(PSD Expansion)	3	East	TSP	6-20-80			
WESTERN GAS PROCESSORS (GRI)[1]	1		SO_2	7-29-81		SO_2-TECO 43 MET-	Brion G. Wise 10701 Melody Northglen, CO 80234 (303)452-5603
	2	(At Plant)	WS,WD,TEMP	7-14-81			
(PSD)							
KOCH HYDROCARBON (W.E.S.T.)[1]	1		SO_2	7-29-81		SO_2-TECO 43	Robert Viaille Box 2256 Wichita, KS 67201 (316)832-5500
			H_2S	10-07-81		H_2S-TECO 43/340(45)	
			WS,WD,TEMP	7-14-81		MET-Climatronics	
	2	(Sites 2&3 terminated 7-82 to 4-83)	H_2S	12-02-81			
(PSD)	3		SO_2	7-29-81			
PHILLIPS (GRI)[1]	1	(At Plant)	H_2S	9-1-81		SO_2-TECO 43	Tom Davis Bartlesville, OK (918)661-3088
			WS,WD,TEMP,DEW PT. Solar Rad,PRECIP,Bar. Press.	8-21-81		H_2S-TECO 45 MET-Climatronics	
	2		SO_2	8-21-81			
(PSD)							
AMOCO REFINERY MANDAN (INTERPOLL)[1]	1	Proposed	SO_2	11-2-83		SO_2-TECO 43	Don Litchfield Amoco Oil Co. Mandan Refinery P.O. Box 549 Mandan, ND 54554 (701)667-2400
			WS,WD,TEMP,STAB.			MET-	
			SO_2				

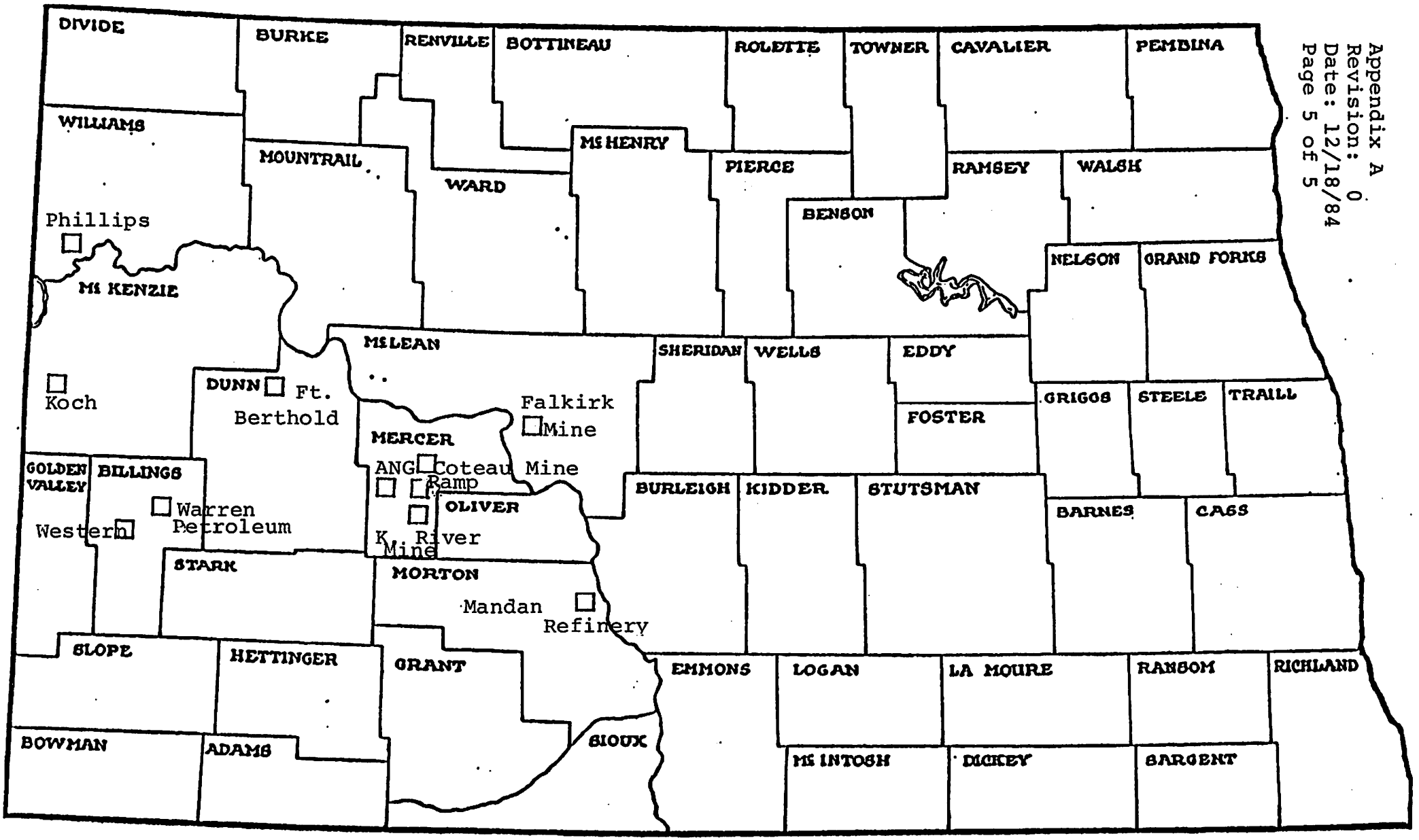
TABLE A (Cont.)

CURRENT INDUSTRIAL AAQM SITES (OCT 1984)

Industry	Site No.	Comments	Parameters Monitored	Started Monitoring	Stopped Monitoring	Ref./Equiv. Method Designation	Representative
FT. BERTHOLD* INDIAN RESERVATION (GRI) 1/	1		TSP SO_2 H_2S WS,WD,TEMP	8-1-82 8-1-82 4-1-83 8-1-82		TSP-Hi-Vol SO_2-TECO 43 H_2S-TECO 45 MET-	Rich Schilf Ft. Berthold Res. Nat. Resources Dept. P.O. Box 460 New Town, ND 58763 (701)627-3620
AMERICAN NATURAL GAS (GRI) 1/ (PSD)	1		H_2S	5-1-83		H_2S-TECO 45	Danny R. Guminski ANG Coal Gas. Co. Great Plains Gas. Associates P.O. Box 1149 Beulah, ND 58523 (701)873-6603

*Not Required to Monitor.

1/ Consultant



☐ Operational Monitoring Network

MAP A

Industry Ambient Air Quality
Monitoring Network