UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80295-0699

September 28, 1983

Ref: 8ES-FO

Dana K. Mount, Director
Division of Environmental Engineering
North Dakota Department of Health
1200 Missouri Avenue
Bismarck, North Dakota 58501

Dear Dana:

This is to respond to your 1983 Network Review received on July 1, 1983. Although this report meets the requirements of 40 CFR 58 and the FY 1983 SEA, my comments include some suggestions on how it may be improved while reducing the work involved.

Both the 1982 and 1983 Network Reviews were reviewed along with the 1981 and 1982 annual SLAMS data reports. My comments are based on the review of all these reports, and conversations between Kevin Kiemele and Marlin Helming during the week of September 6-12, 1983.

As you mentioned in your cover letter, the 1983 Network Review was written in the same format as the 1982 review. Both reviews use unclear terms such as "evaluate the need", and "review the need" in the summary sections. Both reviews show indecisiveness. An example is the decision to use a cut-off population of 10,000 for TSP population-oriented sites. In one part of the review it appears the decision was made, but in the summary section there appears to be indecision regarding the implementation of the cut-off point decision. Will the TSP sites in Devils Lake and Valley City, which do not meet the cut-off point of 10,000, be shut down or not? There is uncertainty regarding the lead monitoring in North Dakota. The 1982 review stated that the lead monitoring would be discontinued on December 31, 1982. Now the 1983 review states the lead monitoring will be discontinued on December 31, 1983. We agree that discontinuance of lead monitoring in North Dakota is justified and recommend that it not be delayed further.

Much of the Network Review elaborated on the concerns regarding current and future oil, gas and coal mining and other energy activities and the effects of these activities on the quality of North Dakota air. The thrust of the review seems to be to expand monitoring, particularly continuous activities, but the availability of resources is uncertain. When resources are limited it is important to review past data to determine if the existing monitors are producing data which justify their continuance. The 1981 and 1982 SLAMS data report for NO_2 at Beulah indicates an annual arithmetic mean

of 0.005 ppm for 1981 and 0.002 ppm for 1982. The Dunn Center site produced an arithmetic mean of 0.000 ppm for both 1981 and 1982. A review of the 1981 and 1982 SLAMS data for SO_2 reveals similar results. I believe there is a need to evaluate your past data. One purpose of the annual network review is to determine if existing monitoring is meeting its objectives or if it should be discontinued or relocated. It will be hard to justify approving additional monitoring resources when there is evidence that current resources are not being used effectively.

In thinking about the 1984 Network Review (which will be due on April 1, 1984), you need to develop criteria for evaluating data from existing monitors in your SLAMS network and the Industrial Network. Also, develop a review process that produces a more definitive report and implements the definitive conclusions to increase the credibility of the report.

I suggest the 1984 Network Review be put into document control format (much like the QA Plan). This would relieve some of the burden on your staff and allow you to document network changes as they occur rather than do a complete rewrite each year. I think this approach would enable the Network Review to avoid becoming an exercise in bureaucratic paper shuffling and be what it is supposed to be -- an annual opportunity for North Dakota and EPA to take an overall look at the network as required by 40 CFR 58 (58.25 System modification). Marlin Helming and I will be happy to discuss this approach with your staff.

If you have any questions, please contact Marlin at 303-234-6849.

Sincerely

Keith

Keith Tipton, Chief
Air Operations Section
Field Operations Branch
Environmental Services Division

cc: Bob DeSpain, 8AW-AP
Ken Lloyd, 8A
Marshall Payne, ES-FO

June 29, 1983

Mr. Keith Tipton
U.S. EPA
Region VIII
1860 Lincoln Street
Denver, CO 80295

Re: 1983 Annual Network Review

Dear Mr. Tipton:

In accordance with the requirements specified under activity/output 11-A of the 1983 State/EPA Agreement Air Quality Media Workplan, enclosed please find a copy of the North Dakota Air Quality Monitoring Annual Network Review for 1983.

Please note that this review has been written in the same format as the 1982 review for ease of comparison.

If you have any questions concerning this update or desire additional information or clarification, please feel free to contact this Department.

Sincerely,

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

DKM/KDK:saj
Encl:

NORTH DAKOTA STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL ENGINEERING

AMBIENT AIR QUALITY MONITORING
ANNUAL NETWORK REVIEW
1983

May 1, 1983

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A. INTRODUCTION

I. Background

The North Dakota State Department of Health, Division of Environmental Engineering (DEE) 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 statewide network of ambient air quality monitors and requires major industrial pollution sources to operate source specific ambient air quality monitoring networks.

To evaluate the effectiveness of the Division's air quality monitoring network, an ambient air quality monitoring network review was initiated in 1979.

The review is updated annually to provide a current, comprehensive evaluation of air quality monitoring activities in North Dakota. When compared to the previous review and existing network, a basis should be evident for additions, deletions or revisions to the network to assure that specific needs or purposes for monitoring are met and that the network is operated as efficiently as possible.

II. Goals and Objectives

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

1. To determine the highest pollutant[1/] concentrations expected to occur in an area covered by the network.

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

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 or 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 a sample of monitored air with a spatial scale most appropriate for the monitoring objective. Spatial scales of representativeness of most interest, as specified by EPA, are:

Micro - dimensions ranging from meters up to 100 meters.

Middle - areas up to several city blocks with dimensions ranging from about 100 meters to 0.5 km.

Neighborhood - city areas of relatively uniform land use with dimensions of 0.5 to 4.0 km.

Urban - Overall, city-wide dimensions on the order of 4.0 to 50.0 km. Usually requires more than one site for definition.

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

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

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:

Criteria Pollutant	Siting Scales
TSP	middle, neighborhood, urban, regional
SO_2	middle, neighborhood, urban, regional
CO	micro, middle, neighborhood
O_3	middle, neighborhood, urban, regional
NO_2	middle, neighborhood, urban
Pb	micro, middle, neighborhood, urban, regional

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. Further siting detail can be found in Appendix D to 40 CFR 58.

III. Siting Criteria

As can be gathered from the prior discussion, each air contaminant has characteristics which make the siting of monitoring equipment for its measurement unique. The difference in siting criteria for various air contaminant measurements may be the result of variations in the source or sources of the pollutant in question, the height of emission,

the distance of dispersion of the pollutant, or interaction with other pollutants.

To determine the highest concentration expected to occur in an area, or the effect of the interaction of emissions from a number of sources, an emission inventory of sources should be compiled and dispersion modeling performed. Where emission inventory and dispersion modeling information is available, it is referenced under the discussion for each pollutant.

To determine representative concentrations in areas of high population density, population centers have been identified and are discussed in Part B. TSP concentrations in cities of less than 10,000 people have not been deemed high enough to be of concern for population exposure monitoring. Cutoff points for other air contaminants have not yet been established. As such, the nature and extent of monitoring in these areas for other air contaminants is determined by the predicted impact of emissions from significant point sources and the need for background or other special data.

Sources 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 determined by analysis of expected pollutant emissions and specific locations for the various monitors are based on dispersion modeling results, published monitoring guidelines and agency judgement.

A description of current industrial monitoring programs is provided in Appendix A.

Areas not directly impacted by major sources are generally chosen for background monitoring. Background particulate concentrations can be considered a function of geography, land use, meteorology and climatology. Experience has shown that background particulate concentrations in areas with comparable terrain tend to be similar and that annual and seasonal variations can be noted.

In summary, the following list indicates those points to be considered during an annual network review:

1. Are present monitoring sites currently located where they will provide data which will meet

the basic monitoring objectives specified earlier?

2. Is the present number of stations adequate for providing complete statewide monitoring coverage?

3. Are any air monitoring sites no longer producing useful information?

4. Are instrument and sampling probes properly sited for air quality measurements?

5. Does monitoring equipment at each site conform to EPA reference/equivalent methods?

6. Does present meteorological monitoring meet data needs and accurately represent weather conditions for the site(s)?

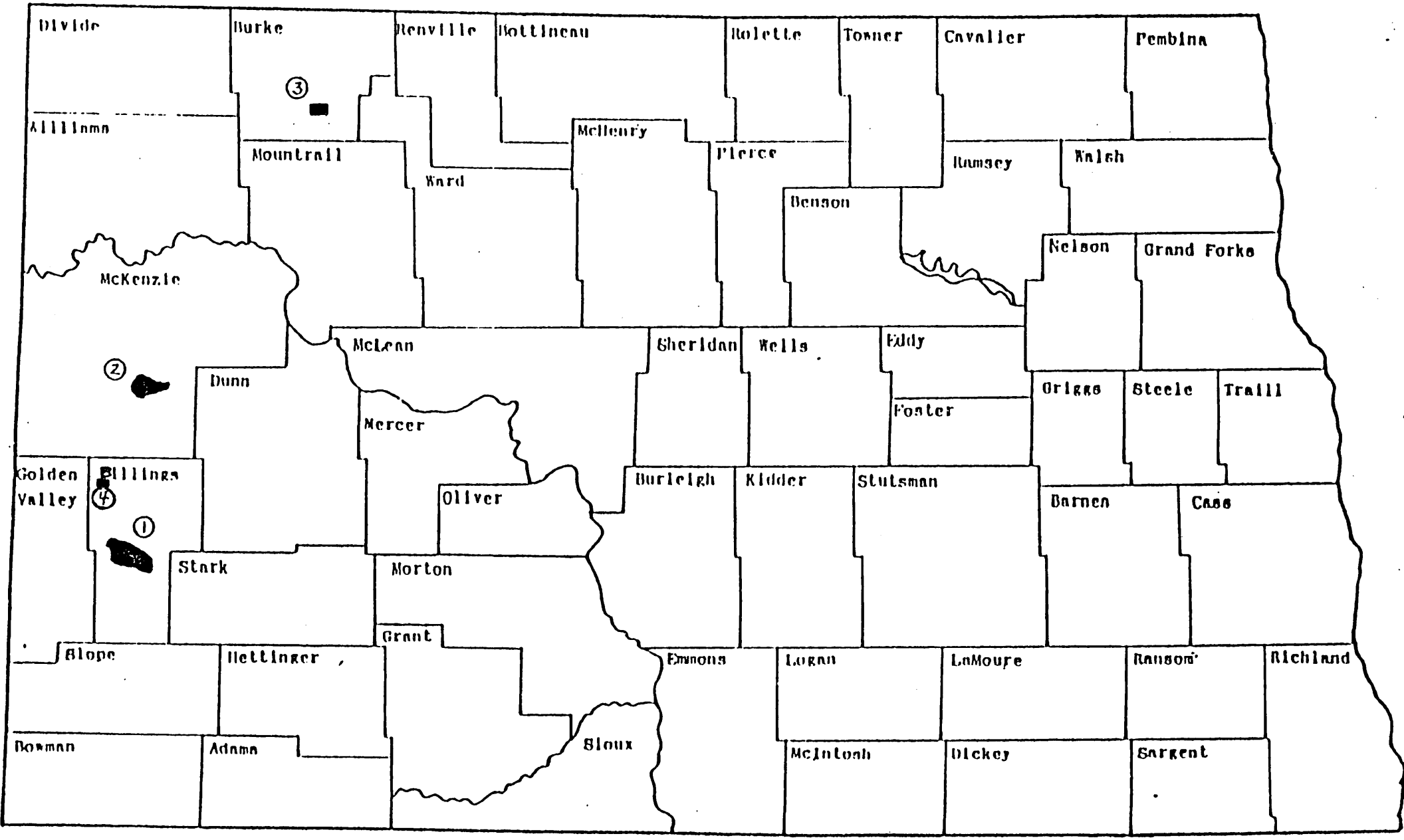
IV. PSD Class I Areas and Air Quality Maintenance (AQM) Areas

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).

On December 5, 1974, the U.S. EPA, promulgated 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.

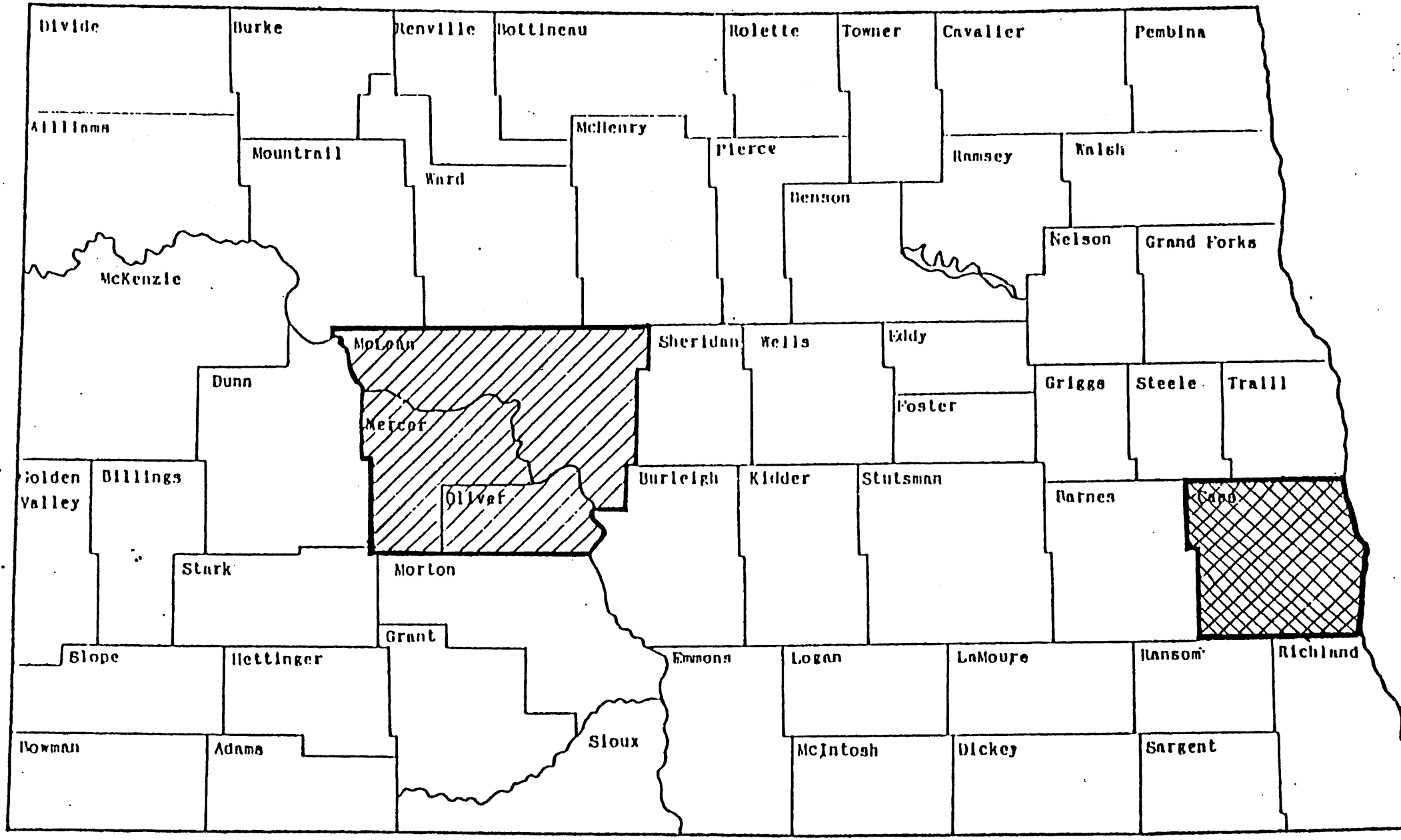
The Clean Air Act Amendments of 1977 established a list of Federally mandated Class I areas. The areas in North Dakota which were included on this list were the Theodore Roosevelt National Park (TRNP) and the Lostwood National Wilderness Area. These areas are shown on Map 1.

On June 5, 1974, the State Implementation Plan for North Dakota designated two air quality maintenance areas (AQMA). As shown on Map 2, the areas are Cass County AQMA and the McLean-Mercer-Oliver County AQMA. Cass County was designated an AQMA for TSP only and the McLean-Mercer-Oliver County area was designated an AQMA for TSP, SO_2, NO_2 and O_x. Cass County was designated an AQMA for TSP due to current air quality and projected growth. The McLean-Mercer-Oliver County area was designated an AQMA due to 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.)



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

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



MAP 2

Designated Air Quality Maintenance Areas (AQMA)

Cass County AQMA

McLean-Mercer-Oliver Co. AQMA

As with the previous review, data is needed to address those contaminants for which the areas were listed as AQMA's.

V. Current State AAQM Network

The Department presently maintains and operates a statewide ambient air quality monitoring network comprised of 20 stationary monitoring sites: 8 rural and 12 urban sites. In addition, two special purpose monitoring (SPM) sites (one portable) are also a part of the network. Map 3 shows the network site locations and Table 1 lists the type of stations and parameters measured.

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

At present, the State's ambient air quality monitoring network does not include source specific monitoring. The Department, in issuing Permits to Construct and Permits to Operate to new major sources, requires such sources to establish source specific air quality monitoring programs to assess the impact on the air quality.

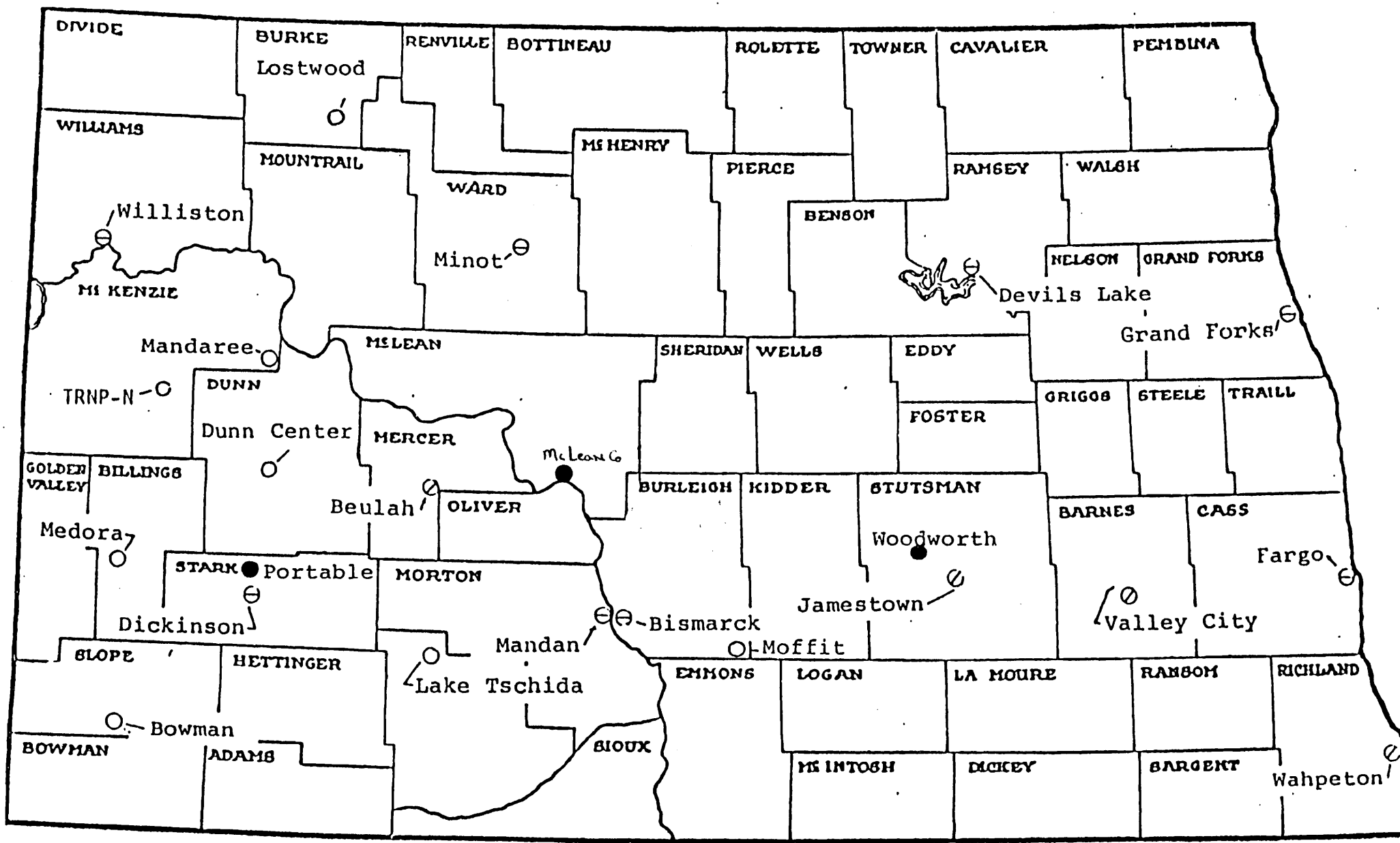
TABLE 1
North Dakota State Department of Health
Ambient Air Quality Monitoring Network Description

Site	Type Station	SAROAD I.D. No.	Parameters[1] Monitored	Ref/Equiv Method Designation No.	Operating Schedule	Monitoring Objective	Spatial Scale	Date Site Began or is Expected to Begin Operation	Date Q.A. Procedures are Expected to Begin	Date Site is Expected to Meet Probe Siting Criteria
Fargo-Commercial	NAMS	350400001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/64	5/80	Presently meets criteria
Fargo-Commercial Dup.		350400001F09	TSP	Hi-vol	6th day	Co-located hi-vol		4/80	5/80	Presently meets criteria
Beulah-Residential	SLAMS	350760001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	4/74	5/80	Presently meets criteria
			SO_2	EQSA-0276-009	cont	Population Exposure	Neighborhood	4/80	7/80	Presently meets criteria
			NO_2	RFNA-0777-022	cont	Population Exposure	Neighborhood	6/80	7/80	Presently meets criteria
			O_3	RFOA-1075-004	cont	Population Exposure	Neighborhood	6/80	7/80	Presently meets criteria
			Met	N/A[2]	cont	N/A	N/A	4/80	7/80	N/A[3]
Bismarck-Commercial	SLAMS	350100001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/57	5/80	Presently meets criteria
Bismarck-Commercial Dup.		350100003F09	TSP	Hi-vol	6th day	Co-located hi-vol		10/79	5/80	Presently meets criteria
Bowman-Rural	SLAMS	350160001F03	TSP	Hi-vol	6th day	General Background	Regional	9/74	5/80	Presently meets criteria
Moffit-Rural	SLAMS	350200002F03	TSP	Hi-vol	6th day	General Background	Regional	7/80	7/80	Presently meets criteria
Devils Lake-Commercial	SLAMS	350260001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/70	5/80	Presently meets criteria
Dickinson-Commercial	SLAMS	350300001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/70	5/80	Presently meets criteria
Dunn Center-Rural	SLAMS	350340003F03	TSP	Hi-vol	6th day	General Background	Regional	10/79	5/80	Presently meets criteria
			SO_2	EQSA-0276-009	cont	General Background	Regional	10/79	5/80	Presently meets criteria
			NO_2	RFNA-0777-022	cont	General Background	Regional	10/79	5/80	Presently meets criteria
			O_3	RFOA-1075-004	cont	General Background	Regional	10/79	5/80	Presently meets criteria
			Met	N/A	cont	N/A	N/A	10/79	5/80	N/A[3]
Grand Forks-Commercial	SLAMS	350480001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/70	5/80	Presently meets criteria
Jamestown-Residential	SLAMS	350580001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/72	5/80	Presently meets criteria
Lake Tschida-Rural	SLAMS	350520001F03	TSP	Hi-vol	6th day	General Background	Regional	9/76	5/80	Presently meets criteria
Lostwoods-Rural	SLAMS	350180001F03	TSP	Hi-vol	6th day	General Background	Regional	10/79	5/80	Presently meets criteria
Mandan-Commercial	SLAMS	350740001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	10/70	5/80	Presently meets criteria
Mandaree-Rural	SLAMS	350340001F03	TSP	Hi-vol	6th day	General Background	Regional	8/76	5/80	Presently meets criteria

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

Site	Type Station	SAROAD I.D. No.	Parameters Monitored[1]	Ref/Equiv Method Designation No.	Operating Schedule	Monitoring Objective	Spatial Scale	Date Site Began or is Expected to Begin Operation	Date Q.A. Procedures are Expected to Begin	Date Site is Expected to Meet Probe Siting Crite
Hadora (TRNF-S)-Rural	SLAMS	350080001F03	TSP	Hi-vol	6th day	General Background	Regional	9/74	5/80	Presently meets criteria
			SO_2	EQSA-0276-009	cont	General Background	Regional	2/80	6/80	Presently meets criteria
			Met	N/A	cont	N/A	N/A	3/80	6/80	N/A[3]
Minot-Commercial	SLAMS	350780001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	4/67	5/80	Presently meets criteria
TRNF(N)-Rural	SLAMS	350700002F03	TSP	Hi-vol	6th day	General Background	Regional	12/78	5/80	Presently meets criteria
			SO_2	EQSA-0276-009	cont	General Background	Regional	2/80	6/80	Presently meets criteria
			O_3	RFOA-1076-015	cont	General Background	Regional	11/82	11/82	Presently meets criteria
			H_2S	N/A	cont	N/A	N/A	5/80	6/80	N/A[3]
			Met	N/A	cont	N/A	N/A	3/80	6/80	N/A[3]
Valley City-Residential	SLAMS	351240001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	1/72	5/80	Presently meets criteria
Wahpeton-Residential	SLAMS	351260001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	10/70	5/80	Presently meets criteria
Williston-Commercial	SLAMS	351360001F01	TSP	Hi-vol	6th day	Population Exposure	Neighborhood	5/70	5/80	Presently meets criteria
Canadian Border-Rural	SLAMS		TSP	Hi-vol	6th day	Source Impact	Neighborhood		Proposed	
McLean County Rural	SPM		TSP	Hi-vol	6th day	Highest Conc.	Neighborhood	7/83	7/83	7/83
			SO_2		cont	Highest Conc.	Neighborhood	7/83	7/83	7/83
			NO_2		cont	Highest Conc.	Neighborhood	7/83	7/83	7/83
			O_3		cont	Highest Conc.	Neighborhood	7/83	7/83	7/83
			Met		cont	N/A	N/A	7/83	7/83	N/A[3]
Portable Unit	SPM		SO_2	EQSA-0276-009	cont			4/80	5/80	Presently meets criteria
			H_2S	N/A	cont			4/80	5/80	N/A[3]
			Met	N/A	cont			4/80	5/80	N/A[3]
Woodworth-Rural	SPM		TSP	Hi-vol	6th day			3/82	3/82	Presently meets criteria

1/ Sulfate and nitrate analysis are performed on all hi-vol filters.
2/ N/A - not applicable.
3/ Probe siting criteria have not been established for these instruments in May 10, Federal Register. Manufacturer guidelines will be followed.



● Special Purpose Monitor(s)

Θ = commercial
Ø = residential
⊖ = industrial
} urban locations

O = rural locations

North Dakota State Department of Health
Ambient Air Quality Monitoring Network (3/31/83)

MAP 3

The scope of each industrial monitoring plan is developed on a case-by-case basis between the source and the Department. The parameters to be monitored are determined by analysis of expected pollutant emissions. The locations of the various monitors are based upon computer air dispersion modeling predictions of maximum ground level concentrations. To assure quality data, all industrial air quality monitoring networks in the State must meet the requirements of Appendix B of 40 CFR 58.

As manpower and resources allow, systems and/or performance audits are conducted on each industrial monitoring network to assure the quality of the data. A network review of each industrial monitoring network should be performed annually to assess the need for the data and to make appropriate changes in the networks.

A detailed description of each industrial monitoring network is provided in Appendix A.

B. POLLUTANT ANALYSIS

I. Particulate

Current EPA regulations require sampling for TSP using the Hi-volume sampler. This method forms

the basis for North Dakota's particulate sampling network. Because of the potential health effects of fine or inhalable particulates (IP), and also because finer particulates cause a greater impairment to visibility, EPA is proposing to adopt a fine particulate standard and sampling procedure. Notice of Proposed Rule Making is scheduled for July 1983.

No sampling for fine particulate is planned by North Dakota until EPA has promulgated the fine particulate standard and established a reference method for measurement.

When EPA promulgated the reference method for TSP, a sampling schedule was also prescribed. For manual methods, including particulates, this sampling schedule is one 24-hour sample every sixth day. All manual sampling done by North Dakota complies with this sampling schedule (note attached schedule for 1983).

a. Population Centers

A primary requirement in establishing a TSP air monitoring network is to determine which urban areas will require air quality monitoring

1983 SAMPLING SCHEDULE

(Every 6th Day)

* Every 12th Day

First Quarter

January	February	March
6	5*	1*
12*	11	7
18	17*	13*
24*	23	19
30		25*
		31

Second Quarter

April	May	June
6*	6	5*
12	12*	11
18*	18	17*
24	24*	23
30*	30	29*

Third Quarter

July	August	September
5	4*	3
11*	10	9*
17	16*	15
23*	22	21*
29	28*	27

Fourth Quarter

October	November	December
3*	2	2*
9	8*	8
15*	14	14*
21	20*	20
27*	26	26*

based on population size. The following table (Table 2) ranks the areas of largest population in the State. As a result of the 1982 review, an air quality monitoring "population breakpoint" of 10,000 has been established.

As pollutant concentrations in areas of less than 10,000 people are not considered high enough to be of concern for population exposure monitoring, the extent and nature of monitoring in such areas is determined by the predicted impact of emissions from significant point sources and the need for background or other special data for certain parameters.

Data Needs

As per this review, no additions or deletions of monitoring sites have been made with regard to population-oriented sampling. Also, a need for two or more monitors in one population area has not been deemed necessary.

Although no changes with regard to population-oriented samplers will be made at this time,

TABLE 2

Rank	City	1970 Population	1980[1/] Population	% of Change	1982[2/] Population
1	Fargo	56,308	61,308	9.4	
2	Bismarck	38,378	44,485	15.9	
3	Grand Forks	41,909	43,765	4.4	
4	Minot	32,790	32,843	0.2	
5	Jamestown	15,330	16,280	6.2	
6	Dickinson	12,492	15,924	27.5	
7	Mandan	12,560	15,513	23.5	
8	Williston	11,364	13,336	17.4	
9	West Fargo	-	10,099	-	
10	Wahpeton	8,183	9,064	10.8	
11	Valley City	6,939	7,774	12.0	
12	Devils Lake	7,391	7,442	0.7	
13	Grafton	-	5,293	-	
14	Rugby	-	3,335	-	
15	Beulah	-	2,878	-	

Neighborhood, population-oriented, monitoring sites are currently located in the following cities:

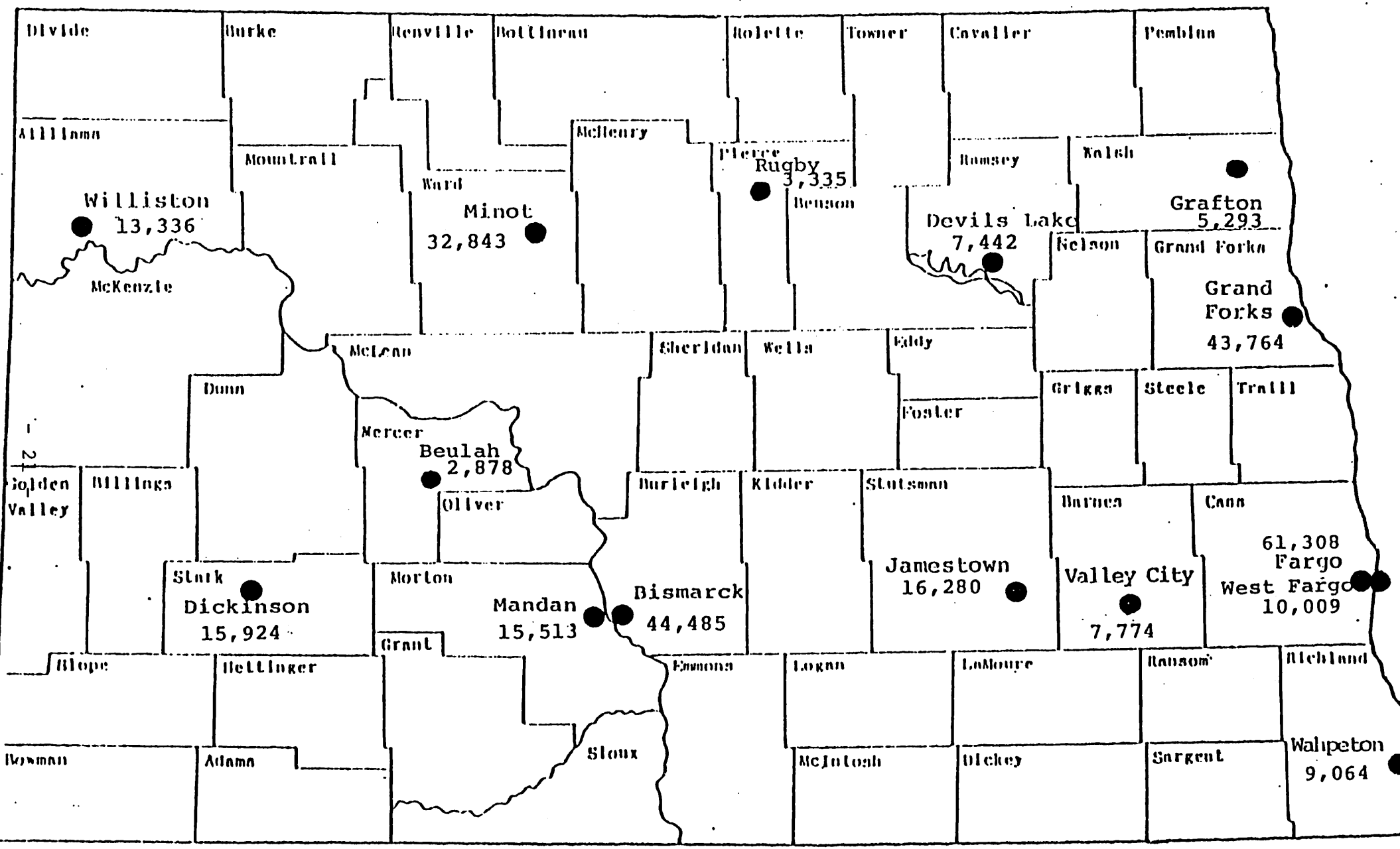
Fargo
Bismarck
Devils Lake
Dickinson
Grand Forks
Jamestown
Mandan
Minot
Valley City
Wahpeton
Williston

Map 4 shows the locations of these sites.

An additional population-oriented TSP monitoring site, Beulah Residential, was established in a less populated city due to growth associated with significant coal-related, industrial development in that area.

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, N.D.S.D.H.

2/ Population estimates for 1982 not available.



Map 4

Major North Dakota Cities 2/

the following points are being considered for further review:

1) population estimates indicate that West Fargo should be considered for monitoring

2) As previously indicated, the effective cutoff point for population-oriented monitoring has been changed to 10,000. As indicated in the 1982 review, this change could result in the discontinuation of monitoring in Wahpeton, Valley City, and Devils Lake. Discontinuation of Wahpeton site has been delayed due to needs for other air contaminants which are monitored by the same method. The need for data at Valley City and Devils Lake is currently under review.

b. Point Sources

To establish and maintain an effective TSP monitoring program, consideration must be given to point and area sources of particulate within the State. The major in-State point sources for particulate (emissions >100 TPY) have been listed in Table 3 along with emission rates as calculated from the most recent emission inventory (1981). Map 5 indicates the approximate location of these facilities.

In addition to point sources located within North Dakota, TSP sources located outside the State must also be considered. The impact from the Boundary Dam Power Plant complex located near Estevan, Saskatchewan, has been a concern for some time. Attempts by this Department to obtain accurate emissions and stack parameter data have only been partially successful. Also, previously conducted computer air dispersion modeling results have shown a possible exceedance of the air quality standard for particulate matter within the State as a result of emissions from this

TABLE 3

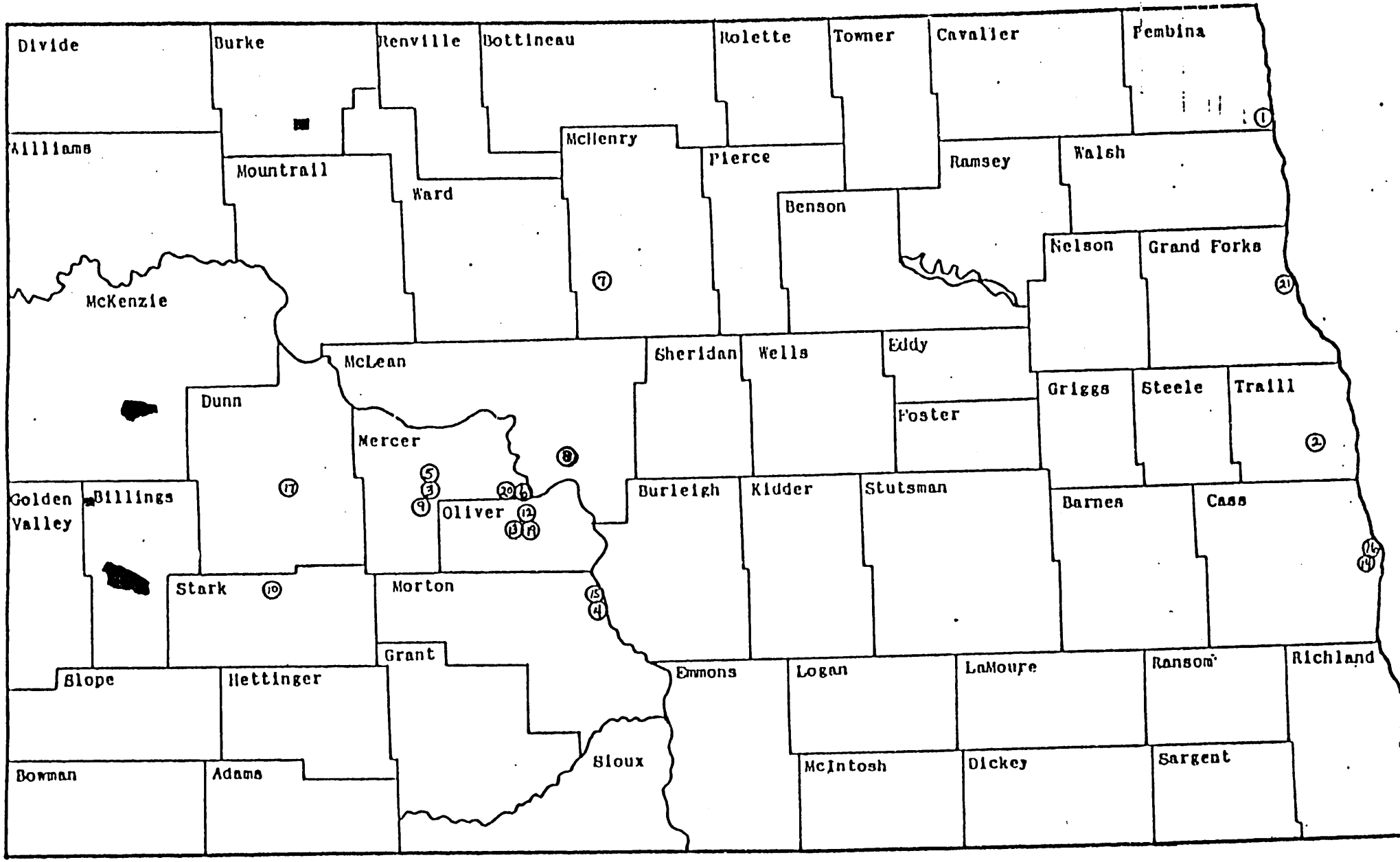
MAJOR TSP SOURCES

#	Name of Company	Type of Source	Location	Permit #	Particulate Emis. Ton/year	Comments
1	American Crystal Sugar Company	Sugar Beet Processing	Drayton Pembine Co.	730015	187.0	
2	American Crystal Sugar Company	Sugar Beet Processing	Hillsboro Traill Co.	X75001	100.0	
3	ANG Coal Gasification Co. (275 mmcfd)	Coal Gasification Plant	Beulah Mercer Co.	PTC Issued	1151.0	Under Construction
4	American Oil Co.	Oil Refinery	Mandan Morton Co.	078001	814.0	
5	Antelope Valley Units 1&2 (440mw/440mw)	Steam Elec. Gen. Facility	Beulah Mercer Co.	PTC Issued	3745	Under Construction
6	Basin Electric Unit 1&2 (216mw/440mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	730004	190/450 1/	
7	Basin Electric Units 1&2 (25 mw/25 mw)	Steam Elec. Gen. Facility	Velva McHenry Co.	73005	100	
8	UPA/CPA Units 1&2 (550mw/550mw)	Steam Elec. Gen. Facility	Underwood McLean Co.	PTC Issued	555/555	
9	Coyote Station Unit 1 (440mw)	Steam Elec. Gen. Facility	Beulah Mercer Co.	PTC Issued	1755.0	
10	Husky Industries	Charcoal Briquetting Plant	Dickinson Stark Co.	730013	1114.0	
11	Minn-Dak Farmers Co-op	Sugar Beet Processing	Wahpeton Richland Co.	X78001	140.0	

1/ Emissions from Unit 1/Emissions from Unit 2

TABLE 3 (Cont.)

#	Name of Company	Type of Source	Location	Permit #	Particulate Emis. Ton/year	Comments
12	Minnesota Power and Light Unit 1 (500 mw)	Steam Elec. Gen. Facility	Center Oliver Co.	None	---	Proposed
13	Minnkota Power Coop Unit 1 (235mw)	Steam Elec. Gen. Facility	Center Oliver Co.	F76009	341.0	
14	Cargill	Sunflower Processing	Fargo Cass	G81005	273.0	
15	MDU Units 1 & 2 (25 mw/66 mw) (Heskett Station)	Steam Elec. Gen. Facility	Mandan Morton Co.	F76001	38/62	
16	NDSU	Heating Plant	Fargo Cass Co.	730019	115.0	
17	The Nokota Co. (96,000 bbl/day)	Coal to Methanol Plant	Dunn Center Dunn Co.	---	---	Proposed
18	NDSSS	Heating Plant	Wahpeton Richland Co.	730022	161.0	
19	Square Butte Unit 1 (440 mw)	Steam Elec. Gen. Facility	Center Oliver Co.	F78007	414.0	
20	UPA Stanton Units 1 & 2 (172 mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	F76007	500	
21	UND	Heating Plant	Grand Forks Grand Forks Co.	730018	321	
				TOTAL	13,081	



MAP 5

Major Point Sources of TSP

complex. No additional out-of-state sources of TSP have warranted attention since the 1982 review.

Data Needs

In regard to the previous discussion, the following concerns for TSP data have been identified.

1. As previously mentioned, emissions from the Boundary Dam power plant complex in Canada, near the North Dakota border, were determined to have the potential to cause an exceedance of the North Dakota AAQS for particulate matter. Prior to the next review, the need to address impact from this facility should be reevaluated and appropriate action taken.

2. As noted in previous reviews, and again in this review, coal related industrial growth in McLean, Mercer and Oliver counties has prompted concern for a TSP site in the eastern Oliver County/southern McLean County area to assess air quality

related impact. To address this data need, the Department is currently in the process of establishing a "highest concentration" special purpose monitoring site in southern McLean County. This site is scheduled to begin operation in July 1983.

c. Area Sources

In addition to 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.

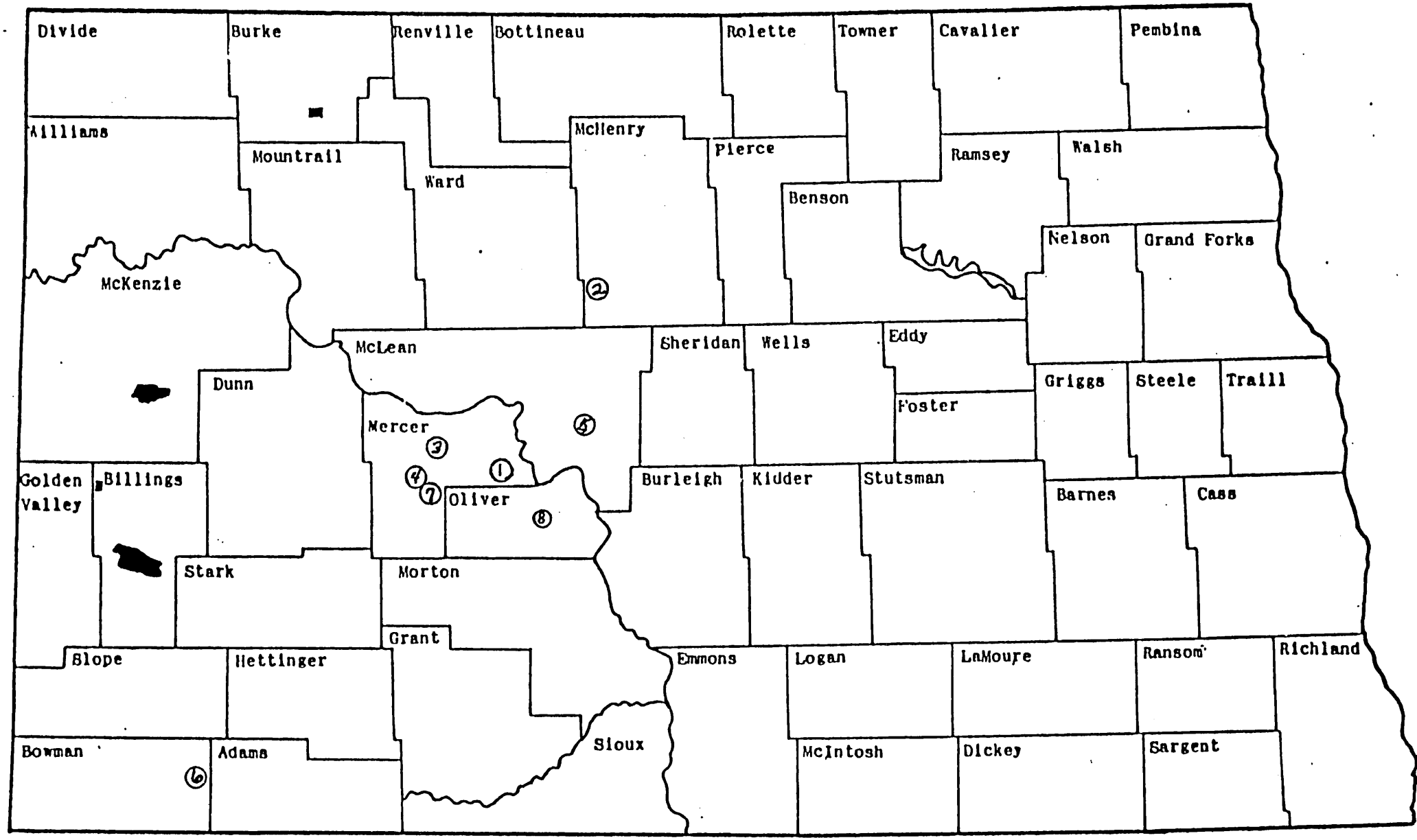
Total suspended particulate (TSP) is considered to be the major pollutant associated with mining activity. Mining related TSP is attributed to such operations as blasting, overburden removal, coal removal, coal transfer and handling, vehicular travel or unpaved haul roads, etc.

Major "area" sources (emissions >100 TPY) of TSP have been listed in Table 4. Map 6 shows the locations of these sources. No additions

TABLE 4

Major Lignite Coal Mines

#	Name of Company (Ton/yr of Coal Mined)	Name of Source	Location	Permit #	Particulate Emis. Ton/year	Comments
1	Basin Co-op Services	Glen Harold	Stanton Mercer Co.	081001	100.0	
2	Basin Co-op Services	Velva Coal Mine	Velva Ward Co.	M76001	155.0	
3	Coteau Properties Co.	Coteau Mine	Beulah Mercer Co.	---	167.0	
4	North American Coal	Indian Head Coal Mine	Zap Mercer Co.	079013	100.0	
5	Falkirk Mining Co.	Falkirk Mine	Underwood McLean Co.	079002	224.0	
6	Knife River Coal Mine	Peerless Coal Mine	Gascoyne Bowman Co.	079011	114.0	
7	Knife River Coal Mine	Knife River Coal Mine	Beulah Mercer Co.	079012	100.0	
8	Baukol-Noonan	Baukol-Noonan Mine	Center Oliver Co.	079004	100.0	
				TOTAL	1,060.0	



Map 6

Lignite Coal Mines

or deletions to this list have been deemed necessary since the 1982 review.

As previously indicated, source specific monitoring in the State is conducted by industry. Appendix A describes the particulate monitoring networks which are currently being operated by industry to address "area" source data needs.

Data Needs

As per this review, data needs with regard to "area" sources are being adequately addressed by industrial monitoring networks. No additional monitoring needs have been identified at this time.

d. Dual Purpose Monitoring

In some cases the maximum impact of point sources and the location of population centers may coincide. In such cases, dual purpose monitoring may be appropriate.

One possibility for dual purpose monitoring for TSP is the Beulah area. As indicated in previous Departmental reviews, the Beulah

residential site was established in a less populated city due to growth associated with significant coal related industrial development in that area. Should it be determined that an overlap exists, action will be initiated to reclassify the site and address the data from a dual purpose aspect. At this time the Beulah site is considered population exposure oriented only.

e. Background Monitoring

Particulate matter background monitoring stations should be selected on the basis of topography, geography, land use, climatic conditions, and other factors within the State.

For TSP background monitoring purposes, the State of North Dakota has several distinct areas that require background measurements. These are: (1) the Red River Valley farming area in the easternmost portion of the State, (2) the farming/ranching mixed operations in the central and western portion of the State, and (3) 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.

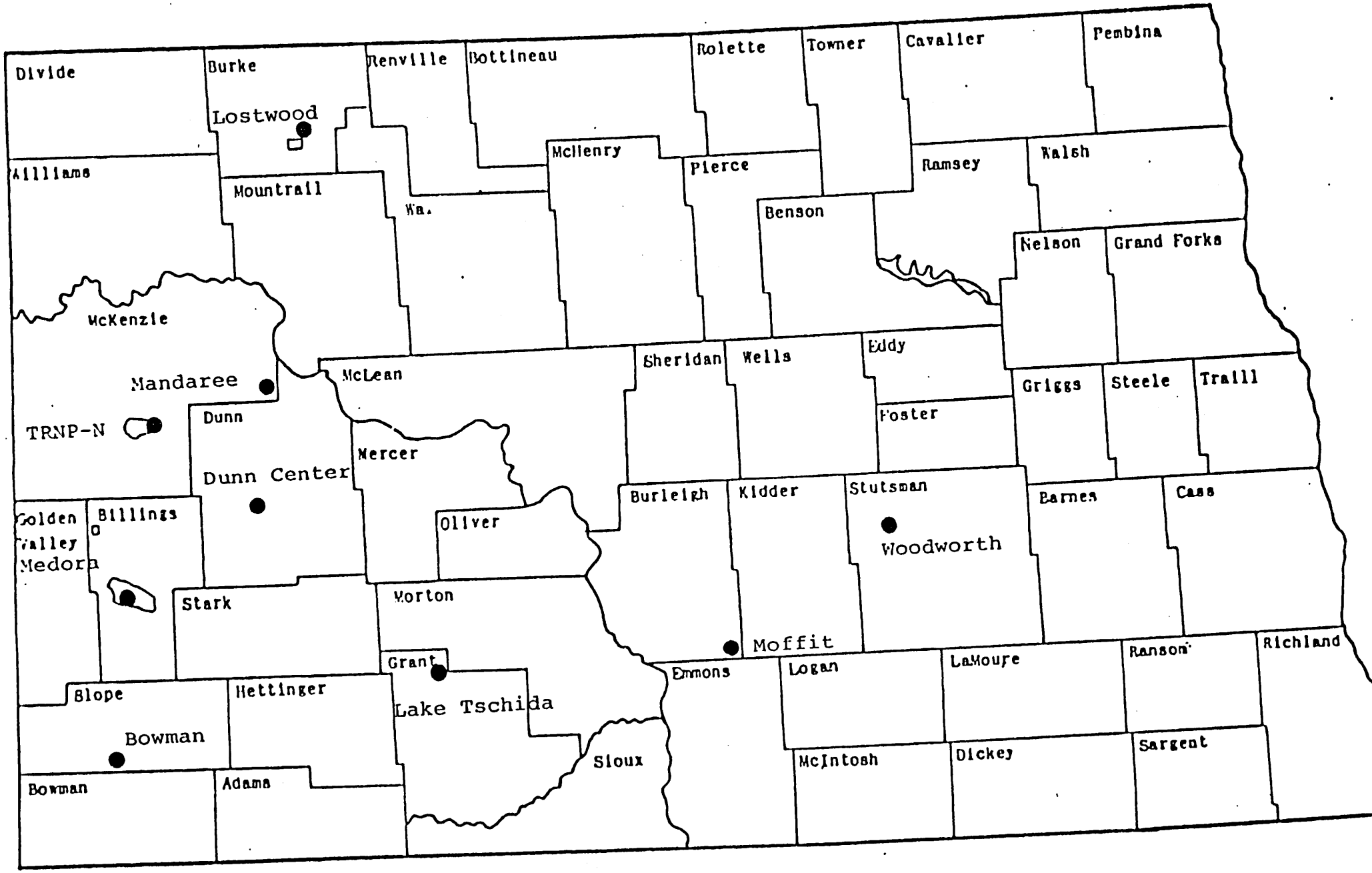
The following air quality monitoring sites are currently being used to provide "background" data or data from sites which are remote and relatively unaffected by industry and population.

1) Bowman
2) Dunn Center
3) Lake Tschida
4) Lostwood
5) Mandaree
6) Medora (TRNP-S)
7) Watford City (TRNP-N)
8) Moffit
9) Woodworth (SPM)

The locations of these sites are shown on Map 7.

Data Needs

A review of data needs for background TSP monitoring, indicates that changes to the State's network for background monitoring may be appropriate.



MAP 7
North Dakota State Department of Health
Background Particulate Monitoring Sites

● = Rural Locations

As with the 1982 report, this would include eliminating Mandaree and Bowman from the monitoring network.

Mandaree may be dropped as a background site as adequate coverage should be provided by samplers located at the North and South Units of the Theodore Roosevelt National Park and Dunn Center. In addition, the Fort Berthold Indian Reservation began monitoring for TSP at its Lost Bridge site near Mandaree in August 1982. Background data currently provided by the Bowman site could be represented by the Lake Tschida site.

As referenced in the 1982 review, data needs, with regard to background monitoring for TSP, included establishing permanent background monitoring sites in the eastern and central portions of the State. This concern still exists. The Woodworth (SPM) site, which was established in March 82, is currently providing background information in what could be termed east-central North Dakota and could be incorporated into the SLAMS network at a future date. Since the last review, the Canfield Lake site has been deleted and the

Moffit site is being used to address data needs in the south-central portion of the State. Although Woodworth serves, in part, the need for data in the eastern part of the State, a site in the Red River Valley is still preferred.

The above-mentioned changes should more adequately address "background" data needs in the distinct areas addressed earlier in this part. As is, data needs are being addressed as best as possible in terms of available manpower and funding.

f. Collocated Sampling

As per the August 7, 1978, Federal Register, sites with the highest geometric mean concentration from the previous year must be selected for collocated sampling. This second particulate sampler is used to assess data for precision. Changes in the sites previously selected for collocated samplers, namely Bismarck and Fargo, do not appear to be necessary at this time.

II. SULFUR DIOXIDE AND HYDROGEN SULFIDE

Current EPA Regulations require sampling for sulfur dioxide using monitors which have been designated reference or equivalent methods. All SO_2 monitors operated by the State satisfy this requirement.

In conjunction with the promulgation of reference/equivalent methodology and quality assurance guidelines, the Environmental Protection Agency has established a sampling schedule for SO_2. In compliance with this schedule, ambient air quality data is collected as consecutive hourly averages except for:

1. periods of routine maintenance,

2. periods of calibration.

Table 1 (Section A, Part V) provides information regarding the reference/equivalence designation of the State's analyzers.

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. Data is collected as consecutive half-hour averages, except for:

1. periods of routine maintenance, or

2. periods of calibration.

As much as practicable, quality assurance guidelines for SO_2 have been adopted for H_2S.

a. Point sources:

In recent years, coal, oil and gas development in the west and west-central portions of North Dakota have produced a number of major point sources of SO_2 and possibly H_2S. These major point sources include coal-fired steam electrical generating facilities, natural gas processing plants, and oil refineries.

The major point sources of SO_2 (>100TPY) are listed in Table 5 along with their emission rates as calculated from the most recent emissions inventory (1981). Map 8 shows the approximate locations of these facilities.

TABLE 5

MAJOR SOURCES OF SO_2

#	Name of Company	Type of Source	Location	Permit #	SO_2 Emissions Ton/year	Comments
1	American Crystal Sugar Company	Sugar Beet Processing	Drayton Pembina Co.	730015	1114.0	
2	American Crystal Sugar Company	Sugar Beet Processing	Hillsboro Traill Co.	X75001	1153.0	
3	ANG Coal Gasification Company (275 mmcfd)	Coal Gasification Plant	Beulah Mercer Co.	---	14973.0	Under Construction
4	American Oil Co. (AMOCO)	Oil Refinery	Mandan Morton Co.	078001	9230.0	
5	Aminoil, USA	Natural Gas Processing	Tioga Williams Co.	082002	4704.0	
6	Amoco Production Co. Whitetail Plant	Natural Gas Processing	Fairfield Billings Co.	---	1091.0	Proposed
7	Antelope Valley Station Units 1&2 (440 mw/440 mw)	Steam Elec. Gen. Facility	Beulah Mercer Co.	---	15517.0	Under Construction
8	Basin Electric Units 1&2 (215 mw/440 mw)	Steam Elec. Gen Facility (Leland Olds)	Stanton Mercer Co.	730004	8285/15664 1/	
9	Basin Electric Units 1&2 (25 mw/25 mw)	Steam Elec. Gen. Facility	Velva McHenry Co.	730005	420/420	
10	Grand Forks AFB	Heating Plant	Grand Forks Grand Forks Co.	F78004	458.0	

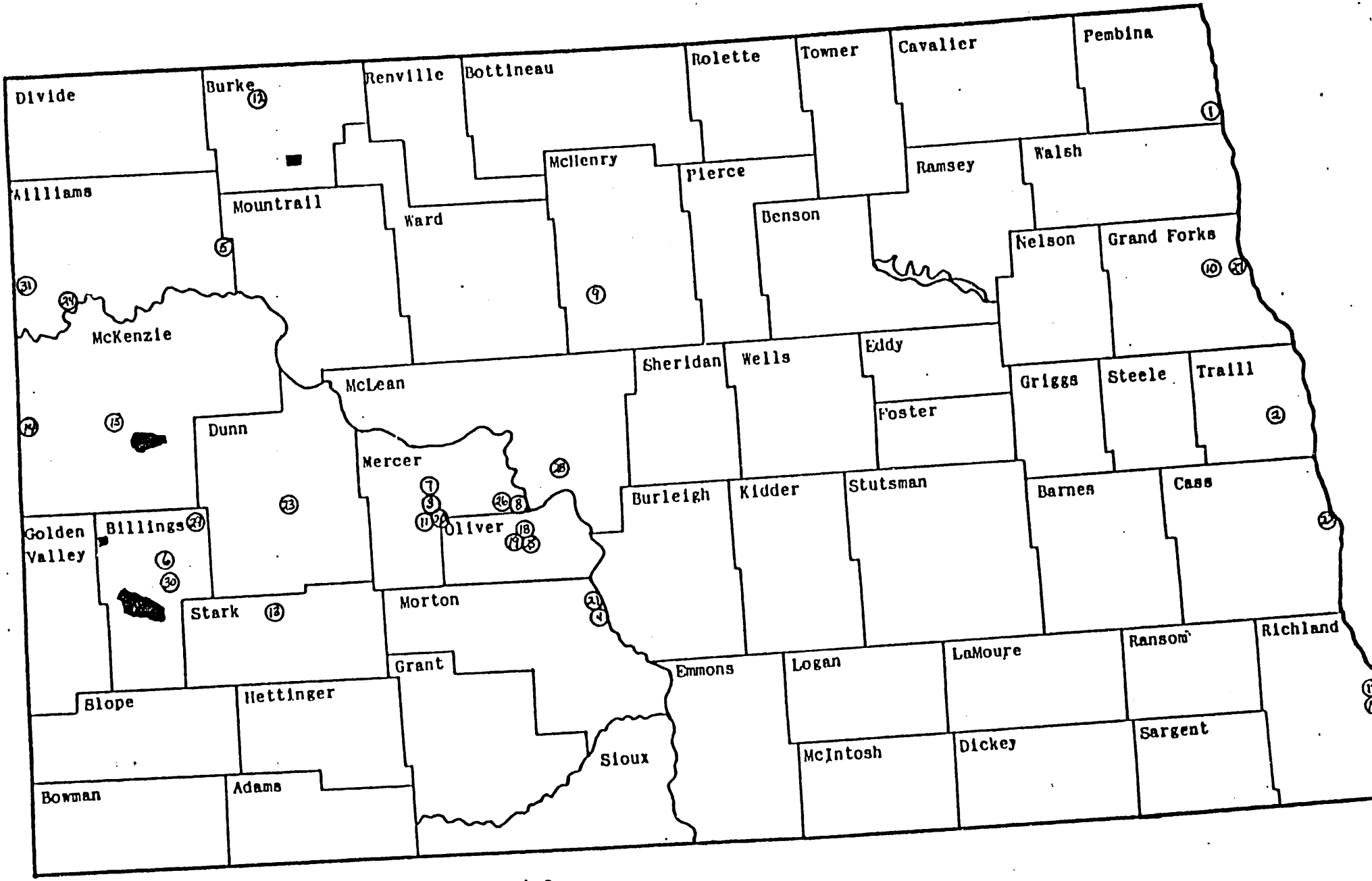
1/ Emissions from Unit 1/emissions from Unit 2

TABLE 5 (Cont.)

#	Name of Company	Type of Source	Location	Permit #	SO_2 Emissions Ton/year	Comments
11	Coyote Station Unit 1 (440 mw)	Steam Elec. Gen. Facility	Beulah Mercer Co.	---	21031.0	
12	Cities Service	Natural Gas Processing	Lignite Burke Co.	080001	2783.0	
13	Husky Industries	Charcoal Briquetting Plant	Dickinson Stark Co.	730013	1006.0	
14	Koch Hydrocarbon	Natural Gas Processing	Sidney, MT McKenzie Co.	---	802.0	
15	Kerr McGee	Gas Processing Plant	McKenzie Co.	076001	1922.0	
16	ND State School of Science	Heating Plant	Wahpeton Richland Co.	730022	322.0	
17	Minn-Dak Farmers Co-op	Sugar Beet Processing	Wahpeton Richland Co.	X78001	598.0	
18	Minn. Power & Light Unit 1 (500 mw)	Steam Elec. Gen. Facility	Center Oliver Co.	---	14910.0	Proposed
19	Minnkota Power Coop Unit 1 (235 mw)	Steam Elec. Gen. Facility	Center Oliver Co.	F76009	14699.0	
20	Montana Dakota Utilities	Steam Elec. Gen. Facility	Beulah Mercer Co.	F76006	391.0	
21	Montana Dakota Utilities Units 1 & 2 (25 mw/66 mw) (Heskett Station)	Steam Elec. Gen. Facility	Mandan Morton Co.	F76001	1840/4305	

TABLE 5 (Cont.)

#	Name of Company	Type of Source	Location	Permit #	SO_2 Emissions Ton/year	Comments
22	NDSU	Heating Plant	Fargo Cass Co.	730019	164	
23	The Nokota Co. (96,000 bbl/day)	Coal-to-Methanol Plant	Dunn Center Dunn Co.	---	10358	Proposed
24	Phillips Petroleum Co.	Natural Gas Processing	Trenton Williams Co.	---	410.0	Under Construction
25	Square Butte Unit 1 (440 mw)	Steam Elec. Gen. Facility	Center Oliver Co.	F78007	15254.0	
26	United Power Asso. Units 1 & 2 (172 mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	F76007	9636.0	
27	UND	Heating Plant	Grand Forks Grand Forks Co.	730018	551.0	
28	UPA/CPA Units 1&2 (550 mw/550 mw)	Steam Elec. Gen. Facility	Underwood McLean Co.	PTC Issued	27750/27750	
29	Warren Petroleum (Proposed modification)	Natural Gas Processing	Little Knife Field Billings Co.	081013	2339.0	With Modification/ addition
30	Western Gas Processors	Natural Gas Processing	Fairfield Billings Co.	082012	1000.0	
31	Dome Petroleum	Natural Gas Processing	Williston Williams Co.	---	184.0	Proposed
				TOTAL	206,491	



MAP 8

Major Sources of SO_2

In addition to major point sources for SO_2 and H_2S located within the State, impact on air quality from sources located outside the State are also of concern. At present, such facilities include the Boundary Dam Power Plant complex located near Estevan, Saskatchewan; and the Shell Oil and Perry-Petrolane natural gas processing facilities and the MDU power plant located on the Montana-North Dakota border near Sidney, Montana. Appendix B provides additional information on major point sources of concern both within and outside North Dakota.

As in the past, no source specific monitoring for SO_2 or H_2S is being conducted by the State as this type of monitoring is performed by industry as a part of their permitting requirements. Appendix A provides information on the industrial monitoring networks which have been established to address SO_2 and/or H_2S source specific impact on air quality in North Dakota.

Data Needs

As per the previous discussion, H_2S and SO_2 data needs with respect to point sources include:

1. Air quality monitoring in the TRNP PSD Class

I areas to address impact from coal, oil and gas development in the west and west-central portions of North Dakota.

2. SO_2 monitoring in west-central North Dakota to assess impact from energy related development in the area (Dunn Center).

3. SO_2 monitoring in Beulah to assess the impact on air quality as a result of energy development in the area.

4. SO_2 monitoring in a Bismarck "rural" location to assess SO_2 impact from the Amoco oil refinery and Heskett power plant.

5. SO_2 monitoring in eastern Oliver County/southern McLean County area to address impacts on air quality as a result of coal related energy development in west-central North Dakota.

6. SO_2 monitoring to assess impacts from sources located on the North Dakota-Montana border; namely, Shell Oil and Perry Petrolane and the MDU power plant located near Sidney, Montana.

7. Monitoring to assess the impact on air quality in North Dakota due to emissions from the

power plant complex located near Estevan, Saskatchewan.

8. Monitoring in the Lostwood National Wildlife Refuge area to assess impact on air quality out of concern for oil/gas development in the area (note Appendix D).

Of the above-mentioned data needs, six are being addressed at this time.

1. As indicated in previous reviews, and as is presently the case, point sources related to coal, oil and gas development have placed significant emphasis on air quality in PSD Class I areas in North Dakota. Computer air dispersion modeling analysis performed by the Department, in conjunction with the processing of Permit to Construct applications, has indicated that under certain meteorological conditions, the 24-hour PSD increment for SO_2 at the TRNP is consumed. To address the need for data in these areas, the State has established, and will continue to operate ambient air quality monitors in both units of the Theodore Roosevelt National Park.

2. In response to Item 2, this Department will continue to operate an SO_2 monitor near Dunn Center to provide background data associated with energy development in the west-central portions of the State and provide data which could be used to evaluate the Department's modeling efforts.

3. In response to Item 3, the Department will continue to operate a monitoring site in Beulah to address coal-related industrial development in the area.

4. In response to Item 4, the Amoco Refinery in Mandan, North Dakota has been required to establish a SO_2 monitoring program in conjunction with the Department's January 24, 1983, Variance to Construct for a sulfur recovery unit for the refineries fuel gas system. The SO_2 monitoring program, scheduled to begin July 1983, should fulfill, in part, the data need specified in Item 4. Modeling results and additional information are provided in Appendix C.

5. In response to an ongoing concern for impact on air quality as a result of coal related energy development in west-central North Dakota, as noted in Item 5, the Department is in the process of establishing a "highest concentration" special purpose monitoring site in southern McLean County. The site will be operated in its initial stage as a special purpose monitor until a more detailed emissions study dictates a more representative site location to address the intended monitoring objective.

6. Monitoring conducted by the Koch Hydrocarbon natural gas processing plant, located on the North Dakota-Montana Border, is fulfilling in part the need for data in regard to Item 6 above.

Any changes to the network at this time would necessitate establishment of additional monitoring site(s) to address Items 7 and 8. The need for monitoring in regard to Item 7 should be reevaluated prior to the next review taking into account current emissions information and modeling results for the facility. In response to the recent concern for emissions from oil/gas producing facilities

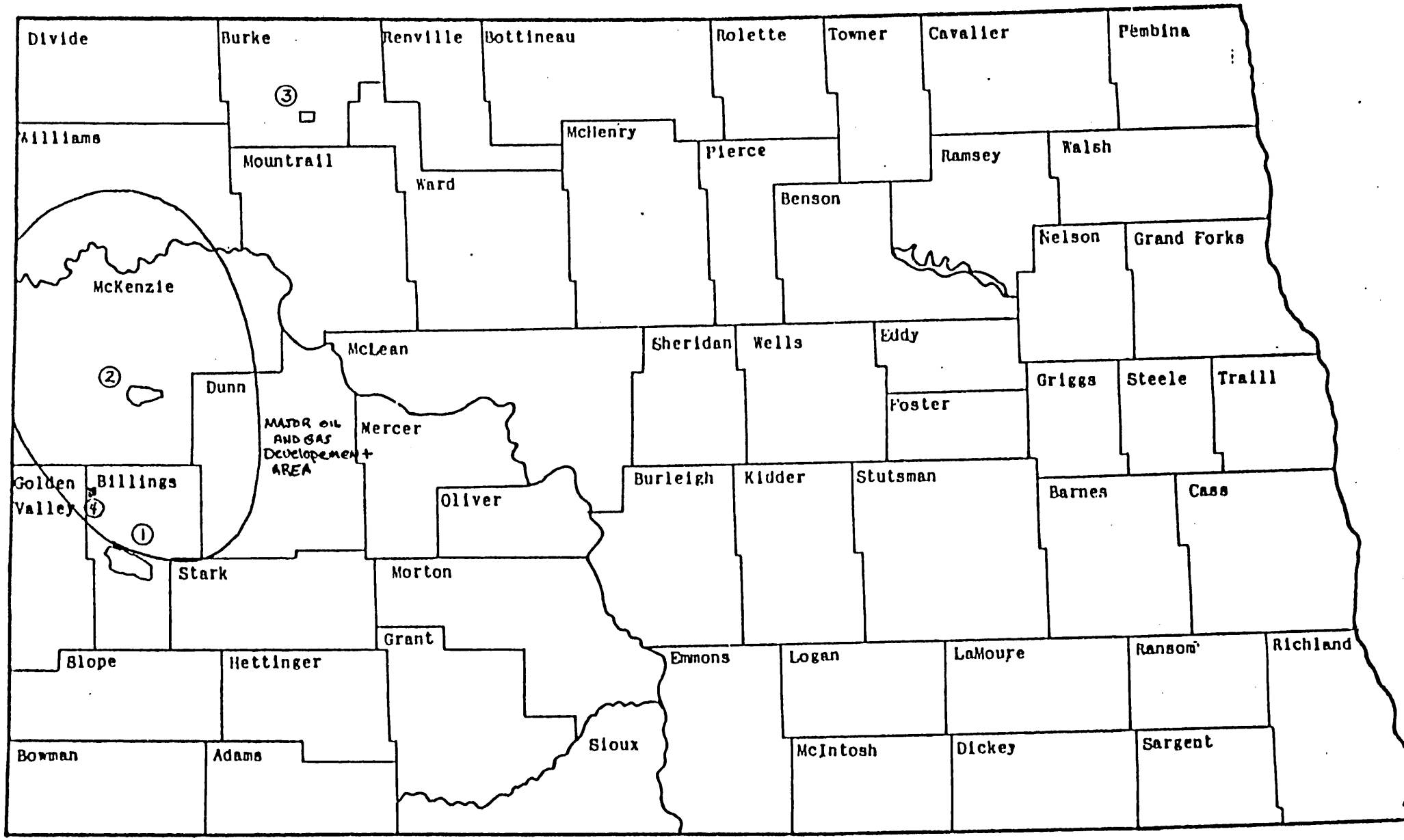
near the Lostwood area, as noted in Item 8, the need for monitoring data should be evaluated in conjunction with the Boundary Dam facility and other area sources as discussed below.

b. Other Sources:

In addition to the major point sources of SO_2 noted above, development of oil and gas in the western part of the State has produced a number of additional sources of H_2S and/or SO_2. These sources include individual oil/gas wells, oil storage facilities, compressor stations, etc.

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; and secondly, flaring of H_2S may cause significant concentrations of SO_2 in the ambient air.

Map 9 indicates the area of primary concern for such sources (Billings, Dunn and McKenzie counties) in western North Dakota. The development of oil and gas in close proximity



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

to the Theodore Roosevelt National Park, and the information provided in Appendices B and D, emphasizes the need for current observation of air quality in the Theodore Roosevelt National Park and the need to evaluate and possibly establish a monitor in the Lostwood area.

Data Needs

As per the above, H_2S and SO_2 data needs include background and/or special purpose monitoring as outlined below:

1. Area-wide oil and gas development monitoring to assess H_2S and SO_2 impacts from oil/gas wells, gas plants, oil storage facilities etc., in the western part of the State.

2. Background air monitoring for H_2S and SO_2 in the TRNP in response to coal, oil and gas development.

3. The evaluation and possible monitoring of air quality in or around the Lostwood area in response to coal, oil and gas development.

Of the above-mentioned data needs, two are being addressed at this time. A mobile, special purpose monitor is being used extensively in the western part of the State to address impacts from sources such as oil/gas wells, oil storage facilities, etc. Although this monitor satisfies part of the regional H_2S and SO_2 monitoring network requirement, at least one additional monitor has been deemed necessary to adequately address data needs.

In response to Item 2, SO_2 analyzers have been placed in both units of the TRNP and at Dunn Center to obtain air quality data with respect to coal, oil and gas related development in the west and west-central portions of the State. An H_2S analyzer has also been placed in the North unit of the Park to monitor H_2S associated with oil and gas development.

Any expansion of the air quality monitoring network, in response to the data needs expressed above, would be to strengthen the monitoring network in regard to Item 1 and to address Item 3. No changes however, are foreseen in the near future due to budget and manpower constraints.

c. Dual Purpose Monitoring

As with particulate, the maximum impact of point sources of SO_2 and population centers may overlap. In such cases, dual purpose monitoring may be appropriate.

As indicated earlier, an SO_2 site was established in Beulah due to significant industrial development in the area. Should it be determined that an overlap exists, action will be initiated to reclassify the site and address the data from a dual purpose aspect. For the time being, this site will remain population exposure oriented with respect to SO_2.

III. CARBON MONOXIDE

Carbon monoxide (CO) has been determined to be generated chiefly by automotive sources, although some industries also emit CO. As such, high carbon monoxide concentrations are generally found near major roadways and intersections which exhibit traffic flow problems and where atmospheric ventilation is poor. Current EPA siting criteria requires two types of CO monitoring stations; one located in an area of peak concentrations ("hot spots" such as high traffic density, downtown streets), and one in a homogeneous, "neighborhood" scale setting.

a. Point Sources

As with other air contaminants, the State does not currently conduct source specific monitoring for carbon monoxide but requires such monitoring as a part of the facility's permitting requirements.

Due to the fact that computer dispersion modeling has shown no problems with regard to compliance with the Ambient Air Quality Standard, no air quality monitoring for CO is currently being conducted. A current point source emissions inventory for CO is not available at this time.

Data Needs

No additional data needs (monitoring) with regard to point sources of CO have been identified at this time.

b. Area Sources

As indicated earlier, mobile sources tend to generate a significant amount of carbon monoxide. In this regard, 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.

At present, the State is considered to have no urbanized areas of significance with regard to CO. A survey of other network reviews has indicated that population centers of 30,000 or greater may be appropriate for initiating CO monitoring. An emissions inventory of mobile or other area sources of CO is not available at this time.

Data Needs

Although monitoring for CO is not considered a high priority item, a special purpose monitor

(SPM) could be established in a major city or urbanized area of population density of 30,000 or greater (primarily near major roadways and intersections with high traffic density) to: 1) determine peak CO concentrations, 2) address the need for additional monitoring, and 3) assess the cutoff point for monitoring indicated above.

To address this data need, at least one of the following cities could be chosen for special purpose monitoring for carbon monoxide.

City	Population (1980)
Fargo	61,308
Bismarck	44,485
Grand Forks	43,765
Minot	32,843

Background concentrations for carbon monoxide in rural areas of North Dakota are assumed to be fairly low, i.e., about 150 $\mu g/m^3$ 1-hr average and 100 $\mu g/m^3$ 8-hr average.

IV. 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) and oxides of nitrogen. Both these pollutants are emitted directly into the atmosphere. As the reaction takes appreciable time to occur (approximately 4-7 hours), the relationship between precursors and ozone tends to produce large separations (spatially and temporally) between the major sources and areas of high oxidant pollution. As such, the meteorological transport process and sinks need to be considered in the development of a network. Generally, the placement of monitoring stations should be considerably downwind from the sources of precursors. Ozone concentrations are generally known to peak in summer months.

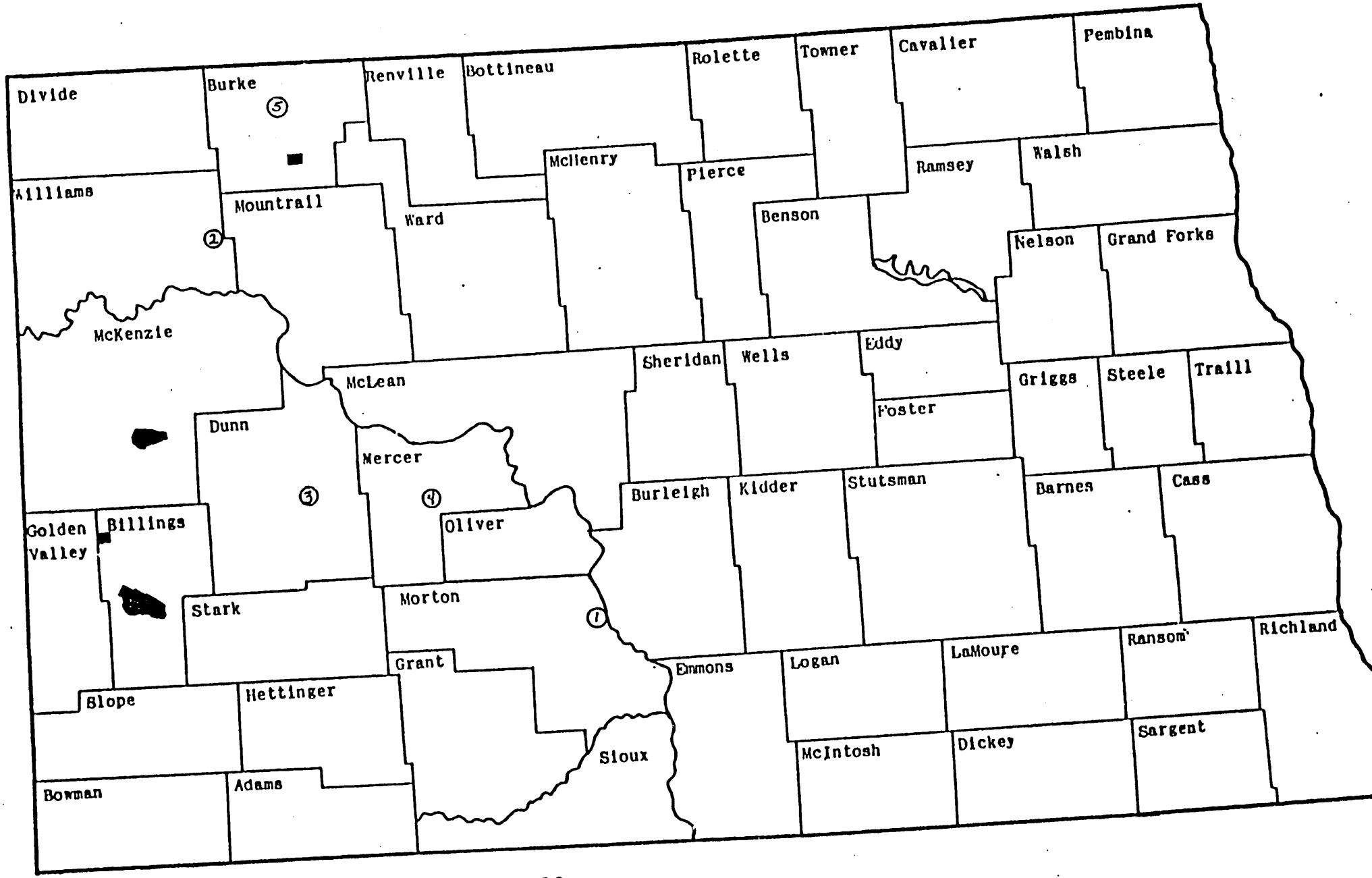
a. Point and Area Sources

Table 6 lists the major point sources of HC emissions in the State (>100 TPY). Map 10 shows the approximate locations of these facilities. Section V of this document lists the major point sources of oxides of nitrogen which, as noted above, play an important part in the formation of O_3.

TABLE 6

Major HC Sources

#	Name of Company	Type of Source	Location	Permit #	HC Emissions Ton/year	Comments
1	American Oil Company (AMOCO)	Oil Refinery	Mandan Morton Co.	078001	21,695	
2	Aminoil, USA	Natural Gas Processing	Tioga Williams Co.	082002	681	
3	The Nokota Co. (96000 bbl/day)	Coal-to-Methanol Plant	Dunn Center Dunn Co.	---		Proposed
4	ANG Coal Gasification Co.	Coal Gasification Plant	Beulah Mercer Co.	---		Under Construction
5.	Cities Service	Natural Gas Processing	Lignite Burke Co.	---	700	
			TOTAL		23,076	



MAP 10

Major HC Emitting Facilities

As was indicated above, point sources generally represent only a fraction of the total HC and oxides of nitrogen emissions. The remaining emissions can generally be attributed to mobile sources in urban areas. The EPA has specified a design criteria for selecting locations for ozone NAMS as any urbanized area having a population of more than 200,000.

At present, the State is considered to have no urbanized areas large enough to warrant monitoring for the ozone. Information on mobile or other sources is not available at this time and a specific cutoff point for monitoring has not been established.

As with other pollutants, point and area sources of precursors of ozone located outside the State should be considered; particularly when one considers the long-range, complex, photochemical process characteristic to ozone formation. In this regard, the Big Stone plant in South Dakota and major metropolitan areas in Minnesota and Canada may be cause for monitoring in eastern North Dakota.

Data Needs

As per the discussion above, the need for ozone

data at this time includes:

1) Monitoring to address ozone as a result of significant sources of precursors of ozone located in State as well as out, i.e., monitoring to obtain data on ozone levels in western, central and eastern North Dakota which can be compared to AAQS.

To address Item 1 above, the State requires industry to conduct monitoring for ozone as a part of a facility's Permit to Construct and Permit to Operate. Appendix A indicates those industries which are currently operating ozone analyzers in the State as a part of their monitoring program. These monitors are established to address background ozone data needs as well as ozone impact attributable to emissions from the various sources. At present all ozone analyzers are operated continuously throughout the year.

In addition, the State currently has three continuous ozone analyzers in operation. One analyzer was established at Dunn Center (October 1979) the other at Beulah (June 1980) and the third at the TRNP-N (November 1982).

The ozone analyzer established at the TRNP-N in November 1983 was established in response to two concerns: the Department's concern for background ozone data in western North Dakota and the National Park Service's interest in background ozone data at the North Unit of the Theodore Roosevelt National Park (Class I area).

The ozone analyzer at Dunn Center was established in 1979 in response to a concern for background data in west-central North Dakota and to serve as an indicator of impact from the major coal burning area to the east and oil/gas development to the west. No change in foreseen at this time with regard to the ozone analyzer at Dunn Center.

As per the discussion on Page 56, the relation between precursors and ozone tends to produce large separations (spatially and temporally) between the major sources and the areas of high oxidant pollution. As the placement of monitoring stations for ozone should be considerably downwind from the source of precursors, it has been noted in past reviews that the ozone analyzer at Beulah might be better located. In this regard the Department has determined that the ozone analyzer at Beulah may better be used in combination with

other analyzers at the proposed "southern McLean County" site. Although the State's program for ozone monitoring in Beulah will be terminated, ozone analyzers currently operated by the RAMP program at Sites 1 and 4, should adequately address data needs in the area.

V. NITROGEN OXIDES

NO_2 is formed when nitric oxide (NO) is oxidized to NO_2. NO is produced primarily by coal-fired power plants, automobiles or by other sources where combustion is a major factor. Nitrogen oxide (NO_x) is the term used to represent both NO and NO_2. As the oxidation of NO to NO_2 occurs over time (approximately 2 hours), the highest NO_2 concentrations are generally located some distance downwind from major NO sources.

Current EPA Regulations require that sampling for NO_x be done using monitors which have been designated reference/equivalent methods. Currently, all NO_x monitors operated by the State comply with this requirement. Table 1 (Section A, Part I) provides information concerning the reference/equivalent designation of NO_2 analyzers used in the State's air quality monitoring network.

In conjunction with the promulgation of reference/equivalent methodology and quality assurance guidelines, the Environmental Protection Agency also established a sampling schedule for NO_2. In compliance with this schedule, air quality data for NO_2 is collected as consecutive hourly averages except for:

1) periods of maintenance,

2) periods of calibration.

a. Point Sources

Most major point sources of NO 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, as calculated from the most recent emission inventory (1981), are listed in Table 7. Map 11 shows the approximate locations of these facilities. No changes have been deemed necessary since the last review.

In addition to the major sources of NO located within the State, impact on air quality from certain sources located outside the State have also drawn attention. At present, such facilities include the Boundary Dam power plant complex located near Estevan, Saskatchewan.

Currently, no source specific monitoring for NO_x is being conducted by the State. As indicated previously in this report, this type of monitoring is addressed by industry as a part of their permitting

TABLE 7

MAJOR SOURCES OF NO_x

#	Name of Company	Type of Source	Location	Permit #	NO_x Emissions Ton/year	Comments
1	American Crystal Sugar Company	Sugarbeet Processing	Hillsboro Trail Co.	X75001	203	
2	ANG Coal Gasification Co. (275 mmcfd)	Coal Gasification Plant	Beulah Mercer Co.	---	2112	Under Construction
3	American Oil Co. (Amoco)	Oil Refinery	Mandan Morton Co.	078001	704	
4	Aminoil, USA 32000 long ton/ day of sulfur	Natural Gas Processing	Tioga Williams Co.	082002	2824	
5	Antelope Valley Station Units 1&2 (440 mw/440 mw)	Steam Elec. Gen. Facility	Beulah Mercer Co.	---	---	Under Construction
	Unit 3 (500 mw)	Gen. Facility	Mercer Co.	---	---	Proposed
6	Basin Electric Units 1&2 (216 mw/440 mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	730004	7733/17752 1/	
7	Basin Electric Units 1&2 (25 mw/25 mw)	Steam Elec. Gen. Facility	Velva McHenry Co.	730005	500/500	
8	Coyote Station Unit 1 (440 mw)	Steam Elec. Gen. Facility	Beulah Mercer Co.	---	---	
9	Husky Industries	Charcoal Briquetting Plant	Dickinson Stark Co.	730013	115	
10	Minnkota Power Co-op Unit 1 (235 mw)	Steam Elec. Gen. Facility	Center Oliver Co.	F76009	11590	

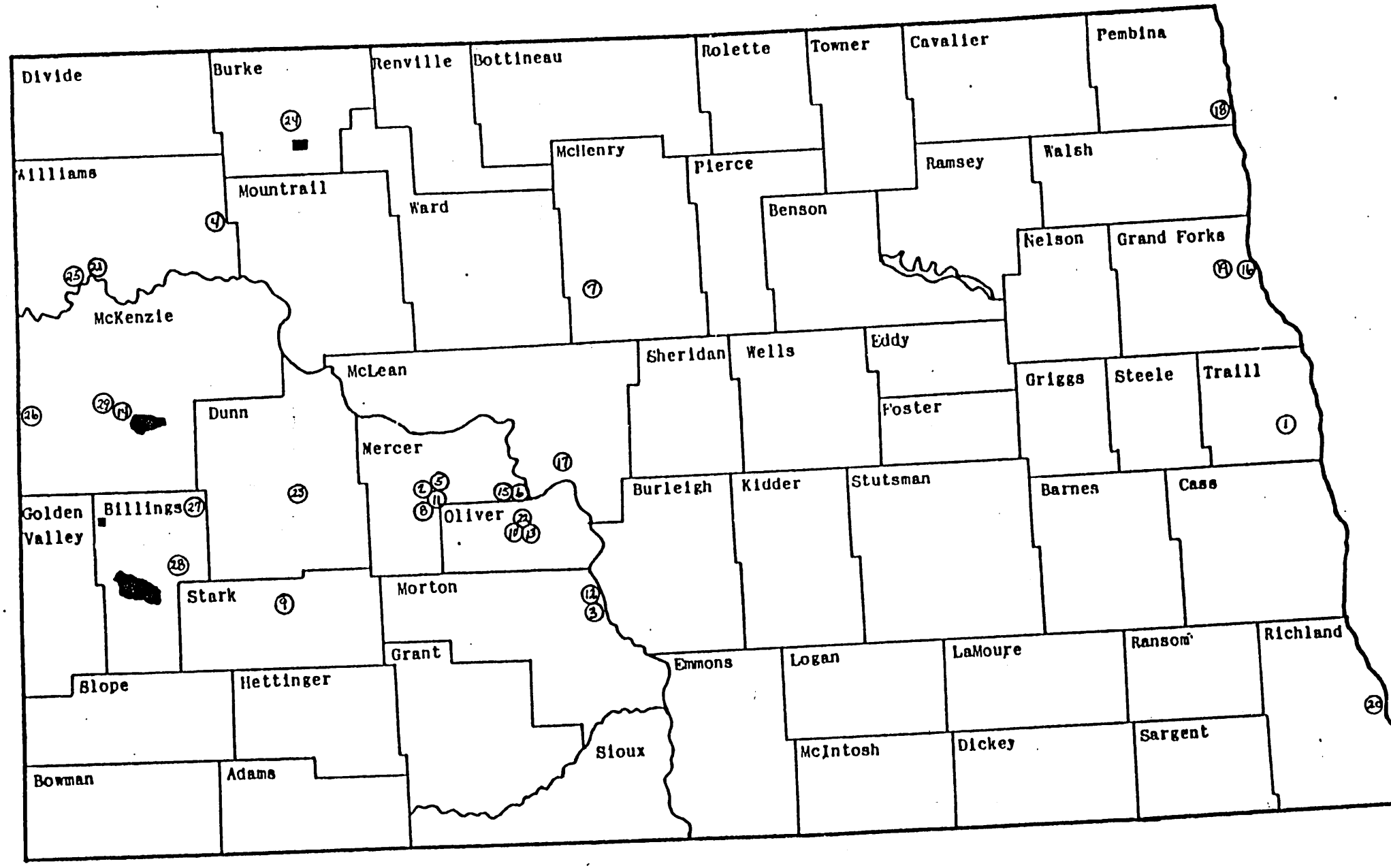
1/ Emissions from Unit 1/emissions from Unit 2
2/ Information not available.

TABLE 7 (Cont.)

#	Name of Company	Type of Source	Location	Permit #	NO_x Emissions Ton/year	Comments
11	Montana Dakota Utilities	Steam Elec. Gen. Facility	Beulah Mercer Co.	F76006	107	
12	Montana Dakota Utilities Units 1 & 2 (25 mw/66 mw)	Steam Elec. Gen. Facility	Mandan Morton Co.	F76001	460/1077	
13	Square Butte Unit 1 (440 mw)	Steam Elec. Gen. Facility	Center Oliver Co.	F78007	15540	
14	True Oil Company	Gas Processing Plant	Watford City McKenzie Co.	078002	177	
15	UPA Stanton Units 1 & 2 (172 mw)	Steam Elec. Gen. Facility	Stanton Mercer Co.	F76007	5362	
16	UND	Heating Plant	Grand Forks Grand Forks Co.	730018	147	
17	UPA/CPA Units 1 & 2 (550 mw/550mw)	Steam Elec. Gen. Facility	Underwood McLean Co.	PTC issued	9440/9326	
18	American Crystal Sugar Company	Sugar Beet Processing	Drayton Pembina Co.	730015	446	
19	Grand Forks Air Force Base	Heating Plant	Grand Forks Grand Forks Co.	F78004	98	
20	Minn-Dak Farmers Co-op	Sugar Beet Processing	Wahpeton Richland Co.	Y78001	502	
21	Westland Oil	Oil Refinery	Williston Williams Co.	081017	108	
22	Minnesota Power & Light	Steam Elec. Gen. Facility	Center Oliver Co.	---	---	Proposed
23	Nokota Company	Coal-to-Methanol	Dunn Center Dunn Co.	---	---	Proposed

TABLE 7 (Cont.)

#	Name of Company	Type of Source	Location	Permit #	NO_x Emissions Ton/year	Comments
24	Cities Service	Natural Gas Processing	Lignite Burke Co.	080001	225	
25	Phillips Petroleum	Natural Gas Processing	Trenton Williams Co.	-----	170	
26	Koch Hydrocarbon	Natural Gas Processing	Sidney, MT McKenzie Co.	-----	160	
27	Warren Petroleum	Natural Gas Processing	Fairfield Billings Co.	081013	Not Available[2/]	
28	Western Gas Processors	Natural Gas Processing	Fairfield Billings Co.	082012	Not Available[2/]	
29	Kerr McGee	Natural Gas Processing	McKenzie Co.	076001	Not Available[2/]	
Compressor Stations (#stations)						
	Aminoil (3)				60/149/144	
				TOTAL	87,731	



MAP 11

MAJOR SOURCES OF NITROGEN OXIDES

requirements. Appendix A provides information on the industrial monitoring networks which have been established to address $NO-NO_2-NO_x$ source specific impact on air quality.

Data Needs

As per the previous discussion, $NO-NO_2-NO_x$ data needs with regard to point sources include:

1. NO_x monitoring in west-central North Dakota to assess impact on air quality in the region as a result of energy development in west-central North Dakota (Dunn Center).

2. NO_x monitoring in Beulah to assess impacts from energy related development in the area.

3. NO_x monitoring in the eastern Oliver County/southern McLean County area to address impact on air quality as a result of coal related energy development in McLean, Mercer and Oliver counties.

4. Monitoring to assess NO_x impact on air quality in North Dakota from the power plant complex located near Estevan, Saskatchewan.

In response to the above-mentioned data needs, the Department currently operates two $NO/NO_2/NO_x$ analyzers in the State. One analyzer is located near Dunn Center and the other is at Beulah. The analyzer near Dunn Center was located to provide background data associated with energy development in the west-central portion of the State and to provide data which could be used to evaluate the Department's modeling efforts. Beulah was established as a population exposure site due to energy related growth in that area. Data needs for oxides of nitrogen, as per this review, dictate that operation of the $NO/NO_2/NO_x$ analyzers at Dunn Center and Beulah should continue.

As noted in past reviews, as well as this review, data needs indicated that an analyzer be operated to address the NO_x data need expressed in Item 3. To address this data need, the Department is proposing to include monitoring for NO_x in conjunction with monitoring for other parameters at the proposed SPM monitoring site in the southern McLean County area. The site should be operational in July 1983.

Since the 1982 review, the need to monitor NO_x in a Bismarck/Mandan rural location in response to impact from Amoco and Heskett or coal energy development to

the northwest has been deleted. Also, a high priority is being given to reevaluation of the need for NO_x monitoring in regard to Item 4 above.

b. Area Sources

As indicated earlier, the second major source of oxides of nitrogen can generally be 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. In such areas, two sites would be necessary: one neighborhood scale station to measure photochemical oxidants production of NO_2 in an urban area where the emission density of NO_x is the greatest, and another urban scale station downwind of the area of the peak NO_x emissions to measure NO_2 produced from the reaction of NO with O_3.

At present, the State is considered to have no significant urbanized areas with regard to oxides of nitrogen. Also, an emission inventory of mobile or other such sources is not available and no determination has been made with regard to an appropriate population cutoff point for monitoring oxides of nitrogen.

Although no specific need for $NO/NO_2/NO_x$ monitoring has been deemed necessary with regard to major urbanized areas located in North Dakota, the concern exists that major urbanized areas located in Canada and Minnesota may have some impact on air quality in North Dakota. As a low priority item, a special purpose NO_x monitor might be located in conjunction with an ozone analyzer in the eastern part of the State as equipment, manpower, resources and priorities allow.

c. Dual Purpose Monitoring

As with particulate, the maximum impact of point sources of NO and population centers may overlap. In such cases, dual purpose monitoring may be appropriate.

As indicated earlier, an NO_x monitor was established in Beulah due to significant industrial growth in the area. Should future development and city growth indicate a dual purpose monitoring classification is better suited to the site, action will be initiated to reclassify the site and address data from a duel purpose point of view. For the time being, this site will remain population exposure oriented with respect to NO_x.

VI. OTHER POLLUTANTS

a. Lead

The September 3, 1981, 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, a minimum of two (2) stations are required for both SLAMS and NAMS networks; one category "a" type station (generally located in area of maximum expected concentration) and one category "b" type station (combining high population density with high pollution concentrations).

Currently, the State of North Dakota has no urbanized areas of 500,000 or greater; nor is it considered to have any significant point sources of lead. As such, the State is not required to establish a lead SLAMS or NAMS monitoring network.

Although lead monitoring is not required, the State has collected lead data to establish background concentrations and assess the need for

continued lead monitoring. Sites currently monitoring for Pb include:

Location - Name (SLAMS)	Date Established
Bismarck - Bismarck Commercial	September 1979
Fargo - Fargo Commercial	September 1979
Grand Forks - Grand Forks Commercial	September 1979
Minot - Minot Commercial (SPM)	September 1979
Dunn Center - Dunn Center Rural	January 1982
Woodworth - Rural	April 1982

Duplicate samplers were located at Bismarck in October 1979, and at Fargo in April 1980, for quality assurance precision estimates.

A review of the data gathered at these sites indicates that lead concentrations, on the average are approximately 10 times lower than the ambient air quality standard of 1.5 $\mu g/m^3$. For this reason, and the previous discussion, it is recommended that monitoring for Pb at all of the above-mentioned sites be terminated.

In response to a Precipitation Chemistry Program being conducted by the Division of Environmental Waste Management and Research - North Dakota State Department of Health, certain sites were requested to maintain special purpose monitoring for lead.

These include:

Site	Date Established
Dunn Center	January 5, 1982
Lake Canfield	August 21, 1982 to March 31, 1983
Woodworth	April 5, 1982

Although monitoring at Lake Canfield has been terminated, monitoring for Pb at Dunn Center and Woodworth will continue until such time as research commitments by the Division of Environmental Waste Management and Research are fulfilled.

b. Suspended Sulfate

Particulate sulfate levels are generally thought to be the result of: 1) contributions from local emissions, 2) formed in the atmosphere by a variety of homogeneous and heterogeneous mechanisms, or 3) transported into an air quality region from distant SO_2 sources.

As suspended sulfates are analyzed from the same filters as total suspended particulate, monitoring for sulfates has been incorporated into the TSP monitoring schedule and is conducted at each of the State's TSP monitoring sites.

An analysis of sulfate data, beginning as early as 1976 for some sites, has shown sulfate levels in exceedance of the 12 $\mu g/m^3$, 24-hr standard; and sulfate levels in exceedance of the 4 $\mu g/m^3$, annual arithmetic mean standard.

As no specific conclusions have been drawn with regard to high sulfate levels in the State and sulfate monitoring has seen increased importance from a research perspective, i.e., its relation to TSP, nitrates and precipitation chemistry, it appears reasonable to continue hi-volume filter analysis for sulfates at all sites. These sites are listed below:

Fargo
Beulah
Bismarck
Bowman
Moffit
Devils Lake
Dickinson
Dunn Center
Grand Forks
Jamestown
Lake Tschida
Lostwood
Mandan
Mandaree
Medora
Minot
TRNP-N
Valley City
Wahpeton
Williston
Woodworth (SPM)

Note: As indicated in earlier portions of this review, certain revisions to the TSP network have been proposed. These revisions included the possible elimination of Bowman and Mandaree as background sites, and the possible elimination of Devils Lake, Valley City and Wahpeton as population-oriented samplers.

It is the Department's opinion that the reductions in TSP monitors and subsequent reduction of sulfate monitors at Bowman, Mandaree, Devils Lake and Valley City will not decrease the State's ability to adequately address the sulfate questions noted above. As the need for sulfate data outweighs the requirement for TSP data at Wahpeton, the hi-volume monitor for that site should be retained. The only other change will include sulfate monitoring in conjunction with TSP at the "southern McLean County" monitoring site scheduled for operation in July 1983.

c. Suspended Nitrates

As suspended nitrates are analyzed from the same filters as total suspended particulate, monitoring for nitrates has been incorporated into the TSP monitoring schedule and is conducted at each of the State's TSP monitoring sites.

To date, a considerable amount of suspended nitrate data has been gathered by the Department. As this data, and nitrate monitoring in general, has seen increased importance from a research perspective, i.e., its relation to suspended sulfates, TSP and

precipitation chemistry, it appears reasonable to continue hi-volume filter analysis for nitrates. Although elimination of samplers at Bowman, Mandaree, Devils Lake and Valley City is proposed, the subsequent reduction of nitrate monitoring at these sites is not expected to decrease the State's ability to adequately address nitrates from the perspectives noted above. The only other change will include monitoring for nitrates in conjunction with TSP at the proposed "southern McLean County" site scheduled for operation in July 1983.

Should the need for nitrate data outweigh the need for other data at any time, the hi-volume monitor will be retained.

d. Other Pollutants

In addition to the pollutants noted previously in this report, concern had been expressed over the quantity of HC emissions from the Amoco oil refinery and its proximity to the Bismarck/Mandan population centers. In this regard, this Department had given consideration to monitoring hydrocarbons in conjunction with other data needs identified with this facility. In response to additional review

concerning the need for hydrocarbon monitoring in connection with this facility, EPA's comments on hydrocarbon monitoring in response to the 1982 review and the repealing of the Federal Hydrocarbon Standard on January 5, 1983, consideration for monitoring has been dropped. It should be noted, however, that the State still retains its hydrocarbon standard at this time.

Data needs for air contaminants other than those mentioned previously in this report, or in this section, have not been identified at this time.

The Department will continue to review data needs with regard to other pollutants to determine if data needs, pollution sources, or pollution concentrations have changed or are changing, and adjust its air quality monitoring program as appropriate.

VII. METEOROLOGICAL DATA

By measuring surface wind speed and direction one can attempt to determine where a pollutant laden air mass has come from and where it is going. This information is deemed to be essential anytime an attempt is made to determine the cause of high pollution periods.

Because of the complexity of wind patterns, and the possible influence of local geographical features, it has been the policy of the Division of Environmental Engineering that meteorological monitoring be conducted at all monitoring stations containing continuous analyzers. General guidelines for establishing meteorological monitoring are outlined below:

1. Special Projects - Special project meteorological monitoring is determined on a case-by-case analysis of the project purpose. If other meteorological data is available and representative of the area studied, this can be used.

2. Background Projects - Background meteorological monitoring is determined on a case-by-case analysis. Data to be used should be representative of the area studied and the type and height of emissions.

The guidelines on ambient monitoring for PSD should be followed as closely as possible.

3. Source Projects - Monitoring around existing sources depends on the location of the source and also the type and height of the emissions. As a minimum, monitoring should provide precipitation, surface wind speed and direction, mixing height, stability, and temperature. Often sources are located close enough to National Weather Service (NWS) stations to allow use of that data. However, again a case-by-case review must be made of the source location to determine what is representative of the area.

4. Population Projects - Population project monitoring is often conducted very near NWS stations which provide the majority of the data needs. However, additional wind systems and/or mixing height data may be necessary.

Currently meteorological data is gathered at the following air quality monitoring stations:

Location	Parameters	Category
Dunn Center	Wind Speed, Wind Direction Temperature, Precipitation	Background
Beulah	Wind Speed, Wind Direction	Population
TRNP-S	Wind Speed, Wind Direction	Background
TRNP-N	Wind Speed, Wind Direction	Background
Portable	Wind Speed, Wind Direction	Special Purpose

No modifications are deemed necessary with regard to meteorological parameters at the above-mentioned AAQM sites at this time.

C. SUMMARY

Having identified specific data needs for each pollutant in the previous portion of this document, the following review summarizes monitoring concerns on a pollutant basis, and makes recommendations for utilizing current sites and establishing new sites to adequately and economically address as many of the data needs as possible.

Monitoring Concerns

1. TSP

- review need for population-oriented sampler in West Fargo
- evaluate the need for continued population-oriented TSP monitoring at Devils Lake and Valley City. In light of the 10,000 population-oriented cutoff point.
- review need for site to address emissions from Boundary Dam power plant in Canada
- establish site in McLean County to address coal related energy development in west-central North Dakota. Site scheduled to begin July 1983

- eliminate Mandaree and Bowman as background ground monitoring sites
- utilize the Woodworth (SPM) site as a background site for eastern North Dakota until a more appropriate background site is established.

2. SO_2 and H_2S

- Establish SO_2 monitor in Bismarck-Mandan area to address emissions from Amoco, the MDU Heskett Station and possible impact from the coal energy development area to the northwest. Monitoring by Amoco is scheduled to begin July 1983.
- Establish SO_2 monitor in McLean County to address coal related energy development in west-central North Dakota. Site scheduled to begin in July 1983.
- Establish a site (obtain additional portable site) for SO_2 and H_2S monitoring on the North Dakota-Montana border in response to oil and gas development, gas processing facilities, i.e., Shell Oil and Perry Petrolane, and the MDU power plant near Sidney, Montana.
- Evaluate need for SO_2 monitor on the North Dakota-Canada border to address emissions from the Boundary Dam power plant near Estevan, Saskatchewan.

- Expand (obtain additional portable site) the area-wide SO_2 and H_2S monitoring in the oil/gas region of western North Dakota.
- Review need for monitoring for H_2S and SO_2 in the Lostwood National Wildlife Refuge area to assess impact from oil/gas development (could possibly be tied in with decision to monitor in regard to the Boundary Dam facility in Canada).

3. CO

- Set up a special purpose CO monitor to gather CO information for a population-oriented sampling cutoff point.

4. Ozone

- Establish a monitor in eastern or southeastern North Dakota to address any impact from major metropolitan areas in Minnesota and Canada and from major point sources of precursors of ozone located in-State as well as out.
- Evaluate ozone analyzer at Beulah and, if appropriate, relocate to proposed site in southern McLean County.

5. Nitrogen Oxides

- Establish a monitor in eastern Oliver County to address coal related energy development in west-central North Dakota. Site scheduled to begin July 1983.
- Review need for a monitor on the North Dakota-Canada border to address emissions from the Boundary Dam power plant in Canada.

6. Lead

- Delete all monitoring for lead except special purpose monitoring.

7. Sulfates and Nitrates

- In conjunction with TSP, delete monitoring for sulfates and nitrates at Bowman and Mandaree, evaluate the need for continued monitoring at Devils Lake and Valley City, include SO_4 and NO_3 monitoring in conjunction with TSP monitoring at the proposed (7/83) McLean County site, and review the need for SO_4 or NO_3 monitoring in conjunction with other TSP monitoring.

8. Hydrocarbons

   - As per this review, no need for hydrocarbon monitoring has been deemed necessary.

9. Meteorological Monitors

   - Maintain meteorological monitors (minimum of wind speed and wind direction at all continuous sites.

Site Recommendations

1. As previously indicated, an area-wide network of SO_2, H_2S and meteorological sites is desired in order to assess impact on air quality from the rapidly developing oil and gas industry in the western portion of the State.

   While a complete assessment of the area would require such a monitoring endeavor, the cost associated with multiple sites makes it impossible to develop such a network.

   To address this data need, a single, special purpose site, with the flexibility to move from one

area to another, has been established for short-term evaluation of air pollution problems within the oil/gas area.

At present, the need exists for at least one additional portable site to address increased SO_2 and H_2S impacts in the western portion of the State. As is, more problem areas and complaints are being registered than can be addressed with one portable SPM.

2. Emissions from the existing Amoco oil refinery and MDU Heskett station, coupled with existing sources and possible increased growth of coal related energy development in Mercer and Oliver counties had prompted a concern for SO_2, NO_x, and HC monitoring in the Bismarck-Mandan area. Since the 1982 review, the need for HC and NO_x data has been reviewed and deleted. In response to SO_2, Amoco will be required to establish one or two monitoring sites to address SO_2 as a part of its Permit to Construct for a sulfur recovery unit.

3. The need for data in the eastern Oliver County/ southern McLean County area, specific to coal related energy development in west-central North

Dakota, has been and still is an important concern. Data needs include monitoring for TSP, SO_4, NO_3, SO_2, NO_x and meteorological parameters. Beginning July 1983, this Department will have established a "highest concentration" SPM monitoring site in the southern McLean County area (near UPA/CPA Site #1) to address this need. Based on further review, i.e., modeling of all major industries in west-central North Dakota, the site may be relocated and established as part of the SLAMS network, for now it is proposed to be a SPM.

4. As per the 1982 review, a need to establish a monitoring site to assess impact on air quality from the Boundary Dam Power Plant complex located near Estevan, Saskatchewan has been noted. Data needs included TSP, SO_4, NO_3, SO_2, NO_2 and meteorological data.

Although a single monitoring site, to fully assess impacts from a power plant is far from the best means of analysis, the establishment of one site at or near the maximum point of impact, as predicted by computer dispersion modeling, was proposed as an acceptable starting point in an

evaluation process. As per this review, a re-evaluation of the need for an air monitoring site to address this facility should be undertaken prior to the next review.

As expressed in past reviews, a need to address air quality in the Lostwood National Wilderness Area, a PSD Class I area, has been noted. Specific data needs, in addition to the hi-volume sampler currently monitoring for TSP, SO_4 and NO_3 included H_2S, SO_2, NO_x and meteorological data. As with the Boundary Dam monitoring concern, a reevaluation of the need or concern for SO_2, NO_x and met data in the Lostwood area needs to be made (note Appendix D). Should it be determined that data needs are warranted for one or the other, appropriate action will be taken within priority, manpower and monetary constraints. Should monitoring be warranted in both cases there exists the possibility that the proposed Canadian border site might be combined with the Lostwood site to address data needs associated with both sites.

5. As with the previous review, reasonable justification appears to exist for establishing a site in eastern or southeastern North Dakota for TSP, SO_4,

NO_3, NO_x, ozone and meteorological parameters. Reasons for such a site include the need for background data in eastern North Dakota and a concern for point and area source impact on air quality in the region from South Dakota and Minnesota.

Ambient air quality monitoring techniques have substantially improved during the past few years. The costs associated with these improvements, as well as increased costs for travel, salaries, etc., and a decline in available monies on both the State and Federal level have lead the Department to weigh the value of the existing monitors with the need to collect special study type data and the requirements of quality assurance.

The extent to which the items previously outlined are accomplished is dependent upon the ability of the Department to obtain necessary funding. If funds are not available to fulfill all the outlined needs, the high priority items, as specified in Part E, will be accomplished first. Other items will be addressed as manpower and monies become available.

D. MONITORING SITE EVALUATION

The following table (8) presents an evaluation of the monitoring sites discussed in this review. The evaluation identifies:

1. Those sites which meet data needs without modification.

2. Those sites which could be modified.

3. Those sites which could be added.

4. Those sites which are not needed for the long term.

TABLE 8

MONITORING SITE EVALUATION

Site	Parameter	Meets Needs	Modification Needed	New Site Needed	Parameter Not Needed
Fargo Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
	Pb				X
Beulah Residential	TSP	X			
	SO_4	X			
	NO_3	X			
	SO_2	X			
	NO_2	X			
	O_3				X
	MET	X			
Bismarck Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
	Pb				X
Bowman Rural	TSP				X
	SO_4				X
	NO_3				X
Moffit Rural	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			
	Pb	X			
	SO_2	X			
	NO_2	X			
	O_3	X			
	MET	X			
Grand Forks Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
	Pb				X

TABLE 8 (Cont.)

Site	Parameter	Meets Needs	Modification Needed	New Site Needed	Parameter Not Needed
Jamestown Residential	TSP	X			
	SO_4	X			
	NO_3	X			
Lake Tschida Rural	TSP				X
	SO_4				X
	NO_3				X
Lostwoods 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
Medora Rural (TRNP-S)	TSP	X			
	SO_4	X			
	NO_3	X			
	SO_2	X			
	MET	X			
Minot Commercial	TSP	X			
	SO_4	X			
	NO_3	X			
	Pb				X
Watford City Rural (TRNP-N)	TSP	X			
	SO_4	X			
	NO_3	X			
	SO_2	X			
	O_3	X			
	H_2S	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			

TABLE 8 (Cont.)

Site	Parameter	Meets Needs	Modification Needed	New Site Needed	Parameter Not Needed
Canadian Border Rural	TSP			X	
	SO_4			X	
	NO_3			X	
	SO_2			X	
	NO_2			X	
	MET			X	
Portable Unit (Western ND oil/gas Area Network)	SO_2		X Additional		
	H_2S		X Sites Needed		
	MET		X		
Woodworth (SPM) Rural	TSP	X			
	SO_4	X			
	NO_3	X			
	Pb	X			
McLean	TSP			X	
	SO_4			X	
	NO_3			X	
	SO_2			X	
	NO_2			X	
	O_3			X	
	MET			X	
Background Monitor in southeastern part of State	TSP			X	
	SO_4			X	
	NO_3			X	
	NO_2			X	
	O_3			X	
	MET			X	
Bismarck Rural*	SO_2	X			
	MET	X			
Lostwoods National Wildlife Refuge	TSP			X	
	SO_4			X	
	NO_3			X	
	SO_2			X	
	H_2S			X	
	MET			X	

*Addressed by Mandan Amoco Refinery Monitoring.
**May be addressed in conjunction with Canadian Boarder site.

E. PRIORITY LIST

Table 9 presents a prioritized list of proposed modifications to the North Dakota Ambient Air Quality Monitoring Network. The prioritized list is based on the importance of the changes and the financial costs involved.

TABLE 9

	Action	Projected Date	Accomplished
1.	Delete Hi-volume sampler at Foxholm	4/30/82	4/30/82
2.	Discontinue all analysis for lead except at SPM sites	12/31/83	
3.	Upgrade monitoring effort for SO_2, H_2S and MET in the Oil/Gas development area to supplement the existing SPM	(As resources & manpower allow)	
4.*	Establish a Bismarck-Mandan rural site for SO_2 and MET	7/1/83	
5.	Establish a site for TSP, SO_4, NO_3, SO_2, NO_x, O_3 and MET in McLean County to address coal energy related development in west-central North Dakota	7/15/83	9-15-83
6.	Utilize the Woodworth SPM site for TSP, SO_4, and NO_3 background data for eastern North Dakota until such as a more representative site is established	3/1/82	3/30/82

*Established in part by Amoco Refinery monitoring in Mandan.

TABLE 9 (Cont.)

		Projected Date	Accomplished
7.	Reevaluate need or a Canadian border site either separately or in conjunction with additional data needs at the Lostwood National Wilderness area	10/1/83	
8.	Establish a site in southeastern part of State for TSP, SO_4, NO_3, NO_x, O_3, and MET	(As resources & manpower allow)	
9.	Review the Moffit and Canfield Lake (SPM) site in terms of background data needs for TSP, SO_4, and NO_3 in central North Dakota	5/1/82	3/31/83
10.	Discontinue population-oriented sampling at Valley City and Devils Lake	12/31/83	
11.	Discontinue background monitoring at Bowman and Mandaree	12/31/83	
12.	Evaluate need for site at Lostwood in response to concerns by Department of Interior Fish and Wildlife Service and this Department either separatly or in conjunction with data needs at Canadian Boarder site	10/1/83	