

CONTROL STRATEGY

I. General

The four Air Quality Control Regions designated for South Dakota are Priority III for the six listed pollutants with the exception of the Interstate Metropolitan Sioux Falls Region (087), which is classified Priority II only for particulates. These classifications are tabulated in Table 1 of the Introduction.

With the above listed exceptions, the measured and estimated ambient air quality levels are below the applicable Federal secondary standards for the six listed pollutants in the four air quality regions. The control strategy for these regions with Priority III pollutant levels will mainly then be concerned with the protection of the existing air quality. This non-degradation policy will be implemented by the compliance with South Dakota Air Pollution Control Regulations of all existing, new, or modified point and area sources within time limits prescribed by the Compliance Schedule section of this plan. Specifically, this will include the review and approval of plans and specifications for all new or modified sources as a check on their future compliance with applicable emission regulations. However, the new or modified sources will not bear the entire burden of this non-degradation policy. Existing sources will also be expected to comply with all applicable emission regulations.

Because particulate emissions form the major air quality problem in South Dakota, area source control efforts will primarily reduce emissions from the open burning of solid wastes, while point source control efforts will primarily reduce emissions from agricultural and mineral processing industries. These reductions will be accomplished by the strict control of open burning and the application of reasonably available control technology. By controlling these point and area sources, particulate emissions could potentially be reduced by a conservative estimate of 60% to 70%. These reduction figures include allowances based on growth factors listed later in this section. This control strategy combined with a program to investigate and control localized air pollution problems should insure ambient air particulate levels below the listed South Dakota Ambient Air Quality Standards.

It should be noted that prevailing meteorological conditions in South Dakota preclude the occurrence of most stagnation conditions that could cause pollutant buildups in excess of Ambient Air Quality Standards. The main factor responsible for the lack of stagnation conditions across South Dakota is the high percentage of days each year that are windy and have early morning inversion break ups.¹

Though the other five pollutants present only occasional localized problems at the present time, their control strategies should be mentioned. For sulfur oxides, the control strategy would consist of the review and approval of new and modified sources and the control of sulfur emissions from fuels used in South Dakota. The control strategy for carbon monoxides, nitrogen oxides, photochemical oxidants, and hydrocarbons will be coordinated with the Federal controls placed on applicable emissions sources.

¹Weather Bureau information indicates that in South Dakota only 5% of the days have calm wind conditions.

II. Particulate Matter

The Metropolitan Sioux Falls Region is classified as Priority II for particulates and therefore emission reductions are necessary to meet South Dakota Ambient Air Quality Standards.

The control strategy for particulate emission reduction in the Sioux Falls Region will follow that strategy used for the rest of the state. Here again, compliance with the regulations will have the greatest impact on point source emissions from grain elevators, concrete and asphalt batch plants, and rock processing operations, and an area source emissions from open burning. Again the responsibility for emission reduction will be evenly spread across the new source, modified source, and the existing source categories.

To demonstrate the adequacy of the control strategy for particulates, the proportional reduction model will be used; but before this model can be used, the existing air quality levels, the background concentration, and the State standards for particulates in the Region must be determined. In 1970, the existing particulate air quality level in the Sioux Falls Region was measured at 64 ug/m^3 as an annual geometric mean and at 159 ug/m^3 as the maximum 24-hour concentration (refer to Table 1 of the Introduction). The South Dakota Ambient Air Quality Standards for particulates are 60 ug/m^3 as an annual geometric mean and 150 ug/m^3 as the maximum 24-hour concentration. There were no specific background measurements taken in the Sioux Falls Region, so air quality measurements from the Black Hills - Rapid City Region were used. Though they were made at the opposite end of the state, the Black Hills Region measurements were taken in a non-urban area that should provide reasonable data on background pollutant levels. At the Black Hills station, the annual geometric mean was 18 ug/m^3 and the maximum 24 hour concentration was 69 ug/m^3 as particulates. The percent reduction needed to meet the Ambient Air Quality Standards is as follows:

(1) Annual geometric mean

$$\frac{64 - 60}{64 - 18} (100) = 8.7\%$$

(2) Maximum 24 hour concentration

$$\frac{159 - 150}{159 - 69} (100) = 10.0\%$$

Using the Emission Inventory data tabulated in the Appendix, the particulate emissions occurring in 1970 in the four South Dakota counties of the Sioux Falls Interstate Region totaled 9,669 tons. With all emission sources in the four counties complying with applicable regulations, the particulate emissions estimated to occur in 1975 would total 2,146 tons. This represents 3.80 and 0.83 tons per square mile respectively. The 1975 figure includes the growth factors based on the year 1970, that are listed below:²

²These factors were supplied by the Environmental Protection Agency and various local sources.

I.	Fuel Combustion	
	A. Total Residential	+8.0%
	B. Total Industrial	+19.9%
	C. Total Utilities	0.0%
II.	Total Process Losses	+19.9%
III.	Total Solid Waste Disposal	+8.0%
IV.	Transportation	
	A. Motor Vehicle	+21.9%
	B. Other	+17.6%

For South Dakota's portion of the Region, the percent reduction of particulate emissions would equal 77.8%. When figures for Lyon County of Iowa are included, the percent reduction for the entire Interstate Region equals 75.6%.

Because most of the sources in the four outlying counties around Minnehaha County are distant enough from the Sioux Falls area so as to have very little impact on the air quality, the emissions from these four counties can be reasonably ignored. In this case, the estimated particulate emissions from Minnehaha County total 8,329 tons, and the projected 1975 particulate emissions total 1,419 tons. This represents 10.25 and 1.75 tons per square mile respectively. For the Sioux Falls area, the percent reduction of particulate emissions would equal 83%.

From these figures developed by the proportional model, the proposed particulate emission reduction of 77.8% to 83% is approximately eight times greater than 8.7% to 10.0% needed to achieve the Ambient Air Quality Standards. Using the proportional model and an average figure of 80.0% particulate emission reduction, the estimated ambient air particulate concentration in 1975 would be 27 $\mu\text{g}/\text{m}^3$ as an annual geometric mean and 87 $\mu\text{g}/\text{m}^3$ as the maximum yearly concentration. Both figures are below the particulate Ambient Air Quality Standards of 60 $\mu\text{g}/\text{m}^3$ and 150 $\mu\text{g}/\text{m}^3$ respectively. The accuracy of these projected figures is totally dependent on the accuracy of the background particulate concentration figure and the actual percentage of emission reduction achieved by 1975. However, with approximately eight times the needed emission reduction available through the application of existing technology, the particulate concentrations should be well below the Ambient Air Quality Standards by 1975.

AIR QUALITY DATA SUMMARY

Sioux Falls Interstate Air Quality Control Region

PARTICULATES (Tons/Year)

	Total Emissions for 4 counties of S. D., and 1 county of Neb, (tons)	Total Emissions for 4 counties of South Dakota (tons)	Total Emissions For Minnehaha County of South Dakota (tons)	Annual Geometric Mean (ug/m ³)	Maximum 24 Hour Concentration (ug/m ³)
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1970	9,902	9,669	8,329	64	159
1975	2,417	2,146	1,418	27	87
% Reduction	75.6	77.8	83.0	89.0	80.9
Standard	---	---	---	69	150
Background	---	---	---	18	69

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Air Quality Data Summary
(NASN Data)
1970, ug/m³

Pollutant	Sampling site location ¹	Sampling interval (months)	Start date	End date	Number of samples	Maximum 24 hours	Annual arith. mean	Annual geo. mean	Geo. std. dev.
Particulate Matter Sioux Falls AQCR	43°32'48" 93°43'45"	12	1-4	12-14	21	159	---	64	1.6
Black Hills-Rapid City AQCR	43°43'28" 103°55'13"	12	1-2	12-14	23	69	---	18	1.9
Sioux City AQCR	---	---	---	---	---	<150	---	<60	---
South Dakota AQCR	---	---	---	---	---	<150	---	<60	---
Sulfur Oxides (as SO ₂) Black Hills-Rapid City AQCR	43°43'28" 103°55'13"	11	1-3	11-15	21	18	6	---	2.9
Sioux Falls AQCR	---	---	---	---	---	<260	<60	---	---
Sioux City AQCR	---	---	---	---	---	<260	<60	---	---
South Dakota AQCR	---	---	---	---	---	<260	<60	---	---

¹Lat./Long.

NOTE: "less than values" estimated from Point Model or Area Model

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NATIONAL AIR SURVEILLANCE NETWORK
BASIC DATA

SITE	SAMPLE DATE YR/MO/DAY	(UG/CU.M) SUSP PART.	B-RADACT
			43:1480 01
			STIOUX FALLS; SOUTH DAKOTA
01	70/01/04	27	
01	70/01/13	60	
01	70/01/29	35	
01	70/02/14	62	
01	70/02/25	90	
01	70/03/09	57	
01	70/03/22	62	
01	70/04/08	159	
01	70/05/07	94	
01	70/05/23	51	
01	70/06/15	68	
01	70/07/04	33	
01	70/07/30	74	
01	70/08/10	113	
01	70/08/26	89	
01	70/09/11	79	
01	70/10/07	30	
01	70/10/20	72	
01	70/11/06	94	
01	70/12/05	82	
01	70/12/14	41	

SUSPENDED PARTICULATES::
GEOMETRIC MEAN = 63.69 or 64-

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NATIONAL AIR SURVEILLANCE NETWORK
BASIC DATASITE SAMPLE DATE
 YR/MO/DAY SUSP PART

(UG/CU.M)

B-RADACT

43 0110 01
BLACK HILLS FOREST S D *

01	70/01/02	17
01	70/01/13	7
01	70/01/29	13
01	70/02/14	10
01	70/02/25	10
01	70/03/09	16
01	70/03/22	9
01	70/04/08	21
01	70/04/21	14
01	70/05/07	46
01	70/05/23	12
01	70/06/02	69
01	70/06/15	21
01	70/07/08	25
01	70/07/18	29
01	70/07/30	22
01	70/08/10	33
01	70/08/26	55
01	70/09/20	30
01	70/10/20	18
01	70/11/15	11
01	70/12/05	11
01	70/12/14	7

SUSPENDED PARTICULATES:
GEOMETRIC MEAN = 17.95 or 18

000059

NATIONAL AIR SURVEILLANCE NETWORK
GAS DATA
(UG/CU.M)

SITE	SAMPLE DATE YR/MO/DAY	SULFUR DIOXIDE	NITROGEN DIOXIDE	ALDEHYDE	AMMONIA	TOTAL OXIDANT
01	70/01/03	4				
01	70/01/14	7				
01	70/01/29	10	31			
			49			
01	70/02/14	12	22			
01	70/02/26	12	34			
01	70/03/10	8	22			
01	70/03/22	13	27			
01	70/04/08	8	34			
01	70/04/21		22			
01	70/05/07	4	63			
01	70/05/23	12	39			
01	70/06/02	3	160			
01	70/06/15	4	37			
01	70/07/08	18	32			
01	70/07/19	13	49			
01	70/07/31	7	42			
01	70/08/10	0	48			
01	70/08/26	0	47			
01	70/09/11	0	15			
01	70/09/20	0	27			
01	70/10/20	0	30			
01	70/11/06		30			
01	70/11/15	0	53			

BLACK HILLS FOREST, S. D.

SULFUR DIOXIDE:
ARITHMETIC MEAN = 6