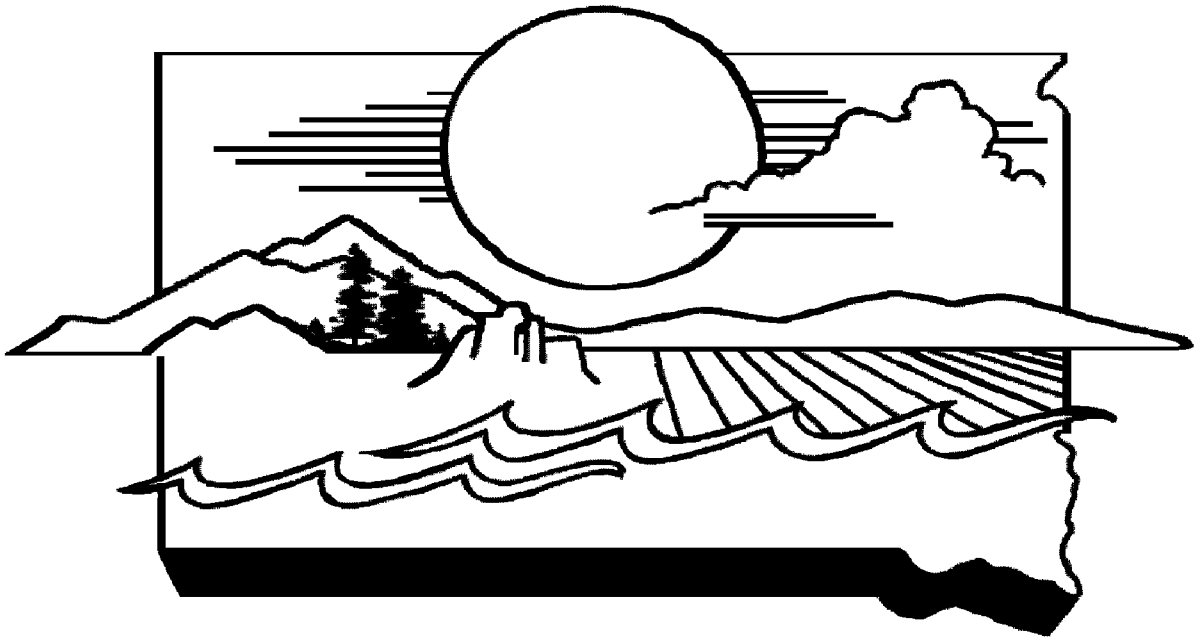
NATURAL EVENTS ACTION PLAN - HIGH WINDS

FOR

RAPID CITY, SOUTH DAKOTA



Prepared by

SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

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I. Introduction

In a memo dated May 30, 1996, by Mary D. Nichols, Assistant Administrator for Air and Radiation, the Environmental Protection Agency (EPA) established a Natural Events Policy (Appendix A) to address National Ambient Air Quality Standards PM_{10} (particulate matter less than 10 microns) violations that occurred during natural events. One of the three natural events identified in the memo was high winds.

The South Dakota Department of Environment and Natural Resources (DENR) recorded four exceedances of the National Ambient Air Quality Standard for PM_{10} in Rapid City, South Dakota in 1996 and 1997. The four exceedances occurred on:

- January 17, 1996
- February 10, 1996
- December 17, 1996
- May 13, 1997

The department determined these exceedances occurred during high winds coupled with dry conditions. Therefore, the department will apply the Natural Events Policy for these events except for the December 17, 1996, exceedance. This date does not meet the dry condition parameters set forth in this document, but it is noted that the high wind criteria was attained for this day.

The exceedances were recorded at the former Family Thrift Center (currently Prairie Market) PM_{10} monitoring site in west Rapid City. The department will also apply this policy to any future exceedances that occur under the high wind and dry conditions listed in this natural events action plan.

The contents of this document address the stipulations in the 1996 Natural Events Policy to develop a Natural Events Action Plan for high wind events in Rapid City. The components of this plan include:

- A discussion of the history of particulate air pollution in Rapid City;
- A characterization of the meteorological conditions for past high wind events;
- Identification of the main sources of air pollution during past high wind events;
- Best Available Control Measures (BACM) for anthropogenic sources contributing to the PM_{10} exceedances;
- A description of the public education activities and meetings held to inform the public of the high wind events and elevated air pollution levels; and
- A description of the notification process developed to inform the public of high wind events that cause high PM_{10} concentrations.

II. Scope

a. Purpose

The purpose of this plan is to discuss the natural events that have resulted in past PM_{10} exceedances and to develop or identify controls for PM_{10} sources to reduce or eliminate future PM_{10} exceedances in west Rapid City during high wind events.

b. Area of Implementation

This plan will be implemented in western Rapid City where the PM_{10} exceedances have occurred. Western Rapid City lies in the middle of the geological formation termed the limestone racetrack that surrounds the Black Hills National Forest. It is bordered on the west and south by the Black Hills and on the east by a series of hogback hills creating a bowl-like formation ideal for air pollution problems. The city's main industrial and mining complex is located in this section of the city. The area of implementation for this plan will be from a north to south line extending west from the "Gap" to five miles beyond the city limit boundary identified on page 3.

c. Identification of Contributing Sources

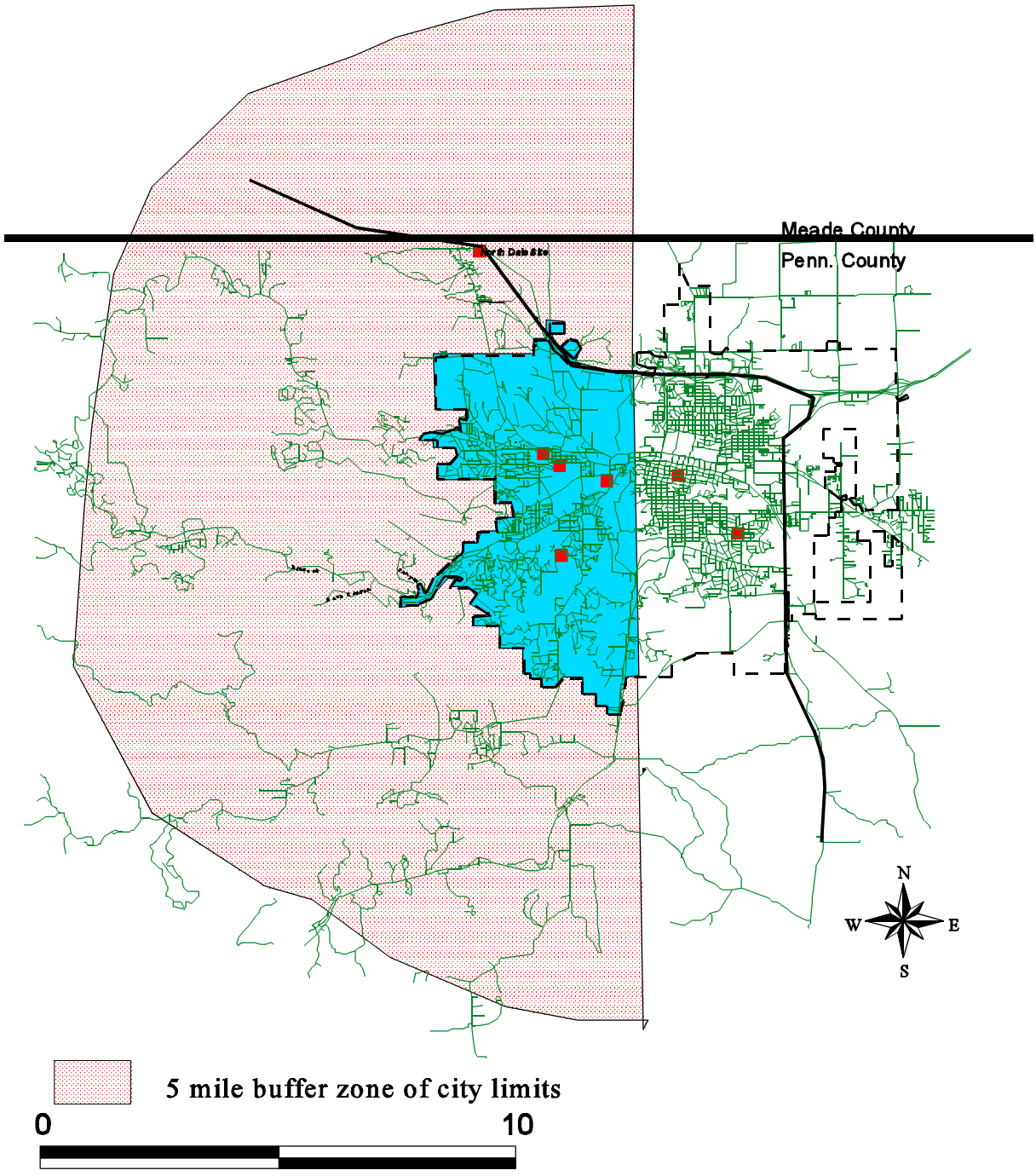
It is stated in the Natural Events Policy that all sources contributing to a PM_{10} violation are required to have Best Available Control Measures (BACM) implemented. This plan identifies fugitive dust sources within the industrial complex as the main contributors to the PM_{10} exceedances. It also identifies the proposed BACM for these sources and the process of implementation.

Other sources having the potential to contribute to the exceedances include point sources in the area, street sanding operations, construction activities, paved and unpaved parking lots/alleys, woodburning, and open burning. BACM have already been implemented for these sources because of past particulate pollution problems in the other sections of the city. They will be cited in the plan. Since the implementation of these measures, particulate pollution problems in other areas in the city have been eliminated.

d. Development and Implementation of BACM

The 1996 policy stipulates that BACM requirements need to be federally enforceable. The BACM for industrial fugitive dust sources will be implemented through the industrial sources' state air pollution permits. This will be either in the state's Part 70 permit or minor permit, both of which are federally enforceable through the State Implementation Plan (SIP). BACM for other sources contributing to the violation, such as reentrained street dust, unpaved parking lots/alleys, woodburning, construction activity, and open burning, has been established either under state regulations or the local Pennington County Air Quality Ordinance #12. Federal SIP approval for rules addressing sanding and deicing requirements are pending.

Rapid City
Natural Events Action Plan



e. Public Education and Notification of High Wind Events

A review of meetings held to notify the public of high concentrations and to discuss the Natural Events Action Plan is provided along with the process for calling air pollution alerts for future high wind events.

III. Particulate Matter Background History

Historically, the Rapid City area has had problems with high particulate levels. Due to recorded exceedances, Rapid City was classified as nonattainment for total suspended particulate (TSP) in 1978. In 1986, the dust standard was changed to Particulate Matter less than 10 microns (PM_{10}). With the change in standards, Rapid City became designated "unclassifiable" for PM_{10}. Rapid City met the new standard for several years.

In October 1992, two samples collected at Jaehn's Business Supply Site in western Rapid City violated the PM_{10} standard and triggered the nonattainment process with EPA. DENR submitted information to EPA requesting the samples be flagged as exceptional events under 40 CFR Part 50 Appendix K as a result of abnormal dry conditions coupled with high winds. It was stated these samples should not be used to determine the air quality status of Rapid City. DENR made several appeals to EPA for a favorable ruling.

In a letter from EPA to Governor Janklow dated July 19, 1995, EPA did not agree with DENR's position and planned to go forward with the nonattainment designation. EPA based their decision on the belief the high wind events are reoccurring. However, DENR convinced EPA the designation would be counterproductive to all the work the city, county, industry, and state had done to improve the air quality. EPA decided to suspend the designation if the following conditions were met:

- DENR submitted an analysis of the Rapid City air monitoring data to EPA;
- New requirements to control fugitive emissions for street sanding operations and industry were implemented;
- DENR continued to operate the air monitoring network in Rapid City; and
- No further violations of the air quality standards in Rapid City were documented.

DENR established some fugitive dust controls in the sources' permits, but the controls were not implemented in all the permits due to the then recent development of the Part 70 permitting program.

In January, February, and December 1996 and May 1997, four exceedances of the daily PM_{10} standard occurred at the Family Thrift Center monitoring site in Rapid City. DENR flagged these exceedances as exceptional events in the Aeromatic Information Retrieval System (AIRS) database. Although the four exceedances occurred on high wind days, the exceedances could not be considered exceptional events under 40 CFR Part 50 Appendix K because, according to EPA,

the conditions could reoccur.

On May 30, 1996, EPA issued its Natural Events Policy to address PM_{10} violations that occur during natural events. The policy covered natural events such as wildfire, volcanos, and high wind with the requirement that best available control measures (BACM) be applied to sources contributing to the PM_{10} violation even if the event could reoccur. On August 7, 1997, the department notified EPA the policy would be applied to the four exceedances and any future exceedances caused by high wind events policy.

IV. Natural Events Documentation for High Winds

a. Meteorology Characteristics

The following meteorological conditions occur in conjunction with high PM_{10} readings at the monitoring sites located south of the industry complex in west Rapid City:

- Consecutive hours of 20 mph or greater (hourly average) wind speeds;
- Peak winds of 40 mph (one minute average) or greater;
- The above wind conditions with three or more days of no precipitation (less than .02 inches); and
- Typically, days when the daily temperature averages below 32 degrees F.

The following information provides a profile of the meteorological conditions on the exceedance days in 1996 and 1997. A consistent meteorological trend can be observed between high winds, cold temperatures and dry conditions. This information was used in developing BACM and the air pollution alert for high winds. The data were extracted from the National Weather Service's reporting station at the Rapid City Regional Airport. Newspaper articles identifying high wind conditions on the exceedance days can be found in Appendix B.

January 17, 1996 - Family Thrift Center Site

- Concentration: 227.7 microgram per cubic meter (ug/m^3) (150 ug/m^3 PM_{10} standard);
- Precipitation: 12 days of no precipitation and 5 days of no snow on ground;
- Temperature: Average daily temperature 11 degrees F. (high 28/low -7); and
- Wind: Peak wind of 53 mph and average hourly wind speed of 28.9 mph.

February 10, 1996 - Family Thrift Center Site

- Concentration: 187.4 ug/m^3 (150 ug/m^3 PM_{10} standard);
- Precipitation: 9 days of no precipitation and 3 days of no snow on ground;
- Temperature: Average daily temperature 30 degrees F (high 40/low 19).; and
- Wind: Peak wind of 70 mph and average hourly wind speed of 30.2 mph.

December 17, 1996 - Family Thrift Center Site

- Concentration: 219 ug/m^3 (150 ug/m^3 PM_{10} standard);

- Precipitation: blowing snow;
- Temperature: Average daily temperature 8 degrees F. (high 11/low 4); and
- Wind: Peak wind of 62 mph and average hourly wind speed (20 to 35 mph).

May 13, 1997 - Family Thrift Center Site

- Concentration: 225 ug/m^3 (150 ug/m^3 PM_{10} standard);
- Precipitation: 5 days of no precipitation;
- Temperature: Average daily temperature 50 degrees F. (high 60/low 40); and
- Wind: Peak wind of 52 mph and average hourly wind speed (10 to 30 mph).

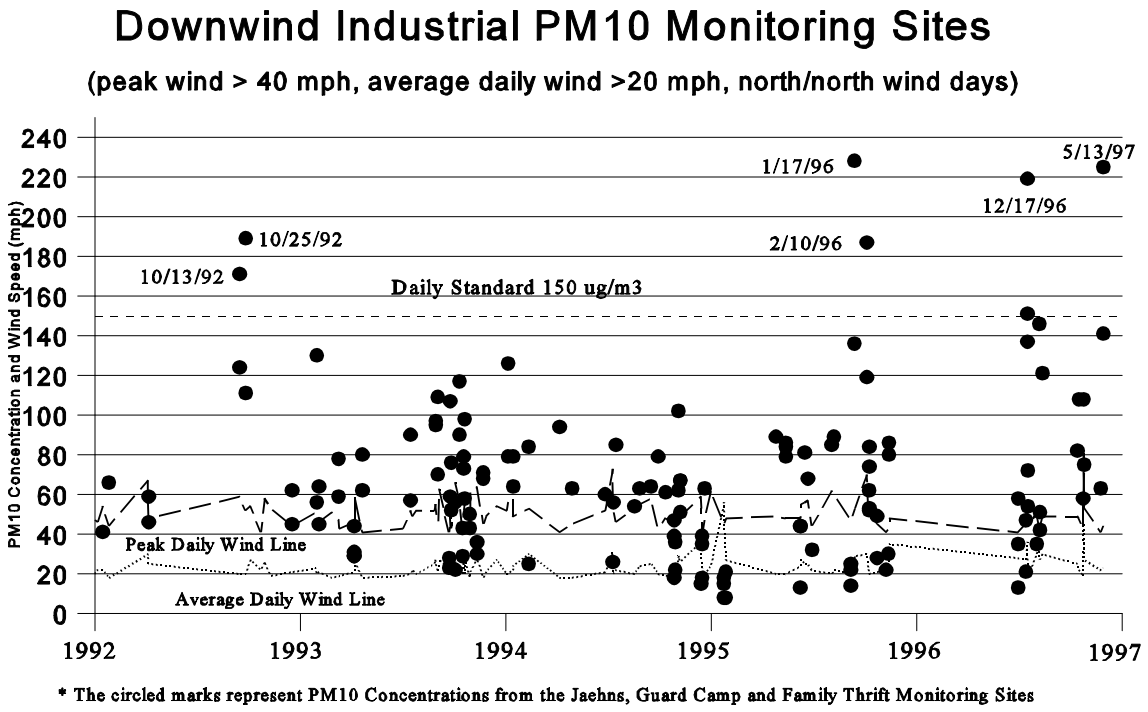


Figure-1. High wind speeds on N/NW wind days, and PM_{10} comparison.

Figure-1 shows PM_{10} concentrations between 1992 to 1997, recorded at the Jaehns, Guard Camp,

and Family Thrift Center monitoring sites. Average wind speed was 20 mph or greater, peak winds were 40 mph or greater, and the prevailing winds were out of the north or northwest. The graph shows that several PM_{10} concentrations were recorded at low levels under these conditions.

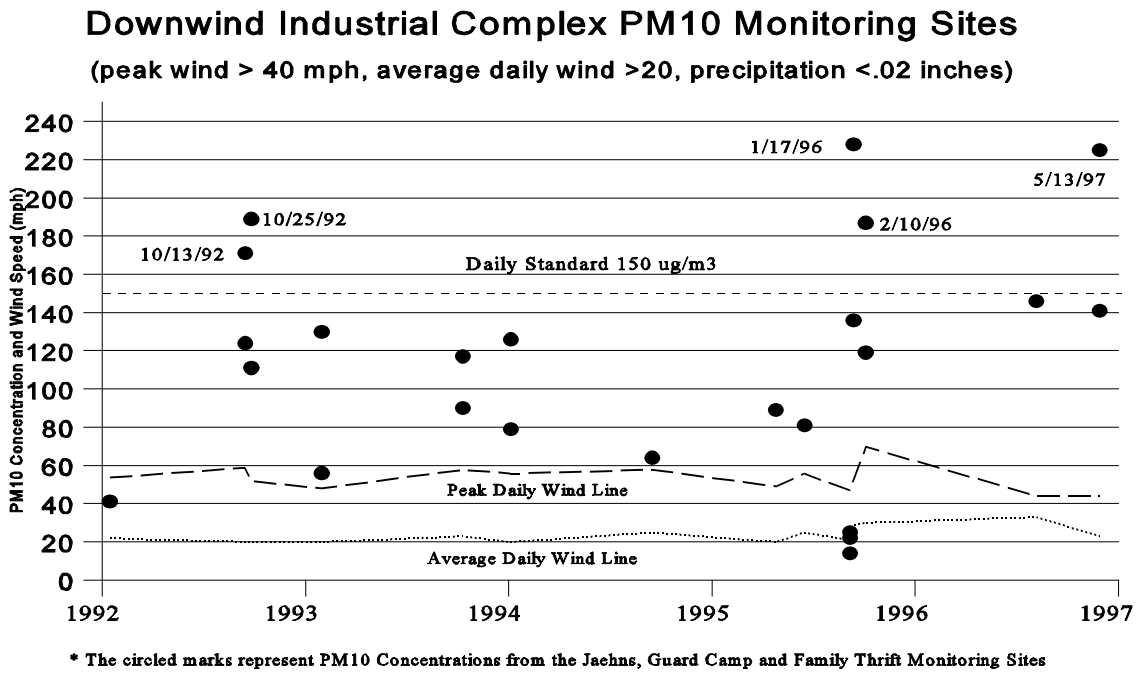


Figure-2. High wind speeds and N/NW wind days, low precipitation and PM_{10} comparison.

Figure-2 is a plot of PM_{10} concentrations on high wind days preceded by low precipitation. This graph excluded days when there were 5 previous days of greater than .02 inches of precipitation and days when precipitation exceeded .02 inches. The precipitation parameter eliminated the December 17, 1996, exceedance. It is very apparent higher PM_{10} concentrations (>100 ug/m3) occur when there are high winds and a lack of precipitation.

Figure-3 further illustrates that when wind speeds exceed 20 mph on an hourly basis, the PM_{10} concentrations increase considerably. Conversely, as the hourly wind speeds decrease below 20 mph, the PM_{10} concentrations follow this decline. This graph also shows a comparison between the hourly wind speeds recorded at the Northdale meteorological station and the National Weather Service meteorological station. The purpose of this comparison is to show that the Northdale and National Weather Service wind observations are similar in pattern and both could be used in depicting wind speeds. This comparison is indicative of most of the meteorological data collected at both sites. The hourly PM_{10} concentrations were taken from the Family Thrift

Center PM_{10} continuous monitoring site.

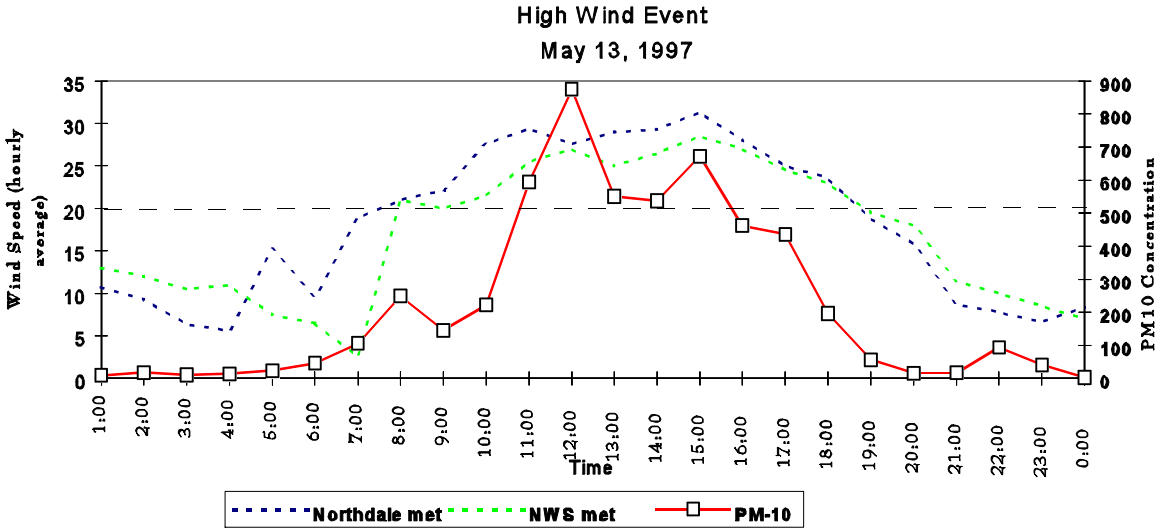


Figure-3. Hourly average wind speeds and hourly PM_{10} concentration comparison.

b. Flagging Data on AIRS

Department staff entered the PM_{10} values caused by high winds into the EPA database and flagged them as exceptional and natural events after performing QA/QC procedures on the filters for each exceedance date. EPA was notified of each exceedance as required by the State EPA Agreement for the Air Pollution Control Program. Copies of the information documenting each event were submitted to EPA on August 7, 1997, identifying these exceedances as exceptional events for high winds under the EPA Natural Events Policy.

The department is requesting through this Natural Events Action Plan that the January 17, 1996, February 10, 1996, and May 13, 1997, exceedances be considered as high wind events under EPA's Natural Events Policy. The December 17, 1996, exceedance does not fall under the conditions which the department has set for high wind events; therefore, it will not be considered a high wind event. It is noted that this day did fit the high wind conditions but did not meet the low precipitation parameters identified in this plan.

The department requests future PM_{10} exceedance days meeting high wind and low precipitation criteria established in this plan be flagged as high wind events under the Natural Events Policy. Cold temperatures will not be set as one of the criteria for an event, but it was critical in developing the BACM. It is apparent that water controls were not used during previous high wind events when there were cold temperatures.

V. Identification of Contributing Sources

One of the requirements of the May 1996 Natural Events Policy is to identify the sources contributing to the violation. This process is conducted to identify the sources that must implement BACM. The following techniques were used to complete this task:

- Maps identifying PM_{10} monitoring sites relative to possible sources and wind direction on exceedance days;
- Air Dispersion Modeling; and
- Mineral Mass Balance (CMB7 Source Apportionment Model).

The results of these analyses indicate that on high wind days:

- Maps: The PM_{10} monitoring sites with exceedances or high concentrations (>100 ug/m3) are located in the downwind direction of the industrial complex. The monitoring site upwind of the industrial complex is indicative of background concentrations;
- Air Dispersion Model: Indicates that fugitive dust emissions from the industrial complex account for 76 ug/m3 to 197 ug/m3 of PM_{10} air pollution at the downwind monitoring sites. This is significant in relation to the daily standard of 150 ug/m3; and
- Source Apportionment: Approximately 67 percent or an average of 106.7 ug/m3 of the particulate loading on the PM_{10} ambient air filters is associated with industrial fugitive dust sources as identified in the CMB7 source apportionment model.

a. Maps of PM_{10} Concentrations on exceedance days

Figures 4 through 7 illustrate the upwind and downwind PM_{10} concentrations occurring on the exceedance days. The relationship between the low concentrations at the upwind monitoring site (Northdale) and the high concentrations at the downwind sites (Family Thrift Center, Jaehns Business Supply and the Rapid City Guard Camp) depict sources of high PM_{10} concentrations occurring within the industrial complex.

On January 17, 1996, and February 10, 1996, the upwind monitoring site (Northdale) was not in operation. At this time, the site was on an every other day monitoring schedule, and these two dates were not recorded. This site was activated to every day sampling, and concentrations were recorded on the third and fourth exceedance days (December 17, 1996, and May 13, 1997).

It has been argued that other sources of particulate air pollution such as street sanding material, unpaved parking lots/alleys, and woodburning are major contributors to the exceedances. If these sources were major contributors, higher concentrations would be expected at other monitoring sites in the city, such as the Northdale and Library monitoring sites. This was not the case, however, since near background PM_{10} concentrations were observed at these sites on the high wind days. Background concentrations average from 20 to 30 ug/m^3 at the Northdale monitoring site on the exceedance days.

PM10 SAMPLER CONCENTRATIONS ON JANUARY 17, 1996

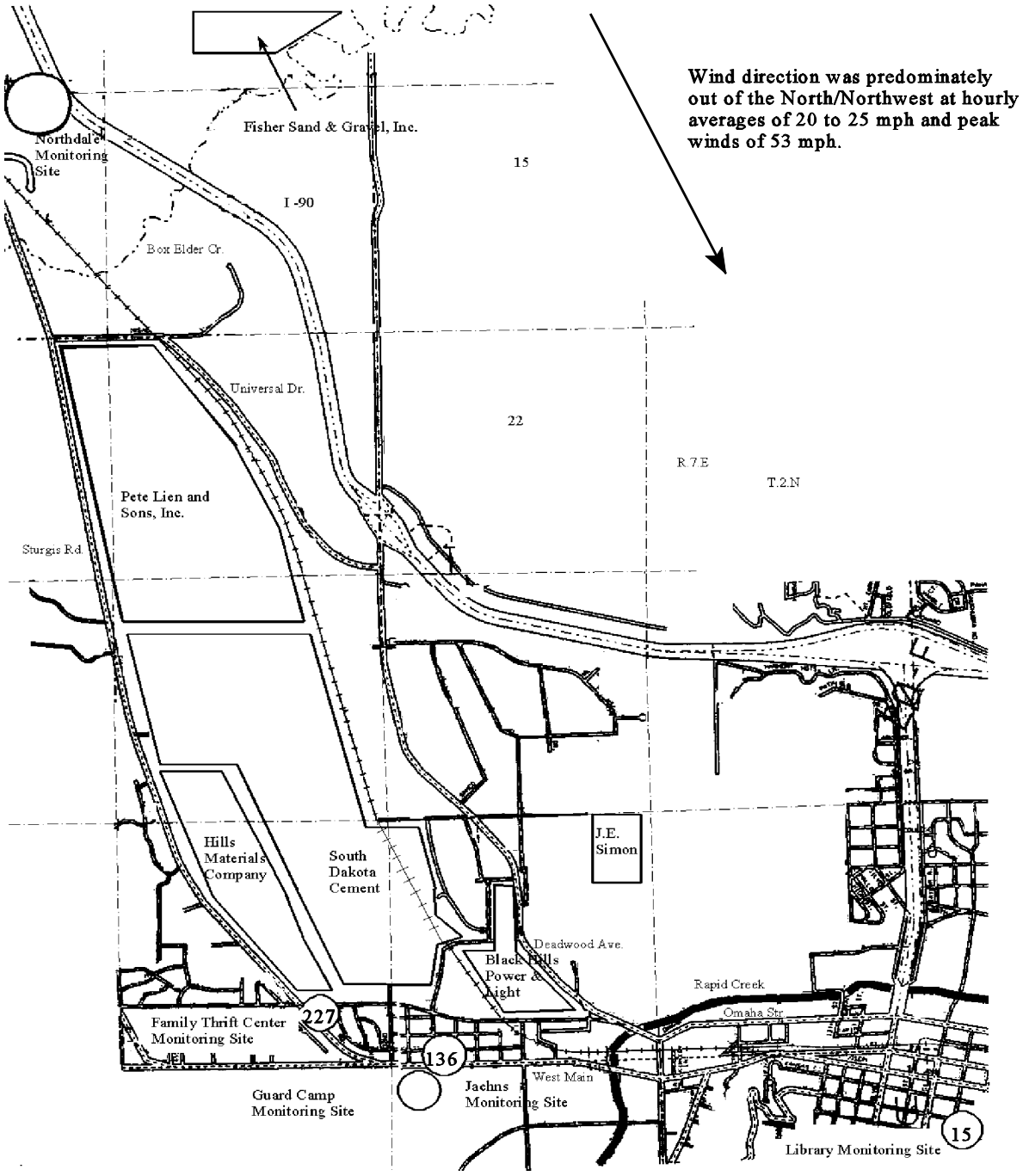


Figure -4. January 17, 1996 PM_{10} concentrations in ug/m^3 and monitoring sites.

PM10 SAMPLER CONCENTRATIONS ON FEBRUARY 10, 1996

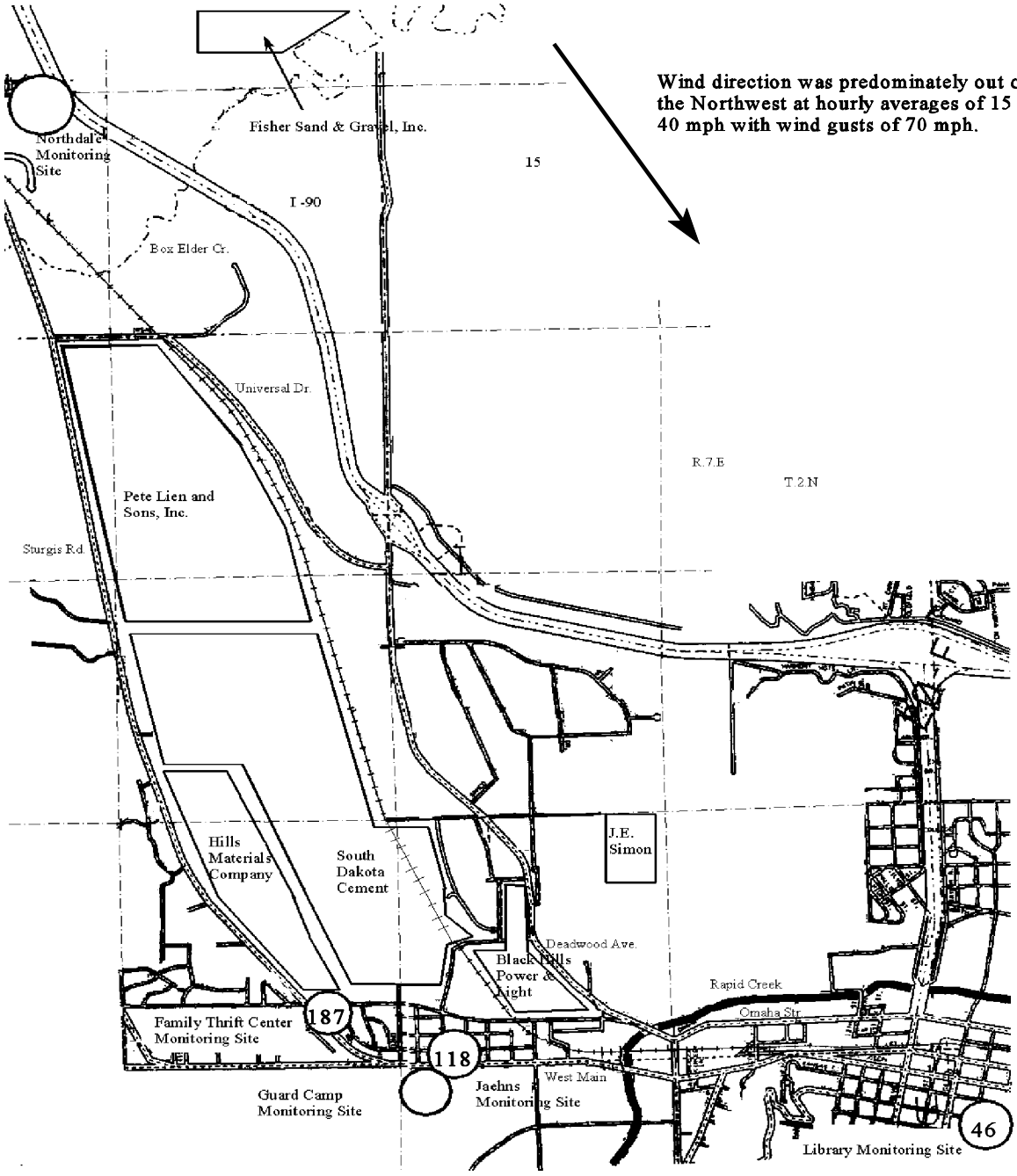


Figure -5. February 10, 1996 PM_{10} concentrations in ug/m^3 and monitoring sites.

PM10 SAMPLER CONCENTRATIONS ON DECEMBER 17, 1996

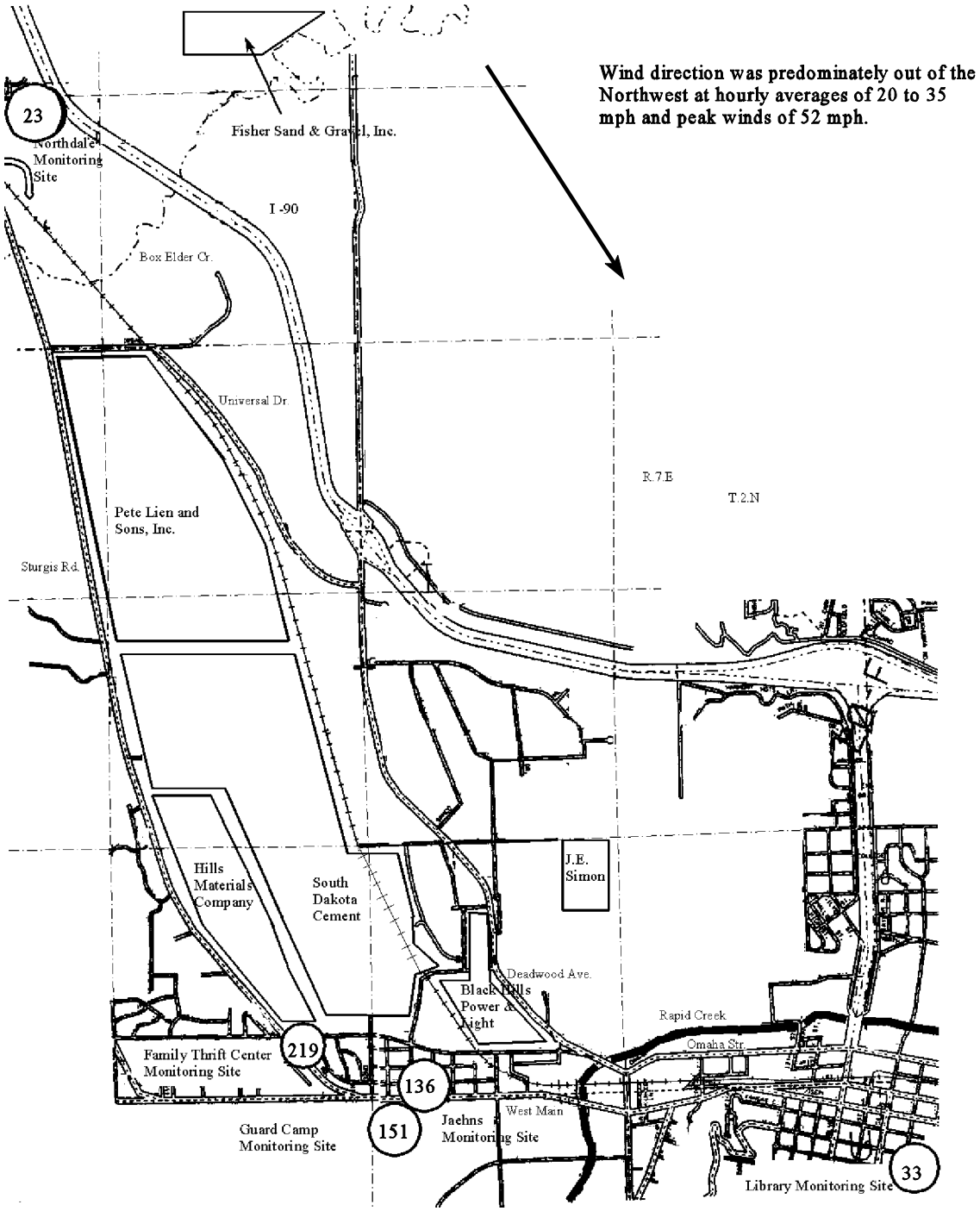


Figure -6. December 17,1996 PM_{10} concentrations in ug/m^3 and monitoring sites.

PM10 SAMPLER CONCENTRATIONS ON MAY 13, 1997

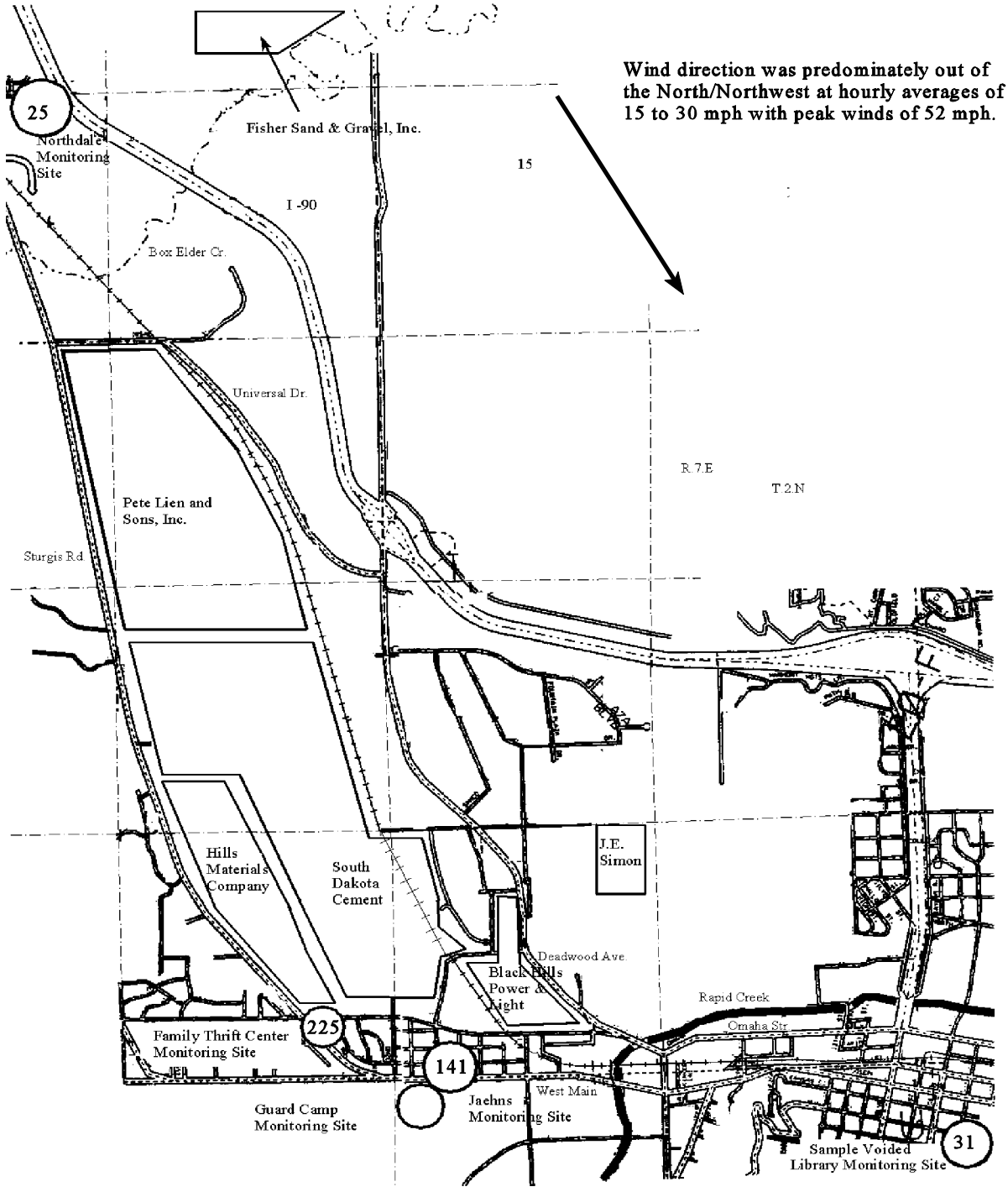


Figure -7. May 13, 1997 PM_{10} concentrations in ug/m^3 and monitoring sites.

b. Air Dispersion Modeling

In this analysis a point source model (ISCIII) was used to determine point source particulate concentrations from the industrial complex. The model output provides the point source particulate concentration in micrograms per cubic meter (ug/m^3) at the receptor points (ambient air quality monitoring sites). The concept of this analysis was to define known air pollution sources and subtract those concentrations from the receptor concentrations to determine the fugitive dust concentrations.

Table 1 lists the results of the modeling as the point source contributions at the monitoring sites in west Rapid City. The analysis identifies point source contributions for a 24-hour period during high winds conditions and prevailing winds from the north/northwest. The weather input in the model included a high wind day of greater than 20 mph for average daily wind speed with peak winds of greater than 40 mph. The point source emission data was extracted from the most recent stack tests conducted at the permitted facilities and EPA's AP42 emission factors. A graphical representation of the model and the results of the model output are found in Appendix C for each analysis.

Table 1. Point Source PM10 Concentrations at Ambient Air Quality Monitoring Sites

Monitoring Site	High Wind Day (20 mph daily average, peak winds > 40 mph, winds - N/NW) (24 hour average ug/m^3)
Northdale	.73
Family Thrift Center	2.06
Jaehns	36.81
Guard Camp	25.27
Mt. View	3.74
Library	.09

To determine the fugitive dust contribution from the industry complex at the monitoring sites where the PM_{10} exceedance and high concentrations occurred, the background concentration from the upwind monitoring site was added to the point source concentrations determined by the model. This sum was subtracted from the PM_{10} concentrations on the exceedance day at the downwind monitoring sites. This provides a prediction of the fugitive dust contribution from industry sources on the high wind days. This analysis is represented in the equation below and Table 2 and Table 3 for the respective high PM_{10} concentration events. Analyses were not conducted for January 17 and February 10, 1996, because background monitoring concentrations were not recorded on these dates.

(Monitor Conc.) - (Background Conc. + Point Source Conc.) – Fugitive Dust Contribution

Table 2. Fugitive Dust Contribution on December 17, 1997

Monitoring Site	Monitor Concentration (ug/m^3)	Background Concentration (ug/m^3)	Point Source Concentration (ug/m^3) Estimated from model	Estimated Fugitive Dust Concentration (ug/m^3)	Estimated Percentage Fugitive Dust
Family Thrift	219	23	2.06	193.94	89%
Jaehns	136	23	36.81	76.19	56%
Guard Camp	151	23	25.27	102.73	68%
Northdale	23				

Table 3. Fugitive Dust Contribution on May 13, 1997

Monitoring Site	Monitor Concentration (ug/m^3)	Background Concentration (ug/m^3)	Point Source Concentration (ug/m^3) Estimated from model	Estimated Fugitive Dust Concentration (ug/m^3)	Estimated Percentage Fugitive Dust
Family Thrift	225	25	2.06	197.94	88%
Jaehns	136	25	36.81	79.19	58%
Northdale	25				

The results of this analysis indicate that fugitive dust sources are a main contributor to PM_{10} concentrations on high wind days. The fugitive dust contributions at the downwind monitoring sites range from 76.19 ug/m^3 to 179.94 ug/m^3 at the monitoring sites. In comparison to the daily PM_{10} standard of 150 ug/m^3, the fugitive dust sources consume half of the standard in some instances and exceed the standard in others.

c. Mineral Mass Balance - Source Apportionment (CMB7) Model Analysis

A Source Apportionment CMB7 (chemical mass balance) analysis was conducted to identify the air pollution sources contributing to the high concentrations of PM_{10} recorded on high wind days. The CMB7 receptor model compares chemical concentrations of particulate matter measured

from the air pollution sources and receptor samples (PM_{10} monitor filter) to estimate the contributions of different source types to ambient pollutant concentrations. In this study, the term mineral was used instead of chemical because the majority of PM_{10} sources in Rapid City are mineral compounds. The model uses the mineral and physical characteristics of gases and particles measured at the sources and receptors to identify the presence of and to quantify source contributions to receptor concentrations.

CMB7 is the software package which implements the model. The model allows the user to:

- Select samples, mineral species, and source types;
- Calculate source contributions and standard errors using the variance of least squares estimation algorithm;
- Evaluate the goodness of fit and validate the model results;
- Prepare outputs for reports and input to database and spreadsheet software; and
- Graph results.

The first part of the analysis established a list of air pollution sources that have the potential to impact the ambient PM_{10} air concentrations recorded in the area of study. The list includes sources such as industrial, construction, street sanding, agricultural (including erodible land) and woodburning activities. Several samples of these sources were analyzed under X-ray defraction at the South Dakota School of Mines and Technology. The samples were categorized under the following source listings:

- Industry sources - haul roads, rock crushers, conveyors, drop points, and stockpiles. These sources are related to the processing of limestone (calcite) at the quarries in the industrial complex;
- Cement - cement from the manufacturer of cement or making of concrete;
- Soils #1 - West side erodible soils in the area of study (industrial and non-industrial);
- Soils #2 - West side erodible soils in the area of study (industrial and non-industrial);
- Soils #3 - West side erodible soils in the area of study (industrial and non-industrial);
- Soils #4 - East side erodible soils in the area of study;
- Soils #5 - East side erodible soils in the area of study;
- Carbon - residential wood burning, car exhaust, coal stockpiles, or industrial point sources;
- Realite Plus - alternative street sanding material;
- Realite Street - samples taken from streets after the Realite Plus application. This source differs from Realite Plus because it contains reentrained material such as calcite from other sources;
- East Street - samples taken from streets in east Rapid after the application of existing sanding material. This source was not identified on the Library monitoring site filters because the city applies MgCl water in the downtown area which has high traffic volumes;
- West Street - samples taken from streets in west Rapid afterthe application of existing

sanding material. This source was not identified on the west side monitors because the city applies Realite Plus which is a low PM_{10} air pollution street sanding source;

C Stockpiles - samples taken from existing sanding material stockpiles; and

C Lime - samples taken from lime manufacturing.

Table 4 lists the mineral composition of the PM_{10} sources. These numbers were derived from the X-ray defration analysis of each source sample. This represents the weight fraction of the mineral compound for each source.

Table 4. Mineral composition of the PM_{10} sources for CMB analysis by weight fraction.

Mineral Compound	Industry	East Street	West Street	Stockpiles	Cement	Lime	Soils #1	Soils #2	Soils #3	Realite	Street Realite	Carbon
Quartz	0.014	0.4385	0.2335	0.3933			0.2694	0.0475	0.2655	0.3825	0.4607	
Calcite	0.9827	0.3607	0.5801	0.3498			0.263	0.9246			0.1959	
Halite										0.3975	0.027	
Orthoclase		0.021	0.075	0.043			0.08	0.007	0.074			
Oligoclase		0.025	0.04	0.05			0.04	0.004	0.01	0.1376	0.226	
Goethite		0.033		0.01						0.0106	0.031	
Muscovite		0.016					0.1436					
Limonite		0.038		0.055					0.1714			
Microcline		0.062		0.071							0.021	
Dolomite			0.036				0.099				0.022	
Illite			0.013	0.016				0.0174	0.047		0.01	
Hematite			0.01	0.01			0.01					
Lime						0.9381						
Portlandite						0.037						
Calcium Nitrate						0.025						
Cement					0.9999							
Glauconite			0.01									
Andradite												
Gypsum							0.017			0.009	0.01	
Chlorite Fe-3							0.01					
Montmorillonite							0.013		0.3648			
Kaolinite							0.028		0.068			
Chlorite Fe-1							0.035					
Carbon												0.99
Anhydrite										0.0149		
Heulandite										0.0265		
Maghemite										0.0207		

Materials from the PM_{10} filters from the monitoring sites on the PM_{10} exceedance days, identified as receptors in the model, were also analyzed by X-ray defraction analysis. The mineral composition of the filter material is listed in Table 5 and Appendix D. The receptors in this study are the ambient air monitoring locations in west Rapid City. These monitoring sites are represented in Figure 3.

Table 5. Mineral Composition on Receptors (filters at PM_{10} monitoring sites).

Mineral Compound	Jaehns 1-17-96	Jaehns 2-10-96	Northdale 12-17-96	Jaehns 12-17-96	Guard Camp 12-17-96	Family Thrift Center 12-17-96	Northdale 5-13-97	Jaehns 5-13-97
Quartz	.0550	.0347	.0923	.0555	.0636	.0492	.1327	.0631
Calcite	.5358	.7423	.2234	.4604	.6036	.7950	.2747	.5109
Halite								
Orthoclase	.0261	.0091	.0439	.0137	.0090	.0074	.0347	.0247
Oligoclase	.0095	.0048	.0259	.0122	.0116	.0019	.0276	.0118
Goethite								
Muscovite								
Limonite								
Microcline								
Dolomite	.0075	.0159	.0802	.0106	.0233	.0221	.0467	.0171
Illite	.0201	.045	.1582	.0408	.0271	.0180	.1515	.0405
Hematite	.0021	.0043		.0043		.0019		.0050
Lime								
Portlandite								
Calcium Nitrate								
Cement	.1792	.0560		.2447	.1459	.0503		.1539
Glauconite								
Andradite								
Gypsum	.0304	.0015	.0421	.0209	.0142	.0039	.0122	.0090
Chlorite Fe-3			.1357				.1476	.0538
Montmorillonite								
Kaolinite	.0127	.0457		.0453	.0380	.0287		.0046
Chlorite Fe-1								
Carbon	.1210	.0400	.1980	.0910	.0630	.0210	.1720	.1050
Anhydrite								
Heulandite								
Maghemite								

The next step in the analysis was to compare the percent fraction of minerals from sources to the percent fraction of minerals collected at the receptors (PM_{10} filters from the monitoring sites). This was completed by running the CMB7 model with the input data from the source mineral profiles and receptor mineral profiles from the X-ray defraction analysis of the filters. The X-ray defraction analysis, fit analysis and source apportionment of each day sampled at each receptor is located in Appendix D.

In executing the model, different combinations of PM_{10} sources were tested to develop the best fit. The model has the following parameter ranges to determine the best fit between the source and receptor:

- 80 to 120 percent of source concentration;
- A chi-square range of 1 to 4;

- C A R- square of .8 to 1;
- C A T-stat of less than 2; and
- C Reduced or eliminated clusters.

Clusters are sources that have the same mineral compound makeup. If a cluster occurred, the cluster was grouped as one source or eliminated. The above parameters were attained for each model run. The model output provided the percent contributions from the PM_{10} sources on the receptors (monitoring site filters). This information is graphed in Figure 8 and 9 for each day and monitoring site studied.

The bar chart in Figure 8 reveals the total percentage of material collected on each filter. It is apparent that industry sources processing limestone and cement account for an average 67 percent of the total on each filter, except for the upwind monitoring site at Northdale.

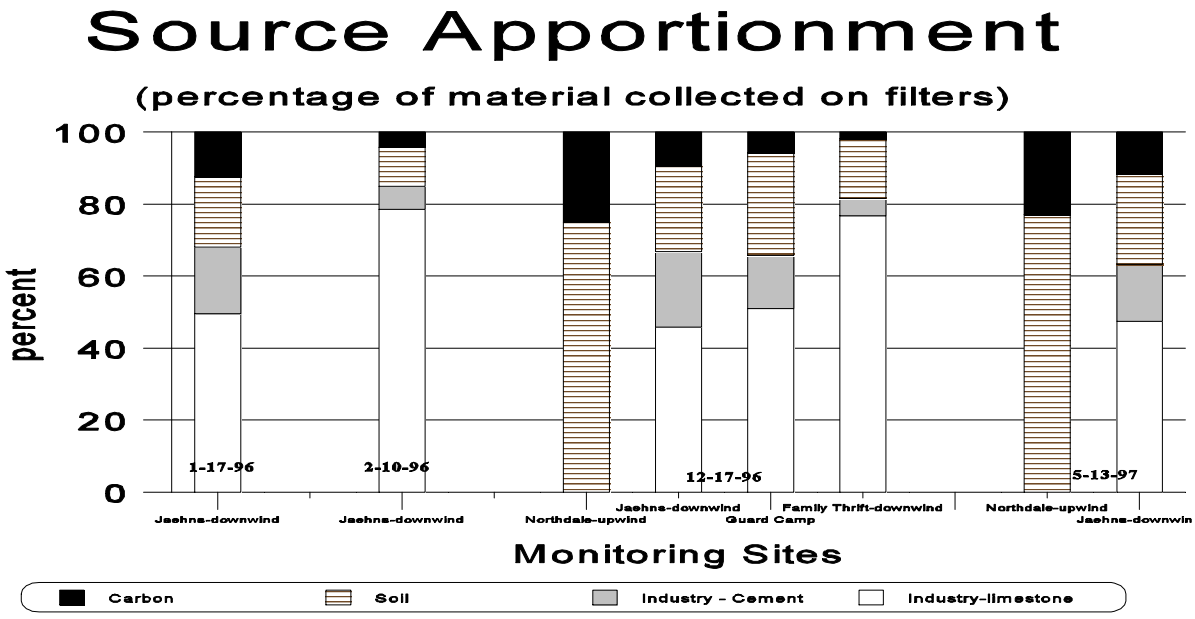


Figure 8. Source Apportionment - PM_{10} percent from sources.

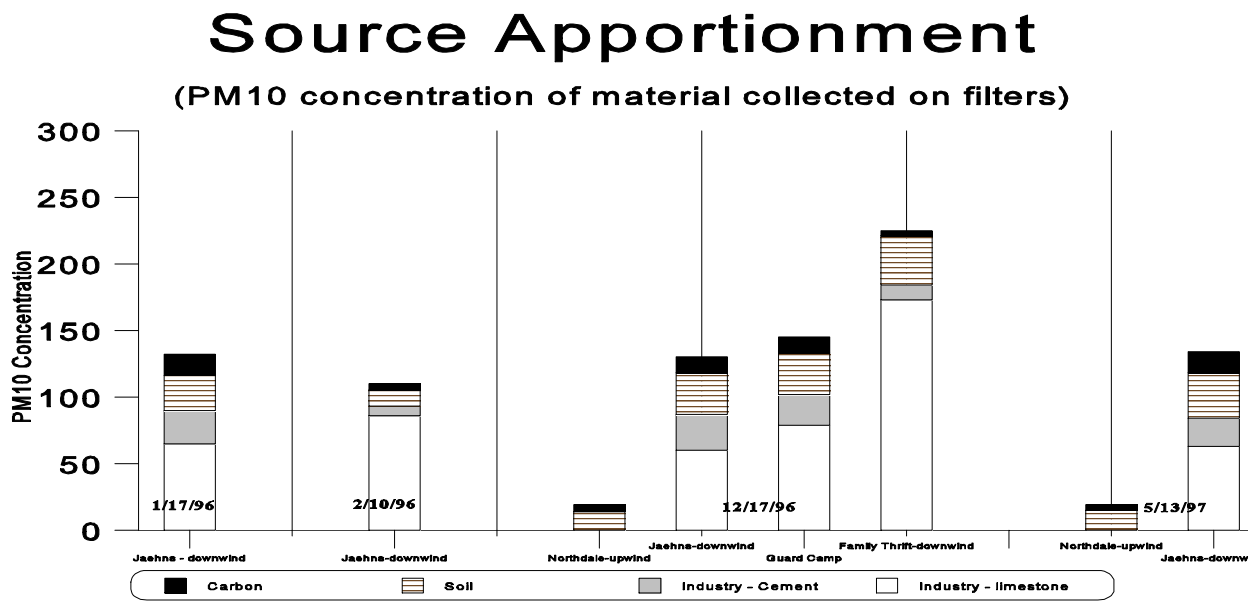


Figure 9. Source Apportionment - PM_{10} concentrations of sources.

Figure 9 shows the actual weight contributed in ug/m^3 by each source on a given day. Again, industry sources processing limestone and cement account for an average of 106.7 ug/m^3 of PM_{10} on each filter analyzed, according to the CMB7 model.

The results of this analysis indicate the need for further controls (BACM) of fugitive dust sources from the limestone and cement processing industries in the industrial park complex. It should be noted most of the filter analyses were conducted on filters from the Jaehns monitoring site instead of the Family Thrift Center site. The reason is the Family Thrift Center site is a continous operating monitor, and it is not possible to analyze the filter from this monitor. It was determined that the Jaehns site was a representive site to conduct these analyses on the exceedance days. One filter from the Family Thrift site was analyzed from a PM_{10} manual monitor located at this site, which serves as quality assurance/quality control to ensure the continuous monitor is working properly and operates every other day.

VI. BACM Determination

a. Identifying why existing controls failed

Section IV(a) of this plan describes the weather conditions in Rapid City which contributed to the PM_{10} exceedances. Following is a discussion of the reasons why existing controls for fugitive

dust emissions fail under these conditions.

When winds exceed 20 mph (hourly average), the crust covering stockpiles, waste dust pits, land, and haul roads deteriorates. This allows the dust to become airborne. This is illustrated in Figure-3, which shows a comparison of hourly wind speeds to hourly PM_{10} concentrations at the Family Thrift Center monitoring site. The PM_{10} concentrations increase from less than 100 ug/m3 per hour up to 900 ug/m3 when hourly winds are greater than 20 mph for an hourly average. Conversely, the concentrations drop below 100 ug/m3 when wind speeds decrease below 20 mph for an hourly average.

When peak winds exceed 40 mph (one minute average), the crust covering is deteriorated at a faster rate, and the dust becomes airborne. These wind speeds also reduce the effectiveness of any water control practices because the strength of the wind makes it difficult to apply the water where needed.

It has been documented in studies that soil erosion caused by wind can begin at 13.4 mph and is highly accelerated at winds of up to 50.0 mph. These studies were conducted on agricultural, construction and industrial soils in separate studies by W.G. Nickling, J.A. Gilles, D.W. Fryrear, D.A. Gillete, J. Adams, A. Endo, D. Smith, R. Kihl, L.D. Stetler, K.E. Saxton. The parameters established in this plan are consistent with these wind rates. Soil moisture content is a vital component in the rate of wind erosion. The following criteria were established to address this issue, although no data are available discussing the relationship between soil moisture, wind speeds and PM_{10} concentrations for this area.

Three or more days of little to no precipitation also results in conditions favorable to generating more dust. First, when there is no precipitation for several consecutive days, there is no creation of a natural crust on fugitive dust sources. Secondly, the moisture content in the existing coating evaporates, leaving it vulnerable to reentrainment. There is also a new buildup of dust from the industrial processes during this time period. Long-term dry periods reduce vegetative cover and cause fugitive dust to become airborne during high winds even in reclaimed quarry areas.

When the temperature is below 32 degrees F., the industrial sources do not apply water, which is the main source of dust control, because it has the potential to freeze and cause unsafe working conditions. Equipment used to apply the water (water trucks or crusher spray bars) can also freeze. The freezing and thawing effect also increases to the erodibility of the crustal surfaces causing high PM_{10} concentrations on windy days.

b. BACM Determination for Industrial Fugitive Dust Sources

The BACM determination was based on finding controls that could provide the best control of fugitive dust during high winds and freezing conditions and were economically feasible to implement. The search began with reviewing Best Available Control Technologies (BACT)

implemented in PM_{10} nonattainment areas with similar air pollution problems as Rapid City. Nonattainment area controls in Reno and Las Vegas, Nevada, Spokane and Pudget Sound, Washington, and South Coast, California were reviewed. The search indicated accepted controls of chemical application on fugitive dust sources such as haul roads, stockpiles, and waste pits with enclosures and installation of pollution control devices on limestone rock crushing and processing. Water for dust suppression was an accepted control in milder climates; however this type of control would not always be effective in Rapid City's colder winter months when water is not used due to safety and mechanical problems associated with freezing.

The department also reviewed EPA's "Best Available Control Technologies for Fugitive Dust Sources." The review indicated the BACM developed by the department (see Section VII) for sources in west Rapid City were comparable to the controls in EPA's document. This book did not provide controls for crushing operations; therefore, a search for BACM controls for rock crushing was conducted in EPA's "RACT/BACT/LAER Clearinghouse." The clearinghouse identifies acceptable level of controls for new and modified sources that have to comply with requirements in nonattainment areas as well as EPA's New Source Review and Prevention of Significant Deterioration rules. The results of this search indicated water spray bars were the accepted control for rock crushing operations processing aggregate other than limestone. Limestone crushing operations were required to enclose the operation and install a pollution collection device. Again, because of the colder seasons, water spray control systems are not acceptable in the Rapid City area except for a wet scrubber system, which is considered a pollution control collection device.

To conclude the search on fugitive dust controls and to determine if the controls were economically feasible to implement, a review of controls already implemented by similar industries in the Rapid City area was conducted. Some sources were implementing most of the proposed fugitive dust and crushing controls, but the majority of industries were implementing only a few of the proposed controls. Many of the proposed controls were implemented within the last three to four years. The implementation of these controls is reflected in the reduction of days with greater than 100 ug/m3 of PM_{10} per year, as shown in Table 2. The exceedances are not reflected in this table, because data were taken from the Jaehns monitoring site. This site was in operation from 1992 to 1996 and provides more historical data in relation to the controls implemented to date.

Table 6- PM_{10} readings over 100 ug/m3 at the Jaehns Monitoring site

1992	1993	1994	1995	1996
> 100 ug/m3				
190 ug/m3 - Oct., 25	130 ug/m3 - Feb., 6	150 ug/m3 - Dec. 23	152 ug/m3 - Dec. 7	146 ug/m3 - Feb. 9
170 ug/m3 - Oct. 13	130 ug/m3 - Mar. 12	140 ug/m3 - Dec. 21	110 ug/m3 - Jan. 5	137 ug/m3 - Jan. 17
150 ug/m3 - Feb. 4	130 ug/m3 - Mar. 2	140 ug/m3 - Apr. 18	110 ug/m3 - Mar. 10	132 ug/m3 - Dec. 17
140 ug/m3 - Sept. 17	120 ug/m3 - Jan. 29	130 ug/m3 - Mar. 17	109 ug/m3 - Dec. 27	120 ug/m3 - Feb. 12
120 ug/m3 - Jan. 21	120 ug/m3 - Dec. 13	120 ug/m3 - Dec., 7	100 ug/m3 - Nov. 16	118 ug/m3 - Feb. 10
120 ug/m3 - Oct. 19	110 ug/m3 - Nov. 3	110 ug/m3 - Mar. 3	100 ug/m3 - Feb. 10	
110 ug/m3 - Nov. 28	110 ug/m3 - Dec. 1	110 ug/m3 - Mar. 11		
100 ug/m3 - Feb. 26	110 ug/m3 - Nov. 1	100 ug/m3 - Mar. 5		
100 ug/m3 - Nov. 12	110 ug/m3 - Nov. 25			
100 ug/m3 - Dec. 26	110 ug/m3 - Sept. 26			
	100 ug/m3 - Jan. 15			
	100 ug/m3 - Mar. 24			
	100 ug/m3 - Dec. 23			
	100 ug/m3 - Oct. 28			

Note: 40 out of 43 days - occurred during the winter months of Oct. through March.
25 out of 43 days (shaded boxes) - occurred on days with either high daily wind averages or peak winds.

VII. BACM for Particulate Emissions

The following BACM, based upon the review described above, were developed for fugitive dust sources in the industrial complex in west Rapid City. The BACM have been reviewed by EPA's Region VIII and Headquarters, the Rapid City industries, the Pennington County Air Quality Board, and the department.

The BACM applies to the following industries and to any new industry locating in the west Rapid City area:

- Birdsall Sand and Gravel;
- Black Hills Power and Light Company;
- Dakota Block Company;
- Fisher Sand and Gravel;
- Hills Materials Company;
- J.E. Simon Construction;

- Pete Lien and Sons, Inc.; and
- South Dakota Cement.

a. Standard of Control

BACM for particulate matter sources are techniques and/or controls that achieve the maximum degree of emission reduction from a source as determined on a case-by-case basis considering technological and economic feasibility. (59 FR 42010, August 16, 1994).

b. Alternative Techniques and Controls

The owner or operator shall have the option to implement other techniques and/or controls that are as efficient in reducing or eliminating particulate matter as the controls listed. If the owner or operator decides to pursue other alternative techniques and/or controls, the owner or operator shall notify the department in writing of the alternative technique and/or controls. The notification shall include an explanation as to what the owner or operator proposes, testing results, emission projections, and a timeline for installing the control measure. The department shall review the proposal and notify the owner or operator in writing within 30 days of receiving the proposal, that the owner or operator may proceed as proposed or with changes outlined in the department's written response. The department shall be receptive of proposals that are as efficient as existing techniques and/or controls. Failure of the department to notify the owner or operator within 30 days shall be deemed to be acceptance of the owner or operator's alternative techniques and/or controls.

c. Crusher Control Options

The owner or operator shall enclose any primary, secondary or tertiary rock crusher along with the associated screens, transfer points and load-outs (from hoppers or conveyors to other than stockpiles). Any captured particulate matter shall be disposed of in a manner that will not allow the captured particulate matter to become reentrained into the ambient air.

The term "enclosure" shall be defined to be either a complete enclosure around one or more pieces of equipment or an enclosure of those points on the equipment from which particulates are emitted. To qualify as an enclosure, the enclosure shall be:

a. Constructed of materials impermeable to air. The actual shell of a piece of equipment may be considered as the enclosure or part of the enclosure.

b. Designed and constructed to minimize the number and size of openings through which air may enter or exit the building or enclosure. Openings shall be covered by a curtain or other method to minimize the opening to the size reasonably needed for the movement of materials, equipment, personnel, and air necessary for operation and ventilation of occupied areas.

c. Designed and constructed so that the discharge of air from the building or enclosed structure on

the unit associated with movement of materials shall be minimized as much as is reasonably possible.

d. Include a method of control, either (1) treating, capturing or removing particulate matter emissions generated from the material being processed with wet suppression, baghouse or wet scrubber for complete enclosed buildings, and/or (2) capturing or removing particulate emissions generated with a baghouse or wet scrubber for an enclosure of an emission point. Wet suppression may not be used as a control for option (2). At least one control method shall be used when equipment is operated.

e. Whenever reasonably possible, the control shall have a negative pressure.

f. Designed and constructed together with the controls to allow for the removal of particulate emissions which have settled out of the air inside the enclosure or have been removed from the air by controls.

Air emissions from the enclosure shall be subject to the 20 percent opacity emission limit or the applicable New Source Performance Standards. Limitations in sealing off enclosures from airflow that will impact worker safety and health standards for indoor particulate emission limits will be considered when reviewing the plans.

d. Unpaved Roads Controls

For Unpaved Road Controls the owner or operator shall implement one of the following:

- Apply a chemical stabilizer to all main haul roads in sufficient quantity and frequency to suppress particulate matter generation to comply with opacity standards in Section VII (12), and apply a chemical stabilizer or water to all secondary haul roads that have daily vehicular traffic at a frequency to suppress particulate matter generation to comply with opacity standards in Section VII (12); or

- Pave main haul roads and secondary haul roads with tack seal, asphalt, recycled asphalt or concrete.

Main haul roads are defined as passageways between the mining area and the processing facility or between the processing facility and the storage area in which material is transferred on a road.

Secondary haul roads are defined as passageways in which there is daily vehicular traffic on normal work days other than the main haul roads.

Chemical stabilizers include magnesium chloride, calcium chloride, or on-specification used oil as defined in ARSD 74:28 that is applied to a scarified road surface. To receive approval for an additional chemical stabilizer, the owner or operator shall submit a written proposal to the department demonstrating the proposed chemical will not violate surface or ground water standards upon run-off or leaching and is equivalent to the approved chemical stabilizer for controlling particulate matter.

Delays for application of chemical stabilizers up to 30 days will be allowed during freezing conditions or when conditions are not favorable for application.

e. Paved Roads and Parking Area Control

The owner or operator shall sweep and water flush or vacuum and water flush all paved roads and parking areas to remove particulate matter that has the potential to be resuspended. The frequency of cleaning will be on an as needed basis to comply with opacity standards.

f. Track Out Area Control

For Track Out Area Controls the owner or operator shall implement one of the following:

- Pave (asphalt or concrete) a track out area to maintain a stabilized surface starting from the point of intersection with the public paved surface into the facility boundary for a total distance of at least 100 feet and a width of at least 20 feet; or

- Install a wash station and require all haul truck vehicles leaving the facility to remove track out materials through the use of water.

For temporary track out areas (in use for less than 60 days in a calendar year), techniques and/or controls shall be implemented so as to prevent particulate matter from becoming entrained in violation of the opacity standard in Section VII (12). The controls and/or techniques shall require DENR approval unless it is a control or technique approved in this section.

Track out areas are defined as driving surfaces from the owner or operator's facility to public roadways upon which particulate matter has been deposited by transport vehicles.

g. Reclamation Control

- Reclamation Plan: The owner or operator shall submit to the department for approval, a plan to reclaim lands that have a wind erosion potential within 90 days of the issuance of the Part 70 Operating Permit. Upon approval of the plan by the department, the plan shall remain in effect as the BACM for lands with wind erosion potential, until reclamation has been completed at the facility and approved by the department. The department will approve a plan that makes reasonable progress toward reclaiming land with a wind erosion potential.

- Plan Approval: The department shall notify the owner or operator within 90 days after issuance of the owner or operator's operating permit if the plan is approved or, in the alternative, which portions are not approved and the reason why the portions have not been approved. The owner or operator shall resubmit a revised plan within 90 days of notification. When the department finds the owner or operator's plan or revised plan to be acceptable, it shall provide written notice to the owner or operator. The accepted plan shall remain in effect until further modification.

- Plan Modification: The owner or operator may propose further modification of an approved plan by written notice to the department. The department shall respond in writing within 90 days of the owner or operator's proposed modification.

- Reclaimed Lands: Lands which have been successfully reclaimed, as approved by the department, shall no longer be subject to the approved plan requirements, as long as they remain reclaimed.

Reclaimed land is defined as an area which meets the requirements for reclamation in SDCL 45-6 for licensed mining operations or established in the reclamation plan of a mining operation permitted under SDCL 45-6B.

Lands with a wind erosion potential are all areas within the facility except those that have a hard rock surface, are paved (concrete or asphalt), have a building structure over it, the working face of the quarry, or have been reclaimed.

h. Front-end Loader Control

Control Development: Controls for particulate matter generated by front-end loader operations are being researched. At the time a control is determined and agreed upon, it will be placed in each permit as necessary.

i. Open Storage Pile Control

For open storage pile controls the owner or operator shall implement one of the following:

- Apply chemical stabilizer in a sufficient quantity and frequency to suppress particulate matter generation to comply with the Section VII (12) opacity standard; or

- Apply water to the surface area of all open storage piles on an as needed basis to comply with the opacity standard between May 1 to October 1; or

- Install at least a two-sided enclosure with walls which extend, at a minimum, to the top of the pile to comply with the opacity standard.

Open storage piles are defined as a storage pile with a silt content of four percent or greater, has a height of three feet or more, and a total surface area of 150 square feet or more. Silt content will be determined by sampling and analysis in accordance with the ASTM C-136 or other equivalent methods approved by the department. Silt is defined as any material with a particulate size less than 74 micrometers in diameter and passes through a number 200 sieve.

Chemical stabilizer delays - Delays for application, up to 30 days, will be allowed during freezing conditions or when conditions are not favorable for application.

j. Waste Pit Control

For waste pit areas, the owner or operator shall implement one of the following:

- Apply a soil cement or similar application that is approved by the department between October 1 and March 31 and apply a water spray to adequately create a crusted surface over the entire waste pit area to adequately control particulate matter between April 1 and September 30; or

- Implement a combination of wind protection (wind-fence, wind-screen, three wall enclosure) and water spray application on an annual basis; or

- Eliminate the waste pit by developing a market for the waste.

Waste pits are defined as areas where waste particulate matter from process equipment or pollution control units are deposited or disposed.

k. Blasting Controls

No blasting shall be allowed when a high wind air quality alert is in effect. The only exception is if the detonation charges have been set in the blasting holes prior to being notified of the high wind air quality alert. This exception is allowed for safety reasons and Mining Safety and Health Administration blasting requirements.

l. Opacity Standards for Fugitive (Particulate matter) Sources

The following are opacity standards for the sources listed in this section. New Source Performance Standard (NSPS) opacity requirements for metallic and non-metallic mineral processors shall apply to those sources where and when applicable.

- Continuous operating sources:

The owner or operator shall not discharge from **crushers, screens, conveyors, transfer points or other continuous flow sources** visible emissions to the ambient air of a density equal to or greater than 20 percent opacity in a six minute period. The opacity will be determined by ARSD 74:36:12 (Method 9) measured at the emission point.

- Intermittent operating sources:

The owner or operator shall not discharge from **main and secondary haul roads, paved roads, waste pits, open storage piles, loading and unloading stations, or buildings** visible emissions to the ambient air of a density equal to or greater than 20 percent opacity for a series of two minute averages with a minimum of a total of six minutes of readings. The opacity will be determined by Tennessee Visual Emissions Method 1 (approved by EPA in 40 CFR Part 52.2220 or Method 9), as measured at the emission point.

m. Opacity Exceedance/Compliance

- If a fugitive particulate matter source exceeds the opacity standard, the department will provide the owner or operator two opportunities to correct the exceedance. In the event of a third exceedance from that source, the department will reevaluate the BACM for that source. Within 60 days of receiving notification from the department, the owner or operator shall submit its written proposal to correct the problem from that source to the department. The department shall respond within 60 days to the owner or operator with approval or disapproval of the owner or operator's proposed new BACM. The department's approval letter will identify the date of implementation of the new BACM. The new BACM shall also be written into this document through an administrative amendment with a new page or pages, specifying the date of implementation.

- Readings during High Wind Alert: No opacity reading documenting an air exceedance, or compliance, will be valid or usable when taken during high wind advisory events as defined and identified in the Natural Events Action Plan, except for point sources. No corrective action by the owner or operator shall be required for opacity readings exceeding the opacity standards, if taken during high wind advisory events, except for point sources.

n. Recordkeeping and Reporting

List of Sources: The owner or operator shall submit a list of existing techniques and/or controls with the corresponding upgrade to BACM within 60 days of issuance of the air quality operating permit. The list will correspond to the sources listed in the Rapid City emissions inventory and any additional sources that need to be added. Any change made to the controls on the list will be reported in the annual compliance certification required in this permit. If a new or different control is requested, then a formal request must be made to the department. The request will include:

- The existing control and air pollutant emissions (i.e., testing results, calculations and/or pollutant factors, etc.);

- The new or different control with air pollutant emissions (i.e., testing results, calculations and/or pollutant factors, etc.); and

- The proposed implementation date of the control.

Department Response Time: The department will respond in writing within 60 days on whether the new or different control is accepted and, if necessary, will make a minor amendment to the permit to reflect the change if the new or different control is approved. Failure of the department to notify the owner or operator within 60 days shall be deemed to be acceptance of the owner or operator's alternative techniques and/or controls.

o. Amendments

Any amendment to the BACM shall require the approval of the department and the owner or operator. Nothing herein is intended as authorization from the owner or operator to the department to amend or change the BACM without the approval of the owner or operator except as provided for above. The owner or operator agrees to cooperatively work in good faith with the department to amend this BACM when needed.

p. Enforcement

In the event the owner or operator fails to comply with the foregoing BACM, the enforcement remedies set forth in SDCL 34A-1 shall apply. It is specifically understood that an opacity exceedance, except for New Source Performance Standard regulated sources and sources considered to be point sources, is not a failure of compliance but shall require the compliance as set forth above.

q. BACM and Control Strategies for other PM_{10} Sources

BACM and control strategies for other sources impacting the PM_{10} concentrations in Rapid City are listed below. These sources are considered to be contributing sources to the PM_{10} exceedances and are being listed to show that measures have been taken to reduce PM_{10} concentrations generated from these activities.

- Point Sources
- Construction Activities
- Parking lots - paved and unpaved
- Reentrained Street Sanding
- Woodburning
- Open Burning

Point Sources: All major point sources, except for rock crushers, in the West Rapid City area have installed control devices such as baghouses, wet scrubbers or electrostatic precipitators. These controls are considered to be BACM.

Construction Activities: The Pennington County Air Quality Board (PCAQB) regulates construction activities. For each site that is over one acre in size, a permit from the county is required. The PCAQB staff monitors the activity at least twice during the project to ensure that air pollution control measures are being implemented. These requirements are listed in Pennington County Ordinance #12. The ordinance is listed in Appendix E.

Paved Parking Lots: The PCAQB regulates paved parking lots. The owner of a parking lot one acre in size or greater must submit a plan on how dust generated from the lot will be minimized. The city of Rapid City requires new businesses to pave their parking lots. There were no requirements for unpaved parking lots prior to adoption of this requirement. These requirements are listed in Pennington County Ordinance #12.

Reentrained Street Sanding: State regulations were developed and approved for street sanding operations in the Rapid City area. The controls established what is considered to be Best Available Control Technology for street sanding operations (ARSD 74:36).

Woodburning: The PCAQB is actively implementing an education program for the public. At this time, the only control for woodburning is the restriction of burning inappropriate fuels. The PCAQB and department have developed an air quality advisory process for air quality inversions. The purpose of this project is to inform the public that an air inversion has occurred and voluntarily request that woodburning devices not be used. The inappropriate fuel burning requirements are listed in Pennington County Ordinance #12.

Open Burning: The PCAQB has established open burning regulations. The board adopted rules to eliminate all open burning except for fire training, ecosystems (prescribed and slash burning), fire hazards, and remediation purposes for the Rapid City area and the three miles surrounding it. These requirements are listed in Pennington County Ordinance #12.

These controls have eliminated exceedances and violations of the PM_{10} NAAQS in other areas in Rapid City. The most significant reduction in PM_{10} air pollution has been identified at the Library monitoring site with the implementation of the Sanding and Deicing Rules for street sanding operations. There have been no exceedances or violations of the standards at this monitoring site since Rapid City implemented their control strategy in 1992. The annual PM_{10} concentrations have lowered to almost background levels of 20 ug/m3 of PM10 on an annual average.

VIII. Implementation and Reevaluation of BACM

a. Implementation of Additional BACM

The implementation mechanism of BACM for particulate matter sources in the industrial complex will be through either the Part 70 Operating permit or state air quality permit for each facility; both are federally enforceable. BACM for other sources contributing to PM_{10} exceedances have been implemented by the PCAQB as described above.

The implementation timeline of all the BACM listed above, except for rock crushers, will be upon permit issuance. Rock crusher controls will be implemented within three years from the date of the fourth exceedance, which is May 13, 1997. Fisher Sand and Gravel has been granted an extension until September 30, 2000, to implement the rock crusher controls.

b. Reevaluation of the Action Plan

The reevaluation of the action plan will be focused on reviewing the BACM developed for sources contributing to the exceedances as described in Section VII of this plan. The plan will be reviewed within three years of implemenation, unless frequency and high concentration of exceedances continue at the same rate and significance that occured prior to the implementation of the plan.

IX. Public Involvement and Notification of High Wind Event

a. Public Involvement

July 1, 1997	Meeting with Rapid City industries to discuss BACM and Natural Events Action Plan
July 2, 1997	Meeting with the Mayor of Rapid City and Planning and Zoning Commission
July 14, 1997	*Meeting with the Pennington County Air Quality Board
July 15, 1997	*Meeting with the Rapid City Common Council's Public Works Committee
July 24, 1997	Phone conference with Representative Thune's staff
July 30, 1997	Phone conference with Senator Johnson's staff - Sara Dahlin
Aug. 6, 1997	Meeting with SD Department of Transportation - Update on Rapid City Natural Events Action Plan
Aug. 12, 1997	Meeting with Senator Daschle - West River Office - Ace Gallagher
Sept. 8, 1997	*Meeting with the Pennington County Air Quality Board - BACM approval
Jan. 14, 1998	*Update to the Board of Minerals and Environment on the Natural Events Action Plan
March 16, 1998	*Submittal of Natural Events Action Plan to the Pennington County Air Quality Board for review.
April 1, 1998	Natural Events Action Plan placed on the Internet for public review and a press release identifying the plan is open for public review
May 10, 1998	Final comments due
May 18, 1998	Comments and a request of approval from the Pennington County Air Quality Board
June 1, 1998	Final Natural Events Action Plan submitted to EPA for review
July 16 1998	EPA reviewed plan and submitted no comments
August 24, 1998	Notice of Intent for permits with NEAP requirements published
Nov. 24, 1998	Public Notice for permits with NEAP requirements published
Dec. 24, 1998	End of public comment period - no comments received
Jan. 5, 1999	45 day EPA review period on permits with NEAP requirements
Feb. 18, 1999	End of EPA 45 day review period

* Public meetings

b. Public Education

Public education is an ongoing process. The Pennington County Air Quality Board meetings have provided the main outlet for the public information. The media in Rapid City has been covering this issue since in television stories and newspaper articles the 1997 PM_{10} exceedance. Newspaper articles can be found in Appendix B.

c. Public Notification and Health Advisories

AIR POLLUTION ALERT- DUST - WEST RAPID CITY

Area of impact: This air quality alert applies only in west Rapid City beginning at the gap and extending three miles beyond the city limit boundaries to the south, west and north as shown in Figure ?.

Meteorological Criteria: An air pollution alert will be called during the following weather conditions in west Rapid City:

1. Five consecutive days of 0.02 inches or less of precipitation each day excluding dry snow;
2. Forecasted peak wind gusts greater than 40 mph; and
3. Forecasted average hourly wind speed greater than 20 mph.

The air pollution alert will be discontinued when the following weather conditions exist:

1. Wind speeds below 12 mph on an hourly average and peak wind gusts below 30 mph; or
2. There is greater than 0.02 inches of precipitation in a 24 hour period excluding dry snow.

Air Pollution Alert issuance: The alert will be called, issued, and discontinued by the National Weather Service (NWS) to the media for the duration of the event. The NWS will notify PCAQB or the department of the event in the following sequence depending upon the availability of Ann Rinke, PCAQB, Jon Epp, DENR, or Tim Rogers, DENR. The department will inform the industries of the high wind event.

Precautions: The public will be advised of the following precautions to take during any of these situations:

Elderly citizens, young children, and individuals with respiratory problems should avoid excessive physical exertion and minimize outdoor activities. Although these people are most susceptible to health impacts, it is recommended that everyone take precautions to avoid exposure to these poor air quality conditions.

Voluntary actions to reduce air pollution levels: To minimize pollution levels, it is recommended that any manipulation of soils, such as construction, industrial or agricultural activity, cease or be minimized during these events. It is also recommended that pollution controls for soil stabilization, process equipment, waste pits, stockpiles and construction sites, such as watering or chemical treatment, be increased.

Basis for criteria selection: High wind/dust conditions typically occur after extended dry periods during the colder months of the year and have on occasion caused air pollution problems during warmer months. Therefore, dust pollution advisories will be called year round. High air pollution

levels occur when peak wind gusts reach 40 to 70 miles per hour and average hourly wind speeds are greater than 20 miles per hour for an extended period of time. The high winds strip away the top crusted layer of the soil and suspend the finer dust particles in the air. The high wind events can last from one to eight hours depending on the strength of the storm system.

During these events, the hourly dust concentrations have ranged from 100 ug/m^3 to 900 ug/m^3 per hour. A violation of the dust health standard is a reading over 150 ug/m^3 averaged over a 24-hour period. This standard has been exceeded during these conditions in west Rapid City. Therefore, air pollution alert for dust will only be called for the west Rapid City area. A review of monitoring data indicates that high concentrations only occur in this area of town during these high wind events.

X. Summary

The Department of Environment and Natural Resources has developed a Natural Events Action Plan for Rapid City, South Dakota as described in EPA's Natural Events Policy (May 30, 1996). The purpose for implementing the policy is to have three days exceeding the National Ambient Air Quality Standard for PM_{10} flagged as high wind natural events. The plan identifies the high wind event causing air quality exceedances, the sources contributing to the exceedances, and has established Best Available Control Measures to be implemented to control PM_{10} from these sources during high wind events. The purpose of developing this plan is not only to have these exceedances flagged to avoid a nonattainment designation, but implement controls to reduce or eliminate future exceedances. It is also the department's intention to flag future exceedances under the conditions as described in this plan.

Appendices note: The appendices were not included in this document to reduce the cost of printing. If you would like a copy of the appendices, please contact the department and request a copy at the address or phone number listed below.

South Dakota Department of Environment and Natural Resources
Joe Foss Building
523 E. Capitol
Pierre, South Dakota 57701
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APPENDIX A

NATURAL EVENTS POLICY

APPENDIX B

NEWSPAPER ARTICLES COVERING EXCEEDANCE DAYS

APPENDIX C

POINT SOURCE AIR DISPERION MODEL (ISCIII)

ISOPLITH

AND

MODEL OUTPUT RESULTS

APENDIX D

CMB ANALYSIS
X-RAY DEFRACTION ANALYSIS OF FILTERS
FIT ANALYSIS AND SOURCE APPORTIONMENT OF FILTERS

APENDIX E

PENNINGTON COUNTY ORDINANCE #12