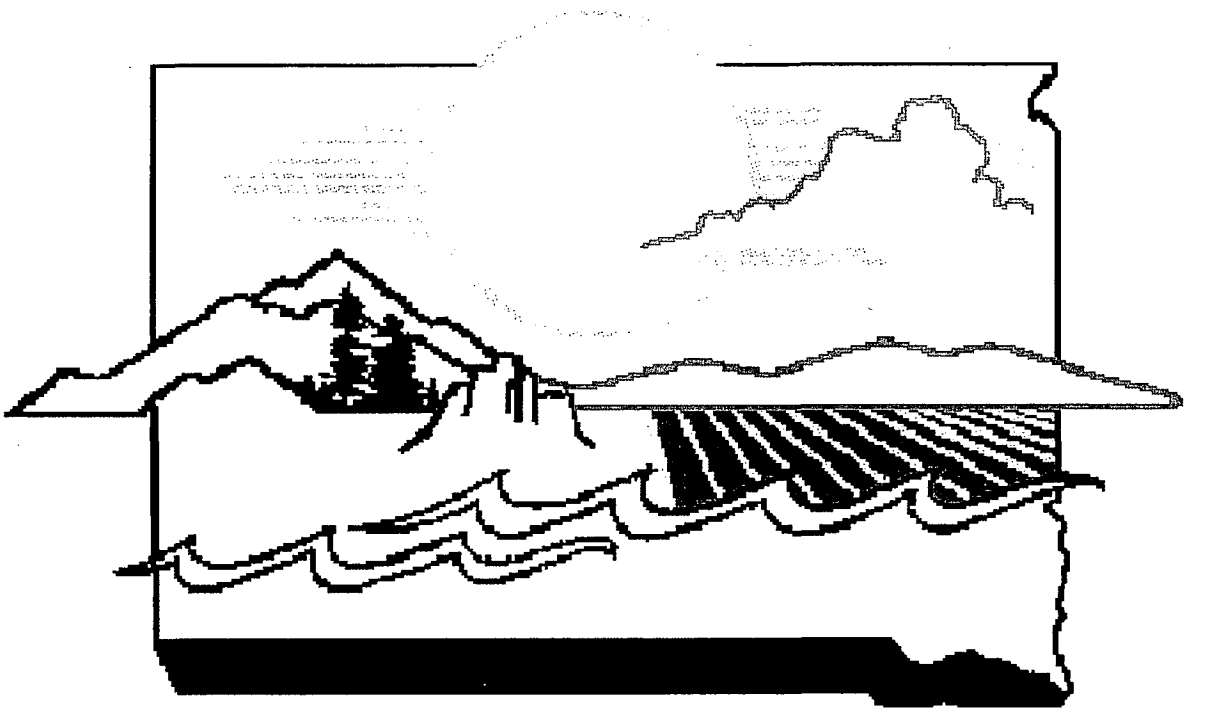
RAPID CITY NATURAL EVENTS ACTION PLAN

FIRST REVIEW OF

PM10 NATURAL EVENTS – HIGH WINDS



Prepared by

South Dakota Department of Environment and Natural Resources

July 2005

Table of Contents

		Page
1.0	Purpose	1
2.0	Introduction	1
3.0	Area of Implementation	2
4.0	Meteorological Criteria for High Wind Dust Alerts	3
4.1	High Concentration Monitoring Site History	5
4.2	Review of High Wind Dust Alert Criteria	6
4.3	Review of PM10 Concentrations on Non-Alert Days	10
4.4	Summary of Meteorological Review	11
5.0	Review of PM10 Concentrations	12
5.1	Frequency Distribution	12
5.2	High Concentration Trends	13
5.3	Second High Concentration Comparison	13
5.4	Summary of PM10 Concentration Review	15
6.0	Procedures to Educate and Minimize Public Exposure	15
7.0	Best Available Control Measures	17
7.1	Crusher Controls	17
7.2	Controls for Unpaved Roads, Parking Lots and Storage Areas	20
7.3	Paved Roads and Parking Area Control	22
7.4	Track Out Area Control	23
7.5	Reclamation Control	24
7.6	Front-end Loaders	25
7.7	Open Storage Pile Controls	26
7.8	Waste Pit Controls	28
7.9	Blasting Controls	29
7.10	Controls for Conveyor Systems not Associated with Crushers	30
7.11	Alternative Techniques and Controls	31
7.12	Opacity Standards for Fugitive Sources	32
7.13	Opacity Exceedance/Compliance	32
7.14	Record Keeping and Reporting	33
7.15	Amendments	33
7.16	Enforcement	33

Table of Contents

		Page
8.0	Contributing Sources	34
9.0	Five Year Review Summary`	35

List of Figures

		Page
Figure 3-1	Natural Events Action Plan Area for West Rapid City	4
Figure 4-1	Credit Union High Concentration Monitoring Site	6
Figure 4-2	Location of High Concentration Ambient Monitoring Sites	7
Figure 4-3	Comparison of PM10 Concentration to Wind Speeds – May 23, 2001	10
Figure 5-1	Concentration Frequency Distribution during High Wind Dust Alerts	12
Figure 5-2	High PM10 Concentration Trends	13
Figure 5-3	Yearly 2nd Maximum PM10 Concentration Trends	14
Figure 7-1	Partially Enclosed Hopper at Hills Materials Company	18
Figure 7-2	Main Haul Road at Fisher Sand and Gravel	21
Figure 7-3	Paved Entrance at J.E. Simon Company	24
Figure 7-4	GCC Dacotah Tree Reclamation	25
Figure 7-5	Front End Loader Dumping into Portable Hopper/Crusher at Pete Lien and Sons	26
Figure 7-6	Birdsall Sand and Gravel Company's Storage Piles	27
Figure 7-7	Fisher Sand and Gravel Company's Gravel Pit	28
Figure 7-8	Black Hills Corporation's Waste Pit Area	29
Figure 7-9	Birdsall Sand and Gravel Company's Conveyor System	30
Figure 7-10	Covered Conveyor System for Dakota Block Company	31

List of Tables

		Page
Table 4-1	Meteorological Data for High Wind Dust Alert Days	7
Table 4-2	Non-Alert Days with High PM10 Concentrations	10

1.0 Purpose

The purpose of this document is to provide for the first review of the Natural Events Action Plan developed for western Rapid City, South Dakota in 1996. The Natural Events Action Plan was developed to minimize emissions of particulate matter 10 microns in diameter or less (PM10) during high winds and dry conditions and to notify the public to take precautions during high wind dust alerts. This document is a supplement to the original Natural Events Action Plan and both shall be used to implement the Natural Events Action Plan in western Rapid City.

2.0 Introduction

Historically, the western Rapid City area has had problems with high particulate concentrations. Early industrial development in western Rapid City consisted of quarries for mining limestone ore. The city grew around the quarry area over the years bringing people in close contact with the dusty conditions. In addition, western Rapid City is surrounded by hills which tend to trap the particulate that forms from the quarrying, processing, and shipping of the various manufactured products in western Rapid City. All this combined resulted in Rapid City being designated as nonattainment for exceeding the federal National Ambient Air Quality Standards for total suspended particulate in 1978.

In 1986, EPA changed the National Ambient Air Quality Standard from total suspended particulate to PM10. Within six years (1992), two samples from an ambient monitoring station near the quarries registered PM10 concentration levels greater than the National Ambient Air Quality Standard. Considerable work and money went into controlling the particulate emissions in Rapid City resulting in great strides being made in lowering concentration levels. But the area continued to experience high PM10 concentrations. A study of emissions levels, analysis of sample elements, meteorological conditions, geological conditions, and identification of sources of PM10 determined that fugitive emissions were the major cause of the remaining dust problems. In addition, it was noted that high PM10 concentrations occurred during periods of dry soil conditions combined with high winds.

These naturally occurring high concentrations presented a problem in trying to keep the Rapid City area from being designated nonattainment by EPA. 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 to address violations of the National Ambient Air Quality Standards for PM10 that occur due to natural events. The three categories of natural events are volcanic and seismic activity, wildland fires, and high wind events.

Based on the Natural Events Policy, high ambient PM10 concentrations resulting from these uncontrollable natural events may be flagged and not considered when determining if an area is meeting the National Ambient Air Quality Standards for PM10. To qualify for this exemption, the state must develop a Natural Events Action Plan and sources contributing to the high

concentration must install and implement best available control measures (BACM) for fugitive dust sources.

DENR developed a Natural Events Action Plan for the west Rapid City area in 1996. Although EPA did not approve the Natural Events Action Plan until 1998, DENR, the local governments, and industry began implementing the Natural Event Plan from 1996 through 1998. The Natural Events Action Plan includes:

- A discussion of the history of particulate air pollution in Rapid City;
- A description of the area of implementation;
- A characterization of the meteorological conditions for past high wind events;
- Identification of the main sources of air pollution during past high wind events;
- Identified BACM for anthropogenic sources contributing to the PM10 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 PM10 concentrations.

Since the development of the Natural Events Action Plan in 1996, the name of the local air quality board and local government implementing the air program have changed. All references to the Pennington County Air Quality Board and staff used in the original Natural Events Action Plan should reference the Rapid City Area Air Quality Board and the Rapid City Air Quality staff, respectively.

In EPA's Natural Events Policy, it states that a Natural Events Action Plan should be reviewed once every five years. To meet this requirement, DENR reviewed the following sections of the Natural Events Action Plan:

- Area of implementation;
- Meteorological criteria for high wind dust alerts;
- Review of PM10 Concentrations;
- Procedures to educate and minimize public exposure;
- Best available control measures; and
- Contributing sources.

3.0 Area of Implementation

An exceedance of the 24-hour PM10 standard occurs when the daily average concentration at a monitoring site exceeds 150 micrograms per cubic meter. A violation of the 24-hour PM10 standard occurs when the expected rate of exceedances is greater than one per year. A violation means the area is not attaining the 24-hour PM10 standard. PM10 concentrations exceeding the 24-hour PM10 standard have been observed in the west Rapid City area during dry conditions

and high winds while concentrations in other parts of Rapid City remain well under the standard. Therefore, the Natural Events Action Plan was developed for the west Rapid City area.

West Rapid City 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. The city's main industrial and quarry complex are located in this section of the city. The west Rapid City area identified in the Natural Events Action Plan was originally established from a north to south line extending west from the "Gap" to five miles beyond the city limit boundary.

The area of implementation on the east side was later adjusted by DENR to run along the hogback instead of straight north and south. This change occurred because the straight north and south line included activities that occurred on the east side of the hogback, which do not impact the western part of Rapid City. In addition, the remaining boundaries grew to maintain the five mile buffer to compensate for the city of Rapid City growing since the Natural Events Action Plan was first approved. Figure 3.1 displays the implementation area, which is being proposed at this time.

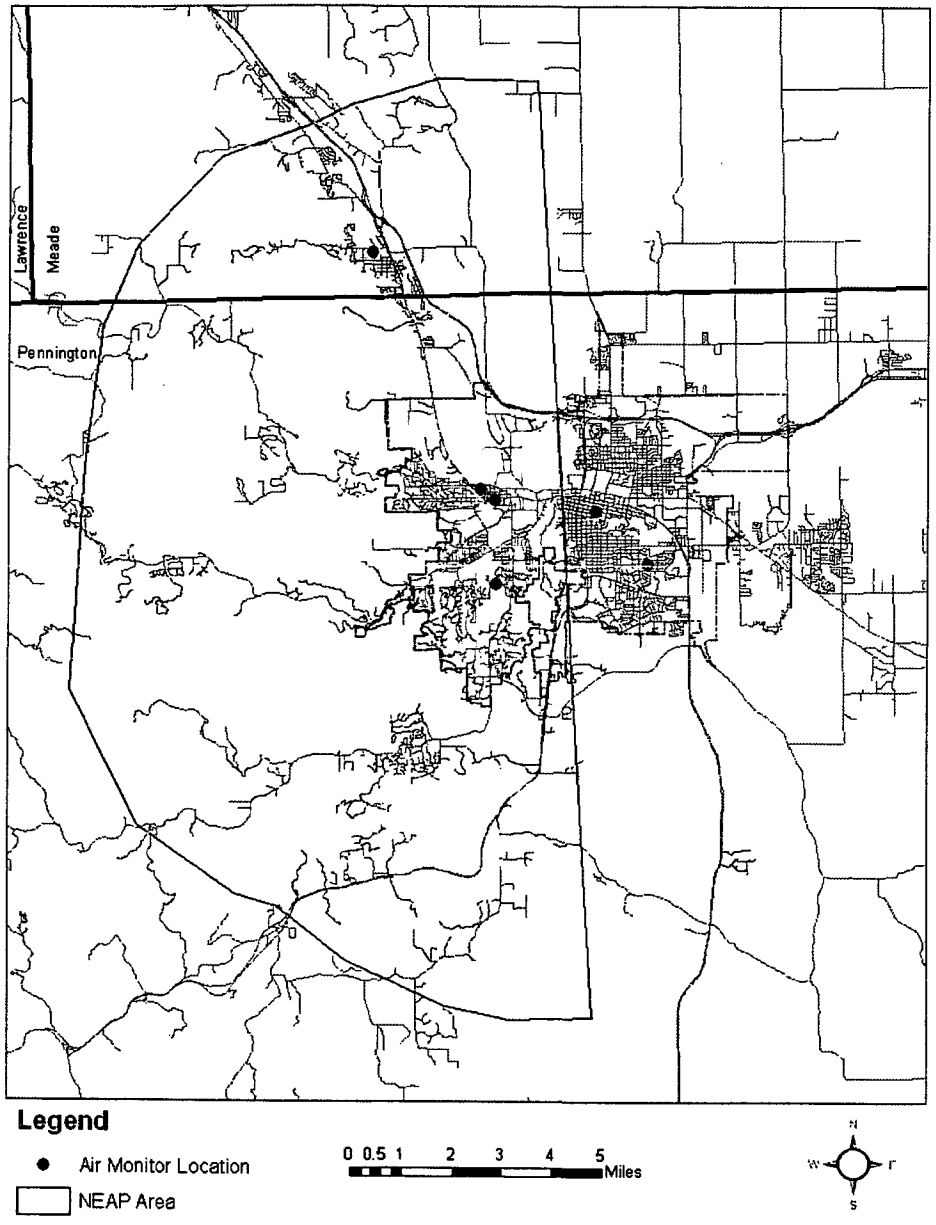
During the implementation of the Natural Events Action Plan, several sources of fugitive dust emissions on the southern end of the implementation area were reviewed and required to comply with the Natural Events Action Plan even though the terrain in that area suggest that dust emissions from that area would not impact western Rapid City. The five mile buffer zone was originally established to ensure all fugitive dust sources impacting western Rapid City would be included in the Natural Events Action Plan. In the future, DENR plans on modeling the implementation area to determine the proper boundary for the Natural Events Action Plan.

4.0 Meteorological Criteria for High Wind Dust Alerts

A review of the ambient air monitoring data and meteorological data in the 1996 Natural Events Action Plan determined that high dust levels occur during dry conditions, when peak wind gusts reach or exceed 40 miles per hour, and when average hourly wind speeds are greater than 20 miles per hour for an extended period of time. The high winds strip away any dry and loose soil and suspend the finer dust particles in the air. High dust concentrations resulting from the high winds and dry conditions occur during various times of the year. Therefore, high wind dust alerts are called year round.

The 1996 Natural Events Action Plan outlines the meteorological criteria for calling a high wind dust alert. High wind dust alerts are called by the National Weather Service to warn the public to take precautions so that they can reduce their health impact during dusty conditions. In addition, the high wind dust alerts are used to give businesses in the west Rapid City area a chance to take the necessary steps to reduce dust causing activities.

Figure 3-1
Natural Events Action Plan Area for West Rapid City



The three meteorological conditions for calling a high wind dust alert in western Rapid City are listed below:

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 miles per hour; and
3. Forecasted average hourly wind speed greater than 20 miles per hour.

Based on experience, under extreme meteorological conditions DENR will call a high wind dust alert even though all three of the meteorological conditions listed above are not met. In these cases, DENR will review the hourly PM10 concentrations and will discuss the meteorological forecasts with the National Weather Service to determine if a high wind dust alert should be called.

The high wind dust alert is discontinued when the following weather conditions exist:

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

4.1 High Concentration Monitoring Site History

One method of determining the success of calling a high wind dust alert is the evaluation of PM10 concentrations at the high concentration site in the western Rapid City area. The highest concentration site is the location with the highest readings both 24-hour and annual averages recorded in an urban planning area or representative geographic area. When the Natural Event Action Plan was implemented in 1997, the Jaehns and Family Thrift sites were operated as the high concentration sites for western Rapid City. Both are located south of the quarry area.

In 1997, the Jaehns site was one of the high concentration locations for the western Rapid City area until it closed in May 1997. The Jaehns site operated on an every day sampling schedule using manual PM10 monitors. In 1996, the building owner gave notice to DENR that planned construction work on the roof in 1997, would require the monitoring site be removed from the Jaehns building. DENR selected the Family Thrift site as the replacement. Sampling began at the Family Thrift site in January 1997. The data from the Jaehns site was included in the review because the site was still considered one of the high concentrations locations along with the Family Thrift site in 1997.

In 1999, a major remodeling project was started on the Family Thrift building and the high concentration site needed to be moved to a new location. The site was closed in December 1999, just before the roof was removed from the building.

At the beginning of 2000, the high concentration site was moved to the Fire Station #3 site located about 98 meters closer to the quarry operations and northeast of the Family Thrift site. The high concentration site began operation at this location in January 2000, and was closed in April 2003. The day after closing the site the Fire Station #3 building was demolished. A new fire station building was constructed at the same site but the design did not allow the use of the building for a monitoring site.

In October 2003, the high concentration site was setup approximately 30 meters east of the old

location. The new site was now located in a monitoring shelter between the new fire station building and the Black Hills Federal Credit Union (see Figure 4-1). This location became the Credit Union site and was put into operation at the start of the fourth quarter of 2003. Figure 4-2 displays the location of all three high concentrations sites that were operated during the years covered by the first review of the Natural Events Action Plan for Rapid City.

4.2 Review of High Wind Dust Alert Criteria

DENR reviewed each high wind dust alert day to determine how the actual meteorological conditions compared to the alert criteria and the PM10 concentrations on those days. The review period consisted of calendar years 1997 through 2003. The year 1996 was not included because the Natural Events Action Plan was not implemented until the fall of 1996. The high wind dust alert days are based on forecasted hourly wind speed and maximum wind gusts. Historical records of moisture events are used to determine when the precipitation alert criterion is met and when the potential for dry soil condition are present. Due to the unpredictability of weather conditions it was expected that actual meteorological conditions would not match the forecasted conditions.

Figure 4-1
Credit Union High Concentration Monitoring Site



Figure 4-2
Location of High Concentration Ambient Monitoring Sites



There were 40 days within the time frame reviewed by DENR that high wind dust alerts were called by the National Weather Service or DENR. Table 4-1 contains a listing of each high wind dust alert day and meteorological information from 1997 to 2003.

Table 4-1
Meteorological Data for High Wind Dust Alert Days

Date	24-hour PM10 Concentration	Maximum 1-Hour Wind Speed	Maximum Wind Gust	Days [1]	Precipitation	Met Criteria	Alert Day Rainfall
27-Mar-97	108 ug/m^3	45 mph	48 mph	10	0.03 inches	X	0.01 inches
13-May97	**224 ug/m^3**	**40 mph**	**48 mph**	**10**	**0.65 inches**	**X**	
28-Dec-98	33 ug/m^3	37 mph	51 mph	8	0.05 inches	X	Trace
03-Feb-99	39 ug/m^3	41 mph	60 mph	8	0.03 inches	X	
06-May-99	**176 ug/m^3**	**54 mph**	**66 mph**	**2**	**0.20 inches**		**Trace**
29-Oct-99	68 ug/m^3	31 mph	39 mph	11	0.05 inches		

Date	24-hour PM10 Concentration	Maximum 1-Hour Wind Speed	Maximum Wind Gust	Days [1]	Precipitation	Met Criteria	Alert Day Rainfall
31-Oct-99	34 ug/m^3	45 mph	63 mph	13	0.05 inches	X	
05-Nov-99	31 ug/m^3	25 mph	32 mph	19	0.05 inches		
09-Nov-99	29 ug/m^3	32 mph	41 mph	23	0.05 inches	X	
19-Jan-00	64 ug/m^3	26 mph	42 mph	8	0.05 inches	X	
05-Apr-00	65 ug/m^3	57 mph	59 mph	7	0.04 inches	X	
28-Nov-00	76 ug/m^3	38 mph	51 mph	18	0.04 inches	X	
18-Dec-00	**387 ug/m^3**	**43 mph**	**53 mph**	**8**	**0.08 inches**	**X**	**Trace**
04-Jan-01	38 ug/m^3	37 mph	47 mph	11	0.03 inches	X	
23-May-01	**173 ug/m^3**	**38 mph**	**46 mph**	**4**	**0.04 inches**		
08-Aug-01	60 ug/m^3	30 mph	43 mph	8	1.23 inches	X	0.29 inches
05-Sep-01	36 ug/m^3	31 mph	39 mph	13	0.03 inches		0.01 inches
06-Sep-01	88 ug/m^3	33 mph	38 mph	14	0.03 inches		0.16 inches
28-Sep-01	44 ug/m^3	22 mph	26 mph	9	0.46 inches		
02-Oct-01	124 ug/m^3	36 mph	41 mph	14	0.12 inches	X	
23-Oct-01	69 ug/m^3	45 mph	55 mph	3	0.03 inches		
24-Oct-01	66 ug/m^3	36 mph	43 mph	4	0.03 inches		Trace
07-Nov-01	129 ug/m^3	40 mph	45 mph	6	0.07 inches	X	Trace
07-Dec-01	29 ug/m^3	26 mph	37 mph	17	0.06 inches		
22-Dec-01	130 ug/m^3	41 mph	49 mph	27	0.06 inches	X	Trace
26-Dec-01	26 ug/m^3	39 mph	45 mph	31	0.06 inches	X	
11-Jan-02	109 ug/m^3	40 mph	54 mph	46	0.06 inches	X	
13-Jan-02	66 ug/m^3	52 mph	68 mph	1	0.03 inches		
08-Feb-02	34 ug/m^3	32 mph	45 mph	27	0.03 inches	X	Trace
14-Feb-02	46 ug/m^3	41 mph	49 mph	3	0.03 inches		
16-Apr-02	45 ug/m^3	31 mph	37 mph	4	0.16 inches		
21-May-02	92 ug/m^3	24 mph	34 mph	9	0.98 inches	X	0.03 inches
31-Jul-02	**168 ug/m^3**	**35 mph**	**47 mph**	**7**	**0.07 inches**	**X**	
16-Aug-02	**189 ug/m^3**	**33 mph**	**50 mph**	**8**	**0.23 inches**	**X**	
19-Dec-02	79 ug/m^3	24 mph	34 mph	28	0.04 inches		
08-Jan-03	80 ug/m^3	24 mph	35 mph	45	0.04 inches		
09-Jan-03	51 ug/m^3	24 mph	49 mph	46	0.04 inches	X	
23-Oct-03	102 ug/m^3	30 mph	44 mph	13	0.39 inches	X	
24-Oct-03	105 ug/m^3	32 mph	43 mph	14	0.39 inches	X	
17-Dec-03	100 ug/m^3	22 mph	34 mph	7	0.04 inches		

[1] – "Days" represents the number of days since the last precipitation exceeded 0.02 inches

The first thing DENR looked at was the 24-hour PM10 concentrations that exceeded the National Ambient Air Quality Standards during the time frame. There were no daily concentrations greater than the 24-hour PM10 standard in 1998 and 2003. The remaining five calendar years resulted in six sampling days recording PM10 concentrations greater than the 24-hour PM10 standard. All six days occurred during a high wind dust alert. The six days were entered into the EPA database and flagged as a high wind event under the Natural Event Action Plan for the west Rapid City area. The date, PM10 concentration, and meteorological data for the six days are bolded and shaded in Table 4-1.

The highest PM10 concentration that exceeded the 24-hour PM10 standard occurred on December 18, 2000. Hills Materials Company had planned to reclaim a waste pit area in three days. Based on forecasted meteorological conditions when they started the project, high winds were not predicted. However, during the project high winds did occur and attempts to minimize dust emissions using water were not enough to prevent excessive dust from blowing off of the area. The end result was a 24-hour PM10 concentration of 387 micrograms per cubic meter. Hills Materials Company was approached about this incident and has taken the necessary steps to ensure this problem does not occur in the future.

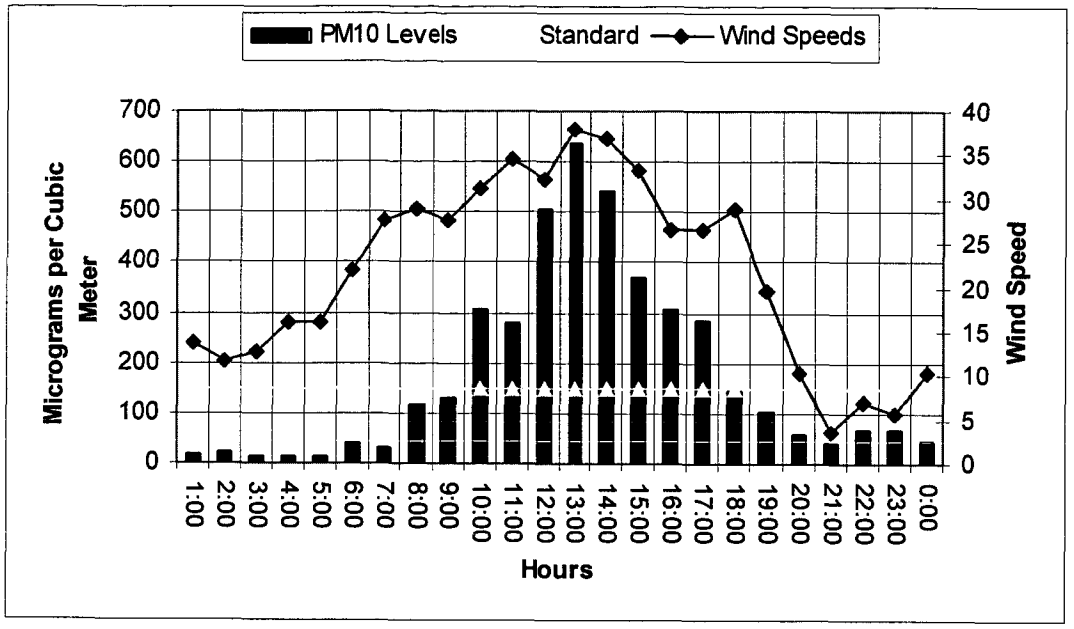
Two of the six exceedance days did not have meteorological data that met all of the criteria for calling a high wind dust alert. However, because of the circumstances leading up to those days high wind dust alerts were called. The first exceedance occurred on May 6, 1999. During May 5 and 6, hourly average wind speeds and wind gusts were greater than the alert criteria for 42 straight hours. Therefore, a high wind dust alert was called by DENR even though a precipitation event of 0.20 inches occurred two days before the exceedance. In this case, DENR did not believe the precipitation event of 0.20 inches was enough moisture to prevent the sustained high winds from eroding the surface soils and causing an exceedance.

The second exceedance occurred on May 23, 2001. In this case, the criteria for calling a high wind dust alert was not met because of a rainfall event four days before the National Weather Service predicted high winds. A high wind dust alert was called because the rainfall event recorded only 0.04 inches of moisture and it occurred four days before the high winds were predicted. Again, the amount of moisture was not enough to prevent the high winds from blowing dust into the air and causing an exceedance of the 24-hour PM10 standard.
Out of the 40 high wind dust alert days, 24 days or 60% met all three of the alert criteria elements during that day. There were 16 days in which at least one of the criteria was not met. In every case, the high wind dust alert days had hourly average wind speeds greater than 20 miles per hour. Figure 4-3 displays a graph of May 23, 2001, and demonstrates how the hourly average wind speeds track with the increase in PM10 concentration levels. The hourly average wind speed criteria shows a good correlation with high wind dust alert days and appears to be a primary factor in deciding when to call a high wind dust alert.

In nine of the 16 days, the maximum hourly wind gusts did not exceed 40 miles per hour. The PM10 concentrations for those nine days were below the 24-hour PM10 standard. There were six

days that the precipitation criteria of 0.02 inches or less during the previous five days before the high wind dust alert is called was not met. Two of the days in this case exceeded the 24-hour

Figure 4-3
Comparison of PM10 Concentration to Wind Speeds – May 23, 2001



PM10 standard and have already been discussed above. There was one day in which both the maximum hourly wind gusts and the precipitation criteria were not met. In this case, the 24-hour PM10 concentration was not exceeded.

4.3 Review of PM10 Concentrations on Non-Alert Days

DENR also reviewed days during the 1997 through 2003, time frame where PM10 concentrations were equal to or greater than 80 percent of the 24-hour PM10 standard (120 to 150 micrograms per cubic meter) and a high wind dust alert was not called. There were 16 days in that time frame were PM10 concentrations were equal to or greater than 120 micrograms per cubic meter. But during that time none of the PM10 concentration exceed the 24-hour PM10 standard. Table 4-2 displays these days along with the meteorological conditions.

Table 4-2
Non-Alert Days with High PM10 Concentrations

Date	PM10 Concentration	Wind Speed	Wind Gusts	Precipitation [1]
09-Jan-97	146 ug/m3	37 mph	44 mph	0 days
15-Jan-97	121 ug/m3	39 mph	49 mph	0 days

Date	PM10 Concentration	Wind Speed	Wind Gusts	Precipitation [1]
22-Mar-97	127 ug/m3	34 mph	43 mph	4 days
13-Nov-97 [2]	129 ug/m^3	36 mph	44 mph	9 days
02-Jun-98 [2]	127 ug/m^3	37 mph	41 mph	9 days
14-Aug-00	139 ug/m^3	38 mph	43 mph	2 days
25-Aug-00	147 ug/m^3	30 mph	37 mph	13 days
28-Aug-00	123 ug/m^3	45 mph	47 mph	1 days
13-Sep-00	130 ug/m^3	30 mph	36 mph	10 days
22-Nov-00	122 ug/m^3	18 mph	20 mph	10 days
17-Dec-00 [2]	121 ug/m^3	43 mph	55 mph	6 days
21-May-01	125 ug/m^3	40 mph	48 mph	0 days
01-Jul-01 [2]	141 ug/m^3	25 mph	44 mph	8 days
18-Aug-02	123 ug/m3	29 mph	33 mph	10 days
05-Nov-02 [2]	121 ug/m^3	21 mph	40 mph	12 days
15-Apr-03	122 ug/m3	23 mph	31 mph	9 days

[1] – The precipitation column represents the number of days before the date with less than 0.02 inches of precipitation.
[2] – These days met the criteria for calling a high wind dust alert.

In all 16 days, except one, the average hourly wind speeds exceeded 20 miles per hour. The highest concentration during a non-alert day occurred on August 25, 2000, which was just under the 24-hour PM10 standard of 150 micrograms per cubic meter. During that day the average wind speeds and precipitation levels met the criteria for calling a high wind dust alert but wind gusts level were just under the criteria of 40 miles per hour.

There were five days in which the high wind dust alert criteria were met but a high wind dust alert was not called. In these cases, it is assumed that the wind speed and wind gust were not projected to reach the criteria level; therefore, a high wind dust alert was not called by the National Weather Service. DENR will discuss ways to ensure high wind dust alerts are called when the criteria is met in the next chapter that deals with notifying the public.

4.4 Summary of Meteorological Review

In summary, the high wind dust alert criteria are working as all of the PM10 sampling days that exceeded the standard occurred when a high wind dust alert was called. This allowed DENR and the City of Rapid City the chance to alert the public and industry to the potential for high PM10 concentrations. High winds and dry soil conditions continues to be the cause of high PM10 levels. The criteria used to call the alerts is identifying in most cases when PM10 concentrations

will be high. The average hourly wind speed criteria is the major factor in knowing when high concentrations will occur during the dry soil conditions. The other two criteria help to eliminate days of low probability but some days continue to have elevated concentrations when actual conditions vary from the forecast meteorology. Therefore, DENR is not recommending any changes to the meteorological data used to call the high wind dust alerts.

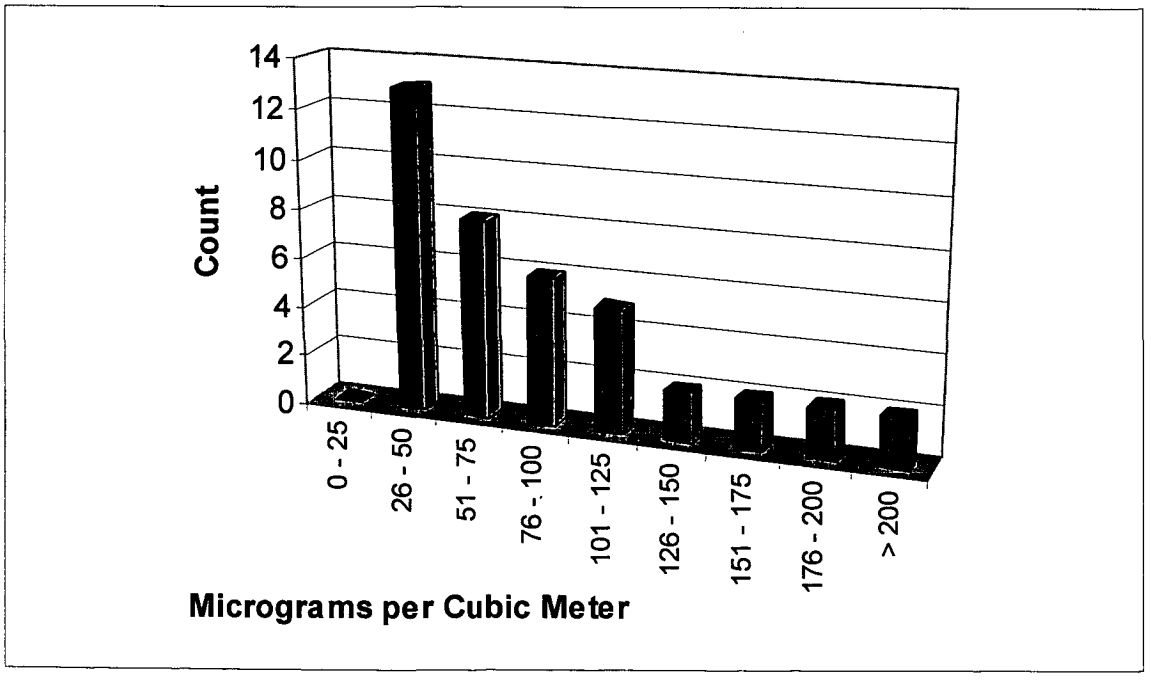
5.0 Review of PM10 Concentrations

A key indication of how well the Natural Events Action Plan is working is a review of the PM10 concentrations during 1997 through 2003. This analysis will consist of reviewing the frequency distribution of high concentration, the high concentrations, and then the second highest reading which is a comparison to the 24-hour PM10 standard.

5.1 Frequency Distribution

The frequency distribution was reviewed to determine if the PM10 concentrations during high wind dust alerts are being minimized by the Best Available Control Measures and extra measures for controlling dust emissions implemented by industry and businesses in the west Rapid City area. The frequency distribution of the PM10 concentrations during the 40 high wind dust alert days may be viewed in Figure 5-1. Sample concentrations of high wind dust alert days ranged

Figure 5-1
Concentration Frequency Distribution during High Wind Dust Alerts

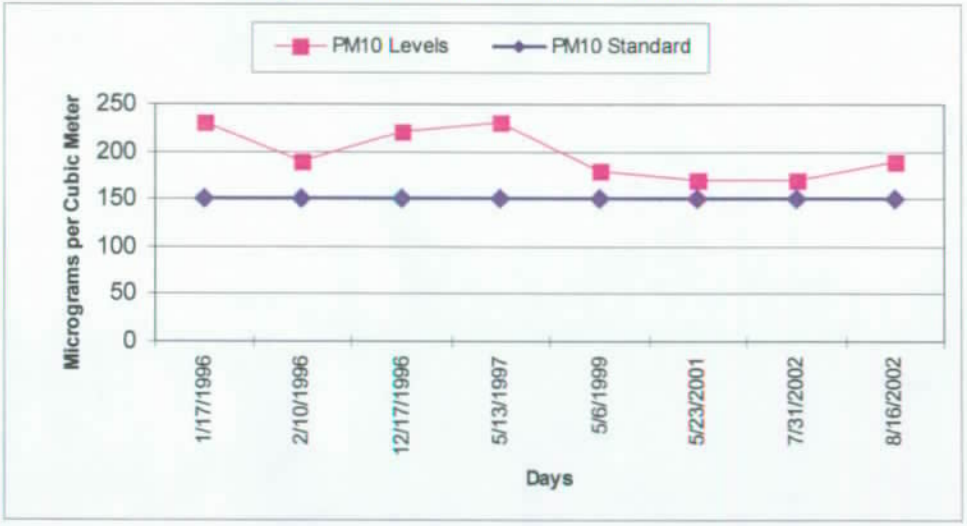


from 26 to 387 micrograms per cubic meter. As stated before, six alert days exceeded the PM10 standard of 150 micrograms per cubic meter. The remaining 34 high wind dust alert days had concentrations less than the PM10 standard. A majority or 26 of the high wind dust alert days had concentrations less than 100 micrograms per cubic meter. Based on the frequency distribution, it appears the high wind dust alert notification of industries and business that have fugitive dust sources helped maintain a majority of the PM10 concentrations at less than the PM10 24-hour standard and reduced the public's exposure to high PM10 levels.

5.2 High Concentration Trends

To determine if the high concentrations are declining as a result of the Natural Events Action Plan, DENR graphed the concentrations that exceeded the 24-hour National Ambient Air Quality Standard for PM10 in 1996 through 2003, excluding the high concentration in 2000 (see Figure 5-2).

Figure 5-2
High PM10 Concentration Trends



Three high concentrations occurring in 1996 were included in the graph to demonstrate the high concentration levels before the Natural Events Action Plan was fully implemented. The high concentration in 2000 was excluded because it was impacted by a particular event that was resolved and should not happen again. Figure 5-2 indicates there is a slight decline in the high concentration levels during high wind dust alert days.

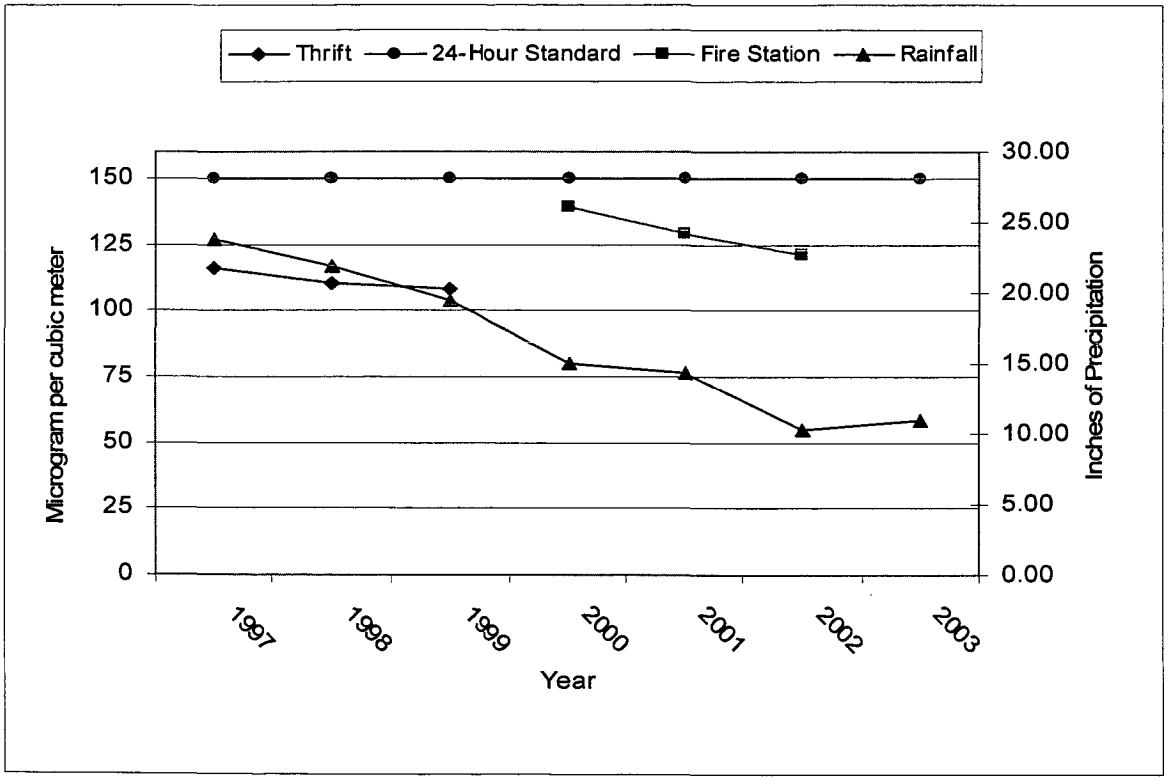
5.3 Second High Concentration Comparison

A second high concentration comparison was made graphing the second maximum 24-hour PM10 concentrations from each calendar year which is the compliance value to EPA's 24-hour PM10 standard. This comparison was made to determine if the same decreasing trend was noted

as indicated by the graph in Figure 5-2. Figure 5-3 displays the results of the comparison of the yearly second maximum 24-hour PM10 concentrations from 1997 to 2002. Calendar year 2003 was not included because a full year of data was not obtained that year. The high concentration site was located at the Family Thrift site from 1997 to 1999 and at the Fire Station #3 site from 2000 to 2002.

Individual monitoring sites were displayed in Figure 5-3 because of the difference in distance the two monitoring site were from the quarry area. Both monitoring sites are located on the south

Figure 5-3
Yearly 2nd Maximum PM10 Concentration Trends



side of the quarry area. The Fire Station #3 site was located 98 meters north or closer to the quarry area than the Family Thrift site. The increase in PM10 concentration levels from 1999 to 2000 is not a surprise since the Fire Station #3 site is closer to the quarries than the Family Thrifts site. Historically, this type of reduction in PM10 concentration levels has been shown between the National Guard site and Jaehns site, which was right across the road. Therefore, the increase in PM10 concentration levels between 1999 and 2000 is not caused by the operations in the quarries or any other manmade operation.

The trends at the Family Thrift site from 1997 through 1999 show a slight decline in the second maximum 24-hour concentrations while the trends for the Fire Station #3 site show a steady

decline of 18 micrograms over the three year period. This decline is opposite of what was expected because rainfall levels fell below the long term average of 17.22 inches in 2000 and the drought continued through 2003 (see Figure 5-3).

5.4 Summary of PM10 Concentrations Review

In summary, both the concentration levels of the samples that exceeded the 24-hour PM10 standard of 150 micrograms per cubic meter and the second maximum 24-hour PM10 concentrations are showing a decline over the last seven years. This trend comes during a time when the area is experiencing an extended drought period, four consecutive annual rainfall levels below average, and demonstrates that the effort put forth by the local air quality program and industry in implementing the Natural Events Action Plan are working.

6.0 Procedures to Educate and Minimize Public Exposure

There are several methods being used to educate the public about health impacts and alert them of the potential for high concentrations. Both DENR and the Rapid City Air Quality staff maintain active websites that inform the public when a high wind dust alert is called, the precautions certain individuals should take to protect their health during a high wind dust alert, and what individuals should do to voluntarily reduce activities that may entrain dust into the air during the high wind dust alert. The National Weather Service places a public health advisory on their website when a high wind dust alert is called. In addition, television and radio public service announcements are aired to warn the public about the high wind dust alert. The websites discussed above are listed below:

- DENR - http://www.state.sd.us/denr/DES/AirQuality/NEAP/neaphome.htm;
- Rapid City - http://www.rcgov.org/planning/airquality/alerts.htm; and
- National Weather Service - http://www.crh.noaa.gov/unr.

The high wind dust alert notifications serve two purposes. The first is to alert the public when meteorological conditions are forecasted so individuals can make plans to limit exposure to PM10 levels that could affect their health and to take voluntary actions to reduce dust causing activities. The second is the notification of industries with a state air quality operating permit and businesses with a city permit about the pending high wind event so they can take voluntary actions to reduce air pollution levels.

The public notification procedures for the high wind dust alerts are described below:

1. The National Weather Service evaluates the meteorological forecast and determines if weather conditions will develop that meet the criteria established in the Natural Events Action Plan;
2. The National Weather Service issues the high wind dust alert by listing it on their website

and notifies DENR's Pierre and Rapid City office and the Rapid City Air Quality staff by fax, e-mail, or telephone;

3. DENR notifies the state regulated facilities and the Rapid City Air Quality staff by e-mail of the high wind dust alert and posts the alert on DENR's website; and
4. The Rapid City Air Quality staff will provide a follow up notification to the local news media and sources regulated by the local program.

When a high wind dust alert is called by the National Weather Service, both DENR and the Rapid City Air Quality staff will notify their respective facilities, construction activities, and potential generators of fugitive dust about the high wind dust alert. These businesses, on a voluntary basis, take extra measures beyond what is called for under the best available control measures to reduce dust generating activities. An example provided by different industries for reducing fugitive dust emissions is spraying extra water on unpaved roads and stockpiles and in some cases the operations may be shutdown during a high wind dust alert.

Along with the notification of industry and companies, DENR includes an e-mail notification of the alert to the City of Rapid City, Rapid City Area Air Quality Board, Rapid City National Weather Service, Ellsworth Air Force Base, Black Hills Forest Service personnel, South Dakota Department of Agriculture, South Dakota Department of Transportation, and South Dakota State Wildfire Coordinator. During the alert DENR provides updates to the list of contacts with information on hourly PM10 concentrations and wind speeds so they can track the conditions. Following the alert day DENR provides a final report on the PM10 concentrations and wind speeds to the same list of people. A graphs and table of hourly PM10 data and wind speed data are updated on the DENR website several times during the regular office hours of the alert day. An archive of past alert days and PM10 exceedance days are maintained on the DENR website for public review. Finally, information on all alert days and any days exceeding PM10 standard in the Rapid City area are provided at the next scheduled Rapid City Area Air Quality Board meeting. Additional updates are provided at later meetings as the collected data is reviewed by DENR and EPA.

The public notification plan has been reviewed several times during the past seven years. Changes were made to the plan because key personnel left the different programs and to improve the effectiveness of the notification. Originally, the National Weather Service contacted the local Rapid City Air Quality staff concerning a high wind dust alert. Since the National Weather Service reviews the forecast and calls the alerts early in the mornings, the first contact was changed to DENR's Pierre office because of the time change so that the local businesses had more time to react to a high wind dust alert. It was determined that contacting the industry an hour sooner gave industry a better chance of changing their operations to minimize dust emissions. In addition, the National Weather Service posts an "Air Pollution Alert for Dust" advisory on their website for the duration of the event.

DENR believes the public education and notice has been successful. On a periodic basis, the public notification procedures will be reviewed by DENR with the Rapid City Air Quality staff

and the National Weather Service to ensure the process stays successful.

7.0 Best Available Control Measures

The 1996 policy stipulates that best available control measures need to be federally enforceable. The best available control measures for industrial fugitive dust sources will be implemented in the industrial sources' Part 70 or minor air quality operating permit. Permit requirements in Part 70 permits are federally enforceable. Permit requirements in a minor permit are federally enforceable once EPA reviews and approves of the permit condition. Therefore, minor air quality operating permits that have best available control measures will be submitted to EPA for review and approval by EPA before the minor air quality operating permit is issued.

Best available control measures were developed by DENR for fugitive dust sources in the industrial complex in the west Rapid City area. The best available control measures were reviewed by EPA's Region VIII and Headquarters, the Rapid City industries, and the Pennington County Air Quality Board. The best available control measures outlined in the Natural Events Action Plan were approved by EPA Region VIII in 1998.

In the summer of 2003, DENR visited each facility listed in the Natural Events Action Plan to determine how the best available control measures were working and if any new control measures were being implemented. The following is a review of and changes to the best available control measures adopted in the Natural Events Action Plan. The best available control measures in this document supersede the best available control measures described in Section VII and VIII of the original Natural Events Action Plan.

7.1 Crusher Controls

Best available controls measures for feeder hoppers were not established in the Natural Events Action Plan. A feeder hopper is the initial opening in which nonmetallic minerals are fed without prior crushing. In most cases the feeder hopper is either enclosed with a sufficient opening for dumping material into the feeder hopper (see Figure 7-1) or the front end loader that dumps a load into an open feeder hopper keeps the drop height at a minimum.

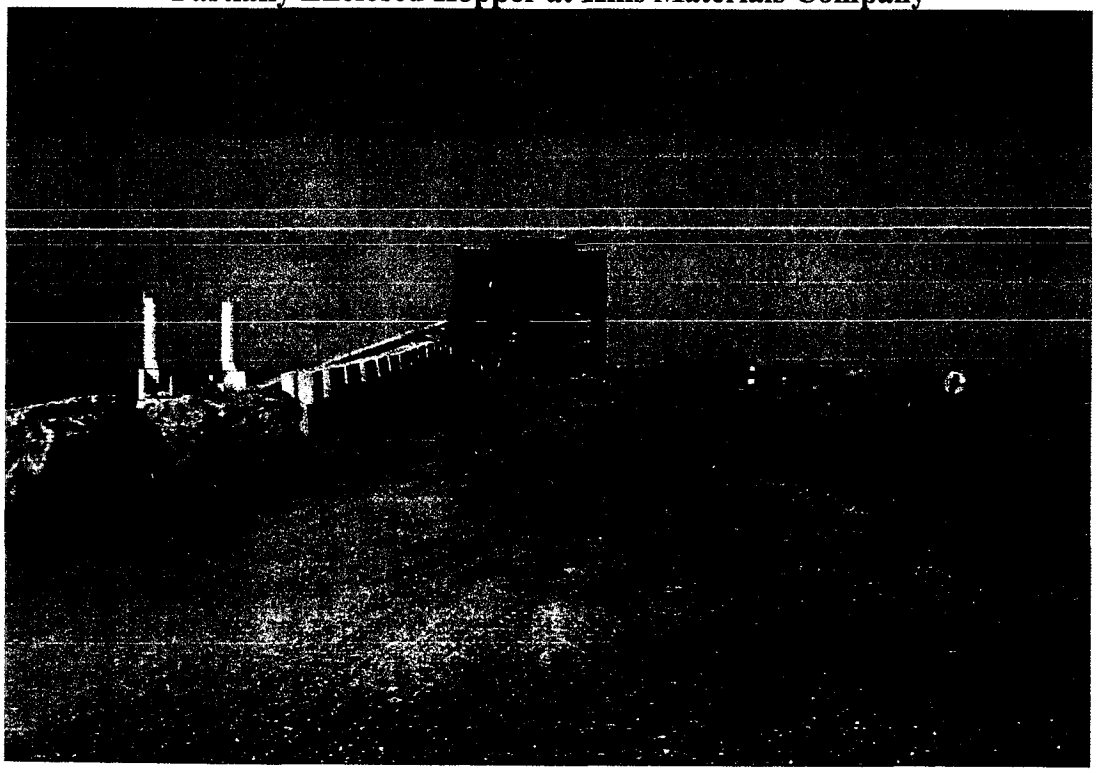
As you can see from Figure 7-1, as the truck dumps raw material from the quarry into the hopper, no fugitive dust emissions are visible. This partially enclosed hopper has an air system on it which sucks the dust created from the unloading of material and passes it through a baghouse.

Both techniques reduce the area in which high winds can impact the material being dropped into the feeder hopper and minimizes dust emissions. After reviewing the procedures implemented by the quarry operations in the west Rapid City area, DENR believes the procedures implemented by the facilities are adequate in controlling dust emissions and will not be addressed further in the Natural Events Action Plan.

The best available control measures for crushers established in the Natural Events Action Plan consist of the following:

- Enclose primary, secondary, or tertiary rock crushers along with the associated screens, transfer points, and load-outs (from hoppers or conveyors to other than stockpiles). The term enclosure is defined as a complete enclosure around one or more pieces of equipment or an enclosure of those points on the equipment from which particulate is emitted.

Figure 7-1
Partially Enclosed Hopper at Hills Materials Company



- The enclosure shall include a method of controlling particulate emissions. The control shall be a wet suppression, baghouse, or wet scrubber for complete enclosed buildings and a baghouse or wet scrubber for an enclosure of an emission point.

Although everyone agreed with this method of controlling particulate emissions from a crusher, implementing the best available control measure for crushers is impractical because not all crushers operated in the west Rapid City area are stationary. There are three types of crushers that facilities operate in the west Rapid City area. The first type involves crushers that are stationary at a certain location. The second type of crusher is one that is operated at a certain location but is mobile and moved around the site. The third type of crusher is a portable crusher that is moved

into the area on a temporary basis. Enclosing a crusher and installing a control device is practical for a stationary crusher but impractical for mobile and portable rock crushers. Therefore, DENR revised the best available control measures for rock crushers as described below:

The owner or operator shall enclose any primary, secondary or tertiary rock crusher that is stationary. A stationary crusher is defined as a crusher that is attached by a cable, chain, turnbuckle, bolt or other means (except electrical connections) to any anchor, slab, or structure including bedrock. The enclosure shall include the associated screens, conveyor belts, and transfer points, except for transfer points that drop material onto an open stock pile or onto a conveyor system that transports limestone ore from the quarry to the processing facility. Any captured particulate shall be disposed of in a manner that will not allow the captured particulate to become re-entrained 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 particulate is emitted. To qualify as an enclosure, the enclosure shall:

1. Be 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;
2. Be 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;
3. Be 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;
4. Include a method of controlling particulate emissions based on the type of enclosure. If the process is enclosed by a building, the owner or operator shall treat, capture, or remove particulate emissions generated from the material being processed with wet suppression, a baghouse or a wet scrubber. If the enclosure just covers the emission point, the owner or operator shall capture or remove particulate emissions generated from the material being processed with a baghouse or wet scrubber. The particulate emission control device shall be used at all times during the operation of the process equipment;
5. Whenever reasonably possible, the enclosure shall be designed so the enclosure and control have a negative pressure; and
6. Be 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.

The owner or operator has the option of enclosing and controlling particulate emissions or applying wet suppression to control particulate emissions from a crusher that is mobile or a

portable crusher that is moved in an area on a temporary basis. The enclosure and control device or wet suppression shall include the associated screens, conveyor belts, and transfer points, except for transfer points that drop material onto an open stock pile. An enclosure for a mobile or portable crusher shall meet the requirements specified above for a stationary crusher.

A portable crusher is defined as a crusher that is located and operated in the west Rapid City area for no more than 90 days per calendar year. An owner or operator that moves a portable crusher into the west Rapid City area is required to document the date the unit was moved in, the days the unit was operated, and the date the unit was moved out of the west Rapid City area. Once a portable crusher is operated in the west Rapid City area for 90 days in a calendar year, the portable crusher must be shutdown for the calendar year or moved to another location outside the west Rapid City area.

Air emissions from the enclosure shall be subject to the opacity limit in Section 7.12 of this document or the applicable New Source Performance Standard for the crusher. 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. In the event of freezing conditions and where the wet suppression equipment is inoperable, the owner and operator may operate the crusher and associated equipment without wet suppression provided the crusher and associated equipment can comply with the applicable opacity standard.

The visible emissions from a mobile and portable rock crusher with wet suppression have been evaluated by DENR and are capable of meeting the 20 percent opacity limit in Section 7.12 of this document.

7.2 Controls for Unpaved Roads, Parking Lots, and Storage Areas

The best available control measures for unpaved roads established in the Natural Events Action Plan consist 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, 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; or
- Pave main haul roads and secondary haul roads with tack seal, asphalt, recycled asphalt or concrete.

During DENR's visits in 2003, most of the main haul roads for the quarry operations were treated with chemical stabilizers and visible emissions were minimal. From Figure 7-2, you can see that the main haul road has been treated with a chemical stabilizer. In some cases, secondary haul roads are also treated with a chemical stabilizer but in most cases the secondary roads are treated with water. Observations of traffic over secondary roads were also witnessed and visible

emissions were minimal.

Figure 7-2
Main Haul Road at Fisher Sand and Gravel



DENR did observe unpaved parking areas or areas in which supplies were being stored at some of the facilities and noticed that this section did not address these areas. Therefore, DENR revised the best available control measures for unpaved roads to include parking lots and storage areas as described below:

There are two types of unpaved roads in the west Rapid City area. The first type is the main haul road, which is defined as a passageway between the mining area and the processing facility or the processing facility and a storage area. The owner or operator shall implement one of the following for unpaved main haul roads:

1. Apply a chemical stabilizer in sufficient quantity and frequency to suppress particulate emissions and comply with the opacity limit established in Section 7.12 of this document; or
2. Pave the main haul road with tack seal, asphalt, recycled asphalt or concrete and meet the best available control measures for paved roads and parking lots.

The second type of unpaved road is a secondary haul road. Secondary haul roads are defined as a passageway in which there is daily vehicular traffic on normal workdays and are not considered main haul roads. The owner or operator shall implement one of the following for unpaved secondary haul roads:

1. Apply water in sufficient quantity and frequency to suppress particulate emissions and comply with the opacity limit established in Section 7.12 of this document;
2. Apply a chemical stabilizer in sufficient quantity and frequency to suppress particulate emissions and comply with the opacity limit established in Section 7.12 of this document; or
3. Pave the secondary haul road with tack seal, asphalt, recycled asphalt or concrete and meet the best available control measures for paved roads and parking lots.

The owner or operator shall implement one of the following for unpaved parking lots or storage areas:

1. Apply water in sufficient quantity and frequency to suppress particulate emissions and comply with the opacity limit established in Section 7.12 of this document;
2. Apply a chemical stabilizer in sufficient quantity and frequency to suppress particulate emissions and comply with the opacity limit established in Section 7.12 of this document; or
3. Pave the parking lot with tack seal, asphalt, recycled asphalt or concrete and meet the best available control measures for paved roads and parking lots.

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 DENR 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 emissions. Delays for application of chemical stabilizers up to 30 days will be allowed during freezing conditions or when conditions are not favorable for application provided the primary or secondary road can comply with the opacity limit in Section 7.12 of this document.

7.3 Paved Roads and Parking Area Control

This best available control measure was also agreed upon by EPA, industry and DENR; but when implemented it was determined that what was actually performed in the field was different then what was described in the Natural Events Action Plan. In most cases, industry with paved roads and parking lots were using a vacuum sweeper, mechanical sweeper with wet suppression that collects the dust in a hopper, or water flushing, not conducting a combination of two of the methods. After reviewing paved roads and parking lots after each method was performed, the paved area was capable of meeting the opacity limit of 20 percent in Section 7.12 of this document. Therefore, DENR revised the best available control measures for paved roads and parking areas as described below:

The owner or operator shall use a mechanical sweeper that collects particulate and is equipped with wet suppression, use a vacuum sweeper, or water flush all paved roads and

parking areas to remove particulate that has the potential to be re-suspended during spring, summer and fall. During winter months or during freezing weather, the paved roads and parking lots shall be cleaned with the mechanical sweeper that collects particulate and is equipped with wet suppression or a vacuum sweeper. The frequency of cleaning will be on an as needed basis to comply with the opacity limit established in Section 7.12 of this document.

7.4 Track Out Area Control

The entrances to the operations associated with the quarries and a majority of the remaining businesses have paved the entrance to the business with concrete or asphalt. In some cases, the business has paved all of the roads or is in the process of paving all of the main haul roads such as Birdsall Sand and Gravel Company, Dakota Block, and J.E. Simon Company. Several businesses on the northern edge of the Natural Events Action Plan's implementation area have unpaved entrances such as Black Hills Corporation's Lange facility and Fisher Sand and Gravel Company.

DENR witnessed the best available control measures implemented by industry for track out areas and found them to be in compliance with the 20 percent opacity limit in Section 7.12 of this document (see Figure 7-3). J.E. Simon Company paved the entrance to their property and water it during the day to keep fugitive dust emissions down. In addition to watering, J.E. Simon Company also hires a vacuum sweeper to control fugitive dust emissions from paved areas on their property but also has the vacuum sweeper clean the public paved road in front of their property.

As mentioned above, there are two sites in which the entrance to the business is connected to a gravel road. These two facilities (Fisher Sand and Gravel Company and Black Hills Corporations' Lange Facility) have not paved or installed a wash station. It does not make sense to require a paved entrance or the installation of a wash station at a site where the public access is a gravel road. Therefore, DENR revised the best available control measures for track out areas as described below:

A track out area is defined as the driving surface from the owner's or operator's facility to a paved public roadway upon which particulate may be deposited by transport vehicles. For track out areas, the owner or operator shall implement one of the following control techniques:

1. Pave and maintain (asphalt or concrete) a track out area to provide 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
2. Install a wash station and require all haul truck vehicles leaving the facility to remove track out materials through the use of water.

Figure 7-3
Paved Entrance at J.E. Simon Company



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 from becoming entrained in violation of the opacity limit established in Section 7.12 of this document. The controls and/or techniques shall require DENR approval unless it is a control or technique approved in this section.

7.5 Reclamation Control

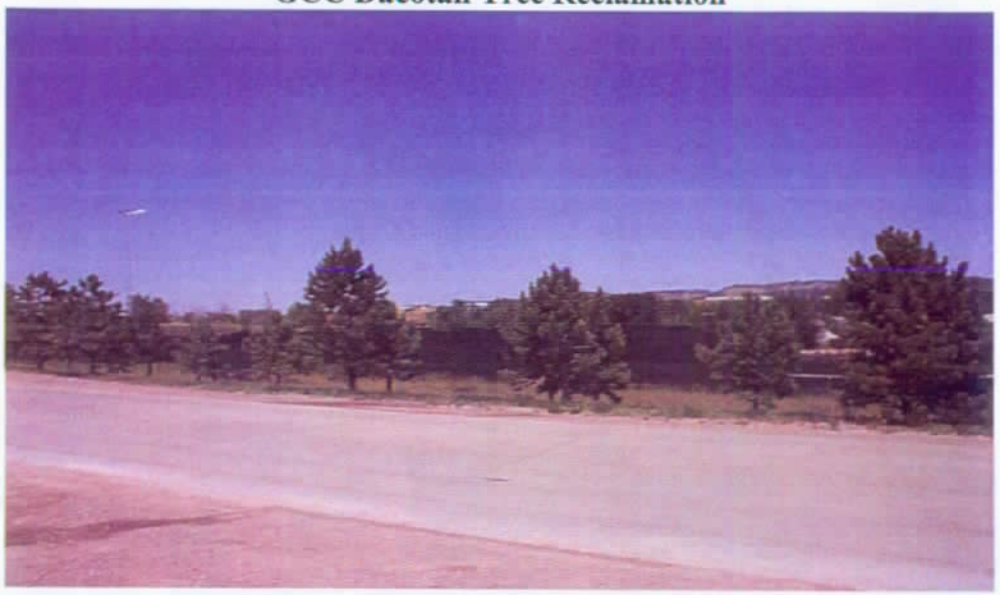
DENR reviewed the reclamation procedures implemented by industry and found that they were adequate in controlling wind blown dust emissions during a high wind dust alert. In most cases, a mixture of grasses is applied to control wind blown dust from exposed areas with some adding trees. GCC Dacotah purchased a tree spade which is used to displace trees in areas that will be quarried and transplanting them at reclaim areas (see Figure 7-4). This process has been successful in transporting trees from a new quarry area and repopulating the remaining area with trees. In some cases the quarries have added organic material to help hold moisture such as wood chips.

DENR revised the best available control measures for reclamation controls as described below:

The owner or operator shall submit to DENR for approval, a plan to reclaim lands that have a wind erosion potential within 90 days of the issuance of an air quality operating permit. Reclaimed land means 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. Upon approval of the plan by DENR, the plan shall remain in effect as best available control measures for lands with wind erosion potential, until reclamation has been completed at the facility and approved by DENR. Lands with wind erosion potential means all areas within the facility except those that have a hard rock surface, are paved, have a structure over it, the working face of a quarry, or have been reclaimed. DENR will approve a plan that makes reasonable progress toward reclaiming land with wind erosion potential.

Figure 7-4
GCC Dacotah Tree Reclamation



DENR shall notify the owner or operator if the plan is approved or disapproved within 90 days after receiving the reclamation plan. If the plan is disapproved, the notification shall identify what information is needed for the plan to be accepted. The owner or operator shall resubmit a revised plan within 90 days of notification. The accepted plan shall remain in effect until modified.

The owner or operator may modify an approved plan by written notice to DENR. Modifications to an approved reclamation plan shall follow the same approval procedures as described above.

7.6 Front-end Loaders

Best available control measures for front end loaders were not established in the Natural Events Action Plan because there were none available. DENR witnessed the use of front end loaders at several of the quarries and noted that the operators practiced what would be considered best

management practices by minimizing the distance the material was dropped (see Figure 7-5). This best management practice resulted in minimal dust emissions from front end loaders.

Figure 7-5
Front End Loader Dumping into Portable Hopper/Crusher at Pete Lien and Sons

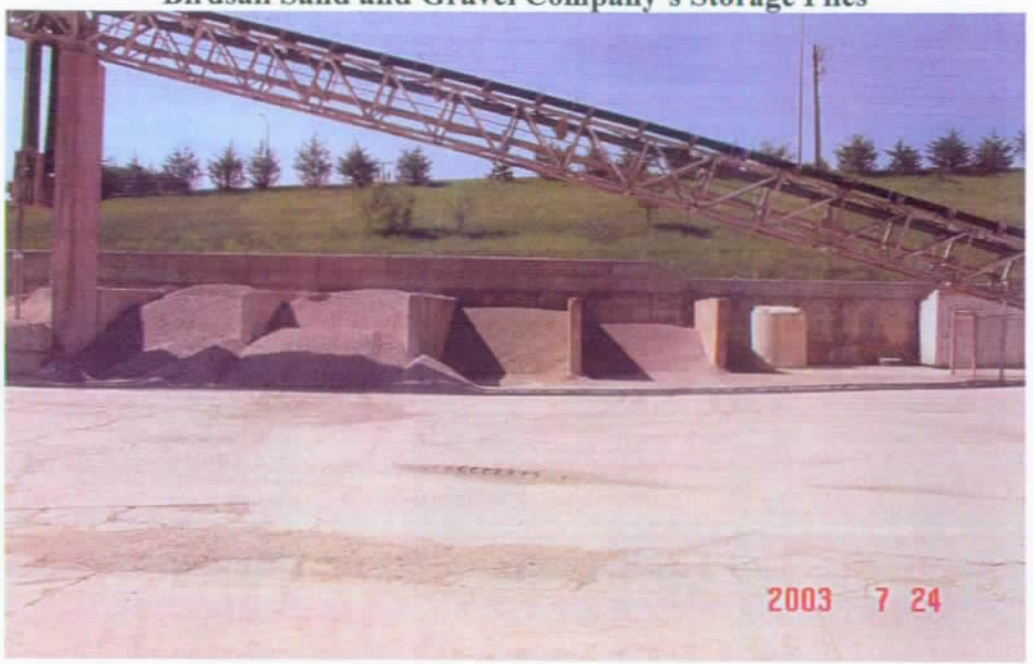


As the front end loader dumps raw material into the hopper in Figure 7-5, there is a brief puff of smoke which quickly dissipates. Visible emissions from this intermittent activity were below the opacity standard in Section 7.12 of this document.

7.7 Open Storage Pile Controls

DENR evaluated the storage piles at each of the facilities that have storage piles and determined that the measures outlined in the Natural Events Action Plan were followed. In most cases, the storage piles that meet the silt content requirement are treated with water when the storage piles are active. Storage piles that are inactive are treated with enough water to create a hard crust or treated with a chemical stabilizer. Birdsall Sand and Gravel Company maintain there storage piles in bunkers on a side of the hill which protects the stock piles from wind erosion (see Figure 7-6).

Figure 7-6
Birdsall Sand and Gravel Company's Storage Piles

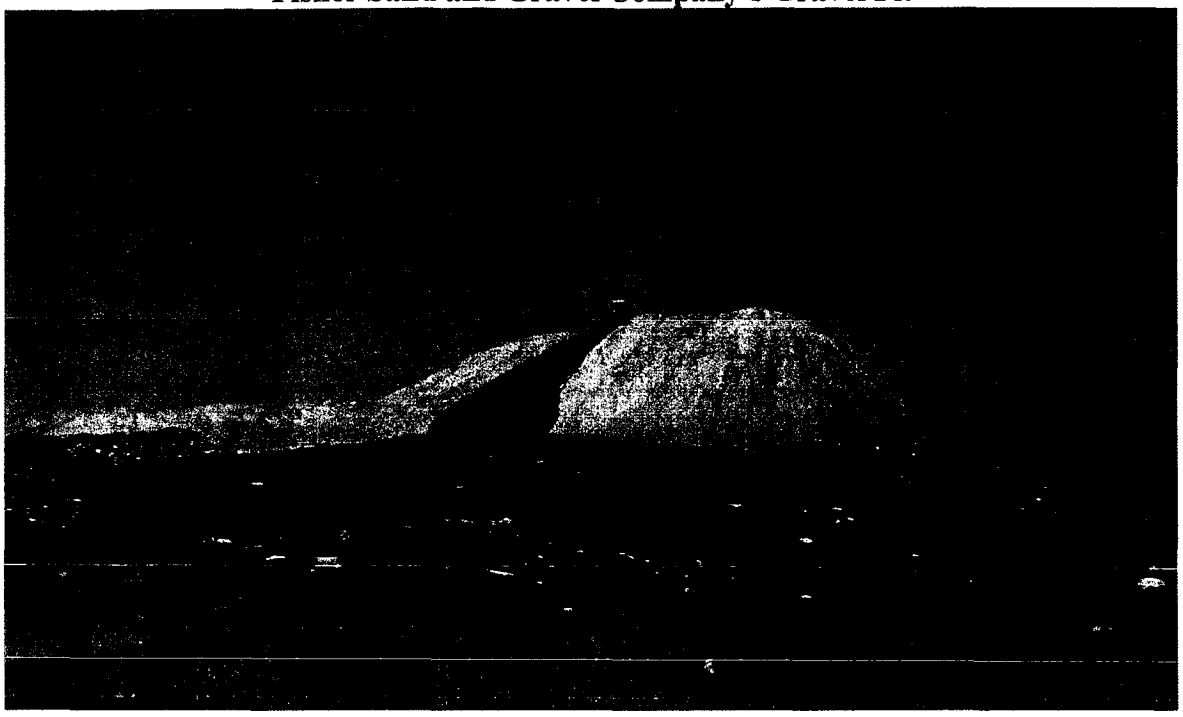


In the case of Fisher Sand and Gravel Company, the moisture in the material being processed is visible which helps minimize fugitive dust emissions during the transporting of the material and as it is dumped onto storage piles (see Figure 7-7). As the material dries, a crusted layer forms which helps protect it from the wind. Visible emissions from all storage piles were minimal.

DENR revised the best available control measures for open storage piles as described below:

> An open storage pile means a storage pile with a silt content of four percent by weight or greater, has a height of three or more feet, and a total surface area of 150 or more square feet. ASTM C-136 or another equivalent method approved by DENR shall be used to sample and analyze the silt content. Silt is defined as any material with a particulate size less than 74 micrometers in diameter and passes through a number 200 sieve. The owner or operator shall implement one of the following control measures for open storage piles:
>
> 1. Apply chemical stabilizer in a sufficient quantity and frequency to suppress particulate generation to comply with the opacity limit established in Section 7.12 of this document; or
> 2. Apply water to the surface area of all open storage piles on an as needed basis to comply with the opacity limit established in Section 7.12 of this document; or
> 3. 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 limit established in Section 7.12 of this document.

Figure 7-7
Fisher Sand and Gravel Company's Gravel Pit



7.8 Waste Pit Controls

DENR observed the waste pits. In most cases the waste pits are located in low lying areas, are protected by the terrain such as a ridge, and/or surrounding on one or all sides with trees. Black Hills Corporation's waste pit for its bottom ash and fly ash is in a low lying area and surrounded by trees (see Figure 7-8).

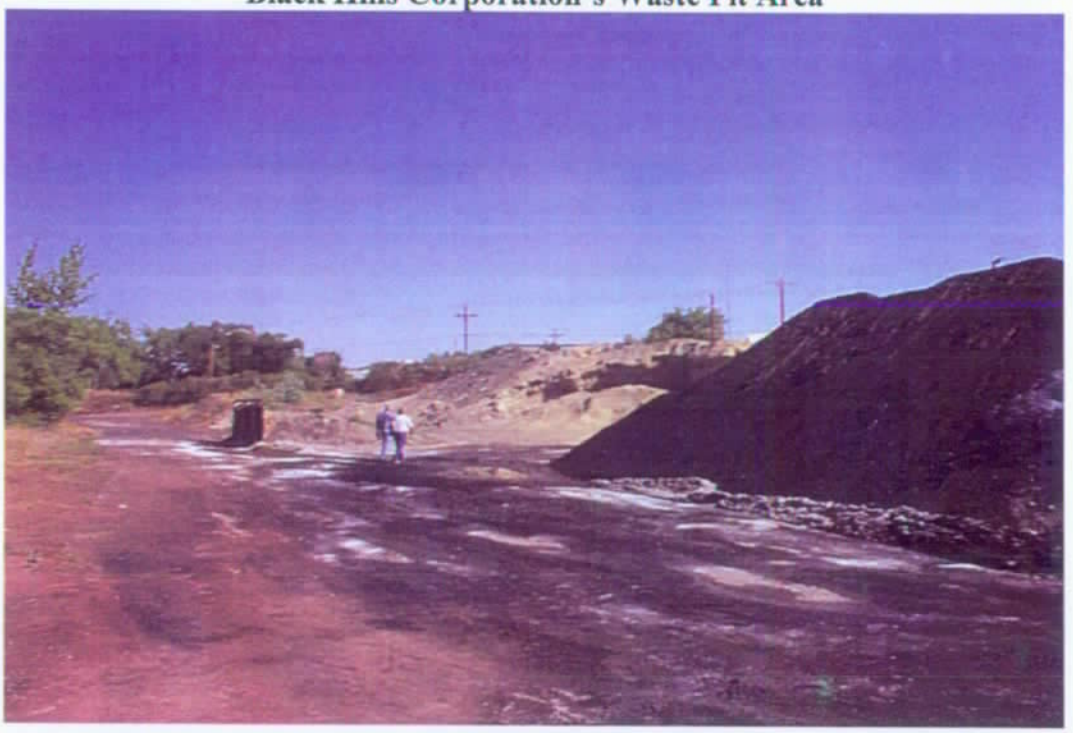
Although this is a good location, Black Hills Corporation is in the process of eliminating a portion of this waste pit by loading fly ash (white material) directly into trucks from a new silo they installed. The trucks haul the fly ash directly to a mine in Wyoming for disposal. The remaining bottom ash (black material) is a glass type material that is slurried to the area by a pipeline.

DENR revised the best available control measures for waste pits as described below:

> A waste pit means an area where particulate from process equipment or pollution control devices are deposited for storage or disposal. The elimination of a waste pit by developing a market for the waste is the best measure for eliminating fugitive dust emissions. If that is not an option, the owner or operator shall implement one of the following control measures for waste pits:

1. Apply a soil cement or similar application that is approved by DENR over the entire waste pit area;
2. Apply water spray to adequately create a crusted surface over the entire waste pit area; or
3. Implement a combination of wind protection (wind-fence, wind-screen, three wall enclosure) and soil cement or water spray applications.

Figure 7-8
Black Hills Corporation's Waste Pit Area



Application of the soil cement, similar application, and water spray shall be applied in such a manner that the waste pit meets the opacity limit established in Section 7.12 of this document.

7.9 Blasting Controls

DENR did not observe a blast during the visit in the summer of 2003, and has had very few complaints about blasting during a high wind dust alert. The best available control measures in the Natural Events Action Plan are described below:

No blasting shall be allowed when a high wind dust 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 dust alert. This exception is allowed for safety reasons and Mining Safety and Health

Administration blasting requirements.

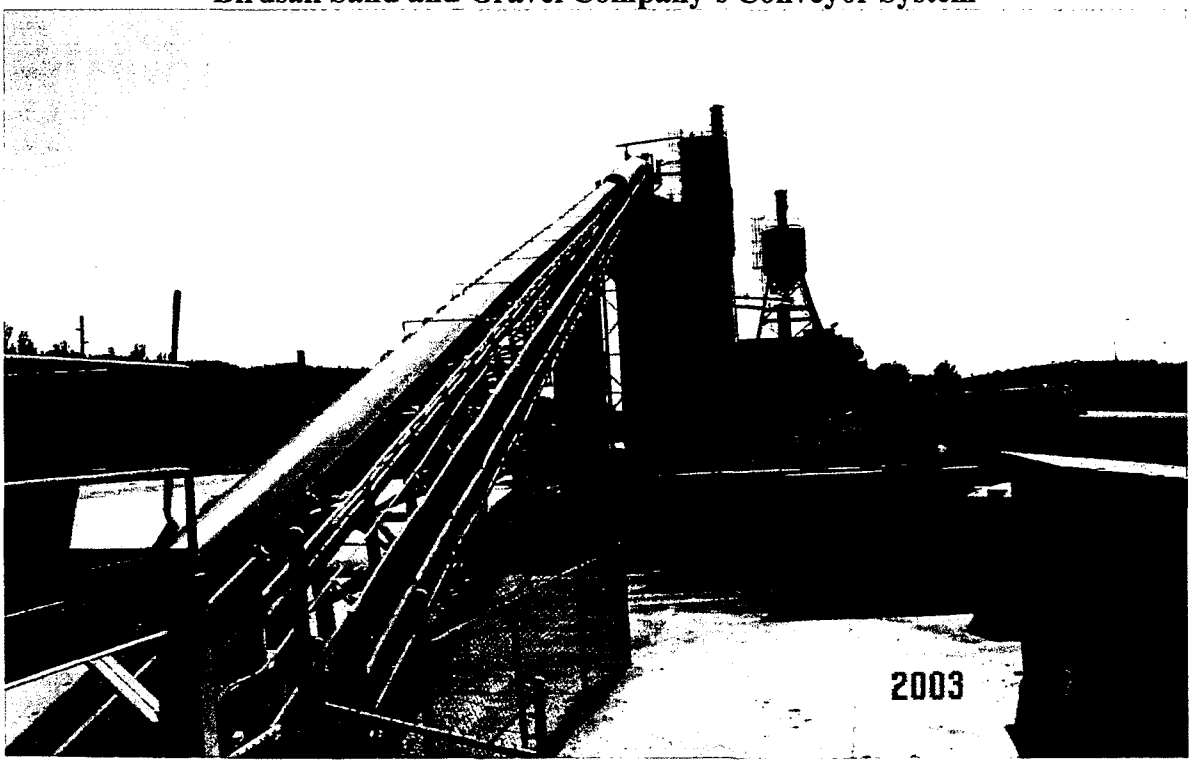
DENR did not change the best available control measures for blasting.

7.10 Controls for Conveyor Systems not Associated with Crushers

Best available control measures in the Natural Events Action Plan for rock crushers included the equipment associated with the crusher such as the screens, conveyor belts, and transfer points. The best available control measure for rock crushers does not include conveyor belts not associated with a rock crusher. For example, there are conveyor belts not associated with a rock crusher at Birdsall Sand and Gravel, Black Hills Power and Light Company, and Dakota Block Company (see Figure 7-9 and 7-10).

The material transported from the storage piles to the concrete batch plant at Birdsall Sand and Gravel is dumped by a front end loader or truck into a below ground hopper system. The material is then transported by a covered conveyor system to the top of the concrete plant (see Figure 7-9). The visible emissions from this conveyor system have been observed and were less than the 20 percent opacity limit in Section 7.12 of this document.

Figure 7-9
Birdsall Sand and Gravel Company's Conveyor System



DENR believes this type of equipment should meet the same requirements as those for equipment associated with a rock crusher and is establishing the following best available control measures for conveyor systems not associated with a crusher.

> Best available control measures for a conveyor system not associated with a rock crusher shall consist of a cover for the conveyor system and transfer points. If the conveyor system and/or transfer point is not capable of meeting the opacity limit in Section 7.12 of this document, the owner or operator shall install a partial enclosure as described in Section 7.1 of this document or wet suppression. In the event of freezing conditions where a wet suppression control device is inoperable, the owner and operator may operate the unit as long as the opacity limit established in Section 7.12 of this document is not violated.

Figure 7-10
Covered Conveyor System for Dakota Block Company



7.11 Alternative Techniques and Controls

The last sentence to this section allows an alternative method to be automatically approved if DENR does not notify the business submitting the alternative technique in 30 days. Automatic approval is not provided by DENR. Therefore, DENR removed this sentence from this section and also made some minor changes. DENR revised the alternative techniques and controls section as described below:

> The owner or operator shall have the option to implement other techniques and/or controls

that are as efficient in reducing or eliminating particulate emissions from the fugitive sources as the controls listed in Section 7.1 through 7.10 of this document. If the owner or operator decides to pursue alternative techniques and/or controls, the owner or operator shall notify DENR 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. DENR shall review the proposal and notify the owner or operator in writing within 60 days of receiving the proposal, that the owner or operator may proceed as proposed or with changes outlined in DENR's written response. DENR shall be receptive of proposals that are as efficient as existing techniques and/or controls.

7.12 Opacity Standards for Fugitive Sources

DENR revised the opacity standards for fugitive sources section as described below:

The following are opacity standards for the fugitive sources listed in this section.

1. New Source Performance Standard (NSPS) opacity requirements for metallic and non-metallic mineral processors shall apply to those sources where and when applicable;
2. The owner or operator shall not discharge from crushers, screens, conveyors, transfer points or other fugitive sources that process material continuously a visible emission 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.
3. 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 a visible emission to the ambient air of a density equal to or greater than 20 percent opacity. The opacity reading will be based on a series of two-minute averages with a minimum 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.

7.13 Opacity Exceedance/Compliance

The Natural Events Action Plan is setup in a fashion that opacity readings greater than 20 percent during a high wind dust alert are not considered an opacity violation. DENR revised the opacity exceedance/compliance section as described below:

An opacity reading on a fugitive source that documents an opacity exceedance will not be valid or usable when taken during a high wind dust alert as defined in the Natural Events Action Plan. Therefore, no corrective action by the owner or operator shall be required for opacity readings on a fugitive source that exceeds the opacity standard in Section 7.12 of this

document, if taken during a high wind dust alert.

If a fugitive source exceeds the opacity standard in Section 7.12 of this document, DENR will provide the owner or operator two opportunities to correct the exceedance. In the event of a third exceedance from that fugitive source, DENR will require the owner or operator to reevaluate best available control measures for that fugitive source. Within 60 days of receiving written notification from DENR, the owner or operator shall submit its written proposal to correct the problem from that fugitive source to DENR. The written proposal shall identify the proposed best available control measure, documentation to support the proposed best available control measure, and a time frame for implementing the proposed best available control measure. DENR shall approve or disapprove the proposed best available control measure within 60 days of receiving the proposal from the owner or operator. DENR's approval letter will identify the date of implementation of the new best available control measure. If DENR disapproves the proposed best available control measure, DENR shall identify the reasons for disapproving the proposed best available control measure and what changes are needed for DENR's approval.

7.14 Record keeping and Reporting

The requirements in the record keeping and reporting section dealt mainly with the initial implementation of the Natural Events Action Plant. The record keeping and reporting requirements are listed in each businesses air quality permit. Therefore, DENR revised the record keeping and reporting section as described below:

The owner or operator shall maintain all monitoring data, records, and reports as required in its air quality operating permit.

7.15 Amendments

DENR is eliminating the amendment section to the Natural Events Action Plan. Amendments to the Natural Events Action Plan will be handled during periodic reviews which are required at a minimum of once every five years. In certain cases, the Natural Events Action Plan may be amended as necessary before a five year review has been completed. In all cases, amendments to the Natural Events Action Plan will be completed following the procedures outlined in EPA's May 30, 1996, Natural Events Policy.

7.16 Enforcement

DENR revised the enforcement section as described below:

In the event the owner or operator fails to comply with the foregoing best available control measure by the implementation date specified by DENR, the enforcement remedies set forth in SDCL 34A-1 shall apply. It is specifically understood that an opacity exceedance, except

for fugitive sources regulated under a New Source Performance Standard is not a failure of compliance but shall require the owner or operator to re-evaluate its best available control measures as set forth above. In the event that the owner or operator does not re-evaluate its best available control measure and implement a new best available control measure as outlined in Section 7.13 of this document, the enforcement remedies set forth in SDCL 34A-1 shall apply.

8.0 Contributing Sources

It is stated in the Natural Events Policy that all sources contributing to a PM10 concentration greater than the national ambient air quality standard are required to implement best available control measures. Best available control measures for processes that emit fugitive particulate are techniques and/or controls that achieve the maximum degree of emission reduction as determined on a case-by-case basis considering technological and economic feasibility (59 FR 42010, August 16, 1994). The efficiency of the best available control measure for each process shall be based on DENR's ambient air monitoring network in the west Rapid City area and the opacity limit established in Section 7.12 of this document.

The Natural Events Action Plan identified fugitive dust sources within the industrial complex as the main contributors to the PM10 exceedances. The industrial sources listed in the Natural Events Action Plan that must implement best available control measures are listed below:

- Birdsall Sand and Gravel;
- Black Hills Power and Light Company – Ben French;
- Dakota Block Company;
- Fisher Sand and Gravel;
- Hills Materials Company;
- J.E. Simon Construction;
- Pete Lien and Sons, Inc; and
- South Dakota Cement.

Since the implementation of the Natural Events Action Plan, South Dakota Cement was bought by GCC Dacotah. GCC Dacotah has accepted the best available control measures in controlling fugitive dust from its operations. In addition, Black Hills Corporation, formerly Black Hills Power and Light Company, installed a simple cycle combustion turbine north of Rapid City within the implementation area after the implementation of the Natural Events Action Plan. The site is known as the Lange Combustion Turbines and is required to implement best available control measures on its operations that generate fugitive dust emissions.

Portable sources such as rock crushers, asphalt batch plants, and concrete plants are moved into the Natural Events Action Plan on a temporary basis. Portable sources are also required to implement best available control measures on the fugitive dust sources associated with the

portable unit.

Other sources having the potential to contribute to the exceedances include street sanding operations, construction activities, and paved and unpaved parking lots and alleys. Street sanding operations are regulated under the Administrative Rules of South Dakota (ARSD) 74:36:17. Construction activities and paved and unpaved parking lots and alleys were originally regulated by Pennington County. Now, the Rapid City Air Quality Division implements the local air quality program and regulates these activities, if the activity does not occur on state property. In July 2001, these types of activities that occur on state property are being regulated under ARSD 74:36:18.

9.0 Five Year Review Summary

The five year review consisted of evaluating the implementation area, criteria for calling a high wind dust alert, the process for educating and alerting the public to a high wind dust alert, PM10 concentrations trends, and best available control measures. DENR proposed minor changes to the implementation area based on the growth of the city of Rapid City and where the hogback separates western Rapid City from eastern Rapid City. DENR plans on conducting a study in the next five years to determine if the borders of the Natural Events Action Plan area have been identified correctly.

DENR reviewed the three meteorological criteria for calling a high wind dust alert and the procedures for calling high wind dust alerts. The review found a strong correlation between hourly wind speed averages and maximum hourly wind gusts to concentration levels. The precipitation events before the high wind dust alert had less of a correlation because other factors such as high temperatures following the event, extended period of dry conditions, and nature of the soil texture all had an affect on the wind erosion capacity. The meteorological criteria review did not warrant any changes to the criteria for calling a high wind dust alert at this time but precipitation levels will need to be evaluated further to determine if the rainfall event of 0.02 inches five days before a high wind dust alert should be changed. To assist in the future with further evaluating and possibly refining the criteria under which high wind alerts are called, DENR will work with the National Weather Service on establishing a new meteorological station in the Natural Events Action Plan area.

There have been some changes to the procedure for calling high wind dust alerts. One change involved the National Weather Service contacting DENR in the Pierre office to provide industry more time to react to a high wind dust alert. This change was made because contacting dust generating operations when high wind dust alerts are called is an important tool in maintaining PM10 concentrations below the national ambient air quality standards. The procedures for calling high wind dust alerts will continually be reviewed to ensure the public is notified properly.

DENR reviewed the PM10 concentrations levels to determine if the 24-hour PM10

concentrations are being impacted by the Natural Events Action Plan. The review found six PM10 concentrations in a seven year period exceeded the 24-hour PM10 standard. All six PM10 concentrations occurred during a high wind dust alert. A graph of the high PM10 concentrations indicated that the magnitude of the high PM10 concentration is reducing. In addition, the second highest PM10 concentration each year is being reduced even though the annual rain fall amounts are below the long term average.

DENR reviewed the best available control measures and noted differences between what was identified as best available control measures and what was actually being practiced or was practical in the field. Based on observing opacity readings from these different practices, DENR revised the best available control measures as allowed by the "Alternative Techniques and Controls" section of the original Natural Events Action Plan. The Best Available Control Measures listed in Chapter 7.0 of this document are the new Best Available Control Measures for the Rapid City Natural Events Action Plan.

The five year review of the Natural Events Action Plan for PM10 High Wind Events in the west Rapid City area determined that the Natural Events Action Plan is being fully implemented. High wind dust alerts are being called as required by the Natural Events Action Plan and the best available control measures are being implemented by industries in western Rapid City. The only sampling days with PM10 concentrations greater than the 24-hour PM10 standard occurred during periods of high wind dust alerts and the magnitude of those exceedances seems to be declining. Therefore, DENR believes that the Natural Events Action Plan is working.