PINEHURST PARTICULATE (PM-10)

AIR QUALITY IMPROVEMENT PLAN

FEBRUARY 5, 1992

IDAHO DIVISION OF ENVIRONMENTAL QUALITY

SILVER VALLEY

IN IDAHO'S MOUNTAINS,
    IN THE SHADOW OF PINES,
EXISTS QUITE A NUMBER
    OF GREAT SILVER MINES.
DOWN THROUGH THE CANYONS,
    IN THE MIDST OF THE HILLS,
ARE A NUMBER OF TROUT STREAMS,
    WITH RIFFLES AND RILLS.
DEEP IN THESE MOUNTAINS,
    FOR MEN TO EXPLORE,
LIE MILLIONS OF TONS,
    OF RICH SILVER ORE.
HIGH ON THE MOUNTAINS,
    AND EASY TO SEE,
ARE SNOW COVERED SLOPES,
    INVITING THE SKI.
THEN BROADENING OUT,
    AS THE VALLEY EXPANDS,
ACRES AND ACRES OF HOME,
    AND FARM LANDS.
THE COEUR D' ALENE RIVER,
    ON IT'S WAY TO THE SEA,
FLOWS THROUGH THIS GREAT VALLEY,
    SO WILD AND SO FREE.
INTO COEUR D' ALENE LAKE,
    WHERE IT POURS,
OUR WONDERFUL VALLEY,
    COULD ALSO BE YOURS.

L. H. HARRY
PINEHURST RESIDENT

PINEHURST PM_{10}
AIR QUALITY IMPROVEMENT PLAN

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SUMMARY

In 1987 the City of Pinehurst, Idaho, was designated as an area that does not meet the 24-hour national and state ambient air quality standard for small particulates, known as PM_{10}. In response to this designation, the Division of Environmental Quality (DEQ) of the Idaho Department of Health and Welfare has developed this plan which outlines the way in which air quality in Pinehurst will be improved to meet the standard by December 31, 1994.

Pinehurst, population 1722, is located in the Silver Valley, an historic mining area along the south fork of the Coeur d'Alene River in Idaho's Panhandle. The City, which was founded in the late 1920s, is situated in an enclosed bowl at the western end of the valley. The physical setting results in the frequent occurrence of stagnant weather conditions in the winter. These conditions, combined with emissions from various sources, can contribute to a buildup of particulate pollutants which sometimes exceeds the PM_{10} national and state health standard.

The DEQ has been measuring air quality in Pinehurst since 1974 when it installed a monitor which measures all sizes of particulate matter at the Pinehurst Elementary School. In 1985, in anticipation of a new particulate standard, expressed in terms of PM_{10}, a monitor which measures these small particulates was placed at the school. In the years following, exceedances of the PM_{10} standard were experienced, and sampling was accelerated from every sixth day to every other day for the winter season starting in October 1988.

At the same time the DEQ initiated an Air Quality Advisory telephone service. This recorded message, which is updated on weekdays and as needed on weekends, reports on the current air quality and short term outlook as well as the potential health effects of various pollution levels. Advice on whether or not to burn wood is also included.

An inventory of sources of small particles, known as an emission inventory, was developed for the Pinehurst area, and it shows that the primary cause of the high PM_{10} levels is residential wood burning at 60%, with dust from roads the second largest category at 37% of the total. There are no industrial sources in the immediate area. Evaluation of the level of PM_{10} emissions from various source categories and analysis of actual air quality samples confirm woodstoves and road dust as the major sources.

Projections of PM_{10} levels were developed for 1994 and 2000, using mathematical models. The results indicate that without further actions the Pinehurst area will continue to experience exceedances of the PM_{10} air quality standard. Particulate emissions will need to be reduced by 19% to achieve air quality standards by the December 31, 1994 deadline. The DEQ has reviewed numerous

strategies to improve air quality with local officials. The ones that have been initially selected focus on a comprehensive public awareness program combined with woodstove replacements, weatherization, and voluntary wood burning reductions. Continued implementation of these programs should ensure maintenance of the standard through the year 2000.

The first chapter provides background on the plan, information on health effects, a description of the area, and a section on community involvement. Chapter II focuses on air quality status, including monitoring and meteorological data. Chapter III is an analysis of the problem and includes the emission inventory and results of the modeling efforts. Chapter IV evaluates alternative control strategies and describes how they will be used to meet attainment. It also details an implementation schedule and describes a contingency plan.

I. INTRODUCTION

A. SIP Overview

The United States Environmental Protection Agency (EPA) adopted a new National Ambient Air Quality standard for particulate matter on July 1, 1987. The standard is expressed in terms of PM_{10}, which is particulate matter less than 10 micrometers in aerodynamic diameter or about one-tenth of the diameter of a human hair. The 24 hour ambient air quality PM_{10} standard is 150 ug/m^3 and the annual standard is 50 ug/m^3 expressed as an annual arithmetic mean. The State of Idaho has adopted both of these standards.

Particulate matter measuring less than or equal to 10 micrometers (PM_{10}) is considered a risk to human health due to the body's inability to effectively filter out particles of this size. These small particles enter through the nose and mouth and can penetrate the deeper regions of the lung. When PM_{10} particles contain cancer causing or toxic materials, such as are found in wood smoke and road dust, the health effects can be acute and long term.

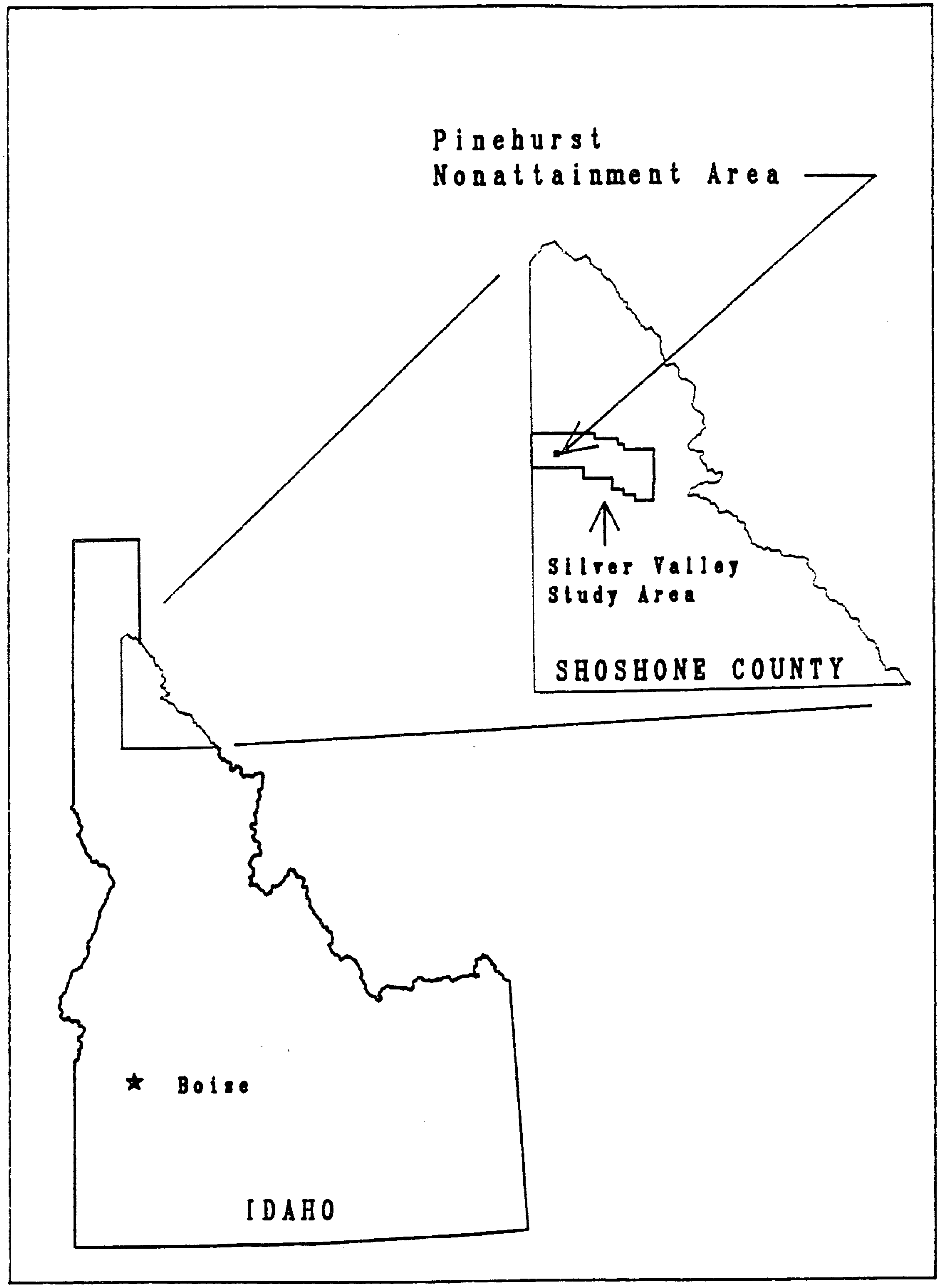
Even periodic exposure to high levels of PM_{10} can lead to increased incidence of cough and symptoms of upper respiratory problems. While this same exposure is usually tolerable for those with healthy respiratory systems, it can lead to irreversible or fatal damage in people already suffering from cardiopulmonary disease, usually children, the elderly and cigarette smokers.

Woodstove emissions are of particular concern because they account for the majority of small particles (less than one micrometer) found in the nonattainment area. These emissions can become an even more serious problem during periods of stagnant air. In the Northwest, accumulation of pollutants is common in valley settings where steep walls can restrict the flow of air. Mountain valleys often experience stagnant or light wind situations during the winter, when wood burning is an important source of heat. The combination of these conditions can result in exceedance of the PM_{10} health standard.

On August 7, 1987, Pinehurst, in Shoshone County (Figure I-1), was designated as a PM_{10} nonattainment area by the EPA. As a consequence of this designation, the State of Idaho was required to submit a State Implementation Plan (SIP) no later than November 15, 1991. A draft plan was sent to EPA on October 15, 1991. The plan document must provide for attainment of the standard as quickly as possible but in any case no later than December 31, 1994. The plan must also show that the standard will be maintained once it has been met.

The plan being submitted focuses on the Pinehurst area since it is the only Silver Valley location which has recorded an exceedance of the standard and as such, is the designated nonattainment area.

Figure I - 1



Location of Proposed Pinehurst Nonattainment Area

However, the Division of Environmental Quality (DEQ) believes that a valleywide approach to solving the PM_{10} problem is appropriate since air quality impacts in a setting such as that of the Silver Valley may be experienced in more than one location. Thus the DEQ has developed emission inventories and preventative air quality improvement strategies for all of the Silver Valley.

B. Study Area Description

1. Physical and Historical

The Silver Valley (Figure I-2) is about 22 miles long and varies from one-tenth of a mile to slightly more than three-fourths of a mile wide. It is surrounded by rounded mountains, with two peaks reaching over 6,000 feet. Elevation in the western end of the valley is 2,200 feet and rises to 3,300 feet at the eastern end. The South Fork of the Coeur d'Alene River traverses the valley. Most of the surrounding land is in the Coeur d'Alene and St. Joe National Forests.

Pinehurst, situated in a bowl at the western end of the valley, lies along the Pine Creek drainage at an elevation of 2,250 feet. The climate is strongly influenced by Pacific storms, which are moist and relatively mild. Annual precipitation is approximately 25 inches, with the majority of this falling during the winter season. Temperatures range from 70° in July to 28° in January, with an average temperature of 47°. However, occasional masses of arctic air can bring bitter cold weather during the winter months.

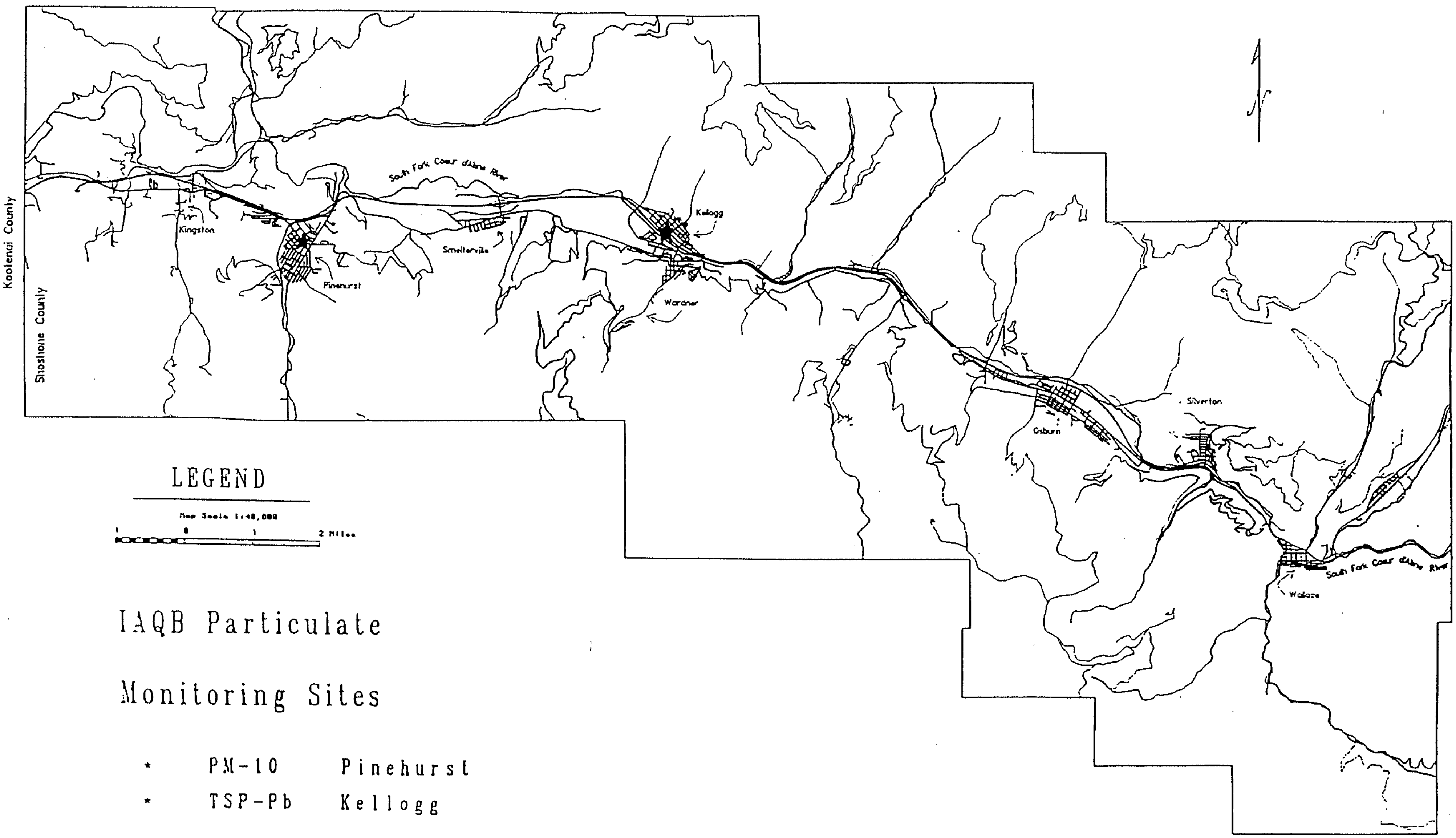
Coeur d'Alene Indians were the first known inhabitants of the Silver Valley, crossing through on their way to hunt bison in Montana. In 1842, the Cataldo Mission was founded by Jesuit priests at the western edge of the valley. More settlers came to the area when Lt. John Mullan had a military road built from Fort Walla Walla, Washington to Fort Benton, Montana. The valley's population began to increase rapidly after Andrew J. Prichard discovered gold in 1881.

Recent valley history has been based primarily on the mining industry. The valley is one of the world's richest silver sites, although fluctuations in metal prices and the cost to extract ore have caused a "boom-and-bust" cycle in the local economy. The last "boom" occurred in the valley in the late 1970s, when the price of silver reached its historic high. A "bust" occurred in 1981, when most of the mines closed and left 2,000 people out of work. Mining activity picked up again in the mid 1980s, but it has dropped off dramatically since 1990.

Unemployment is approaching 30%, and income levels are dropping sharply. The DEQ's March 1991 residential heating survey indicates that approximately 50% of the valley's residents have incomes less than $20,000 per year. The assessed valuation of property in

Figure I - 2

Silver Valley Study Area



Shoshone County has decreased from its 1981 high of 1.3 billion dollars to $340 million dollars in 1991.

Pinehurst has been somewhat insulated from the effects of the fluctuating fortunes of the mining industry because of a diversified employment base. The community was founded in the late 1920s. Called Arkansas Flat, it was named after the settlers who came from Arkansas to work in the sawmills and mines that were found up Pine Creek. It has continued to function as a residential and retail area for residents in the western part of the County, and in 1970 it was incorporated with a population of 1,926. That number increased to 2,188 in 1980, and, reflecting valleywide patterns, dropped in 1990 to 1,722.

2. Legal

The Pinehurst PM_{10} nonattainment area is that area shown on Figure I-3 and included within the following section number designations:

south half of southeast quarter of Section 31 of Range 2 east, Township 49 north

south quarter of Section 32 of Range 2 east, Township 49 north

Section 5 of Range 2 east, Township 48 north

east half of Section 6 of Range 2 east, Township 48 north

west quarter of Section 8 of Range 2 east, Township 48 north

C. Community Involvement

1. Intergovernmental Consultation

The DEQ recognizes the importance of consulting with "local political subdivisions" in order to ensure their participation in the development and implementation of PM_{10} control strategies. While a formal process has not been established, a number of consultations have taken place during the SIP planning effort.

The DEQ has made several presentations to the Pinehurst City Council on aspects of SIP development. These include population projections, data trends and control strategies. Shoshone County School District 391 has been involved in the SIP process because both the meteorological station and air quality monitors are located at the Pinehurst Elementary School. DEQ staff has met with the School Board several times and will be working directly with the elementary school on several projects.

The DEQ made presentations on the Division's programs to the Board of the Panhandle Area Council, the regional planning and economic development agency for North Idaho, which is made up of local elected officials. DEQ staff met with the Shoshone County Commissioners on several occasions to explain why an air quality plan was being developed and the types of control measures that were being contemplated.

The County Commissioners were asked to consider setting up a Clean Air Advisory Committee, but they did not feel it was necessary. Therefore the DEQ asked the Pinehurst City Council to establish a citizen advisory committee. The City Council felt that it would be appropriate for them to act in that capacity, and they requested quarterly updates on air quality status, with additional communication as needed.

2. Public Involvement

The DEQ staff has worked hard to make contacts with agencies and individuals whose operations impact the Pinehurst area. Organizations contacted include the United States Forest Service, North Idaho Community Action Agency, Silver Valley Economic Development Corporation, Washington Water Power, Idaho Citizens Network, Idaho Chapter of the American Lung Association, Idaho-Washington Resource Conservation and Development District, Farmers' Home Administration and others.

A public information meeting on the plan was held on December 17, 1991 with the required public hearing on the final draft of the plan on January 22, 1992. The DEQ staff is planning some community meetings later in 1992 to give Pinehurst area residents an opportunity to learn more about proposed wood burning programs and ways in which emissions can be reduced. The meetings will be co-sponsored by the Idaho Chapter of the American Lung Association.

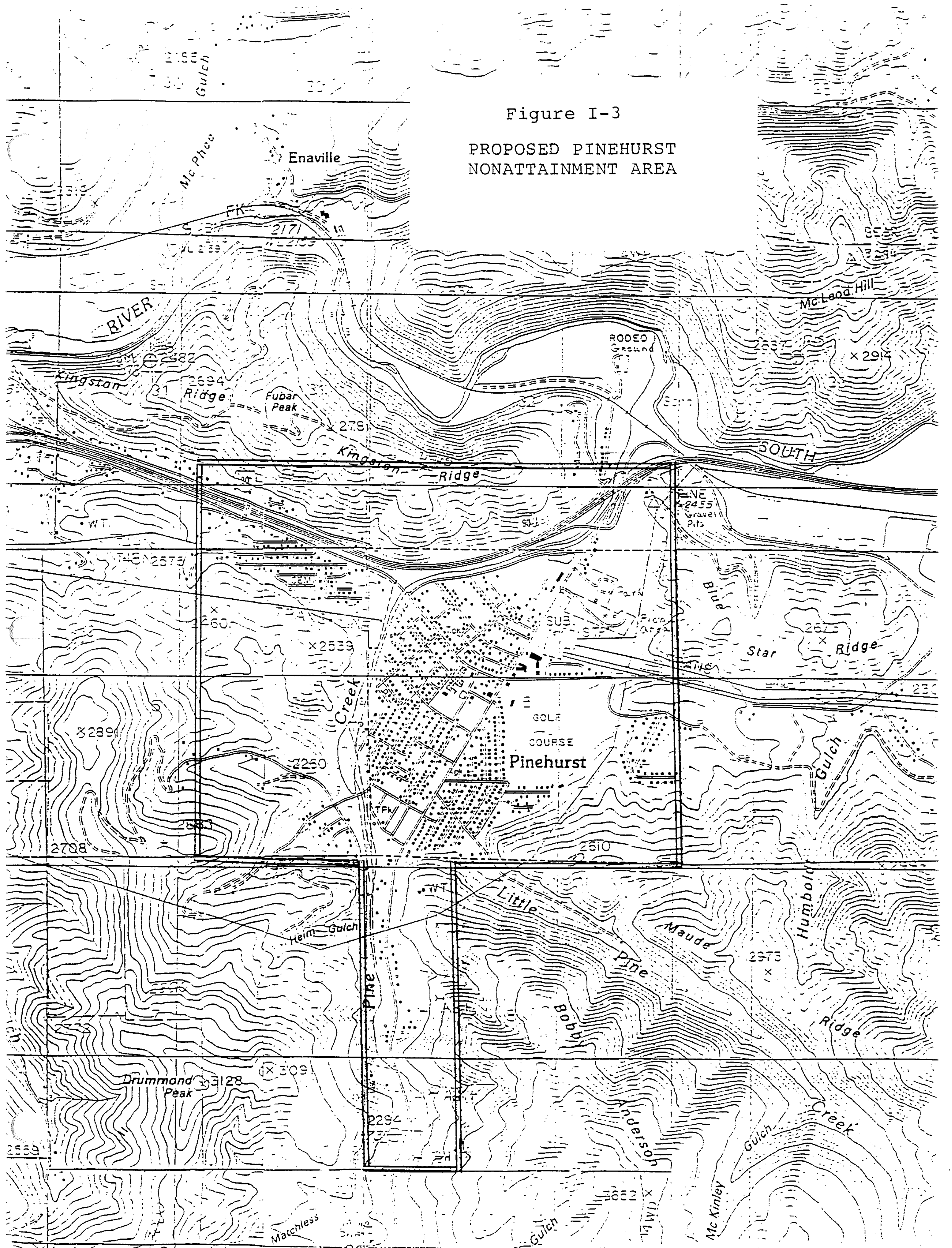


Figure I-3

PROPOSED PINEHURST NONATTAINMENT AREA

II. AIR QUALITY

A. Ambient PM_{10} Monitoring Network

The Division of Environmental Quality (DEQ) has monitored particulates in the Silver Valley since 1970 by various methods. Monitoring for total suspended particulates (TSP) was started in 1970 with a high-volume sampler at one site in Kellogg. In 1974, there were nine of these sites in the valley. Table II-1 lists the sites and the years that reference method monitoring started and ended in the Silver Valley. By the fall of 1986, the number of monitoring sites was reduced to three; two in Kellogg and one at the Pinehurst Elementary School.

Table II - 1

Silver Valley Particulate Monitoring History

	Site	Year Established	Year Discontinued
TSP			
	Kellogg City Hall	1970	1980
	Smelterville	1971	1987
	Kellogg Medical Cntr.	1971	
	Mullan	1974	1976
	Pinehurst School	1974	1985*
	Kellogg Silverking	1974	1987*
	Osburn Radio Station	1974	1985*
	Wallace Post Office	1974	1980
	Cataldo	1974	1980
	Kingston	1978	1980
PM_{10}			
	Pinehurst School	1985*	

*indicates monitor ran part of that year

In 1985 a PM_{10} monitor was installed in Pinehurst and use of the TSP equipment was discontinued. In October 1987 another PM_{10} monitor was located at the Pinehurst site. This collocated monitor was installed as part of the DEQ Quality Assurance program. It is used as a precision measurement for the monitoring program in the area.

Additional data support is provided by a nephelometer, which measures the light scattering associated with fine particulate concentrations. It was installed at Pinehurst in October 1987. The nephelometer provides "real time" information on the ambient particulate concentrations and works especially well on fine particulates such as wood smoke.

Figure II-1 provides a map of the current monitoring sites in Pinehurst and the Silver Valley. An additional PM_{10} monitor has been installed in Osburn, approximately 11 miles east of Pinehurst. Data will be available for the 1991-92 winter season.

A special saturation study was conducted in the Silver Valley from January to March of 1989 using small portable monitors temporarily located at fifteen sites. The purpose of the study was to measure the representativeness of the Pinehurst monitoring site as a maximum impact location and to assess the extent of the PM_{10} problem. However, because the portable monitors are not federally approved as an alternate or equivalent method for PM_{10} sampling, the concentrations cannot be used to determine air quality violations. Instead, they are used mainly to establish trends.

The Saturation Study indicated that values higher than the 24 hour standard occurred in Pinehurst and Osburn. All other monitoring locations with acceptable data show PM_{10} levels well under 150 ug/m^3. As a result of this study, PM_{10} monitoring was initiated in Osburn in the fall of 1991. For a detailed discussion of the Saturation Study, see Appendix D.

1. Pinehurst

The Pinehurst Elementary School was originally established as a TSP site in 1974. The location was chosen because it is in the center of the community and it is representative of the surrounding neighborhood. This site is an official State and Local Air Monitoring Site (SLAMS) for PM_{10}, and as such, monitoring is conducted in accordance with 40 CFR 58 Subpart C.

PM_{10} monitoring was initiated at this location in October 1985 with the first full calendar year of data in 1986. PM_{10} exceedances (>150 ug/m^3) were measured numerous times during the winters of 1985-86, 1986-87, and 1987-88. As a result, sampling accelerated from once every six days to a one in three schedule during the winter of 1987-88. The sampling frequency returned to one in six day schedule during the summer months.

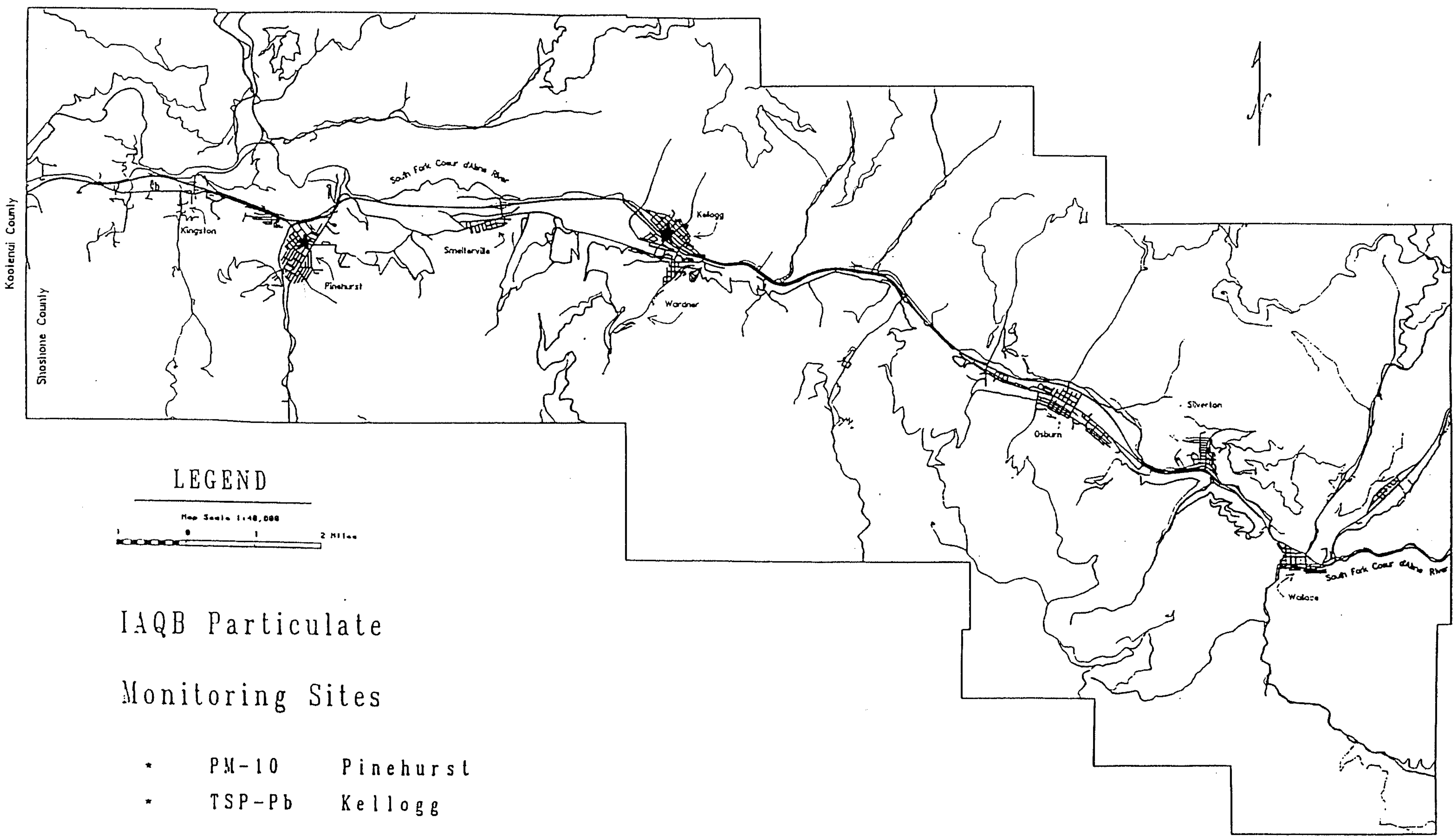
Starting in October 1988, the sampling frequency was increased to every other day in order to improve the PM_{10} data during the winter months. This intensive sampling frequency terminates at the end of March and returns to every sixth day during the summer months. This intense monitoring routine during the first and fourth quarters continues to be followed.

2. Background Concentration

As defined by the SIP Guideline Document, background is the portion of the ambient particulate concentration attributed to natural sources, nearby sources other than those inventoried, and unidentified sources. For the purposes of this SIP, the background

Figure II - 1

Silver Valley Study Area



concentration is the fraction of the total PM_{10} concentration that is not produced by emissions within Pinehurst.

The EPA's PM_{10} SIP Development Guideline states that "the preferred method for background determination is to use an upwind PM_{10} site in the vicinity of the study area under review, which reported data during the time period in question, but which is not influenced by the sources in question or by other sources which do not impact the study area." The other PM_{10} monitoring sites in the region - Sandpoint, Hope, Hayden, Post Falls and Coeur d'Alene - are impacted by sources similar to those that are found in Pinehurst and therefore they are unacceptable for the determination of an ambient background concentration. Therefore, alternate sources of representative background data were investigated.

The State of Montana operated a background PM_{10} site outside of Thompson Falls, Montana between October 1990 and March 1991. Thompson Falls, about 50 miles east of Pinehurst, is located in a mountainous and forested area very similar to the terrain the Silver Valley. The highest 24 hour background concentration recorded during the winter season (November - February) was 19 ug/m^3. This value is the same as the Pinehurst mean PM_{10} value for May-July of 1988, 1989 and 1990. That three month period is the time of year when area source influences are considered to be at a minimum in Pinehurst, and the monitored concentrations can be considered representative of a regional PM_{10} background level.

Emissions from other Silver Valley communities have been modeled to determine their impact on Pinehurst. A model representing valley stagnation conditions, called WYNDvalley, was run using the 1988 Silver Valley Emission Inventory minus the Pinehurst emissions. For the ten day stagnation episode in January 1988, the maximum impact of sources outside Pinehurst on any of WYNDvalley's eight Pinehurst receptors was 0.5 ug/m^3. Rounding up to the nearest whole ug/m^3, 1 ug/m^3 of impact from the Silver Valley was added to the regional background of 19 ug/m^3 for a total background concentration of 20 ug/m^3. The DEQ has used 20 ug/m^3 as the worst case 24 hour background value in the proportional rollback calculations for Pinehurst.

B. PM_{10} Air Quality Data

Appendix K, 40 CFR 50, Interpretation of the National Ambient Air Quality Standards for Particulate Matter, requires the use of the three most recent calendar years of data in the demonstration of attainment or nonattainment status. Each year must have at least 75% data recovery in each quarter if that year is to be considered in the analysis process. Historically, the ambient data collected during the summer months in Pinehurst have shown the lowest PM_{10} concentrations throughout the year. The highest PM_{10} levels generally occur in the winter months, November through February, although high concentrations are sometimes measured during the fall. These fall exceedances have been attributed to sources such as wind blown dust and forest fires.

Out of five full years of PM_{10} monitoring in Pinehurst, only four, 1987-90, meet the 75% completeness criteria. Since the meteorological data for 1987 are incomplete, 1988, 1989, and 1990 were chosen for calculation of the 24 hour and annual expected PM_{10} exceedances. Data recovery for PM_{10} and meteorological data during these three years meets recovery criteria for sufficient analysis of the episode conditions. The DEQ selected the design concentration from these three years of data for use in the attainment demonstration.

1. Summary of PM_{10} Data

According to 40 CFR 50, Appendix K, "the 24 hour primary and secondary standards are attained when the expected number of exceedances per year at each site is less than or equal to one." The expected number of exceedances is calculated from the past three years of data using the estimated number of exceedances per year. The estimated number of exceedances is computed from the number of exceedances recorded in each quarter, the number of days in each quarter, and the number of PM_{10} samples collected in each quarter. Table II-2 summarizes the 24-hour PM_{10} data collected at the Pinehurst site from 1986 through 1990.

TABLE II - 2

Pinehurst 24 hr. PM_{10} Data Summary

YEAR	# OF SAMPLES	# SAMPLES >150 UG/M³	MAX. UG/M³	CONC. (DATE)	2ND MAX UG/M³	(DATE)	THREE YEAR EXPECTED # OF EXCEEDANCES	EXCEPTIONAL EVENTS INCLUDED
1986	43	4	372	(1/14)	205	(1/2)	N/A	
1987	59	6	189	(12/29)	179	(1/21)	N/A	
1988	102	2	183	(1/28)	164	(2/24)	22.7	
1989	118	1	[a]306	(9/25)	131	(1/20)	14.7	16.8[b]
1990	120	0	142	(2/28)	101	(3/6)	2.2	4.2[b]

[a] Exceptional Event
[b] Three Year expected # of exceedances including exceptional events

The expected number of exceedances for 1988 through 1990 does not meet the criteria for attainment ($\leq$ 1 per year). Therefore, Pinehurst is classified as a nonattainment area for the 24 hour standard. To show attainment of the standard by 1994, Pinehurst would have to measure no new exceedances of the 24 hour standard,

>150 ug/m^3, for the next several years (with the current sampling schedule). This would bring the three year average down to less than 1 exceedance as required. However, an exceedance of 159 ug/m^3 was reported in January 1991, which will classify Pinehurst as a nonattainment area for 1991, as well.

The NAAQS 150 ug/m^3 24-hour PM_{10} standard is violated most frequently during the winter months of December through February. The exception has been two exceedances measured in the fall (September and October), one of which has been classified as an exceptional event due to a large dust storm in eastern Washington. Figure II-2 clearly shows the influence of the winter season on the PM_{10} concentrations.

Figures II-3 through II-5 display the three highest PM_{10} concentrations for each quarter for 1988 to 1990 in Pinehurst. Figure II-6 shows the mean quarterly PM_{10} concentration for all years with a full year of monitoring, and demonstrates the significance of the first and fourth quarters (winter season) on the PM_{10} problem. In addition, it does show a general downward trend in the first and fourth quarter arithmetic means over the past five years. A table showing all PM_{10} exceedances since 1986 is found in Appendix A.

2. Annual PM_{10} Trends

The first year that the annual arithmetic mean did not exceed the annual standard of 50 ug/m^3 was 1988. The annual standard was achieved for the first time in Pinehurst in 1990 when the expected annual arithmetic mean dropped to 41 ug/m^3. As stated in Appendix K, 40 CFR 50, "the annual primary and secondary standards are attained when the expected annual arithmetic PM_{10} concentration is less than or equal to the standard (50 ug/m^3)". Table II-3 summarizes the annual PM_{10} concentrations, listing both the annual arithmetic mean and the expected three year mean. The annual arithmetic mean has declined steadily over the past five years and this downward trend is illustrated in Figure II-7.

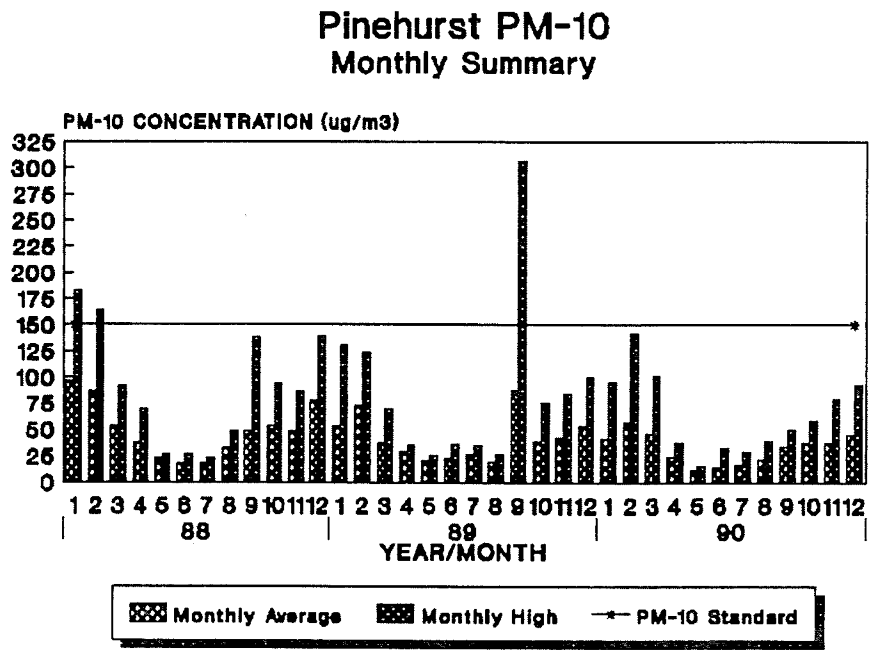
Table II - 3

Average Annual PM_{10} Concentrations

SITE	YEAR	ANNUAL AVERAGE	3-YEAR AVERAGE
Pinehurst	1986	*76.3	N/A
	1987	68.0	N/A
	1988	49.8	65
	1989	39.7	53
	1990	32.2	41

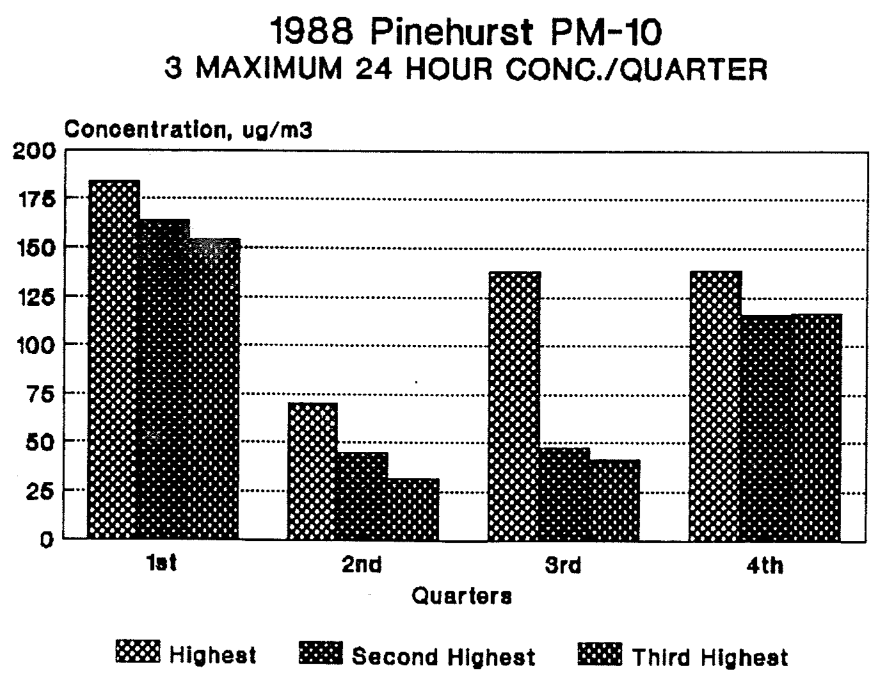
* 3rd Quarter data not included in average

Figure II - 2



Monthly Averages of 24 Hour PM-10

Figure II - 3



Exceptional Events not included

Figure II - 4

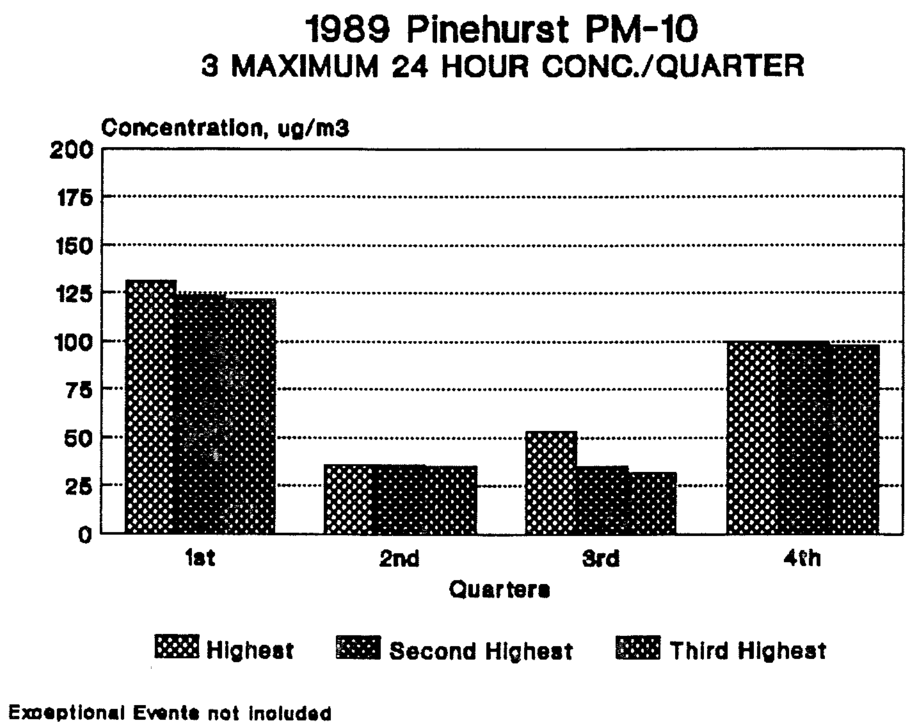


Figure II - 5

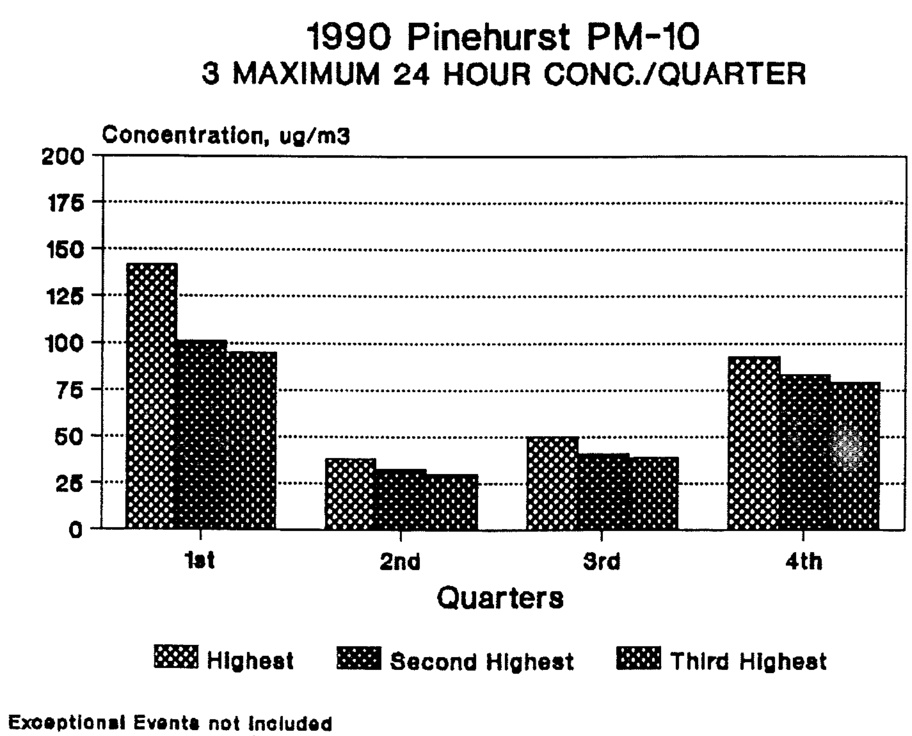


Figure II - 6

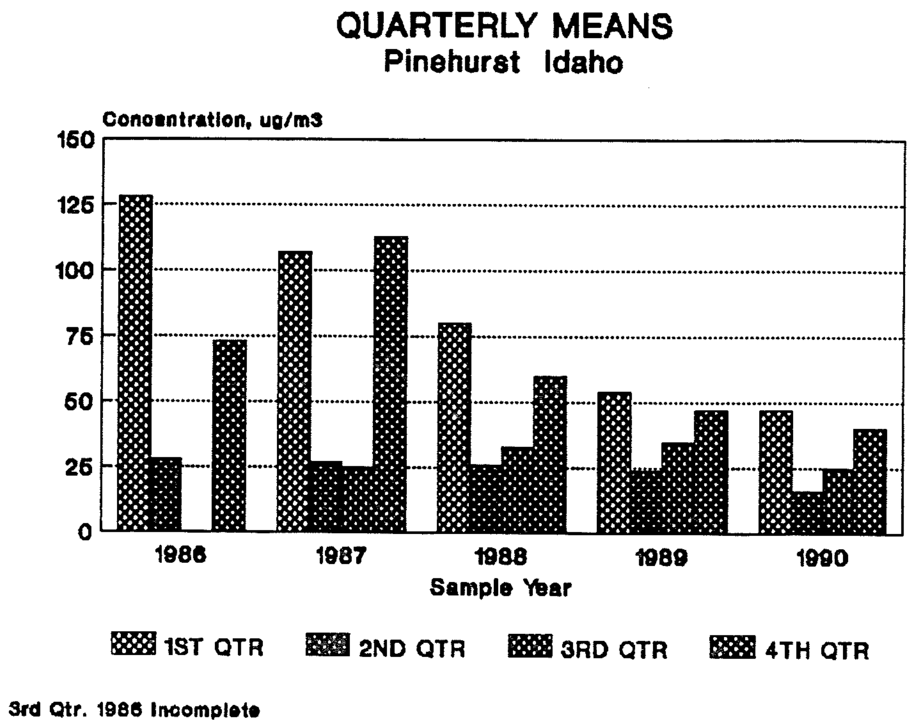
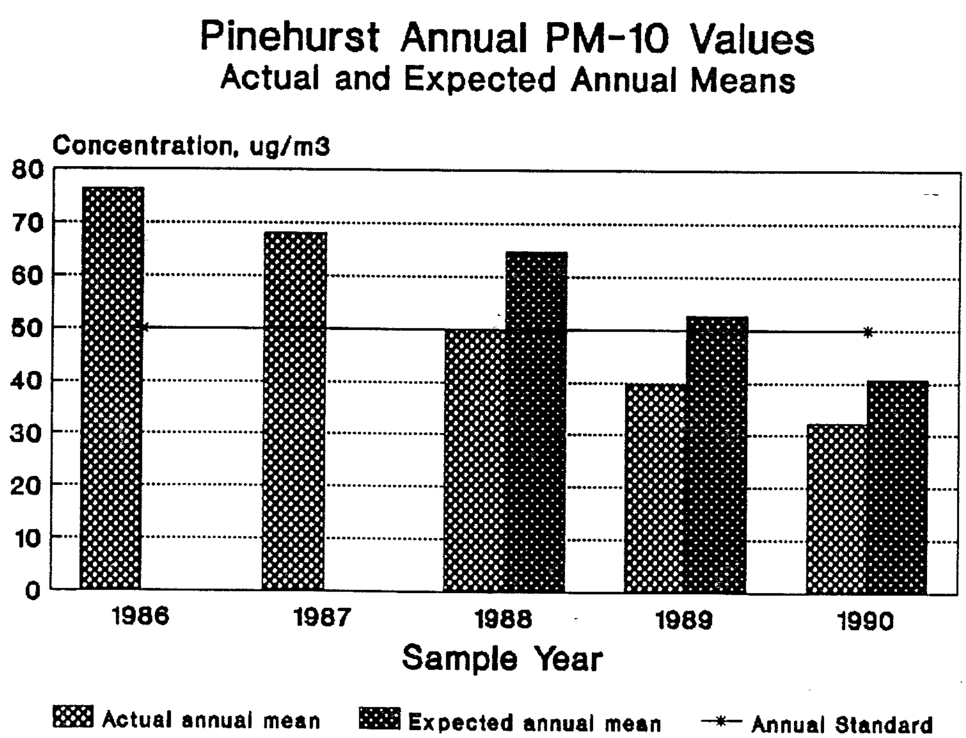


Figure II - 7



3. Exceptional Event Status

The only record of a non-winter violation of the 24 hour PM_{10} standard during the three year period under consideration occurred on September 25, 1989 when the Pinehurst monitor recorded a value of 306 ug/m³. PM_{10} concentrations from Coeur d'Alene in Kootenai County and Hope in Bonner County on the 25th and 26th were 441 ug/m³ and 444 ug/m³, respectively. Dust from a sudden large wind storm which developed in the Spokane, Washington area on the afternoon of September 25 was the most probable cause of these extremely high PM_{10} values. The dust originated in Washington and moved across Idaho's Panhandle area during the evening of September 25th and on September 26th.

The 306 ug/m³ value in Pinehurst has been labeled an exceptional event by the DEQ and EPA Region 10. Correspondence regarding the exceptional event designation is found in Appendix A. EPA's Guideline on the Identification and Use of Air Quality Data Affected by Exceptional Events, July 1986, defines an exceptional event as an event that is not expected to recur or is unrealistic to control through the SIP process. The high wind conditions that created this violation do occur occasionally in eastern Washington and northern Idaho. Empirical observations suggest these conditions may arise once or twice a year. These dust storms are regional events and can originate outside of Idaho, in fact, these events are part of the geologic history of the Palouse region. Building PM_{10} control strategies for such large-scale events is unrealistic.

The exceptional event designation serves as information to the data user on the cause of a particular value, but does not preclude it from use as a 24 hour standard violation or in the calculation of summary statistics. The 306 ug/m³ from Pinehurst is considered as an exceedance and has been included in the annual summary statistics and the expected exceedance calculations. However, the DEQ is not including it as part of the modeling effort or the control strategy development for Pinehurst. The DEQ's PM_{10} control strategy development will focus on the wintertime PM_{10} violations which are affected by stagnation conditions.

C. Meteorological Data

1. Summary

The Silver Valley is an east-west oriented mountain valley located in the Panhandle region of North Idaho at a latitude of approximately 47.5°N. The South Fork of the Coeur d'Alene River flows through the Silver Valley. Pinehurst is located in the Pine Creek drainage near its confluence with the South Fork of the Coeur d'Alene River. Pinehurst sits in a small, enclosed bowl (nearly 2 square miles in area) near the western end of the Silver Valley. Local terrain around Pinehurst limits wind impacts and effectively isolates the city from the Silver Valley through flow conditions especially during stagnation events.

In general, surface meteorological data in the Silver Valley region are limited. This is especially true for those parameters required in modeling, particularly wind speed and wind direction. No upper air data is available. To better understand the meteorological conditions during air stagnation episodes, the DEQ collected meteorological data in Pinehurst from December 18, 1987 through July 10, 1990. Several gaps in the data are noted. Considerable gaps occur from March 29, 1988 through June 29, 1988, from March 10, 1989 through March 27, 1989 and from June 12, 1990 through June 30, 1990. The two longest periods of data loss occurred as a result of lightning damage to the instrumentation.

The meteorological data were collected as hourly averages using a Climatronics Electronic Weather Station. The parameters measured were wind speed, wind direction, and temperature. The monitoring site was collocated with the DEQ's nephelometer on the Annex building at the Pinehurst Elementary School. PM_{10} data was collected on a breezeway above the School entrance roughly one block to the north. The school is located very near the center of the three square mile community. This site was chosen because it best met EPA siting criteria, it was further from the encircling valley walls than any other location, and it was not affected by local obstructions. The site was also representative of meteorological conditions encountered by the PM_{10} measurement instruments, since it was essentially collocated with the PM_{10} sampler.

The only regularly reporting National Weather Service monitoring station in the Silver Valley region is located about 25 miles east of the area of concern in Mullan. The data collection there is fully automated, possibly not meeting EPA Q/A requirements. The DEQ determined that due to the valley steepness, higher elevation, and dissimilar local influences, this data is not representative of the area of concern.

Only one other source of meteorological data was available which was appropriate for modeling. From October 27, 1988 to November 8, 1989, one year of meteorological data was collected on Smelterville Flats by Dames and Moore, contractors for the Superfund program. Meteorological parameters monitored were wind speed, wind direction, sigma theta, and temperature. Precipitation was also collected at two locations including the Smelterville site. The data are presented as 15 minute averages. Stability was calculated from the wind speed and wind direction. These data were considered representative of the broad flood plain area of Smelterville and Kellogg. The DEQ's observed exceedances occurred under stagnant weather conditions in Pinehurst where wind flow is limited. Therefore, the DEQ's meteorological data from Pinehurst was utilized for stagnation modeling.

No routine upper air meteorological measurements are collected by the National Weather Service in the Silver Valley. The nearest sounding stations are in Spokane, about 55 miles to the west over a small divide 10 miles west of the valley, and Missoula, nearly 100 miles to the east over a larger divide which separates Idaho and Montana.

2. Summary of Stagnation Events (1987-1990)

In Pinehurst, exceedances of the 24 hour PM_{10} standard occur during winter season stagnation periods. Cold, stable air is advected into the region by arctic outbreaks or cold Pacific storms. After the air mass enters the Silver Valley airshed, following the passage of a cold front, cold air becomes pooled in the narrow mountain valleys of the region. A shallow surface-based inversion is created, trapping any local emissions in a thin layer near the valley bottom and severely limiting vertical mixing. This cold air mass can further stabilize as high pressure aloft overtakes the region, deepening the inversion and associated stable layer. Cold surface temperatures are also responsible for an increase of emissions as more heating is required by the homes and businesses of the area. This combination of a greatly decreased mixing volume and an increase in emissions required for heating allow a quick buildup of pollutants, especially in the areas where terrain greatly restricts the flow. Persistent stagnant conditions can allow concentrations to rise above the PM_{10} based health standard of 150 ug/m^3. The short length of the days in wintertime at this latitude, the low sun angle, and the strong likelihood of snow cover, aggravate the situation by severely limiting daytime heating and by preventing atmospheric mixing from weakening or destroying an inversion once it is in place.

Monitoring of PM_{10} began in 1985 in the Silver Valley at the Pinehurst Elementary School. Frequent violations of the PM_{10} standards occurred in both 1986 and 1987. The number of recorded violations have decreased significantly during the period 1988 through 1990. During the period of concern addressed in this document, 1988 through 1990, two official exceedances of the PM_{10} standard were measured at Pinehurst in the Silver Valley. The 24 hour average concentrations measured were 183 ug/m^3 on January 28, 1988, and 164 ug/m^3 on February 24, 1988.

In addition to these official violations, a PM_{10} exceedance was measured on a temporary sampler that was part of the Silver Valley Saturation Study. On February 10, 1989, the Saturation Study monitor, located next to the permanent, official monitor on Pinehurst Elementary School, measured an ambient concentration of 163 ug/m^3. However, the Saturation Study monitors are portable, easy to set-up samplers which are used for screening purposes and are not approved by the EPA for routine, long-term PM_{10} sampling. The permanent, official sampler at Pinehurst School was not scheduled to operate on February 10. Therefore, the "exceedance" measured on February 10 can not be considered a definitive violation of the 24 hour PM_{10} standard.

Meteorological conditions leading to the above mentioned exceedances are summarized below.

January 28, 1988

A 24 hour PM_{10} exceedance of 183 ug/m^3 was measured at Pinehurst on January 28, 1988. Nephelometer implied values displayed elevated (>150 ug/m^3) PM_{10} concentrations for the period beginning on January 23rd and continuing through the 28th indicating that January 28th was the last day of a six day long stagnation event.

Strong meridional flow existed at the 500 millibar (mb) level with strong ridging occurring along the entire west coast. A dome of strong high pressure at the surface was centered along a northwest to southeast oriented axis that ran from Southern British Columbia through Idaho and into the eastern portion of the Great Basin. Surface pressure at Spokane was greater than 1030 mb during the first four days of the episode but began dropping on January 27 as the surface high pressure system began to drift slowly eastward.

Temperatures at Pinehurst during the period were cold, dipping to a low of 7°F on January 24th. Temperatures during the period ranged from the upper thirties and low forties to the teens and low twenties. The high and low temperature on January 28th was 40°F and 33°F respectively. A moderation in temperatures was beginning late in the episode as the high pressure began to drift eastward and zonal flow aloft began to influence the area.

Winds during the entire period were light, and highly variable at Pinehurst. Winds less than 1 mph were the general rule and the highest hourly average wind speed was only 3 mph. The 24 hour mean wind direction had a southerly component each day.

By the 28th, the day of the measured exceedance and the last day of the stagnation episode, the high pressure was beginning to weaken and move eastward. By the 29th the Silver Valley was beginning to feel the influence of a Pacific trough. PM_{10} concentrations began to fall as mixing increased. Precipitation fell on this day in the Silver Valley with 0.02 inches reported at Kellogg.

February 24, 1988

A 24 hour PM_{10} exceedance of 164 ug/m^3 was measured at Pinehurst on February 24, 1988. Nephelometer implied values displayed elevated (>110 ug/m^3) PM_{10} concentrations for the extended period beginning on February 22nd and continuing through the end of the month, indicating a multiple day stagnation event.

After the passage of a cold front early on the 22nd of February, high pressure at both the surface and aloft built over the Silver Valley and persisted for over a week. Surface pressure at Spokane rose to above 1020 mb on the 24th and remained about that level through the end of the month.

The surface pressure gradient was generally flat over the Silver Valley during this period. This was reflected in the measured winds, as they were light and variable throughout the period. Pinehurst winds averaged under 2 mph for each day from the 22nd through the end of the month. The highest 1 hour average wind occurred on the 22nd at 5.2 mph. On the day of the exceedance the peak 1 hour average value was 3.9 mph and the wind speed averaged 1.1 mph for the day. Wind direction was variable but showed a southerly component for the majority of hours during the entire episode.

Temperatures were cool at the beginning of the period with Pinehurst highs in the mid-forties and lows in the upper teens to low twenties. There was a slow warming trend during the episode and afternoon temperatures reached the low sixties by the end of the month. These moderating temperatures allowed for afternoon mixing and a gradual reduction of concentrations after the exceedance measured on the 24th. On the 24th the high temperature was 53.2°F after a morning low of 21°F. No precipitation was noted during the period at Silver Valley precipitation sites.

February 10, 1989

Nephelometer implied PM_{10} concentrations showed elevated values beginning in the evening of February 4th and continuing through the morning of the 11th. The DEQ's official sampler was running every second day during this period. Values of 124 ug/m^3, 122 ug/m^3, and 119 ug/m^3 occurred on February 7, 9, and 11, respectively. Elevated PM_{10} measurements from the Saturation Study were noted daily beginning on February 7, with a maximum value of 163 ug/m^3 occurring on February 10.

An arctic outbreak of bitter cold air and high winds invaded the region beginning February 1st. As the winds died down, this cold air became trapped in the valley and held in pollutants for just over a week beginning on the 4th and continuing through the 11th. Strong high pressure settled in at the surface during the period with Spokane's surface pressure peaking at over 1040 mb. At 500 mb a strong high pressure system was located over the Gulf of Alaska with a deep low over the Great Basin. This low would retrograde to the west during the period and cut off from the main flow.

A temperature in Pinehurst of -10°F was recorded on both the 2nd and 3rd of the month. Temperatures moderated slightly but remained in the single digits to teens during the early morning hours and remained near or below freezing for afternoon highs.

Winds were again light and variable during the stagnation period. Wind speed averaged less 2 mph during each day of stagnation. Precipitation ended on the 4th of February and none was noted at the Silver Valley precipitation sites through the duration of the stagnation event.

3. Heating Degree-Day Determination

The term heating degree-day is defined as a day on which the mean daily temperature is 1°F below 65°F. As an example, a mean temperature $((T_{max}-T_{min})/2)$ of 60°F for a given day would yield 5 heating degree-days. A determination of heating degree-days is required for the calculation of emissions produced during home heating. An appropriate designation of heating degree-days is therefore primary to emission inventory estimates in the Pinehurst airshed.

The coldest day in a given year would yield the greatest number of heating degree-days and therefore the highest emission rates. In general, the coldest days do not occur during stagnation events in Pinehurst and are not appropriate for use in emission estimates. The DEQ defined the appropriate number of heating degree-days to be used for emission inventory purposes as the average number of heating degree-days during a significant stagnation event.

The number of heating degree-days used to determine Pinehurst wood burning emissions were calculated from the average number of degree-days during a significant eleven day stagnation event. This stagnation episode led to the January 28, 1988 exceedance on which the design day value is based. The stagnation event began on January 20th and continued through January 30th. Temperatures from the DEQ Pinehurst meteorological site were used. The average heating degree-days for this episode were 35.7.

III. ANALYSIS OF PROBLEM

A. Emission Inventory

1. Emission Inventory Definition

An emission inventory is a technique used to measure the relative strength of sources contributing pollutants to an airshed. By definition, an emission inventory is a compilation of the sources in a designated area that emit pollutants into the atmosphere. Moreover, the emission inventory is one of several techniques used to decide where to apply pollution controls in order to meet and maintain National Ambient Air Quality Standards (NAAQS). The emission inventory is also the data base used to calculate ambient impacts of sources as various control measures are evaluated.

The emission inventory is generally broken down into the following source categories:

> **Point source emissions** are those emissions confined to a specific process and fixed location, most commonly ducted through a stack. These emissions are typically associated with industrial sources and are tracked by each facility.
>
> **Area source emissions** are those emissions produced from fixed locations that are too small and/or too numerous to be surveyed and characterized individually. These emissions are generally nonindustrial and commonly associated with residential and agricultural activities.
>
> **Mobile source emissions** are those emissions from motor vehicles (not including fugitive dust), aircraft, and locomotive sources.

The point source emission inventory is presented in greater detail in Appendix B. This report has combined the area and mobile sources into one emission inventory document which is presented in Appendix C. Both appendices document in detail the methodology and calculations used to develop the emissions from each source or source category.

2. Approach

The pollutant of concern in Pinehurst and the Silver Valley is particulates, and specifically, PM_{10}. However, the emission inventories classify the particulates into two size categories, total suspended particulates (TSP) and PM_{10}, to accommodate the change in NAAQS from TSP to PM_{10} measurements.

The emission inventory not only provides information on the spatial distribution of emissions but also tracks the amount of pollutants released as function of time, ranging from hourly to annual emission estimates. The units of time used in the inventories are annual, daily and wintertime daily. The last time frame is the one of greatest concern because it correlates with the season when exceedances of the NAAQS are most frequently observed in the Pinehurst area.

TSP and PM_{10} emission rates are usually expressed in terms of tons of particulate per year (TPY) or in pounds of particulate per day (lbs/day). The emission rates are calculated from emission factors and source activity records. Emission factors are typically obtained from the Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, AP-42, Fourth Edition, September 1985, and reported as weight of pollutant emitted per weight of material processed (e.g., grams of PM_{10} per kilogram of wood burned).

Source activity information is obtained by a wide variety of methods such as public surveys, process log books, census data, traffic counts, and questionnaires. For example, a telephone survey was conducted in the Silver Valley to update the residential wood burning portion of the emission inventory. And a detailed questionnaire was mailed to all the major industries in the valley to update the point source emission inventory.

3. Study Area

An emission inventory was completed for the Silver Valley in July 1991 by the DEQ. This inventory documented point, area, and mobile sources from Enaville on the west to Mullan on the east (see Figure I-2). The point source inventory covered more of the valley then the area/mobile source inventory, which was limited to the gridded area developed for forecasting and modeling purposes.

The emission inventory results for both locations are summarized in the following sections, and include a discussion of the annual emissions and the maximum daily wintertime emissions. The Pinehurst emission inventory is a subset of the Silver Valley emission inventory. All emission sources for the Pinehurst area are located within the boundaries of the Silver Valley study area.

4. Base Year Annual Emissions

The base year (1988) annual emission rates were computed for Silver Valley and Pinehurst sources for both PM_{10} and TSP (see Table III-1). On an annual basis, Pinehurst sources contribute to approximately 11 to 12% of the total Silver Valley PM_{10} and TSP emissions.

There are relatively few categories of PM_{10} emissions in the Pinehurst airshed which is dominated by area source emissions. Residential wood burning and fugitive road dust contribute 80% of the total annual PM_{10} emissions in Pinehurst. For Pinehurst, residential wood burning and fugitive road dust are almost equal sources of PM_{10} emissions, with residential wood burning emissions just slightly higher than fugitive road dust, 17.9 TPY versus 17.0 TPY, respectively. Building construction is estimated to be the third largest source of annual PM_{10} emissions in Pinehurst.

Table III - 1

Summary of 1988 Annual Emission Rates
for Pinehurst and the Silver Valley

Pinehurst Emission Inventory

	Emission Rate, tons/year			
Source Type*	PM_{10}	%	TSP	%
Residential Wood Burning	17.9	40.6	18.8	21.2
Fugitive Road Dust	17.0	38.5	46.3	52.2
Building Construction	7.86	17.8	21.8	24.6
Vehicle Emissions	0.81	1.8	0.93	1.0
Residential Heating	0.41	0.9	0.66	0.7
Open Burning	0.15	0.3	0.22	0.2
TOTAL	44.1 tons/year		88.71 tons/year	

Silver Valley Emission Inventory

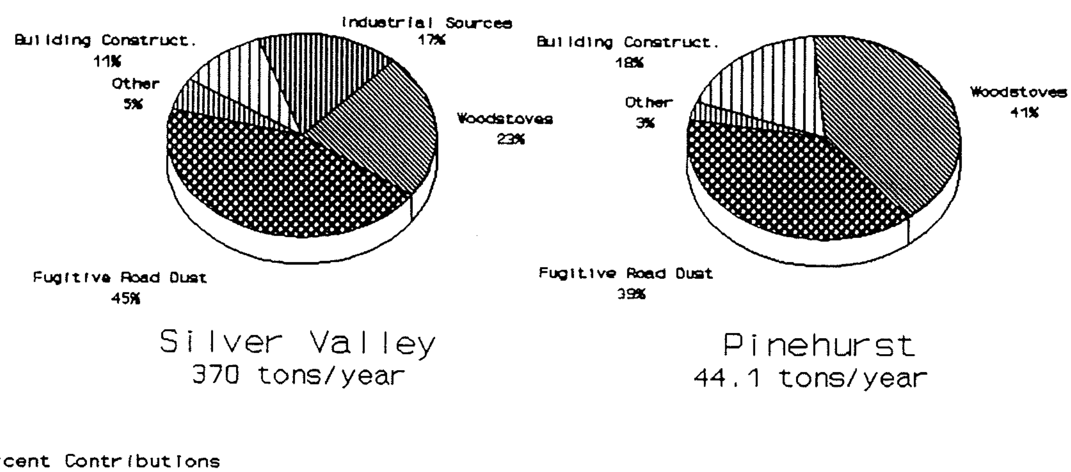
	Emission Rate, tons/year			
Source Type*	PM_{10}	%	TSP	%
Fugitive Road Dust	165.0	44.6	444.0	56.7
Residential Wood Burning	85.2	23.0	89.7	11.5
Industrial Sources	62.9	17.0	120.0	15.3
Building Construction	38.5	10.4	107.0	13.7
Vehicle Emissions	11.1	3.0	12.8	1.6
Residential Heating	1.99	0.5	3.21	0.4
Other	5.09	2.3	6.55	0.8
TOTAL	369.8 tons/year		783.3 tons/year	

*Ordered by PM_{10} emission rate

The Silver Valley has a greater number of PM_{10} sources and the relative source contribution is different from the Pinehurst airshed (see Figure III-1). In the Silver Valley, fugitive road dust is the dominant annual PM_{10} source at 44.6% with residential wood burning as the second largest source at 23.0%. Point sources of PM_{10}, which are not found in the Pinehurst area, are the third largest source category, 17.0%, for the Silver Valley.

Figure III - 1

1988 Annual PM-10 Emission Inventory



5. Maximum Daily Wintertime Emissions

The DEQ identified the winter season as the critical time of year for determining emission rates from all the source types because this is the time of year when a majority of the exceedances of the 24 hour standard were recorded. Therefore, emission rates were calculated for all the source types based on a worst case winter 24 hour day (see Table III-2). A worst case scenario for Pinehurst and the Silver Valley is based on the meteorological conditions recorded during a stagnation period. See section II.C.3 for a detailed discussion of the heating degree-day values used for the emission inventory.

For the 1988 base year, the total maximum daily wintertime PM_{10} emissions were calculated to be 3,843 lbs/day for the Silver

Valley. As a subset of that total, 493 lbs/day of PM_{10} emissions were calculated for the Pinehurst area, which is approximately 13% of the Silver Valley PM_{10} emissions. In comparison, the Pinehurst area contains 20% of the households and roughly 7% of the vehicle miles traveled (VMT) in the Silver Valley.

Table III - 2

Summary of 1988 Maximum Daily Wintertime Emission Rates for Pinehurst and the Silver Valley

Pinehurst Emission Inventory

Source Type*	PM_{10}	%	TSP	%
	Emission Rate, lbs/day			
Residential Wood Burning	292.3	59.3	307.6	34.8
Fugitive Road Dust	187.5	38.1	556.0	62.9
Residential Heating	6.2	1.3	10.5	1.2
Vehicle Emissions	4.5	0.9	5.1	0.6
Other	2.2	0.4	4.4	0.5
TOTAL	492.7 lbs/day		883.6 lbs/day	

Silver Valley Emission Inventory

Source Type*	PM_{10}	%	TSP	%
	Emission Rate, lbs/day			
Fugitive Road Dust	1814.0	47.2	5373.0	66.6
Residential Wood Burning	1448.0	37.7	1524.0	18.9
Industrial Sources	453.0	11.8	995.0	12.3
Vehicle Emissions	60.7	1.6	69.9	0.9
Residential Heating	30.5	0.8	51.0	0.6
Other	36.9	0.9	55.4	0.7
TOTAL	3,843 lbs/day		8,068 lbs/day	

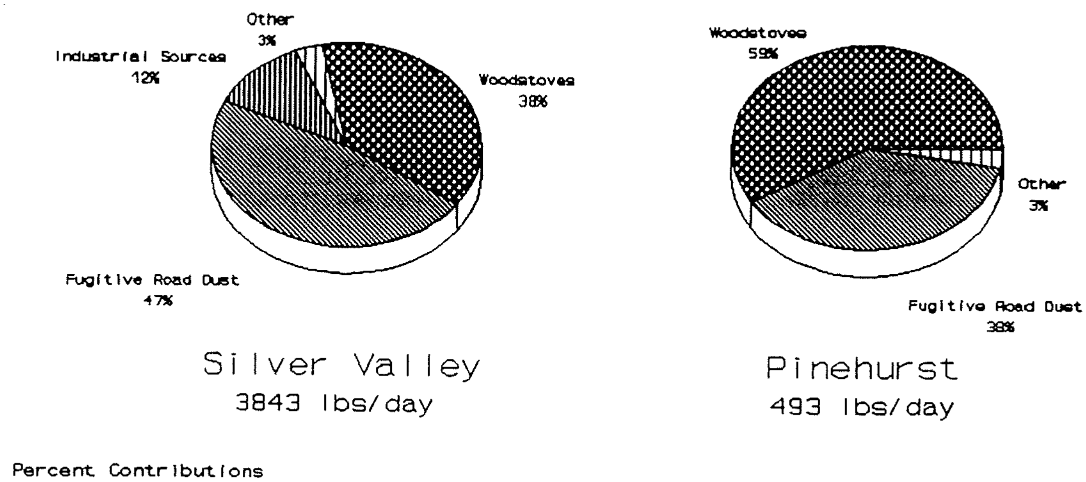
*Ordered by PM_{10} emission rate

The relative source contribution varies between the two airsheds (see Figure III-2), as was seen in the comparison of the annual emission rate. Residential wood burning is the dominant PM_{10} source at 59.3% in Pinehurst as compared to 37.7% in the Silver Valley. Fugitive road dust is the second largest source of PM_{10} emissions in

Pinehurst at 38.0%, whereas in the Silver Valley, fugitive road dust is the largest PM_{10} source at 47.2%.

Figure III - 2

1988 Maximum Daily Wintertime
PM-10 Emission Inventory



In the Silver Valley, point source emissions contribute a relatively small percent of the total wintertime PM_{10} emissions because a number of the industrial facilities are either shut down or operating at a reduced rate. Emissions from industrial fugitive sources are also decreased due to the increased amounts of precipitation during the winter.

6. Emission Projections

The DEQ is required to show attainment of the National Ambient Air Quality Standards (NAAQS) in Pinehurst by 1994 and maintenance of the standard until the year 2000. To meet these goals, the DEQ developed emission inventories for three years, 1990, 1994 and 2000. Current data were used to update the 1988 base year inventory for 1990 and then projections were made for 1994 and 2000. Projections for area and mobile sources were made using information from Intermountain Demographics (IMD), which was contracted to develop a data base for households and vehicle miles traveled (VMT) for 1990, 1994 and 2000. The final report from IMD, 1990, 1994 and 2000 Household and Vehicle Miles Traveled Forecasts for Silver Valley, Shoshone County, Idaho, dated August 1991, is found in Appendix E of this document. The methodologies used to develop the growth projections are described in detail in this report. Emission projections for Pinehurst were extrapolated from the Silver Valley data set.

a. Point Sources - Silver Valley and Pinehurst

Emissions from point sources were held constant for the projected years because of the economic situation in the Silver Valley. When the base year inventory was performed, the valley was in a period of a economic recession. It still is today, and it is uncertain what will become of the industries that remain there. Therefore, as a conservative estimate, the DEQ used the 1988 emissions for all the projected years.

b. Area and Mobile Sources - Silver Valley

Table III-3 presents the calculated emission estimates for the area and mobile sources in the Silver Valley for 1990, 1994, and 2000. Only maximum daily wintertime PM_{10} emissions are shown in the table. The emission calculations are based on data from the IMD report and from contacting local officials and agencies in the Silver Valley. In addition, the emissions from residential heating are based on the 1988 worst case heating degree-day value used for the base year emissions.

Based on the current predications of growth for the Silver Valley, the DEQ estimates that only a very slight increase (one percent) in maximum daily wintertime PM_{10} emission will occur between 1990 and 1994. The 1994 calculated emissions are approximately 8% higher than the 1988 maximum daily PM_{10} emissions. However, much of the net emission increase is due to the change in the base area surveyed by IMD for 1990, 1994 and 2000 report. The grid area was expanded over the 1988 grid area to incorporate additional households and roads in the Silver Valley. This change is explained in detail in the August 1991 report by IMD.

From 1994 to the year 2000, the area and mobile emissions are estimated to increase by approximately 14%. From 1990 to 2000, this equates to an approximate increase of 16%. The increase in emissions is predominately influenced by the two largest PM_{10} sources, fugitive road dust and residential wood combustion. Fugitive road dust emissions from paved and unpaved roads are predicted to steadily increase over the ten year period due to projected increases in vehicle traffic, i.e. VMT, for the region. The VMT projections are based on information collected from the state and regional transportation planning agencies.

TABLE III - 3

Future Projections - Silver Valley Area and Mobile Sources
PM_{10} Maximum Daily Wintertime Emissions, lbs/day

Source Category*	Emission Rates, lbs/day 1990	1994	2000
Fugitive Road Dust	2202.0	2325.0	2679.0
Residential Wood Combustion	1741.7	1654.6	1872.3
Vehicle-related Emissions	76.9	87.7	104.4
Coal Combustion	13.8	13.8	13.8
Natural Gas Combustion	11.0	10.4	11.8
Aircraft	11.0	11.0	11.0
Heating Oil Combustion	9.2	8.7	9.9
Building Construction	10.7	10.1	11.5
Open Burning	9.4	9.4	9.4
Railroad	7.7	7.7	7.7
TOTAL	4,093.4	4,138.4	4,730.8

*Ranked according to 1994 emission rates

On the other hand, emissions from residential wood combustion are subject to fluctuations over the ten year period, with the emissions rising and falling proportionally to the population changes. In addition, residential wood combustion emissions are influenced by a wide variety of factors such as weather conditions, local rules and regulations, energy prices and the regional economy. The impact that these variables have on wood burning emissions is constantly changing and this complicates the process for estimating future emissions. To compensate for these changing variables, a very simple and conservative approach was used to calculate residential wood burning emissions for the Silver Valley and Pinehurst areas. The calculations were built around three main assumptions:

- Due to the current lack of wood burning regulations and enforcement in this region, the percent distribution of wood burning devices remained constant for the projected years.

- Wood burning habits did not change over time, i.e., the number of cords burned per year remained constant.

- The percentage of wood burning households and the number of devices per household remained constant.

Based on these assumptions, the calculation of wood burning emissions was reduced to two variables, the total number of households in the area and the worst case heating degree-day. As stated earlier, the heating degree-day value was assumed to remain constant for all the projected years. With this simplified scenario, the wood burning emissions changed proportionally with the change in population and occupied households. By tracking the population changes, the DEQ could then reasonably predict the changes in residential wood combustion emissions. This approach also applied to the other residential heating sources such as oil, coal and natural gas.

c. Area and Mobile Sources - Pinehurst

Table III-4 presents the calculated emission estimates for area and mobile sources found in Pinehurst for 1990, 1994 and 2000. Only maximum daily wintertime PM_{10} emissions are shown in Table III-4. As mentioned earlier, the Pinehurst emissions are a subset of the Silver Valley emission inventory and for most sources, Pinehurst emissions are extrapolated from the Silver Valley data. When data was available, emissions were calculated for specific conditions in Pinehurst. For example, Pinehurst was found to have a slightly different distribution of wood burning devices as compared to the entire Silver Valley and the emission equations were changed accordingly.

TABLE III - 4

Future Projections - Pinehurst Area and Mobile Sources
PM_{10} Maximum Daily Wintertime Emissions, lbs/day

Source Category*	Emission Rates, lbs/day 1990	1994	2000
Residential Wood Combustion	280.2	263.8	311.7
Fugitive Road Dust	200.8	206.4	235.8
Vehicle-related Emissions	5.3	5.9	6.8
Residential Heating Combustion[a]	6.0	5.6	6.4
Other[b]	3.6	3.1	3.5
TOTAL	495.9	484.8	564.2

*Ranked according to 1994 emission rates
[a] - Contains emissions for combustion of natural gas, heating oil and coal
[b] - Contains building construction and open burning emissions

The PM_{10} emissions in Pinehurst for the predicted years followed the same trends as the Silver Valley. There was an insignificant change in the total PM_{10} emissions from 1988 to 1990. The total maximum daily wintertime PM_{10} emissions for 1990 were 496 lbs/day versus 493 lbs/day for the base year. A decrease in wood burning emissions during 1990 was offset by an increase in fugitive road dust emissions.

From 1990 to 1994, the total maximum daily PM_{10} emissions actually decreased by 2%. In 1994, residential wood combustion emissions dropped to their lowest level of 263.8 lbs/day. This decrease in wood burning emissions was primarily due to a decrease in the Pinehurst population as a whole. The continued increase in fugitive road dust emissions was not enough to offset the larger decline in wood burning emissions.

By the year 2000, the population in Pinehurst and the rest of the Silver Valley is predicted to have increased again as a result of an economic recovery program. The increased population will result in increased wood burning emissions under the assumption that no regulatory controls are implemented and enforced in the region. Assuming the area population responds as predicted, the total maximum daily wintertime PM_{10} emissions will increase by 16% from 1994 to 2000.

B. Chemical Mass Balance Receptor Modeling

The Chemical Mass Balance (CMB) air quality model is one of several receptor models which have been applied to air resources management. The CMB model uses the chemical composition of the particles measured in source emissions and on ambient PM_{10} filter samples (receptors) to identify and quantify the contributions from potential sources that affect the measured ambient PM_{10} concentrations.

The DEQ has operated a permanent PM_{10} monitor in Pinehurst since 1985. In addition, filters from two other short-term ambient monitoring projects (a saturation study and a dicot study) in Pinehurst have provided the opportunity to investigate the composition of the ambient PM_{10} particulates and determine the sources which are influencing the high particulate levels. Selected high concentration filters from the three permanent and short-term monitoring efforts were analyzed for their elemental and ionic composition. The analytical information from these filters, as well as from source samples of road dust, wood burning and tailpipe exhaust, was used in the Chemical Mass Balance (CMB) version 7.0 model to determine the influence of local sources on the high ambient PM_{10} levels. Table III-5 lists the filters included in the CMB analysis for Pinehurst.

The source apportionment results shown in figures III-3 and III-4 provide accurate representation of the source influences on ambient PM_{10} levels within the limitations of the model. Figure III-3 displays the results from the CMB analysis of the filters from DEQ's long-term Pinehurst PM_{10} monitor. Figure III-4 shows the results of the Pinehurst Saturation Study filters.

Dicot data CMB analyses are not presented here. Because elemental and organic carbon are unavailable for the Teflon dicot filter samples, the CMB analysis did not produce adequate results. A discussion of the dicot analyses can be found in Appendix D. The size fractionated dicot data do suggest that wood burning is the source of much of the collected mass since the majority of the PM_{10} mass is found in the fine fraction. Particulates from combustion sources are found in the fine (<2.5u) fraction and dust emissions are concentrated in the coarse (2.5u-10u) fraction.

Table III - 5

Pinehurst Filters Selected for CMB Analysis

Monitoring Project	Date	Location	PM_{10} Concentration
Permanent PM_{10} Monitor	1-21-88	Pinehurst Elem. School	154 ug/m^3
	1-28-88	Pinehurst Elem. School	183 ug/m^3
	2-24-88	Pinehurst Elem. School	164 ug/m^3
	1-20-89	Pinehurst Elem. School	131 ug/m^3
	2-28-90	Pinehurst Elem. School	142 ug/m^3
Saturation Study	2-7-89	Site 3, Pine. El. School	116 ug/m^3
	2-9-89	Site 2, Pine. El. School	118 ug/m^3
	2-9-89	Site 7, City Hall	132 ug/m^3
	2-10-89	Site 2, Pine. El. School	163 ug/m^3
	2-10-89	Site 5, 4th & Montana	142 ug/m^3
Dicot Study	2-24-88	Pinehurst Elem. School	37 ug/m^3 c
			62 ug/m^3 f
	3-2-88	Pinehurst Elem. School	35 ug/m^3 c
			99 ug/m^3 f

c - coarse fraction, 2.5-10u
f - fine fraction, 0-2.5u

The data presented in Figures III-3 and III-4 indicate that wood burning is the major source and fugitive dust is the second largest source contributing to PM_{10} concentrations over 100 ug/m^3 during the winter months in Pinehurst. The percent contribution of wood burning to PM_{10} levels ranges between 50-90% of the total mass collected on the filters. Fugitive road dust is shown to contribute 0-40% of the mass on a given day. The PM_{10} samples from late February appear to have a higher contribution from fugitive road dust than samples taken earlier in the winter. This is consistent with the increase in the amount of fugitive dust that would be expected with the onset of warmer, spring weather. Vehicle tailpipes show a small contribution, under 10% to the PM_{10} levels on all the days analyzed. Secondary sulfate and nitrate compounds, particulate pollutants created in the atmosphere from gaseous emissions, each contribute about 2-3% to the total PM_{10} mass.

A more detailed discussion of the receptor modeling and the percent source contributions (and their associated uncertainties) for each modeled day are given in Appendix D, Receptor Modeling For the Silver Valley. Also, the individual CMB model runs are attached.

Figure III-5 summarizes the relationship of the PM_{10} source apportionment by receptor modeling and by the emission inventory. The receptor modeling indicates that the wood burning and road dust influences are variable during the winter months, but wood burning remains the largest contributor of PM_{10} for all the high concentration days that were modeled. The PM_{10} contributions vary between 50-90%. The ambient PM_{10} impact from fugitive road dust sources varies between 0-35%.

The emission inventory also shows that wood burning is the largest PM_{10} source. Wood burning was found to contribute 60% and fugitive road dust contributes about 38% to the ambient PM_{10} levels on the worst case winter day.

Each receptor analysis is a "snapshot", a view of one day's source contributions. Therefore, the range of receptor analysis results must be considered when determining the extent of the various source impacts. The emission inventory results fall between the high and low receptor modeling estimates. The similarity in the results of the two independent methods of analysis provides the DEQ increased confidence in using the emission inventory results in the projection calculations.

Figure III - 3

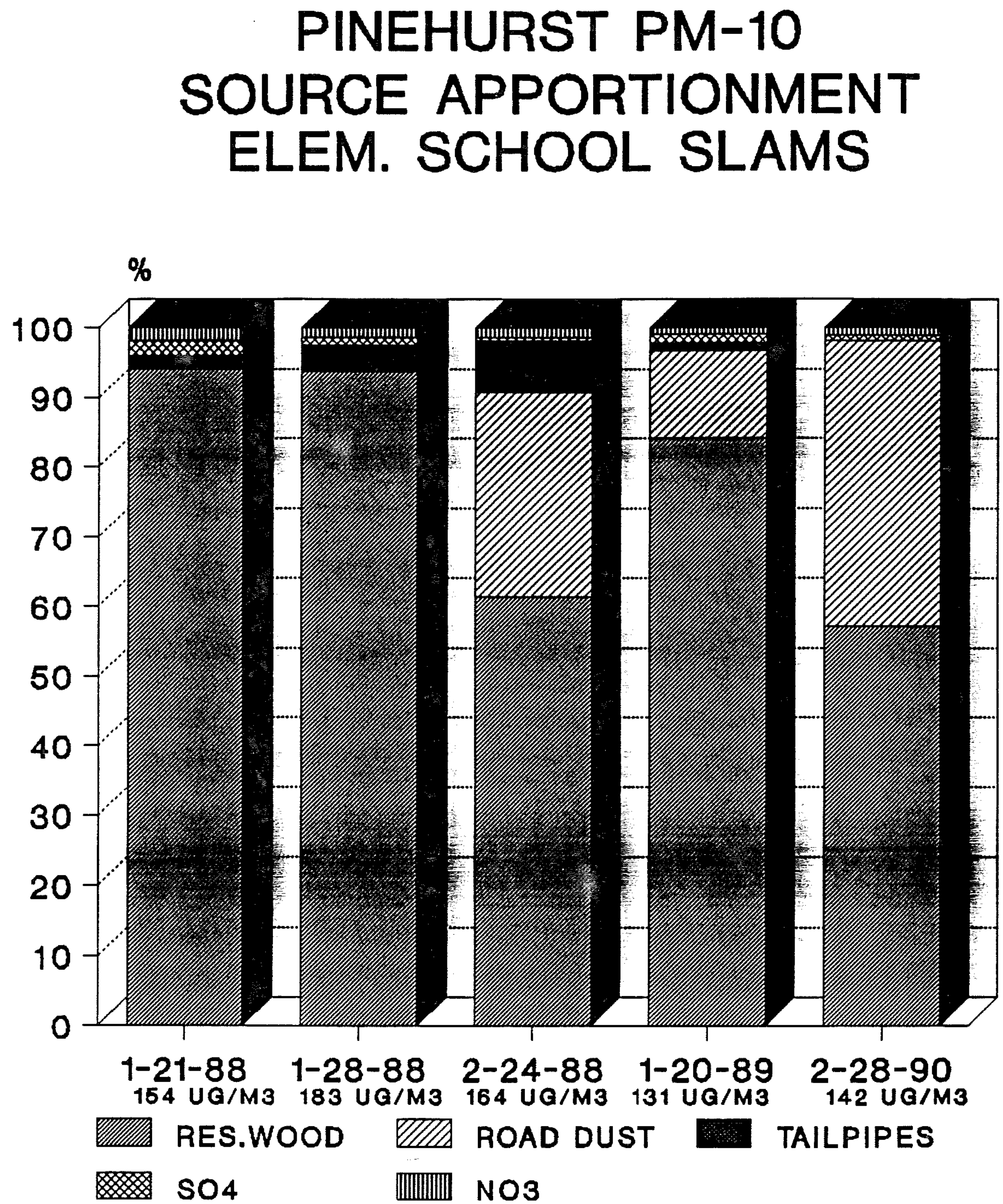
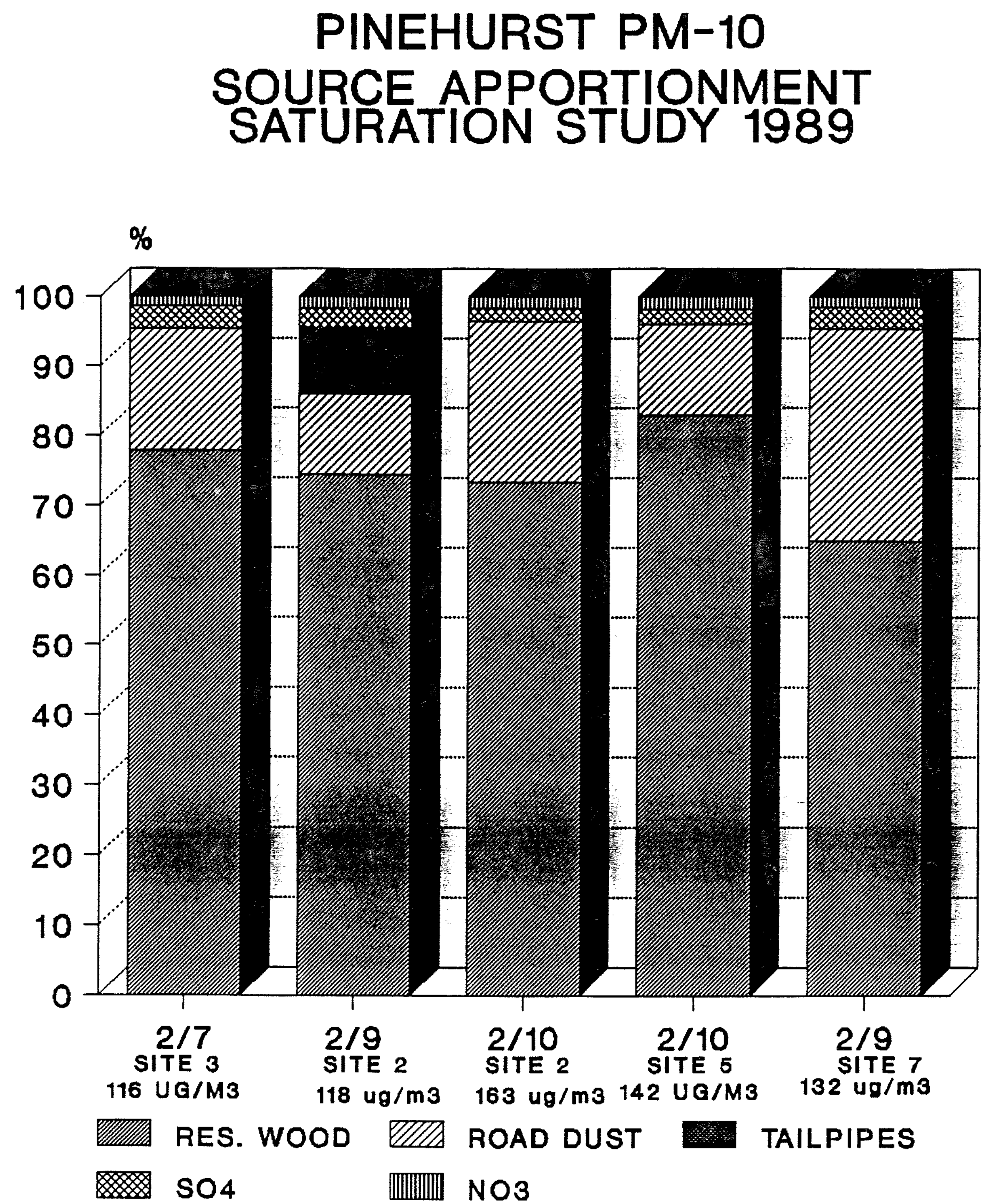

PINEHURST PM-10
SOURCE APPORTIONMENT
ELEM. SCHOOL SLAMS
%
100
90
80
70
60
50
40
30
20
10
0
1-21-88
154 UG/M3
1-28-88
183 UG/M3
2-24-88
164 UG/M3
1-20-89
131 UG/M3
2-28-90
142 UG/M3
RES.WOOD
ROAD DUST
TAILPIPES
SO4
NO3

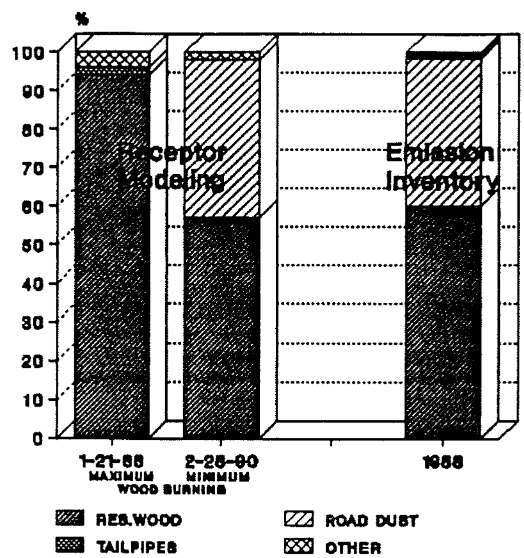
Figure III - 4



PINEHURST PM-10
SOURCE APPORTIONMENT
SATURATION STUDY 1989
%
100
90
80
70
60
50
40
30
20
10
0
2/7
SITE 3
116 UG/M3
2/9
SITE 2
118 ug/m3
2/10
SITE 2
163 ug/m3
2/10
SITE 5
142 UG/M3
2/9
SITE 7
132 ug/m3
RES. WOOD
ROAD DUST
TAILPIPES
SO4
NO3

Figure III - 5

PINEHURST PM-10
WINTER SOURCE APPORTIONMENT



C. Proportional Rollback Modeling

1. Introduction

The DEQ requested and received EPA approval for a modified attainment demonstration for the Pinehurst PM_{10} nonattainment area. The modified demonstration is based upon proportional rollback modeling supported by a complete emission inventory, receptor modeling and limited stagnation modeling.

Recent EPA guidance and related correspondence outline conditions in which rollback modeling is an appropriate alternative to dispersion (or stagnation) modeling. Briefly the conditions are:

1. The spatial representativeness of the monitoring network and the spatial uniformity of emissions. The PM_{10} monitoring network must represent the site of the maximum impact from the major sources identified in the Emissions Inventory. This is shown to be true from both a 1989 saturation study and from stagnation modeling results.

2. Temporal representativeness of the monitoring network. Sampling intervals must be frequent enough to characterize the impacts of the major sources. Sampling during the winter occurred on every third day in 1988 and every other day in both 1989 and 1990. Only two exceedances were measured during this three year period. Considering the large influence of area sources, the sampling

frequency is adequate to characterize the elevated ambient PM_{10} concentrations caused by major sources.

3. The impact of only a few, relatively well ~~categorized~~ characterized source categories. The emission inventory for a worst case day in 1988 shows that over 97% of emissions can be attributed to wood smoke and fugitive road dust. Receptor modeling results also demonstrate that wood burning and road dust are the dominant sources.

The rollback modeling request to EPA is entitled Silver Valley PM_{10} SIP Justification for Rollback Modeling Attainment Demonstration and is included in Appendix E of this document.

2. Design Concentration

The design concentration is used to represent the maximum ambient PM_{10} concentration for the airshed during the past three years. For this project, the design concentration is the basis for the rollback calculations to determine the expected maximum ambient concentrations for the projection year of 1994. Therefore, the selection of the appropriate design concentration is very important because the relative magnitude of the design concentration will directly influence the level of controls that are needed to bring the area into attainment for NAAQS.

From Table II-2 on page 2-5, the number of ambient PM_{10} samples collected at the Pinehurst site is 340 for the three year period of 1988 to 1990. Using the lookup table for design concentration from Section 6.0 of the PM_{10} SIP Development Guideline document, the data point used for the design concentration must be the highest value. Determination of the value selected is based upon the total number of monitored days in the area of interest. The highest 24-hour average PM_{10} concentration measured at the Pinehurst site from 1988 to 1990 is 306 ug/m^3 on September 25, 1989. However, this sample has been classified by the DEQ and EPA as an exceptional event due to a wind-blown dust storm which impacted eastern Washington and northern Idaho, as discussed earlier in Section II.B. of this document. Because of the exceptional event status and the time of year the sample was collected, the sample is not representative of the winter season which historically has been the problem season for PM_{10} in Pinehurst.

The next highest value is 183 ug/m^3 measured on January 28, 1988. This sample best represents the wintertime problem in this area because it occurred during an air stagnation event and therefore, DEQ has selected 183 as the design concentration for Pinehurst.

3. Proportional Rollback Modeling

Proportional Rollback Modeling is used to estimate the emission reductions required in 1994 to achieve ambient air quality standards. The reductions are calculated using 1988 and 1994 worst case winter day emissions from the emission inventory, which are presented in Table III-6. The emission reduction or percent reduction (R) is applied to the base year emission inventory to establish the attainment emission level. The attainment emission level is the upper boundary or ceiling limit on the total amount of PM_{10} emissions produced. This attainment emission level cannot be exceeded without violating the ambient PM_{10} standard (150 ug/m^3). The attainment emission level is subtracted from the future year emissions to determine the total amount of emission reductions necessary to meet and maintain the ambient PM_{10} standard.

The equation used for rollback modeling is:

$$R = (C_d - C_s) / (C_d - B_d)$$

Where: R = percent reduction required;

C_d = design concentration for design year;

C_s = concentration of PM_{10} standard; and

B_d = background concentration.

Note: This equation assumes that the background concentration is constant from base year to future year.

For Pinehurst, the following values were used:

C_d = 183 ug/m^3;

C_s = 150 ug/m^3; and

B_d = 20 ug/m^3.

The rollback equation yields an attainment emission level of 393.0 lbs/day. From Table III-6, the 1994 emission inventory has predicted that the PM_{10} sources in the Pinehurst area will generate 484.8 lbs/day during a worst case winter day. The attainment emission level is then subtracted from the 1994 emission estimate to yield an emissions reduction of 91.8 lbs/day.

According to the principle of proportional rollback modeling, a reduction of 91.8 lbs/day from the Pinehurst PM_{10} emission sources will result in a proportional reduction in the ambient PM_{10} concentration and thereby qualify Pinehurst to meet ambient air quality standards under worst case meteorological conditions. The documentation of the attainment procedure in Section 4 describes how the reductions will be achieved.

Table III - 6

1988 and 1994 Pinehurst Worst Case PM_{10} Emissions

Source	1988 Emissions lbs/day	1988 % Contribution	1994 Emissions lbs/day	1994 % Contribution
Res Wood Combustion	292.3	59.3	263.8	54.4
Fugitive Road Dust	187.5	38.0	206.4	42.6
Residential Heating	6.2	1.3	5.6	1.2
Vehicle Emissions	4.5	0.9	5.9	1.2
Other	2.2	0.4	3.1	0.6
Total	492.7		484.8	

221

IV. CONTROL STRATEGY DEVELOPMENT

A. Evaluation of Potential Control Strategies

1. Introduction

Development of reasonably available control measures for PM_{10} emissions hinges more on the economic and political realities of the Silver Valley than on technical issues. The silver mines that have enriched Shoshone County are shutting down and the County's tax base has dropped dramatically. The County's assessed valuation has dropped from $1.3 billion in 1982 to $349 million in 1991.

The unemployment rate has climbed above 20%, and in spite of vigorous economic development efforts, no new industry has come into the valley. More than 20% of the residents have incomes below the official poverty level. In response to this grim economic situation, local elected officials have made it clear that it is not feasible to institute any control strategies that will incur costs for residents. Mandatory programs which would eliminate the only source of heat for some households are also not reasonable under the circumstances. Therefore, the DEQ is relying on voluntary incentive programs to demonstrate attainment and maintenance of the standard.

2. Residential Wood Combustion

The emission inventory, in combination with the receptor analysis, shows residential wood burning to be the primary source of PM_{10} wintertime emissions in the Silver Valley. Although each of the four residential wood combustion control measure categories will be considered, the DEQ must rely heavily on a strong public education effort combined with a comprehensive woodstove upgrade and replacement program because of the unique economic and political situation in the valley.

a. Public Awareness Program

The strategies selected for the Silver Valley focus on a broad-based public awareness (PA) program. While public education by itself may not always result directly in any emission reductions, it is clear that the success of any residential wood burning control effort depends heavily on an effective PA program. This is because the PA component has a significant effect on the degree of public acceptance of all other program elements.

The DEQ proposes a multi-media approach addressing a wide variety of topics: weatherization, clean burning practices, proper installation and maintenance of wood burning equipment, the Air Quality Advisory telephone line, wood storage, etc. Key elements of the program include:

- Educational brochures
- Utility bill stuffers
- A series of newspaper articles-public service announcements
- Educational materials for elementary schools
- Surveys to determine level of awareness and response to the program
- Radio interviews
- Radio public service announcements
- Enhancements to the Air Quality Advisory service
- Contact with woodstove dealers and wood/pellet fuel outlets
- Speakers Bureau
- Community meetings to obtain public input

Public awareness efforts will be concentrated on the Pinehurst area where possible. Brochures will be delivered to every household using community groups to do the distribution. Service clubs in Pinehurst will be contacted individually for speakers' bureau possibilities. A community meeting will be held in the city to inform residents about wood burning reduction programs. Finally, the Air Quality Advisory Service, which is located in Pinehurst, will be modified and enhanced.

b. Improved Performance of Wood Burning Devices

Weatherization

Woodstove emissions can be reduced through comprehensive weatherization programs that result in a reduction of the amount of fuel combusted. The Idaho Economic Opportunity Office offers free weatherization assistance to low income families. This assistance takes the form of an energy audit, which may result in insulation, weather stripping, and heating system improvements. The DEQ will continue to work with the North Idaho Community Action Agency (NICAA) to identify potential recipients of this service who are using wood burning as their main source of heat.

Weatherization grant and loan programs for residents of the Silver Valley are available through Washington Water Power, Citizens Utilities, the State of Idaho Energy Division, and the Farmers Home Administration (FmHA). All of these opportunities will be explained in a brochure which will be available throughout the valley. Pinehurst residents will have the brochures delivered to their homes as part of an effort to ensure a high participation rate in all the wood burning reduction programs.

Fuel Quality

A major component of any fuel quality program deals with wood moisture content. The results of the residential heating survey (see Appendix F) indicate that of the 208 wood burners, only 35% split their wood more than six months before they use it. Even though 94% of those surveyed store their wood inside or covered outside, it would appear that the moisture content of this wood when it is burned may still be high.

Throughout the public awareness campaign, the DEQ will highlight the importance of proper wood splitting and storage. In addition, the DEQ is working closely with the Wallace Ranger District of the Coeur d'Alene National Forest to distribute information on wood collection and storage to firewood permit purchasers, both individual and commercial. This material will be available at the community meeting in Pinehurst and also at public buildings throughout the Silver Valley.

Finally, the DEQ has received Department of Energy funding to purchase four wood moisture meters which would be placed at the four fire stations throughout the valley, including one in Pinehurst. Residents will be advised to bring a piece of their wood to these locations for testing, thereby becoming more knowledgeable about the moisture issue.

Prohibited Fuel Types

There are presently no Shoshone County ordinances relating to what can be burned in residential woodstoves. The survey results show that only 10% of those polled burn other materials such as trash in their stoves. In order to minimize the possibility of this occurring, it will be recommended to the Pinehurst City Council and to the County Commissioners that an ordinance be passed prohibiting trash and garbage from being burned in residential woodstoves.

Certified Stoves

As of July 1, 1992 all new residential wood burning devices sold in Idaho must be EPA Phase II certified. However, there are no restrictions on the sale of used stoves in most parts of Idaho. The Silver Valley faces a potential problem with the dumping of used devices since both Oregon and Washington prohibit the installation of used, non-certified stoves.

DEQ is working with several groups which are interested in state legislation that would prohibit the advertising and sale of any non Phase II stove. The same law could also prohibit the installation of any stove not complying with Phase II standards.

Permit Program

An important part of improved wood burning performance is the initiation of a permit program for new wood burning devices. Shoshone County requires a permit for woodstove installation, but the incorporated cities do not. This may be due to the fact that the authority to have a woodstove permit requirement appears to derive from adoption of the Uniform Mechanical Code. Local governments in the Silver Valley are struggling to administer the

Uniform Building Code, and they are not willing at this time to adopt portions of the Mechanical Code.

In recognition of the code and enforcement problems faced by local officials, DEQ staff, in cooperation with the North Idaho Code Enforcers, which is a part of the Inland Empire Chapter of the International Conference of Building Officials, sponsored a woodstove inspection workshop. As Figure IV-1 reflects, the focus of the workshop was to give the local building and fire inspectors enough background to be able to perform a professional woodstove inspection.

It should also be recognized that a permit program would probably have very little impact in Shoshone County since the number of new residential building permits issued this year has been less than 20, with only two of those in Pinehurst. This is a reflection of the depressed economy and also of the fact that there is a high housing vacancy rate. Thus, even when population growth does occur, there may be little new residential construction.

c. Reducing the Use of Cord wood Burning Devices and Fuel

Changeover Incentives

Inducements to accelerate changeovers will be an effective tool to reduce wood burning emissions. The DEQ is putting together a package of programs for Silver Valley residents in an effort to encourage main source wood heaters to convert to cleaner burning heat sources. Some of these programs will be applicable valley wide, and some will be available only to residents of the Pinehurst area. The primary sources of funding for the changeover effort will be the Idaho Division of Energy, local utilities, and the FmHA. DEQ staff will ensure that NICAA staff in the valley receive training in the requirements and processing for these programs.

Several agencies offer woodstove changeover loan programs. The FMHA has low interest home rehabilitation loans under Section 504 and market rate loans through Section 502. These funds can be used for repair or replacement of the heating system and also for energy conservation measures. The Energy Division of the Idaho Department of Water Resources offers energy conservation loans for ceiling and wall insulation, heating system replacements resulting in a more energy-efficient system, and existing woodstove upgrades.

The DEQ, in cooperation with the Washington-Idaho Resource Conservation and Development District in Coeur d'Alene, is working on a request to the State Division of Energy for funds to create a rebate program for main source wood burners to purchase a Phase II certified or exempt woodstove. This incentive would be offered in the Pinehurst area prior to its being available throughout Shoshone County.

Figure IV - 1

NORTH IDAHO CODE ENFORCERS

in cooperation with

DIVISION OF ENVIRONMENTAL QUALITY
Idaho Department of Health & Welfare

presents

WOODSTOVE INSPECTION WORKSHOP

Friday, October 18, 1991 9AM - Noon

Coeur d'Alene City Hall
710 Mullan

AGENDA

9:00 - 9:15	**Purpose of Workshop** Rick Ulveling, President, NICE Vicky McLane, Idaho DEQ
9:15 - 10:00	**NFPA 211 - The Whys and Wherefores** **How UL Standards Relate to NFPA 211** Wes Christensen, Underwriters Laboratory
10:00 - 10:15	**Q & A**
10:15 - 11:00	**Woodstove Installation - The How Tos** **A Practical Perspective, Including Training & Technical Assistance** John Killen, The Log House John Crouch, Wood Heating Alliance
11:00 - 11:15	**Q & A**
11:15 - 12:00	**Woodstove Inspection - The Process** **How to Develop A Simple Inspection Program** Jim Fackrell, Building & Community Development Department
12:00 - ?	**Q & A**

Anyone who is interested in learning more about woodstove inspections is welcome to attend this free workshop.

For more information, Call Mike Jacobs, 667-9533

With any of the programs described above, Silver Valley residents will be hard pressed to make the repayments. Therefore, DEQ plans to work with local governments in seeking grant funds which will defray any of the interest costs, and possibly a significant portion of the principal costs. Shoshone County has applied for $50,000 in Community Development Block Grant money for the purpose, with a final decision on the request due in April 1992. The DEQ also intends to pursue foundation funding as another alternative.

Another program which offers a way to reduce the use of wood burning devices is the FMHA home rehabilitation grant program for low income seniors. The grants may not exceed $5000 and can be used "only to pay costs for repairs or improvements which will remove identified health or safety hazards." Conversations with FMHA staff indicate that they would consider the replacement of an old, polluting woodstove as an eligible activity. Since senior citizens are understandably reluctant to take out a loan and yet they often have some of the most inefficient woodstoves, this may be the only changeover program that they will take advantage of.

An essential part of the success of incentive programs is public awareness of their availability. The DEQ will produce an educational brochure describing the various opportunities available to Silver Valley residents. This will include a description of incentive and weatherization programs as well as information on where to apply for participation. This information will also be shared with staff from human service agencies such as the NICAA, the senior programs, Shoshone County social services, and others.

d. Episodic Wood Burning Curtailment Program

Episodic curtailment programs are most effective in areas where the highest PM_{10} readings occur when dispersion characteristics are the worst, resulting in peaks of unacceptably high PM_{10} concentrations. Since parts of the Silver Valley, particularly the Pinehurst area, have serious dispersion problems, this is the type of program that can cause significant lowering of these concentrations.

In December of 1988, in response to numerous PM_{10} exceedances during the previous winters, the DEQ started work on an Air Quality Advisory (AQA) service for Pinehurst. This service consists of a 24-hour telephone line (682-3333) dedicated to reporting the current air quality and short term outlook as well as potential health effects. Advice on whether or not to burn wood is also included. This recorded message is available from November 1 to the end of February. It is updated daily and on weekends as necessary. The AQA report also carries Air Stagnation Advisories which cover a wider area, and carry with them the force of state law in prohibiting open burning.

A detailed description of this program, "Operations Manual for the Air Quality Advisory Program in the Silver Valley," October 1989, is found in Appendix F, along with an effectiveness review. The effectiveness review and survey results show that the availability of the advisory service needs to be heavily publicized and enhanced. The 1991 residential heating survey indicated that only 5% of the valley's population are aware of the service.

The PA program (page 4-1) is critical to more extensive use of this important information source. All printed materials and some of the radio public service announcements will promote the AQA service, which will be improved in several ways. First, the answering machine will be set up so that it can be programmed by the caller to provide additional wood burning information. Second, the DEQ will develop a mechanism to track the number and distribution of calls, as this would be helpful in assessing usage at the times of stagnation events compared to usage at other times.

It is essential that the communities most severely affected by high PM_{10} readings implement a voluntary no-burn program, and it is important for Pinehurst to adopt this approach. The City Council has passed a resolution supporting the program and asking for the cooperation of residents(see Appendix F). The curtailment call will be carried by the local radio station and the local newspaper will be asked to print the information daily.

3. Fugitive Road Dust

The other significant source of PM_{10} emissions in the Silver Valley is fugitive road dust. Since the emission inventory assumed that there were no fugitive emissions from unpaved roads during winter months, November - March, and since the PM_{10} exceedances occur only in the winter, it appears that the higher levels of road dust result from the application of skid control (sanding) materials.

The EPA Guidance Document for Selecting Antiskid Materials Applied to Ice and Snow Covered Roadways indicates that the tendency for an antiskid material to generate silt-sized particles is a function of its durability. It also concludes that <50 mesh particles are not particularly effective in increasing the coefficient of friction on paved roads. These two considerations indicate the importance of using a larger and more durable material than is presently used, possibly in conjunction with some liquid de-icing chemicals.

The DEQ is working with the Idaho Department of Transportation (ITD) on a project to analyze the content of the material presently found on Interstate 90. ITD has agreed to provide the necessary analysis through the use of their laboratory. The DEQ is also requesting funding from EPA to assess material availability and quality in North Idaho.

ITD has agreed to assist in identifying ways to minimize the PM_{10} impacts of the material which is applied to the road surface. This may be through the use of a higher grade material, through more stringent silt content requirements or through application of less material. The DEQ will work with Shoshone County and the City of Pinehurst to use the same sanding materials as the State commits to use. This should be economically feasible because the cost of a higher grade material and/or de-icing material should be offset by the smaller amount of material required.

Once selected control strategies are applied, the DEQ will monitor their effectiveness through a roadside sampling program. Road dust samples will be collected at various times during the winter, and the samples would then be analyzed by ITD for silt content to determine the effectiveness of the control measures.

4. Point Sources

Point sources, at 8% of the total wintertime emission loading, constitute the only other significant category of PM_{10} emissions in the Silver Valley. However, since none of these sources is found in the Pinehurst area, the DEQ does not intend to devote additional resources to controls in this category of emissions.

5. Conclusion

Pinehurst and the Silver Valley present an unusual challenge for air quality planning purposes. The PM_{10} exceedances are marginal (there were none in 1989 and 1990 and one in 1991), the local governments are very independent, and the precarious economic situation precludes a wide range of traditional control measures. Therefore the DEQ will be relying on changeover incentives, weatherization, public awareness, and voluntary curtailment to demonstrate and maintain attainment.

B. Demonstration of Attainment

The recommended attainment plan is comprised of a mix of individual control measures that will result in a reduction that exceeds the 91.8 pounds per day total indicated by the rollback modeling. The strategies selected are woodstove changeover, weatherization, public awareness and voluntary curtailment. Together they yield a decrease of 108.87 pounds per day (see Table IV-1).

The woodstove changeover strategy has three objectives. The first is to replace 10% or 40 of the uncertified wood stoves in the Pinehurst area with natural gas heating. DEQ staff have met with Washington Water Power to discuss the possibility of offering changeover incentives to main source wood burning households with electrical backup in the Pinehurst area. This proposal has been submitted to the company, which needs the permission of the Idaho Public Utilities Commission before implementing such a program. It may be May of 1992 before the Commission acts on the request.

TABLE IV - 1

Pinehurst Attainment Demonstration

Number of households 611
No. of wood burning households 382

STRATEGY	Number	% CREDIT	LBS.[1] EMITTED	LBS.[2] REDUCED	LBS.[3] REMAINING
WOODSTOVE REPLACEMENT w/					
a. Natural Gas	40	100	213.86	22.38	191.48
b. Phase II stoves	25	55	191.48	7.69	183.79
c. Pellet Stoves	25	95	183.79	13.29	170.50
				43.4	
WEATHERIZATION					
Number of households replaced	90	8	219.35	3.45	215.90
Number of additional households	30				
PUBLIC AWARENESS		5	215.90	10.80	205.11
VOLUNTARY CURTAILMENT		25	205.11	51.28	153.83
SUBTOTAL				108.87	153.83
CONTINGENCY MEASURES					
Road Sanding Improvement		25	206.40	51.60	154.80

1. Lbs. Emitted - Pounds of PM-10 emissions by source category
2. Lbs. Reduced - Pounds of PM-10 reduced according to the percent reduction applied.
3. Lbs. Remaining - Subtract Lbs. reduced from the Lbs. emitted to obtain the amount of PM-10 remaining for each source category.

The second objective is to replace 14% or 50 of the uncertified wood stoves in the Pinehurst area with Phase II certified stoves and/or pellet stoves. The plan assumes that 25 of each kind will be installed. This objective will be achieved through existing programs such as those of the Farmers Home Administration (FMHA) and the Department of Energy. And in cooperation with the Idaho and Washington Rural Conservation and Development District, funding is being requested from the Idaho Division of Energy.

Weatherization measures will be applied to all 90 households in which stove changeovers occur, using ongoing funding from WWP, FMHA and North Idaho Community Action Agency. These same sources will be used to weatherize an additional 30 homes in the Pinehurst area where wood is the main source of heat. The DEQ is also working with the State Economic Opportunity Office to tap into some special weatherization funding from the Department of Energy.

The EPA guidance document allows a 5% credit for weatherization, but the DEQ has applied an 8% credit for three reasons. First, the average age of the homes in Shoshone County is substantially greater than that of the state as a whole, indicating that they are probably not as well weatherized. According to the 1980 census, 35.5% of the homes in the county were built prior to 1939 whereas the comparable state figure is 21.9%.

Second, Shoshone County has a high percentage of low income households, which are often poorly weatherized as a simple reflection of economics. According to DEQ's March 1991 Silver Valley residential heating survey, 55% of the households in the County had incomes less than $20,000 per year. Finally, Pinehurst has a high number of effective annual heating degree days, which would increase the impact of weatherization as compared to a community in a warmer climate.

Public awareness is the third control measure that has been selected to achieve attainment. While EPA traditionally does not allow a credit for this measure, the DEQ believes that 5% is a realistic number in the Pinehurst area for several reasons. First, the Division already has an aggressive PA campaign in place and was recently awarded $14,550 by the Pacific Northwest and Alaska Bioenergy Program for wood energy education in the Silver Valley. This money will be used over the next year for a variety of tasks. "Learn to Burn Better" brochures were distributed in the fall of 1991, and advertisements have been placed in the local newspaper. Materials will be developed in the spring of 1992 on how to split and store wood, and soon thereafter time moisture meters will be placed at fire stations. Another residential heating survey will be conducted in the spring of 1992 to determine the effects of the PA program, and to identify behavioral changes. A middle school wood energy curriculum will be developed in cooperation with the American Lung Association and an advisory group from the Pinehurst area. Finally, the bioenergy money will be used to enhance the air quality advisory service capabilities with the addition of a new answering machine and call counter.

The second reason that a 5% credit is being taken is that in an area as small as Pinehurst, it is relatively easy to contact all households on a regular basis. With the support of various community groups, information will be distributed on a variety of issues, including weatherization opportunities, wood storage, stove operation, and replacement incentives. And the third reason is that the DEQ intends to use the 1992 wood burning survey to identify to what extent various PA measures are causing behavioral changes in the Pinehurst area.

The final control measure selected is a voluntary curtailment program. Although the Air Quality Advisory program was formally initiated in the fall of 1988, it was a low profile, unpublicized effort, and as the 1991 residential heating survey indicated, its existence was not well known. Only 5% of those surveyed mentioned the AQA as a way to find out about air quality in their area.

The program was initiated in order to have the air quality advisory mechanism in place rather than to realize any measurable air quality improvement. Until recently the technical capabilities did not exist in the Pinehurst area to run an accurate program. No reduction credit has been taken for the program during the first three winters of operation, as reflected in the WYNDvalley modeling that used uncontrolled emissions.

Most of the equipment necessary to initiate an effective program is now in place, with every other day sampling equipment, a nephelometer, and a new state of the art meteorological station. In preparation for a full scale voluntary curtailment program in the fall of 1992, DEQ meteorologists will devote a significant amount of time to this year's effort. With the help of several teachers at the Pinehurst elementary school who are trained in visual observation, the accuracy of the forecasts will be enhanced.

Community awareness and knowledge of the AQA was increased in a number of ways well in advance of the start of the 1991-1992 program. The Air Quality Advisory line carried a message about it, the local radio station aired the forecasts and accompanying wood burning recommendations several time each day, newspaper advertisements were purchased with the telephone number prominently displayed, and all PA materials will include the number. The Pinehurst elementary school will be asked to post notices of high pollution events, as will the post office and the bank. Additional enhancements will take place in the 1992-1993 season.

It is proposed that the curtailment call be activated as soon as a 24 hour rolling average hits a predetermined PM_{10} level, probably 100, and it is anticipated that the air quality advisory service would be updated at least once a day, and more than that when necessary. The Pinehurst City Council has adopted a resolution supporting the curtailment and encouraging residents to participate (see Appendix F), and details of the program will be developed in conjunction with the Council.

Data from Northern Ada County has shown that the Idaho public is receptive in responding to a well publicized full scale voluntary curtailment campaign, with survey results indicating a 43% effectiveness rate. The DEQ believes that this experience, coupled with the extensive local input which has been described, will enable the Pinehurst curtailment program to achieve a conservative 25% effectiveness level. It may, however, take several years before the full effectiveness is realized.

Once the Pinehurst area has attained the PM_{10} standard, it will be necessary to continue implementation of the control strategies in order to ensure maintenance of the standard. Projections show that continuation of the types of reductions described above will more than offset any emission growth associated with post-1994 increases in population and vehicle miles traveled. The DEQ will coordinate with local groups to design an appropriate program.

C. Implementation

Implementation of the selected control measures relies on funding from a variety of sources, as is reflected in Table IV-2, and on a continued commitment from staff of the DEQ. Documentation of the economic based control measures is attached in the form of grant applications and program descriptions (Appendix F). It will be easy to track the success of the programs since DEQ staff have a close working relationship with the agencies concerned. As older woodstoves are replaced, DEQ staff will be involved in the process. If the dollars being targeted for these measures are not available from the sources mentioned, DEQ will apply to EPA and other organizations for a one time grant to buy out the stoves.

DEQ has relied on its 1991 residential heating survey to establish a baseline for Pinehurst's woodstove population. Of the 350 households surveyed, 218 had some type of residential wood burning device. 82 of these 350 households, or almost 25%, are from the Pinehurst area. DEQ believes that this large a sample gives a valid representation of the overall wood burning population. Additions to that population are minimal in terms of new construction since only 2 such building permits have been issued this year in Pinehurst. There may be some woodstoves being put in older homes, but the Pinehurst City Council indicated that this is not happening, and in fact, a number of people are converting to natural gas heating. In order to continue to quantify the woodstove population, and changes that are taking place, DEQ will do another residential heating survey in the spring of 1992. Funding for this survey has been sought and obtained from the Idaho Division of Energy through the regional bio-energy program.

Table IV - 2

IMPLEMENTATION OF PINEHURST SIP CONTROL MEASURES

Measure	Goal	Means	Dates
Convert main source wood-burners to natural gas	40 homes	Funding from local utilities - $100,000 proposal submitted.	Approval 3/92
		Community development blockgrant application for $50,000 - proposal submitted 11/1/91.	Approval 5/92 Start Program 6/92
Convert main source wood burners to Phase II stoves Pellet stoves	 25 homes 25 homes	Funding from Idaho Division of Energy - proposal for $35,000 (in cooperation with Idaho-Washington RC&D).	Approval 3/92
		Funding from FMHA 502 & 504 loan and grant programs.	Start Program 5/92
Weatherization	120 homes	Ongoing funding from Dept. of Energy through NICAA. Also WWP and FMHA loan and grant programs.	Start Program 4/92
Public Awareness	Educate residents so that they change wood burning behavior	$14,550 from regional bioenergy program; EPA environmental education grassroots grant, $3,000 proposal.	Start Program 10/91
		Cooperative efforts with other agencies.	
Voluntary Curtailment	25% reduction in wood burning on high pollution days	AQA enhancements funded by regional bioenergy program.	Start Education Program 4/92
		Additional DEQ staff commitment.	Start Curtailment Program 11/92
		Cooperation of local media and citizens.	

The implementation schedule for the selected control measures (see Figure IV-1) reflects that the initial activities in the fall of 1991 will focus on a comprehensive public awareness program. This will lay the groundwork for development of the other measures described in the demonstration of attainment. The woodstove changeover and weatherization programs will begin in the spring of 1992 with the upgrade and pellet program, followed by conversions to natural gas. The comprehensive curtailment program will start in the fall of 1992, after a summer of intensive publicity. All of these measures will be continued as long as they are necessary to attain and maintain the standard.

D. Contingency Plan

The Contingency Plan provides for additional emission reductions which will be automatically implemented if attainment is not reached by the December 31, 1994 deadline. While the Pinehurst area SIP shows that attainment will be met by this date, it is a requirement to have some fall back or contingency measures.

The DEQ has identified reduction of winter road sanding materials as the core of its contingency plan. As was explained in the fugitive road dust discussion in IV.A., the Division is working with the Idaho Department of Transportation (ITD) to develop control strategies which will result in reduced PM_{10} emissions from sanding materials. This study should be completed by May of 1993 and a demonstration program is planned for the 1993-1994 winter to test the results in the field.

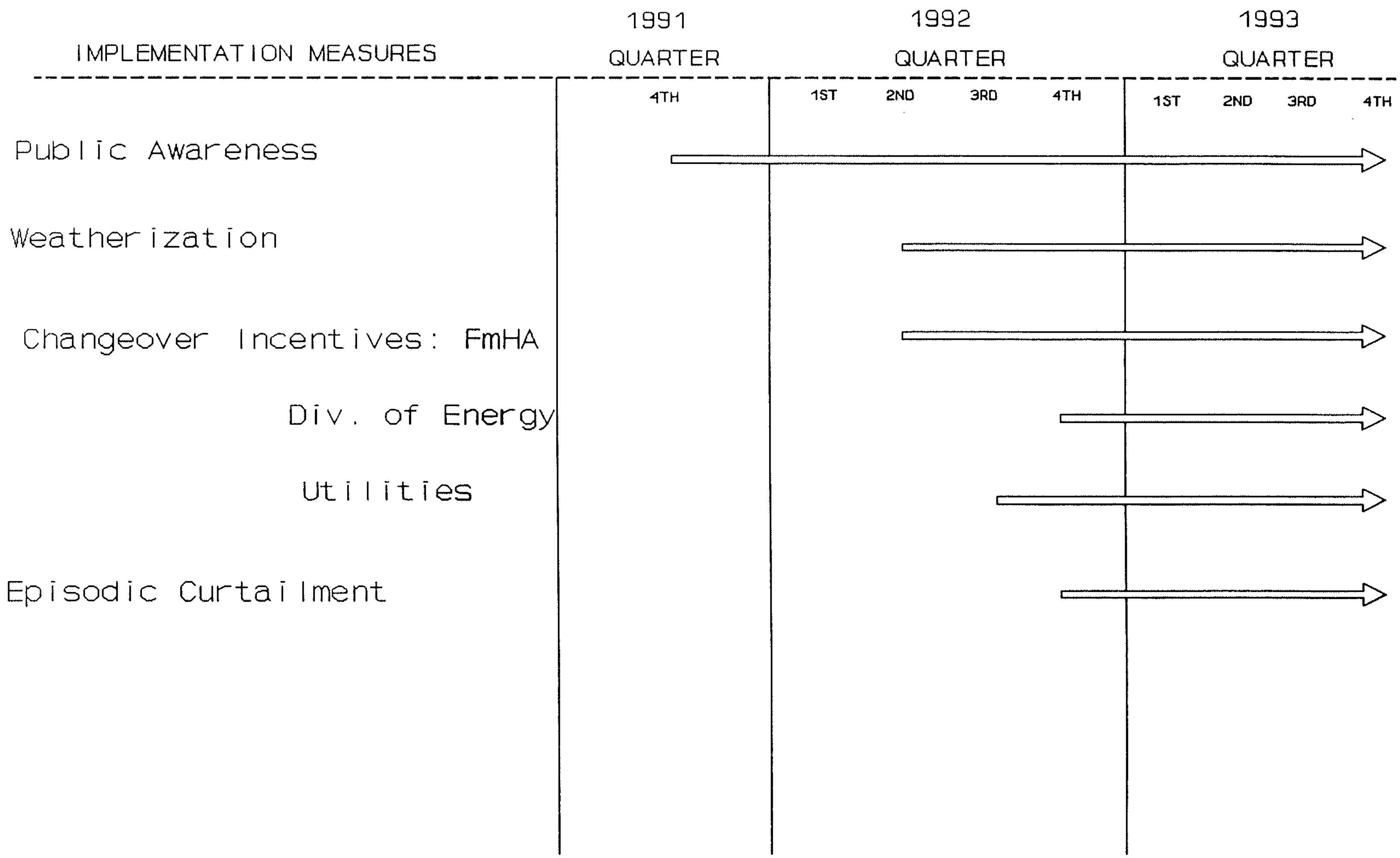
It is important to initiate reductions in winter road sanding as soon as adequate support data is available rather than waiting until problems with wood burning control strategies occur. Therefore, the DEQ staff will work with ITD to implement whatever control strategies are agreed on by the fall of 1993.

While the project with the ITD is proceeding, the DEQ will be working with the City of Pinehurst on a sanding program which will result in reduced PM_{10} emissions. Once the field testing is complete, the City will use the same type of material as the ITD, when feasible, applying the recommended material in a manner that minimizes PM_{10} emissions.

Control measures for reducing road dust are not well documented; therefore the DEQ has taken a conservative approach to their effectiveness. It is projected that through parallel reduction efforts at the State and local level, PM_{10} emissions from road sanding will be decreased by at least 25%, or 51 pounds per day. These numbers, which are based on what other areas are realizing from similar measures, translate into more than the EPA recommended 25% of total control strategy emission reduction.

Figure IV - 1

CONTROL MEASURE IMPLEMENTATION SCHEDULE



APPENDIX A

PM_{10} DATA AND EXCEPTIONAL EVENT DOCUMENTATION

Pinehurst PM_{10}
Air Quality Improvement Plan
February 5, 1992

: following PM_{10} data for Pinehurst are from 6 through 1990. The data are listed in the ndard EPA Aerometric Information Retrieval tem (AIRS) Air Quality Subsystem Standards ort format for easy reference.

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
STANDARDS REPORT - PM10 TOTAL 0-10UM (81102)
DAILY VALUES
STATE 16 IDAHO

SITE-ID: 16-079-0017 POC: 2
COUNTY (079): SHOSHONE CO
CITY (00000): NOT IN A CITY
SITE ADDRESS: PINEHURST SCHOOL, PINEHURST
SUPPORT AGENCY (000): *** NOT FOUND ***
SITE COMMENTS: SLAMS TSP SITE.SLAMS PB 1-1-82
MONITOR COMMENTS: 52
REPORTING ORGANIZATION (001): IDAHO DEPARTMENT OF HEALTH AND WELFAR
MONITOR TYPE (0): UNKNOWN
COLLECTION AND ANALYSIS METHOD (052): HI-VOL-SA321A GRAVIMETRIC

AQCR (062): EASTERN WASHINGTON-NORTHERN IDAHO
URBAN AREA (0000): NOT IN AN URBAN AREA
LAND USE (1): RESIDENTIAL
LOCATION-SETTING (1): URBAN AND CENTER CIT
MONITORING OBJECTIVE ( ): *** NOT FOUND ***

LATITUDE: 47:32:16 N
LONGITUDE: 116:14:10 W
UTM ZONE: 11
UTM-NORTHING: 5265000
UTM-EASTING: 00557500
ELEVATION-MSL: 00671 M
UNITS (001): UG/CU MET
PROBE HEIGHT: 5 M

		JAN 1986		FEB 1986		MAR 1986		APR 1986		MAY 1986		JUN 1986		JUL 1986		AUG 1986		SEP 1986		OCT 1986		NOV 1986		DEC 1986	
	1		W	116	S		S		T		T	37	S	19	T		F		M		W		S		M
	2	205 *	T		S		S	40	W	21	F		M		W		S		T		T		S		T
	3		F		M	102	M		T		S		T		T		S		W		F		M		W
	4		S		T		T		F		S		W		F		M		T		S	33	T	128	T
D	5		S		W		W		S		M		T		S		T		F		S		W		F
	6		M		T		T		S		T		F		S		W		S		M		T		S
A	7		T	116	F		F		M		W	21	S		M		T		S		T		F		S
	8	198 *	W		S		S	45	T	22	T		S		T		F		M		W		S		M
Y	9		T		S	54	S		W		F		M		W		S		T		T		S		T
	10		F		M		M		T		S		T		T		S		W		F	50	M	68	W
	11		S		T		T		F		S		W		F		M		T		S		T		T
O	12		S		W		W		S		M		T		S		T		F		S		W		F
	13		M	63	T		T		S		T	26	F		S		W		S		M		T		S
F	14	372 *	T		F		F	35	M	26	W		S		M		T		S		T		F		S
	15		W		S	41	S		T		T		S		T		F		M		W		S		M
	16		T		S		S		W		F		M		W		S		T		T	69	S	26	T
M	17		F		M		M		T		S		T		T		S		W		F		M		W
	18		S		T		T		F		S		W		F		M		T		S		T		T
O	19		S	104	W		W		S		M	12	T		S		T		F		S		W		F
	20	115	M		T		T	45	S	21	T		F		S		W		S		M		T		S
N	21		T		F	43	F		M		W		S		M		T		S		T		F		S
	22		W		S		S		T		T		S		T		F		M		W	69	S	107	M
T	23		T		S		S		W		F		M		W		S		T	116	T		S		T
	24		F		M		M		T		S		T		T		S		W		F		M		W
H	25		S	170 *	T		T		F		S	31	W		F		M		T		S		T		T
	26	143	S		W		W	17	S	18	M		T		S		T		F		S		W		F
	27		M		T	72	T		S		T		F		S		W		S		M		T		S
	28		T		F		F		M		W		S		M		T		S		T		F	70	S
	29		W				S		T		T		S		T		F		M	77	W		S		M
	30		T				S		W		F		M		W		S		T		T		S		T
	31		F				M				S				T		S			67	F				W
NUMBER		5		5		5		5		5		5		1						3		4		5	
MAXIMUM		372		170		102		45		26		37		19						116		69		128	
ARITH-MEAN		207		114		62		36		22		25		19						87		55		80	
SAMPLE FREQS(QTRLY MIN)						(6)						(6)						(6)						(6)	
QTRLY ARITH MEAN						127.6						27.0						19.0						73.5	
QTRLY EXP NUM EXCEED						24.00						0.00						0.00						0.00	

TOTAL SAMPLES = 43
ARITHMETIC MEAN = 62.0
ARITHMETIC STANDARD DEVIATION = 68

4 STARRED (*) ITEMS EXCEEDED THE PRIMARY STANDARD OF 150-UG/CU METER (25 C)
DOES NOT MEET SUMMARY CRITERIA — EXPECTED NUMBER OF EXCEEDANCES 24.0
PRIMARY STANDARD OF 50-UG/CU METER (25 C) WAS EXCEEDED

SAMPLING STRATA USED BECAUSE OF UNSCHEDULED SAMPLES

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
STANDARDS REPORT - PM10 TOTAL 0-10UM (81102)
DAILY VALUES
STATE 16 IDAHO

SITE-ID: 16-079-0017 POC: 2
COUNTY (079): SHOSHONE CO
CITY (00000): NOT IN A CITY
SITE ADDRESS: PINEHURST SCHOOL, PINEHURST
SUPPORT AGENCY (000): *** NOT FOUND ***
SITE COMMENTS: SLAMS TSP SITE.SLAMS PB 1-1-82
MONITOR COMMENTS: 52
REPORTING ORGANIZATION (001): IDAHO DEPARTMENT OF HEALTH AND WELFAR
MONITOR TYPE (0): UNKNOWN
COLLECTION AND ANALYSIS METHOD (052): HI-VOL-SA321A GRAVIMETRIC

AQCR (062): EASTERN WASHINGTON-NORTHERN IDAHO
URBAN AREA (0000): NOT IN AN URBAN AREA
LAND USE (1): RESIDENTIAL
LOCATION-SETTING (1): URBAN AND CENTER CIT
MONITORING OBJECTIVE ( ): *** NOT FOUND ***

LATITUDE: 47:32:16 N
LONGITUDE: 116:14:10 W
UTM ZONE: 11
UTM-NORTHING: 5265000
UTM-EASTING: 00557500
ELEVATION-MSL: 00671 M
UNITS (001): UG/CU MET
PROBE HEIGHT: 5 M

DAY OF MONTH	JAN 1987	FEB 1987	MAR 1987	APR 1987	MAY 1987	JUN 1987	JUL 1987	AUG 1987	SEP 1987	OCT 1987	NOV 1987	DEC 1987
1	T	S	S	W	F	20 M	W	18 S	T	T	S	T
2	F	167 * M	M	T	S	T	21 T	S	W	F	M	W
3	134 S	T	T	52 F	22 S	W	F	M	T	S	T	T
4	S	W	104 W	S	M	T	S	T	F	S	W	F
5	M	T	T	S	T	F	S	W	S	M	83 T	113 S
6	T	F	F	M	W	S	M	T	24 S	T	F	S
7	W	S	S	T	T	S	T	24 F	M	W	S	M
8	T	164 * S	S	W	F	14 M	20 W	S	T	T	S	T
9	90 F	M	M	43 T	31 S	T	T	S	W	F	M	W
10	S	T	61 T	F	S	W	F	M	T	S	T	T
11	S	W	W	S	M	T	S	T	F	S	112 W	25 F
12	M	T	T	S	T	F	S	W	36 S	M	T	S
13	T	F	F	M	W	S	M	19 T	S	T	F	S
14	W	101 S	S	T	T	S	23 T	F	M	W	S	M
15	125 T	S	S	34 W	13 F	M	W	S	T	T	S	T
16	F	M	39 M	T	S	T	T	S	W	F	M	W
17	S	T	T	F	S	W	F	M	T	S	147 T	69 T
18	98 S	W	W	S	M	T	S	T	43 F	S	W	F
19	M	T	T	S	T	F	S	21 W	S	M	T	S
20	T	141 F	F	M	W	12 S	11 M	T	S	T	F	85 S
21	179 * W	S	S	43 T	12 T	S	T	F	M	W	S	M
22	T	S	87 S	W	F	M	W	S	T	121 T	S	T
23	F	M	M	T	S	T	T	S	W	F	69 M	121 W
24	S	T	T	F	S	W	F	M	47 T	S	T	T
25	S	W	W	S	M	T	S	13 T	F	S	W	F
26	M	97 T	T	S	T	20 F	16 S	W	S	M	T	174 * S
27	T	F	F	39 M	17 W	S	M	T	S	T	F	S
28	W	S	28 S	T	T	S	T	F	M	W	S	M
29	T		S	W	F	M	W	S	T	T	102 S	189 * T
30	F		M	T	S	T	T	S	43 W	167 * F	M	W
31	S		T		S		F	20 M		S		T
NUMBER	5	5	5	5	5	4	5	6	5	2	5	7
MAXIMUM	179	167	104	52	31	20	23	24	47	167	147	189
ARITH-MEAN	125	134	64	42	19	17	18	19	39	144	103	111
SAMPLE FREQS(QTRLY MIN)			(6)			(6)			(6)			(6)
QTRLY ARITH MEAN			107.4			27.2			24.9			109.4
QTRLY EXP NUM EXCEED			19.29			0.00			0.00			16.73

TOTAL SAMPLES = 59
ARITHMETIC MEAN = 67.2
ARITHMETIC STANDARD DEVIATION = 53

6 STARRED (*) ITEMS EXCEEDED THE PRIMARY STANDARD OF 150-UG/CU METER (25 C)
DOES NOT MEET SUMMARY CRITERIA
PRIMARY STANDARD OF 50-UG/CU METER (25 C)

EXPECTED NUMBER OF EXCEEDANCES 36.0
WAS EXCEEDED

SAMPL: STRATA USED BECAUSE OF UNSCHEDULED SAMPLES

10/02/91
AMP355RP

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
STANDARDS REPORT - PM10 TOTAL 0-10UM (81102)
DAILY VALUES
STATE 16 IDAHO

SITE-ID: 16-079-0017 POC: 1
COUNTY (079): SHOSHONE CO
CITY (00000): NOT IN A CITY
SITE ADDRESS: PINEHURST SCHOOL, PINEHURST
SUPPORT AGENCY (000): *** NOT FOUND ***
SITE COMMENTS: SLAMS TSP SITE.SLAMS PB 1-1-82
MONITOR COMMENTS: 52
REPORTING ORGANIZATION (000): *** NOT FOUND ***
MONITOR TYPE (2): SLAMS

AQCR (062): EASTERN WASHINGTON-NORTHERN IDAHO
URBAN AREA (0000): NOT IN AN URBAN AREA
LAND USE (1): RESIDENTIAL
LOCATION-SETTING (1): URBAN AND CENTER CIT
MONITORING OBJECTIVE ( ): *** NOT FOUND ***

LATITUDE: 47:32:16 N
LONGITUDE: 116:14:10 W
UTM ZONE: 11
UTM-NORTHING: 5265000
UTM-EASTING: 00557500
ELEVATION-MSL: 00671 M
UNITS (001): UG/CU MET
PROBE HEIGHT: 5 M

COLLECTION AND ANALYSIS METHOD (RRR): MULTIPLE REFERENCE METHOD CODES

SLAMS 1/6 RUN DAYS

		JAN 1988	FEB 1988	MAR 1988	APR 1988	MAY 1988	JUN 1988	JUL 1988	AUG 1988	SEP 1988	OCT 1988	NOV 1988	DEC 1988
	1	F	97 M	88 T	F	S	W	F	42 M	T	S	65 T	61 T
	2	S	T	W	S	M	17 T	23 S	T	F	S	W	F
	3	S	82 [W]	T	13 [S]	24 T	F	S	W	S	M	13 T	78 S
	4	73 [M]	T	49 [F]	M	W	S	M	T	S	26 T	F	S
D	5	T	F	S	T	T	S	T	F	M	W	37 S	57 M
	6	W	74 S	S	W	F	M	W	S	138 T	42 T	S	T
A	7	92 T	S	53 M	T	S	T	T	21 S	W	F	40 M	W
	8	F	M	T	F	S	W	14 F	M	T	44 S	T	T
Y	9	S	55 [T]	W	70 [S]	26 M	13 T	S	T	F	S	63 W	76 F
	10	85 [S]	W	38 [T]	S	T	F	S	W	S	42 M	T	S
	11	M	T	F	M	W	S	M	T	S	T	35 F	47 S
O	12	T	70 F	S	T	T	S	T	F	29 M	49 W	S	M
	13	78 W	S	S	W	F	M	W	30 S	T	T	70 S	T
F	14	T	S	M	T	S	24 T	11 T	S	W	47 F	M	W
	15	F	30 [M]	T	45 [F]	18 S	W	F	M	T	S	86 T	116 T
	16	86 [S]	T	92 [W]	S	M	T	S	T	F	58 S	W	F
M	17	S	W	T	S	T	F	S	W	S	M	28 T	115 S
	18	M	78 T	F	M	W	S	M	T	22 S	23 T	F	S
O	19	56 T	F	78 S	T	T	S	T	27 F	M	W	38 S	102 M
	20	W	S	S	W	F	26 M	17 W	S	T	72 T	S	T
N	21	154 T	[S]	M	27 [T]	27 S	T	T	S	W	F	34 M	63 W
	22	[F]	M	31 [T]	F	S	W	F	M	T	59 S	T	T
T	23	S	T	W	S	M	T	S	T	F	S	29 W	46 F
	24	S	164 * W	T	S	T	F	S	W	30 S	50 M	T	S
H	25	133 M	T	16 F	M	W	S	M	48 T	S	T	65 F	139 S
	26	T	F	S	T	T	12 S	23 T	F	M	47 W	S	M
	27	W	130 [S]	S	32 [W]	20 F	M	W	S	T	T	50 S	65 T
	28	183 * [T]	S	[M]	T	S	T	T	S	W	94 F	M	W
	29	F	M	T	F	S	W	F	M	T	S	84 T	63 T
	30	S		41 W	S	M	T	S	T	26 F	90 S	W	F
	31	32 S		T		T		S	30 W		M		68 S
NUMBER		10	9	9	5	5	5	5	6	5	14	15	14
MAXIMUM		183	164	92	70	27	26	23	48	138	94	86	139
ARITH-MEAN		97	87	54	37	23	18	18	33	49	53	49	78
SAMPLE FREQS(QTRLY MIN)				(3)			(6)			(6)			(2)
QTRLY ARITH MEAN				79.6			26.3			33.2			59.9
QTRLY EXP NUM EXCEED				7.00			0.00			0.00			0.00

TOTAL SAMPLES = 102   2 STARRED (*) ITEMS EXCEEDED THE PRIMARY STANDARD OF 150-UG/CU METER (25 C)
ARITHMETIC MEAN = 49.7   MEETS SUMMARY CRITERIA   EXPECTED NUMBER OF EXCEEDANCES 7.0
ARITHMETIC STANDARD DEVIATION = 36   PRIMARY STANDARD OF 50-UG/CU METER (25 C) WAS MET
THIS PAGE CONTAINS EXCEPTIONAL EVENT DATA
SAMPLING STRATA USED BECAUSE OF UNSCHEDULED SAMPLES

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
STANDARDS REPORT - PM10 TOTAL 0-10UM (81102)
DAILY VALUES
STATE 16 IDAHO

SITE-ID: 16-079-0017 POC: 1
COUNTY (079): SHOSHONE CO
CITY (00000): NOT IN A CITY
SITE ADDRESS: PINEHURST SCHOOL, PINEHURST
SUPPORT AGENCY (000): *** NOT FOUND ***
SITE COMMENTS: SLAMS TSP SITE.SLAMS PB 1-1-82
MONITOR COMMENTS: 52
REPORTING ORGANIZATION (001): IDAHO DEPARTMENT OF HEALTH AND WELFAR
MONITOR TYPE (2): SLAMS
COLLECTION AND ANALYSIS METHOD (RRR): MULTIPLE REFERENCE METHOD CODES

AQCR (062): EASTERN WASHINGTON-NORTHERN IDAHO
URBAN AREA (0000): NOT IN AN URBAN AREA
LAND USE (1): RESIDENTIAL
LOCATION-SETTING (1): URBAN AND CENTER CIT
MONITORING OBJECTIVE ( ): *** NOT FOUND ***

LATITUDE: 47:32:16 N
LONGITUDE: 116:14:10 W
UTM ZONE: 11
UTM-NORTHING: 5265000
UTM-EASTING: 00557500
ELEVATION-MSL: 00671 M
UNITS (001): UG/CU MET
PROBE HEIGHT: 5 M

		JAN 1989		FEB 1989		MAR 1989		APR 1989		MAY 1989		JUN 1989		JUL 1989		AUG 1989		SEP 1989		OCT 1989		NOV 1989		DEC 1989	
	1		S		W	21	W		S		M		T		S		T		F	20	S		W		F
	2	56	M		T		T		S		T		F		S	17	W		S		M	84	T	98	S
	3		T	31	F	69	F		M		W	19	S	14	M		T		S	36	T		F		S
	4	68	W		S		S	27	T	23	T		S		T		F		M		W	42	S	46	M
D	5		T	84	S	39	S		W		F		M		W		S		T	49	T		S		T
	6	38	F		M		M		T		S		T		T		S		W		F	27	M	34	W
A	7		S	124	T	66	T		F		S		W		F		M	24	T	42	S		T		T
	8	41	S		W		W		S		M		T		S	26	T		F		S	49	W	23	F
Y	9		M	122	T	59	T		S		T	36	F	20	S		W		S	41	M		T		S
	10		T		F		F	35	M	16	W		S		M		T		S		T	20	F	45	S
	11		W	119	S	32	S		T		T		S		T		F		M	28	W		S		M
O	12	64	T		S		S		W		F		M		W		S		T		T	18	S	80	T
	13		F	56	M	39	M		T		S		T		T		S		W	34	F		M		W
F	14	23	S		T		T		F		S		W		F	25	M		T		S	35	T	100	T
	15		S	107	W	34	W		S		M	9	T	29	S		T		F	35	S		W		F
	16	14	M		T		T	29	S	25	T		F		S		W		S		M	54	T	25	S
M	17		T	38	F	28	F		M		W		S		M		T		S	57	T		F		S
	18	48	W		S		S		T		T		S		T		F		M		W	46	S	36	M
O	19		T	53	S	49	S		W		F		M		W		S	26	T	75	T		S		T
	20	131	F		M		M		T		S		T		T	18	S		W		F	36	M	100	W
N	21		S	62	T	22	T		F		S	15	W	30	F		M	32	T	12	S		T		T
	22	42	S		W		W	21	S	22	M		T		S		T		F		S	39	W	83	F
T	23		M	56	T	54	T		S		T		F		S		W		S	26	M		T		S
	24	64	T		F		F		M		W		S		M		T		S		T	28	F	45	S
H	25		W	74	S	33	S		T		T		S		T		F	306 *	M	27	W		S		M
	26	72	T		S		S		W		F		M		W	11	S		T		T	54	S	18	T
	27		F	27	M	16	M		T		S	36	T	35	T		S	53	W	27	F		M		W
	28	87	S		T		T	32	F	12	S		W		F		M		T		S	58	T	19	T
	29		S			31	W		S		M		T		S		T		F	49	S		W		F
	30	9	M				T		S		T		F		S		W		S		M		T	61	S
	31		T			13	F				W				M		T			65	T				S
NUMBER		14		13		16		5		5		5		5		5		5		16		14		15	
MAXIMUM		131		124		69		35		25		36		35		26		306		75		84		100	
ARITH-MEAN		54		73		38		29		20		23		26		19		88		39		42		54	
SAMPLE FREQS(QTRLY MIN)						2(6)						(6)						(6)						(2)	
QTRLY ARITH MEAN						53.9						23.8						35.2						45.0	
QTRLY EXP NUM EXCEED						0.00						0.00						3.54						0.00	

TOTAL SAMPLES = 118
ARITHMETIC MEAN = 39.5
ARITHMETIC STANDARD DEVIATION = 36

1 STARRED (*) ITEMS EXCEEDED THE PRIMARY STANDARD OF 150-UG/CU METER (25 C)
DOES NOT MEET SUMMARY CRITERIA
PRIMARY STANDARD OF 50-UG/CU METER (25 C)

EXPECTED NUMBER OF EXCEEDANCES 3.5
WAS MET

THIS PAGE CONTAINS EXCEPTIONAL EVENT DATA
SAMPLI[illegible] TRATA USED BECAUSE OF UNSCHEDULED SAMPLES

[illegible] LING STRATA USED DUE TO MID-QTR CHANGE IN SAMPLING FREQ[illegible]NCY

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
STANDARDS REPORT - PM10 TOTAL 0-10UM (81102)
DAILY VALUES
STATE 16 IDAHO

SITE-ID: 16-079-0017 POC: 1
COUNTY (079): SHOSHONE CO
CITY (00000): NOT IN A CITY
SITE ADDRESS: PINEHURST SCHOOL, PINEHURST
SUPPORT AGENCY (000): *** NOT FOUND ***
SITE COMMENTS: SLAMS TSP SITE.SLAMS PB 1-1-82
MONITOR COMMENTS: 52
REPORTING ORGANIZATION (001): IDAHO DEPARTMENT OF HEALTH AND WELFAR
MONITOR TYPE (2): SLAMS
COLLECTION AND ANALYSIS METHOD (063): HI-VOL-SA/GMW-1200 GRAVIMETRIC

AQCR (062): EASTERN WASHINGTON-NORTHERN IDAHO
URBAN AREA (0000): NOT IN AN URBAN AREA
LAND USE (1): RESIDENTIAL
LOCATION-SETTING (1): URBAN AND CENTER CIT
MONITORING OBJECTIVE ( ): *** NOT FOUND ***

LATITUDE: 47:32:16 N
LONGITUDE: 116:14:10 W
UTM ZONE: 11
UTM-NORTHING: 5265000
UTM-EASTING: 00557500
ELEVATION-MSL: 00671 M
UNITS (001): UG/CU MET
PROBE HEIGHT: 5 M

		JAN 1990		FEB 1990		MAR 1990		APR 1990		MAY 1990		JUN 1990		JUL 1990		AUG 1990		SEP 1990		OCT 1990		NOV 1990		DEC 1990	
	1	57	M		T		T		S		T		F		S		W		S		M	33	T	13	S
	2		T	19	F	41	F		M		W		S		M		T	19	S	30	T		F		S
	3	70	W		S		S		T		T		S		T	19	F		M		W	63	S	50	M
	4		T	36	S	61	S		W		F	13	M	11	W		S		T	26	T		S		T
D	5	47	F		M		M	38	T	15	S		T		T		S		W		F	30	M	57	W
	6		S	16	T	101	T		F		S		W		F		M		T	32	S		T		T
A	7	20	S		W		W		S		M		T		S		T		F		S	48	W	93	F
	8		M	36	T	7	T		S		T		F		S		W	50	S	54	M		T		S
Y	9	18	T		F		F		M		W		S		M	32	T		S		T	12	F	76	S
	10		W	82	S	20	S		T		T	4	S	16	T		F		M	26	W		S		M
	11		T		S		S	30	W	16	F		M		W		S		T		T	63	S	22	T
O	12		F	35	M	36	M		T		S		T		T		S		W	25	F		M		W
	13	58	S		T		T		F		S		W		F		M		T		S	79	T	40	T
F	14		S	51	W	41	W		S		M		T		S		T	33	F	28	S		W		F
	15	36	M		T		T		S		T		F		S	39	W		S		M	51	T	83	S
	16		T	52	F	46	F		M		W	10	S	29	M		T		S	41	T		F		S
M	17	95	W		S		S	17	T	16	T		S		T		F		M		W	30	S	41	M
	18		T	32	S	58	S		W		F		M		W		S		T	38	T		S		T
O	19	70	F		M		M		T		S		T		T		S		W		F	36	M	17	W
	20		S	54	T	37	T		F		S		W		F		M	29	T	30	S		T		T
N	21	65	S		W		W		S		M		T		S	8	T		F		S	45	W	49	F
	22		M	77	T	24	T		S		T	33	F	15	S		W		S	33	M		T		S
T	23	20	T		F		F	13	M	2	W		S		M		T		S		T	7	F	31	S
	24		W	95	S	48	S		T		T		S		T		F		M	58	W		S		M
H	25	11	T		S		S		W		F		M		W		S		T		T	18	S	42	T
	26		F	74	M	55	M		T		S		T		T		S	41	W	32	F		M		W
	27	11	S		T		T		F		S		W		F	10	M		T		S	28	T	20	T
	28		S	142	W	58	W		S		M	10	T	12	S		T		F	56	S		W		F
	29	12	M				T	21	S	11	T		F		S		W		S		M	12	T	55	S
	30		T			60	F		M		W		S		M		T		S	43	T		F		S
	31	28	W				S				T				T		F				W			27	M
NUMBER		15		14		15		5		5		5		5		5		5		15		15		16	
MAXIMUM		95		142		101		38		16		33		29		39		50		58		79		93	
ARITH-MEAN		41		57		46		24		12		14		17		22		34		37		37		45	
SAMPLE FREQS(QTRLY MIN)						(2)						(6)						(6)						(2)	
QTRLY ARITH MEAN						48.0						16.6						24.2						39.6	
QTRLY EXP NUM EXCEED						0.00						0.00						0.00						0.00	

TOTAL SAMPLES = 120
ARITHMETIC MEAN = 32.1
ARITHMETIC STANDARD DEVIATION = 24

0 STARRED (*) ITEMS EXCEEDED THE PRIMARY STANDARD OF 150-UG/CU METER (25 C)
DOES NOT MEET SUMMARY CRITERIA
PRIMARY STANDARD OF 50-UG/CU METER (25 C) WAS MET

EXPECTED NUMBER OF EXCEEDANCES 0.0

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
STANDARDS REPORT - PM10 TOTAL 0-10UM (81102)
DAILY VALUES
STATE 16 IDAHO

SITE-ID: 16-079-0017 POC: 1
COUNTY (079): SHOSHONE CO
CITY (00000): NOT IN A CITY
SITE ADDRESS: PINEHURST SCHOOL, PINEHURST
SUPPORT AGENCY (000): *** NOT FOUND ***
SITE COMMENTS: SLAMS TSP SITE.SLAMS PB 1-1-82
MONITOR COMMENTS: 52
REPORTING ORGANIZATION (001): IDAHO DEPARTMENT OF HEALTH AND WELFAR
MONITOR TYPE (2): SLAMS
COLLECTION AND ANALYSIS METHOD (063): HI-VOL-SA/GMW-1200 GRAVIMETRIC

AQCR (062): EASTERN WASHINGTON-NORTHERN IDAHO
URBAN AREA (0000): NOT IN AN URBAN AREA
LAND USE (1): RESIDENTIAL
LOCATION-SETTING (1): URBAN AND CENTER CIT
MONITORING OBJECTIVE ( ): *** NOT FOUND ***

LATITUDE: 47:32:16 N
LONGITUDE: 116:14:10 W
UTM ZONE: 11
UTM-NORTHING: 5265000
UTM-EASTING: 00557500
ELEVATION-MSL: 00671 M
UNITS (001): UG/CU MET
PROBE HEIGHT: 5 M

DAY OF MONTH	JAN 1991		FEB 1991		MAR 1991		APR 1991		MAY 1991		JUN 1991		JUL 1991		AUG 1991		SEP 1991		OCT 1991		NOV 1991		DEC 1991	
1		T	123	F	82	F		M		W		S		M		T		S		T		F		S
2	39	W		S		S		T		T		S		T		F		M		W		S		M
3		T	76	S	16	S		W		F		M		W		S		T		T		S		T
4	64	F		M		M		T		S		T		T		S		W		F		M		W
5		S	79	T	11	T		F		S	16	W		F		M		T		S		T		T
6	76	S		W		W	31	S		M		T		S		T		F		S		W		F
7		M	76	T	60	T		S		T		F		S		W		S		M		T		S
8	59	T		F		F		M		W		S		M		T		S		T		F		S
9		W	82	S	42	S		T		T		S		T		F		M		W		S		M
10	159 *	T		S		S		W		F		M		W		S		T		T		S		T
11		F	99	M	66	M		T		S	47	T		T		S		W		F		M		W
12	20	S		T		T		F		S		W		F		M		T		S		T		T
13		S	89	W	40	W		S		M		T		S		T		F		S		W		F
14	112	M		T		T		S		T		F		S		W		S		M		T		S
15		T	56	F	46	F		M		W		S		M		T		S		T		F		S
16	77	W		S		S		T		T		S		T		F		M		W		S		M
17		T	50	S	68	S		W		F	15	M		W		S		T		T		S		T
18	66	F		M		M	30	T		S		T		T		S		W		F		M		W
19		S	42	T	49	T		F		S		W		F		M		T		S		T		T
20	79	S		W		W		S		M		T		S		T		F		S		W		F
21		M	82	T	28	T		S		T		F		S		W		S		M		T		S
22	122	T		F		F		M		W		S		M		T		S		T		F		S
23		W	87	S	45	S		T		T	12	S		T		F		M		W		S		M
24	57	T		S		S	10	W		F		M		W		S		T		T		S		T
25		F	120	M	26	M		T		S		T		T		S		W		F		M		W
26	103	S		T		T		F		S		W		F		M		T		S		T		T
27		S	104	W	36	W		S		M		T		S		T		F		S		W		F
28	64	M		T		T		S		T		F		S		W		S		M		T		S
29		T			47	F		M		W	12	S		M		T		S		T		F		S
30	134	W				S	15	T		T		S		T		F		M		W		S		M
31		T			37	S				F				W		S				T				T
NUMBER	15		14		16		4				5													
MAXIMUM	159		123		82		31				47													
ARITH-MEAN	82		83		44		22				20													
SAMPLE FREQS(QTRLY MIN)					(2)						(6)						( )						( )	
QTRLY ARITH MEAN					68.8						20.9													
QTRLY EXP NUM EXCEED					2.00						0.00						0.00						0.00	

TOTAL SAMPLES = 54
ARITHMETIC MEAN = 44.8
ARITHMETIC STANDARD DEVIATION = 35

1 STARRED (*) ITEMS EXCEEDED THE PRIMARY STANDARD OF 150-UG/CU METER (25 C)
DOES NOT MEET SUMMARY CRITERIA
PRIMARY STANDARD OF 50-UG/CU METER (25 C)
EXPECTED NUMBER OF EXCEEDANCES 2.0
WAS MET

24 Hour Standard Exceedances in Pinehurst

205 ug/m^3	1-2-86
198 ug/m^3	1-8-86
372 ug/m^3	1-14-86
170 ug/m^3	2-25-86
179 ug/m^3	1-21-87
167 ug/m^3	2-2-87
164 ug/m^3	2-8-87
167 ug/m^3	10-30-87
174 ug/m^3	12-29-87
189 ug/m^3	12-29-87
183 ug/m^3	1-28-88
164 ug/m^3	2-24-88
*306 ug/m^3	9-25-89

* exceptional event, dust storm

IDAHO DEPARTMENT
OF HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

1410 North Hilton, Statehouse Mail, Boise, ID 83720-9000, (208) 334-0502

Cecil D. Andrus, Governor Richard P. Donovan, Director

June 25, 1991

Mr. William Puckett
USEPA, Region X
ES-097
1200 Sixth Ave.
Seattle, Washington 98101

Dear Mr. Puckett,

On September 25, 1989 extremely high PM-10 concentrations were recorded at the northern Idaho SLAMS particulate monitoring sites. A concentration of 306 ug/m^3 was recorded in Pinehurst, 441 ug/m^3 was recorded in Coeur d'Alene, and 607 ug/m^3 (TSP) was measured at Kellogg. The IAQB has flagged these pieces of data in the AIRS system as exceptional events due to a wind storm. We would like your review of the enclosed supporting information and your concurrence that these data were indeed caused by an exceptional wind and dust storm.

To summarize the inclosed documentation, a significant dust storm hit Spokane with rapid pressure changes and strong and gusty winds on the afternoon of September 25, 1989. Limited visibility and blowing dust was reported in the Spokane area two hours after the storm hit. Winds gusted to 28 knots or higher in Spokane during this time. The dust persisted for the rest of the day and continued to obscure visibility. Numerous Spokane area PM-10 monitors all measured significant blowing dust impacts and these data were flagged as exceptional events. Meteorological data from northern Idaho appear to have been less gusty than in Spokane. A significant PM-10 impact was noticed at most northern Idaho PM-10 monitors running on September 25 and 26. It appears that dust from the Palouse dust storm advected into northern Idaho and caused exceptional PM-10 values. Unfortunately, nephelometer readings from Pinehurst and Sandpoint are not available for September 1989.

We would appreciate a timely response to this exceptional event verification request. As you are aware we are currently working on the Silver Valley PM-10 SIP and the status of the 306 ug/m3 concentration from Pinehurst is critical to our SIP presentation. This is the only non-winter PM-10 24 hour standard violation recorded in the Silver Valley. We are proceeding under the assumption that you will find this exceedance to be caused by an exceptional event since the conditions that created this violation were regional in nature. It is unrealistic to control such events through the SIP process. We will consider the 306 ug/m^3 in data summaries and in the expected number of exceedances calculations, but do not believe this event should be considered in the Silver Valley modeling effort and in control strategy development. Please let us know the results of your review as soon as possible.

Sincerely,

Robert Wilson for:

Orville Green
Acting Chief,
Air Quality Bureau

cc: Jon Schweiss, EPA-10
George Lauderdale, EPA-10
Dave Pisarski, IAQB
Helen Rigg, IAQB
Mark Masarik, EPA-IOO
COF 1.1

United States
Environmental Protection
Agency

Region 10
1200 Sixth Avenue
Seattle WA 98101

Alaska
Idaho
Oregon
Washington

Helen

EPA

RECEIVED
JUL 29 1991
DHW - Div. Of Environment
Air Quality Bureau

July 25, 1991

Reply To
Attn of: ES-097

Orville Green, Acting Chief
Idaho Air Quality Bureau
1410 N. Hilton
Boise, Idaho 83706

Dear ~~Mr. Green~~ Orville:

We concur with your exceptional event classification of particulate samples collected at the Pinehurst (PM-10, 306 ug/m3), Coeur d'Alene (PM-10, 441 ug/m3), and Kellog (TSP, 607 ug/m3) SLAMS monitoring sites on September 25, 1989. The meteorological data show that a short duration wind storm accompanied by blowing dust hit Eastern Washington and Northern Idaho in the early evening (8:00-to-9:00 PM PDT in Spokane).

Although these data are flagged as exceptional events in AIRS, it does not preclude them from use in SIP regulatory activities (See Section 3.4, Guideline on the Identification and Use of Air Quality Date Affected by Exceptional Events). A decision on whether and how to use these data should be part of the SIP process.

Exceptional event classification of these data is not a clear-cut determination. First, there is evidence that wind storms with blowing dust are not uncommon in Eastern Washington and Northern Idaho during the late summer and early fall. A similar wind storm event in Spokane resulted in PM-10 exceedance levels on September 6, 1988. Second, it appears the high particulate levels during these events are attributable to agricultural dust, which may be controlled to some degree through the SIP process. Third, the "Exceptional Events Guidance" classifies "high winds" as hourly wind speeds in excess of 30 mph. However, the maximum hourly wind speeds on both September 25, 1989 and September 6, 1988 were only in the 20 mph range, suggesting that only moderate wind is required to re-entrain agricultural dust to the extent that PM-10 exceedances result.

If in the future it is determined that these PM-10 impacts routinely occur during the late summer and fall, the exceptional event classification will be removed. However, for the present, it seems appropriate to classify these data as exceptional events.

If you have any comments or questions on this matter, please give me a call at (206) 553-1690.

Sincerely,

Jon Schweiss, Chief
Air Monitoring and Analysis Section

APPENDIX B

EMISSION INVENTORY POINT SOURCES

Pinehurst PM_{10}
Air Quality Improvement Plan
February 5, 1992

APPENDIX B

EMISSION INVENTORY DETAIL

AND PROJECTIONS

TABLE OF CONTENTS

I. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) has promulgated new federal ambient air quality standards for inhalable particulate matter with an aerodynamic particle diameter less than or equal to 10 micrometers (PM_{10}). This standard replaced the total suspended particulate (TSP) standard.

The Silver Valley area in Shoshone County has been identified as a problem area for PM_{10}. PM_{10} monitoring in this area has shown that PM_{10} ambient concentrations have exceeded the PM_{10} National Ambient Air Quality PM_{10} Standards (NAAQS).

Idaho is required by Section 110 of the Federal Clean Air Act to submit a State Implementation Plan (SIP) for the Silver Valley. This SIP must show strategies for attainment and maintenance of PM_{10} standards. Development of a comprehensive emission inventory is an integral part of the SIP.

This report, prepared by the Idaho Air Quality Bureau (IAQB), serves to summarize the procedures and results of a TSP and PM_{10} point source emission inventory for the Silver Valley. The TSP and PM_{10} emissions were inventoried to account for any problems resulting in the transition from TSP to PM_{10} standards.

The geographic area inventoried includes the Silver Valley from Kingston to Mullan with boundaries to the north and south generally following the ridge lines running parallel to the valley. Most of the population and industries are located on the valley floor, while some pockets of population and industries, such as mines, exist in side valleys. Figure 1 shows the area inventoried.

The dominant industries in the Silver Valley include logging, lumber mills, and mining. For this SIP, logging emissions (logging truck traffic and slash burning) were covered as area sources. Therefore, the main industries in the point source inventory were lumber mills and mines.

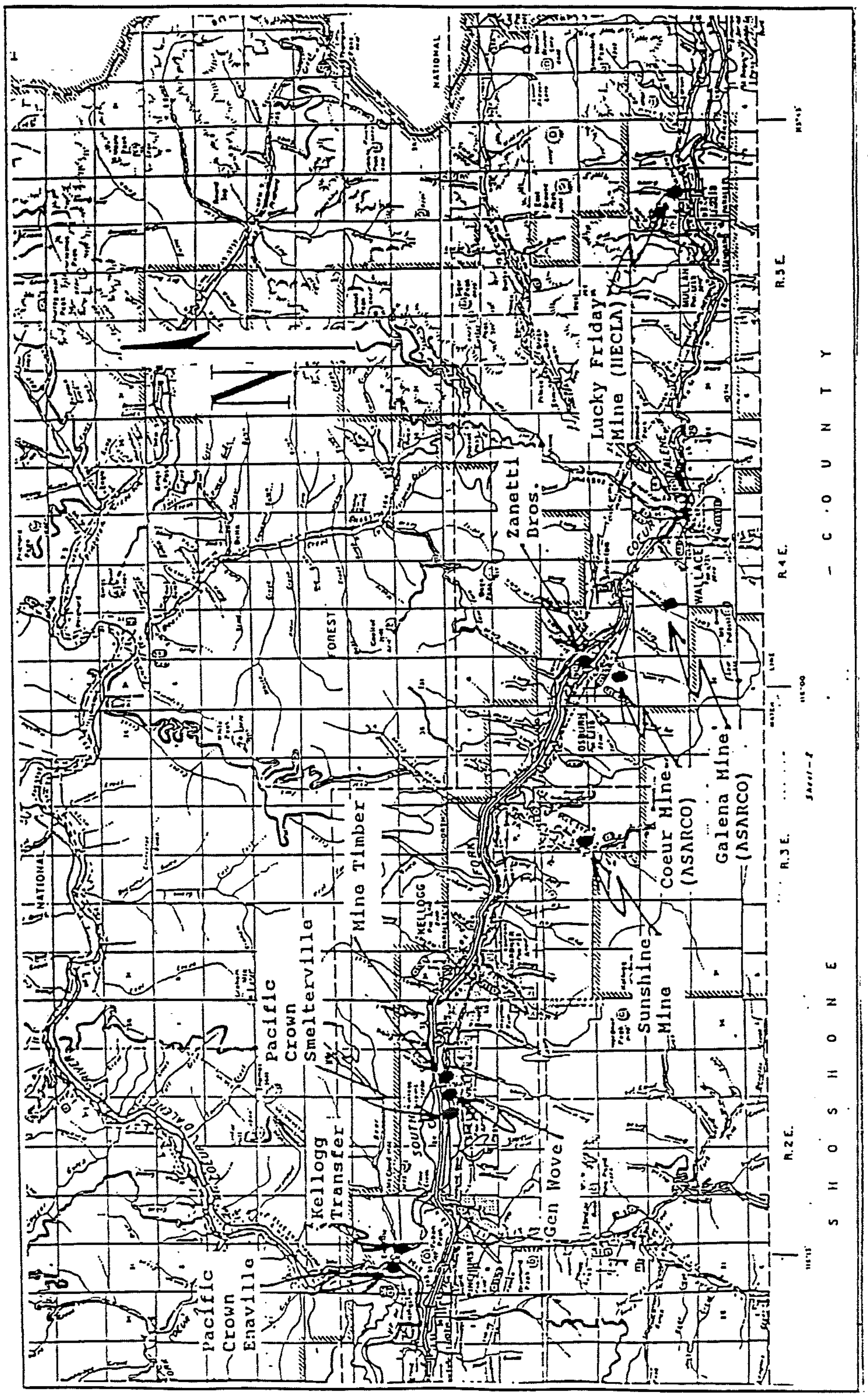
The area between and including Smelterville and Kellogg is currently being investigated by the EPA and State Hazardous Materials Bureau as a CERCLA (Superfund) project. This area includes the Bunker Hill lead smelting facility which is no longer operating.

It should also be noted that this area has been experiencing a significant recession. Therefore some of the plants covered in this inventory have shut down or cut back production since 1988, or are planning shut down or cut back measures in the near future.

Where possible, data collected from facilities were for 1988 operations. When adequate 1988 data were not available, the

FIGURE B - 1

TSP and PM_{10} emission inventory area and plant locations.



previous year's data were used, provided the facility in question did not significantly alter processes or rates of production between the two time periods.

Total TSP and PM_{10} emission rates for inventoried facilities with emissions exceeding 1000 lbs per year (0.5 tons) are listed in Attachment A. Emission rates and emission estimation parameters for specific sources within individual facilities are included in Attachment B.

The IAQB contracted PEI Associates, Inc. to calculate emission rates for lumber mills in the area between Kingston and Kellogg. This work was checked and most of it needed to be recalculated by IAQB staff. The remaining facilities in the Kellogg to Mullan area were inventoried and emissions were calculated by IAQB staff.

Quality control checks were performed to ensure that all arithmetic errors were found and corrected, and that proper emission equations and factors were used.

II. IDENTIFICATION OF SOURCES

The IAQB established an initial list of TSP and PM_{10} source facilities by researching IAQB facility source files. These files contain all of the air quality permits issued to facilities (permits to construct and operating permits), inspection reports of facilities, and other information on facilities that the IAQB may possess. Source files within the region to be inventoried were identified by searching the Compliance Data System (CDS) and the Point Source Emission System (PSES, a State database) for sources in Shoshone County.

As a final check, IAQB staff performed a rough "windowshield survey" by car of the inventoried areas to ensure that no large emission sources were missed.

Table 1 includes a list of the inventoried facilities, their mailing addresses, and their UTM coordinates. Two of the listed companies, Pacific Crown and Asarco, operate two facilities each. For each of these companies the two facilities are listed under the single company name.

III. INITIAL DATA GATHERING

Data needed to calculate emissions from facilities in the Silver Valley were calculated in two stages. The first stage covered the emissions inventory area from Kingston to Kellogg since this was the area defined for the initial inventory effort. This initial effort was conducted by IAQB staff along with the assistance of an outside contractor, PEI. The second stage consisted of reviewing the work accomplished during the first stage in addition to inventorying the sources from Kellogg to Mullan when the inventory area was expanded. The second stage work was completed solely by IAQB staff.

In the first stage, data needed to calculate emissions were obtained by mailing questionnaires to facilities with potential sources. A general request sheet, developed by IAQB staff, requested the facility to submit a general description of the facility, a scaled plot plan of the facility, a process flow diagram describing what takes place at the facility, production values, detailed descriptions of emission sources and emission control methods used, seasonal operation information, hours of operation, and other data. A cover sheet briefly explained why the IAQB was requesting the information and when the information was needed.

In this stage specific data requests were categorized into six tables according to emission types. These tables included the following source categories: combustion equipment, general process equipment, aggregate handling equipment, stacks or vents (this table was referenced by other tables if emissions were vented to a stack or vent), vehicle traffic on paved and unpaved roads, and storage piles. If the IAQB already had some data for a certain facility, those data were included on the tables before the tables were mailed to facilities. Facilities were then asked to verify or correct the existing data.

Many of the questionnaires submitted to facilities were not returned to the IAQB by the requested deadline date, which was about one month. The IAQB contacted these facilities by phone to determine why the questionnaires were not returned, and to stress the importance of submitting the requested information as soon as possible.

In many cases PEI determined that the data collected were either not accurate or were not complete. PEI then contacted the facilities to obtain the needed data. If the required data were not available, PEI or the IAQB made appropriate assumptions for missing parameters needed to calculate emissions. Assumptions made were based on existing known data for the facility, as well as previous knowledge and experience with similar facilities. These assumptions are covered in the footnotes in Attachment B.

The second stage of the inventory began by reviewing the data compiled in the first stage. As these data were found to be mostly unacceptable, they were recalculated though IAQB staff did occasionally use the emission factors compiled in the first stage (see footnotes in Attachment B). The unacceptable data were discovered when erroneous balances of inputs and outputs were noted for the lumber mills.

During the second stage, questionnaires were sent by fax to the facilities. These questionnaires requested similar information as

TABLE 1

Silver Valley Point Sources

FACILITY	SOURCE TYPE	MAILING ADDRESS STREET	CITY	ZIP	UTM H	UTM V	LOCATION NOTES
Pacific Crown Timber Products	Sawmill	P. O. Box 189	Plummer	83851	557.7	5267.7	Enaville
	Planer Mill				560.9	5265.8	Smelterville
Kellogg Transfer	Framer, Press. Treat., and Chip Handling	P. O. Box 70	Kingston	83829	556.8	5267.4	Enaville
Mine Timber Inc.	Plane & Saw Rough Green Lumber	P. O. Box 479	Kellogg	83837	562.6	5265.9	Smelterville
Gen Wove	Produce Rough Green Lumber	P. O. Box 310	Smelterville	83868	561.5	5265.9	Smelterville
Sunshine Mining Co.	Mine, Mill, and Refine, Silver, Antimony, Copper, and Gold	P. O. Box 1080	Kellogg	83837	570.0	5263.3	Refinery-Big Ck Residential Area
					569.8	5260.9	Mine-South of Refinery
					571.0	5263.3	Tailings-No. of Refinery
Zanetti Bros.	Rock Crushing Concrete Batching	P. O. Box 500	Osburn	83849	575.5	5261.2	E. Osburn
ASARCO, Inc.	Mine and Mill Silver and Lead Ore	P. O. Box 440	Wallace	83873	577.6	5258.4	Galena Mine-Lake Creek
					575.6	5259.5	Coeur Mine-Shields Gulch
					576.9	5260.3	Tailings E. of Osburn
HECLA Mining Co.	Mine and Mill Silver, Lead, and Zinc Ore	6500 Mineral Dr.	Coeur d'Alene	83814	591.6	5257.3	Mine-East of Mullan
					589.5	5256.7	Tailings-West of Mullan

the initial questionnaires, but were abbreviated so that only necessary data were requested.

After the questionnaires were sent by fax, some data were collected during visits to facilities. The facilities were contacted by phone to inform them about the project and to schedule a visit to their site. These visits were scheduled after the facility had about one week to review and to work on the questionnaire. They were asked to have at least reviewed the requested data, and to be prepared to address the questions before the scheduled visit. The results of these visits were variable, but, in general, they were beneficial to the inventory project. One benefit of visiting the facilities was that this allowed IAQB staff to visually assess source emissions and controls, thus gaining information on which sources at each facility were the most significant. Another benefit was that these visits expedited the gathering of data from each facility since the data could be reviewed at the site and any deficiencies in the data could be addressed immediately.

Some facilities were dropped from the list of source facilities after IAQB staff spoke with them and determined that emissions from the facility in question would be insignificant (obviously less than one ton of TSP per year).

For emissions from the Bunker Hill Superfund site we used the emission rate estimated by Dames and Moore[1,2]. This study focuses on estimating windblown dust in and around the Bunker Hill Superfund site to assess the impact of toxics entrained in the dust.

IV. CALCULATION OF EMISSIONS

Emission calculations were separated into five source categories: 1) combustion; 2) general processes; 3) aggregate handling; 4) stack test results; and 5) vehicle traffic on paved and unpaved roads. Most emission calculations were performed using AP-42 emission factors and equations. Emission rate calculations for fugitive dust sources were calculated using AP-42 emission equations for vehicular traffic on paved and unpaved roads, and aggregate handling. This procedure has been documented in the footnotes in Attachment B.

Emission rates were calculated for both TSP and PM_{10} and included an annual emission rate, a wintertime 24 hour maximum emission rate, and a maximum hourly emission rate. The wintertime 24 hour emission rate has the most significance for this study since this is the time period for which the ambient PM_{10} standards were exceeded.

A computerized spreadsheet was generated by the IAQB to calculate TSP and PM_{10} emission rates for point source facilities in the Silver Valley area. The computerized spreadsheet was created using

LOTUS 1-2-3 software. The spreadsheet was divided into combustion sources, general industrial process sources, aggregate material handling, source emissions based on stack tests, and paved and unpaved road fugitive dust sources. The spreadsheet calculates point, fugitive, and total emissions for each source type (combustion sources, general processes, etc.).

The spreadsheet for each facility is given in Attachment B. The facility name and location are listed at the top of each of each page. Source data are included in the first columns of each spreadsheet. These data include source descriptions, process rates, operating schedules, and whether the source produces point or fugitive emissions.

Columns titled "UNCTRL TSP E. F." and "CTRL TSP E. F." contain uncontrolled and controlled TSP emission factors used for the listed source, usually expressed as pounds of emissions per amount of material processed or handled. The column titled "PM_{10} FRAC FACT" contains the fraction of TSP emissions which are PM_{10}. These were used to generate PM_{10} emissions by multiplying the TSP emission rates by these fractions. The PM_{10} fractions were either taken directly from references or they were calculated by dividing a PM_{10} factor by a TSP factor for a specific emission source.

The PM_{10} emission factors have not been developed for many small industrial or commercial operations involving unique individual processes. In these situations, or if it was determined that a certain process occurring within a facility was not adequately handled by AP-42, emissions were calculated using other known methods, or assumptions were made using available materials and existing knowledge of the facility. When methods other than AP-42 were used to calculate emissions, those methods were documented by IAQB staff and PEI within workbooks or data sheets and are kept on file at the IAQB. These are also documented in the footnotes of Attachment B.

Average 24 hour emission rates were implicitly calculated by dividing the annual emission rate by the days per year of operation. Wintertime maximum 24 hour emission rates were calculated by multiplying the average 24 hour emission rate by a seasonal factor. A description of how seasonal factors were developed is provided in Section IV.B of this report. Maximum hourly emission rates were calculated from maximum hourly throughputs submitted by the facility, or estimated by IAQB staff.

Equations programed into the spreadsheets to calculate emission rates have been described in Section IV.A. Calculation methods were footnoted for further explanation. Footnote columns are identified by "FN". A description of the footnotes are provided following the spreadsheets in Attachment B.

A. Emission Source Categories

1. Combustion

This category includes TSP and PM_{10} emissions from any combustion source. Typical sources include incinerators and boilers.

TSP emissions from combustion sources were calculated as follows:

E = (EF)(1-CE)(AMT).

Where:
- E = Emission rate (lb of TSP per unit time);
- EF = Emission factor (lb of TSP/material unit combusted);
- CE = TSP emission control efficiency of control equipment; and
- AMT = Amount of material (units per unit time) combusted.

The PM_{10} emissions were then calculated using the PM_{10} fraction data.

2. General Industrial Process

This section of the spreadsheet estimated emissions from those general industrial processes for which TSP emissions could be calculated by using an emission factor rather than an equation. Typical examples include ore crushing and screening, sawdust cyclones, cement silos, etc. For the Silver Valley emission inventory, sources such as storage piles and ore handling were included on this portion of the spreadsheet since TSP factors were used to calculate emissions from these sources. TSP emissions were calculated using the following equation:

E = EF(1-CE)(AMT).

Where:
- E = Emission rate (lb of TSP per unit time);
- EF = Emission factor (lb of TSP/ton of material processed; or lb per other noted units of material processed);
- CE = TSP Emission control efficiency of control equipment; and
- AMT = Amount of material processed (tons or other noted units per unit time).

For the lumber industry, in general, production rates were given in board-feet. It was usually necessary to convert these units to tons because tons were the basis of most of the emissions factors. In addition it was necessary to calculate waste production rates using documented factors. These references and factors can be found in the footnotes to Attachment B.

The PM_{10} fraction was multiplied by the TSP emission rate to generate a PM_{10} emission rate.

3. Aggregate Handling

TSP and PM_{10} emissions from aggregate handling (transfers of material from loaders to hoppers, conveyor to conveyor, etc.) were calculated using the following equation from AP-42 Section 11.2.3:

$$E = k(0.0032)\frac{(u/5)^{1.3}}{(M/2)^{1.4}}(1-CE)(AMT).$$

Where:
- E = Emission rate (lb of TSP or PM_{10} per unit time);
- k = Particle size multiplier which is equal to .74 for TSP and 0.35 for PM_{10};
- u = Mean wind speed (MPH) (for Osburn a default value of 10 MPH was used since no met data was available);
- M = Percent moisture content of material;
- CE = Emission control efficiency of any control methods used to reduce emissions; and
- AMT = Amount of material handled (tons or other noted units per unit time).

This handling equation was not used for estimating emissions from the handling of mined ore. The emissions from these sources were calculated in the general process section of the spreadsheet using the PM_{10} and TSP factors for material handling and transfer on Table 8.23-1 in AP-42.

4. Emissions Based On Stack Tests

There were no stack tests available for the facilities investigated in the Silver Valley, therefore this portion of the spreadsheet was never used.

5. Vehicle Traffic On Paved And Unpaved Roads

Fugitive emissions from both paved and unpaved roads were calculated in the same section of the spreadsheet. On the spreadsheet, vehicle miles travelled (VMT) were either input directly (if these data were available from the facility) or calculated from the length of the road and the number of trips the vehicle took per day or per year.

TSP and PM_{10} emissions from vehicle traffic on paved roads within the boundary of an inventoried facility were calculated using the following equation from AP-42 Section 11.2.6(equation 1):

$$E = .077I(4/n)(s/10)(L/1000)(W/3)^{0.7}.$$

Where:
- E = TSP emission factor (lb/VMT);
- I = Industrial augmentation factor (unitless);
- n = Number of lanes;
- s = Surface material silt content (%);
- L = Surface dust loading (lb/mi); and
- W = Average vehicle weight (ton).

A PM_{10} fraction of 0.7 was calculated by dividing the result of equation 2 in AP-42 Section 11.2.6 (using the default AP-42 parameters for sand and gravel processing plant roads and a PM_{10} multiplier of 0.22) by the result from the above equation (using the default AP-42 parameters for sand and gravel processing plant roads and a 20 ton vehicle weight). This was done to simplify the spreadsheet calculations, and the result should not be significantly different from the PM_{10} emissions calculated using equation 2 in AP-42, Section 11.2.6 since the default parameters for sand and gravel plant roads were used in most instances.

TSP and PM_{10} emissions from vehicle traffic on unpaved roads within the boundary of an inventoried facility were calculated using the following equation from AP-42 Section 11.2.1:

$$E = k(5.9)(s/12)(S/30)(W/3)^{0.7}(w/4)^{0.5}((365-p)/365)(1-CE)(VMT).$$

Where:
- E = Emission rate (lb of TSP or PM_{10} per unit time);
- k = Particle size multiplier; which is equal to 0.8 for TSP and 0.36 for PM_{10};
- s = Road silt content (percent);
- S = Average vehicle speed (MPH);
- W = Mean vehicle weight (tons);
- w = Number of wheels on the vehicle;
- p = Number of days per year with at least 0.01 in. of precipitation (120 for Silver Valley);
- CE = Emission control efficiency of any control methods used to reduce emissions; and
- VMT = Vehicle miles traveled per unit time.

TSP emissions were calculated from this equation directly. PM_{10} emissions were subsequently calculated by multiplying this result by (0.36/0.8) or 0.45.

In cases where road silt content information was not available, a silt content of 5% (AP-42 table 11.2.1-1 "sand and gravel processing- plant roads") was assumed. If water was used as an emission control method, a control efficiency of 50% (Orlemann et al., 1983 -- see footnotes to Attachment B) was used. For oil or chemical dust suppressants applied, a control efficiency of 68% (median value, AP-42, page 11.2.1-7) was used.

6. Miscellaneous Sources

Storage Piles. Storage pile emissions not associated with the Bunker Hill Superfund site were calculated in the general process section of the spreadsheet.

TSP and PM_{10} emissions from these storage piles were generated by using the following equation:

$$E = (EF)(A)(D)(1-CE).$$

Where:
E = Emission rate (lb of TSP or PM_{10} per unit time);
EF = Emission factor for TSP or PM_{10} (lb of TSP or PM_{10}/(acre-day));
A = Area of the storage pile (acres);
D = Number of days the storage pile is either active or inactive (days per unit time); and
CE = Emission control efficiency of control measures used.

The parameters "A" and "D" were combined and entered as "THROUGHPUT" on the emission calculating spreadsheet. The resulting units of the combined parameters were either acre*day/hr or acre*day/year.

All storage piles inventoried involved sand and gravel or similar materials. Emission factors from TABLE 8.19.1-1 in AP-42 were used to generate emissions. These factors were used since the physical data required for a more complex analysis were not available.

Dames and Moore estimated the Superfund site wind blown emissions using the modified wind erosion equation developed by Cowherd[1,2]:

E = A*I*K*C*L'*V'.

Where:
E = Suspended particulate fraction of wind erosion losses (ton/acre-year);
A = Portion of total wind erosion losses that would be measured as suspended particulate; estimated at 0.025 (unitless);
I = Soil erodibility (ton/acre-yr);
K = Surface roughness factor (unitless);
C = Climatic factor (unitless);
L' = Unsheltered field width factor (unitless); and
V' = Vegetative cover factor (unitless).

It is important to note that these emissions reflect summer emissions (7/1 through 10/31), thus they would not be applicable to assessing wintertime impacts.

Tailings Ponds. For the current emissions inventory emissions for tailings ponds have not been considered. The main justification for this is that snow cover and moist conditions in general would make tailings ponds an insignificant source during the winter season.

The Bunker Hill superfund study calculated emissions from Bunker Hill tailings using the modified wind erosion equation described above. In addition, this study also considered emissions from flats and hillsides in the study area. As with the Superfund storage pile emission estimates, these estimates only reflect summertime emissions.

B. Wintertime Emission Calculations

The highest monitored particulate levels in Silver Valley usually occur from late fall through early spring. This is primarily because of strong temperature inversions occurring during these periods which effectively trap pollutants near the surface for extended periods of time. Therefore, in addition to the routinely collected annual, average 24 hour, and hourly data, the IAQB collected specific wintertime data from inventoried facilities. Wintertime emissions were considered to be emissions occurring between October 1 and March 31 (calendar quarters one and four).

Wintertime emission rates were only calculated for 24 hour time periods. If a given source was operating anytime during the wintertime period, a wintertime 24 hour emission rate was calculated. This value was calculated by multiplying the average daily TSP or PM_{10} emission rate by a "seasonal factor".

The seasonal factor was generated by considering maximum wintertime daily operation rates and hours, accounting for colder and more damp wintertime conditions, and allowing for any other seasonal information affecting emission rates. On the spreadsheet the seasonal factor was multiplied by the average daily controlled TSP or PM_{10} emission rate. A value less than 1.0 indicates that wintertime emissions are expected to be less than the average daily emission rate. A value greater than 1.0 indicates that the result is expected to be a greater than the average daily rate. Similar to the conversion of emission factors, the generation of the seasonal factor often involved combining several factors into a single factor.

For sources such as heating boilers the ratio of winter fuel use relative to average usage was the seasonal factor. For example, if 30% of the fuel was used during the winter, and this occurred during 25% of the boiler's annual operating time, the seasonal factor would be (30/25) or 1.2.

For sources such as unpaved road vehicle traffic a seasonal factor of 0.5 was used since the prevailing moist conditions were assumed to be similar to applying water as a control. If water, chemicals, or oil were applied to control unpaved road emissions at the facility, then a seasonal factor of 1.0 was used assuming that emissions didn't change during the winter, or whether controls were used during winter or not. A similar factor was not applied to paved roads because paved roads are frequently dry for prolonged periods during wintertime.

For storage pile emissions, if a given pile was present anytime during the wintertime period defined above a seasonal factor of 0.5 was used. This seasonal factor was chosen using engineering judgement since some control was necessary to account for snow cover or prevailing moist conditions.

Some sources which were not operating during the winter were given seasonal factors of 0.

V. HANDLING OF DATA

As described in Section IV, all of the final data and emission calculations were compiled on the LOTUS 1-2-3 spreadsheet. The spreadsheet data were divided into the five emission calculation types described above. One spreadsheet was used per facility to calculate emission rates from input data for given sources. Both point and fugitive emissions were totalled on each spreadsheet. By including all calculations for a facility on a single spreadsheet, transcriptional errors were avoided. Attachment B includes the spreadsheet data for each facility.

Some of the data input into the spreadsheets were calculated by hand to allow generalized computer calculation of emissions. Such hand calculations usually involved combining emission control measures into one control factor, calculating production rates from known production/waste factors, or converting or combining emission factors or equations to enable a simple emission factor to be used for unique industrial processes. The spreadsheets were footnoted to identify such unique calculation methods.

In addition to the computer spreadsheet files, production data, emission factors, control efficiency data, and other emissions estimation references for the spreadsheet, calculations by IAQB staff are kept in an emission inventory file at the IAQB. These files also contain original questionnaires from the two data gathering stages of the inventory; additional data such as flow charts and plot plans; and data collected during plant visits and phone conversations by IAQB staff.

VI. QUALITY CONTROL OF DATA

The emission rate data submitted to the IAQB from PEI had only undergone "loose quality control" by PEI. Loose quality control involved a check to ensure proper methodologies were used, but did not include a recheck of actual calculations.

IAQB staff were responsible for more in-depth quality control checks. In-depth spot checks were made for emission calculations for the facilities inventoried. These checks involved:

1) examining raw data supplied by the facility (e.g., ensuring that the amount of waste generated was equal to the difference between incoming raw materials and outgoing product);

2) ensuring that correct data were used in the correct equations or multiplied by the correct emission factors, and ensuring that the spreadsheet was calculating correctly;

3) ensuring that all emission points for a facility had been considered; and

4) ensuring that methodologies were consistent among different facilities for a given industrial process.

For most sources, IAQB staff determined that methods used by PEI were not the most appropriate. In such cases alternative calculation methods, determined by IAQB staff to be more appropriate for the given situation, were used to calculate emission rates. Calculation methods were changed mainly when the following conditions arose: the IAQB received a more accurate source description or reference which then dictated the use of a different emission factor or emission control efficiency, or when erroneous process rates or operating schedules were corrected.

Final quality control checks were performed by IAQB staff for all emission sources inventoried.

VII. RESULTS

The results of the Silver Valley TSP and PM_{10} emission inventory are in Attachments A and B. Attachment A lists the individual emission points for each facility, the source data which were used to estimate emissions, and the estimated emissions from each point. Attachment B lists the source category totals for each facility as well as each facility's total emissions.

In addition each plant's emissions have been summarized in Table 2 on the following page. This table gives the point, fugitive, and total emissions for each facility included in this inventory.

The final reported inventory list consisted of 10 facilities. Nine facilities had annual TSP emission rates in excess of one ton per year, 6 facilities had PM_{10} annual rates in excess of one ton per year, and 9 had PM_{10} emissions in excess of 0.5 tons per year. For all the facilities combined there were annual TSP and PM_{10} emissions of 120.2 tons and 62.9 tons, and wintertime maximum daily emissions of 994.7 pounds and 453.5 pounds respectively. Kellogg Transfer and Pacific Crown in Enaville had combined annual TSP and PM_{10} emissions of 12.6 tons and 1.5 tons, and wintertime maximum daily emissions of 102.0 pounds and 13.3 pounds respectively. Gen Wove, Mine Timber, and Pacific Crown in Smelterville had combined annual TSP and PM_{10} emissions of 9.1 tons and 2.4 tons, and wintertime maximum daily emissions of 92.1 pounds and 24.4 pounds respectively. Asarco's Coeur and Galena mines, and Zanetti Bros. near Osburn and Silverton had combined annual TSP and PM_{10} emissions of 56.6 tons and 33.5 tons, and wintertime maximum daily emissions of 245.2 pounds and 104.8 pounds respectively.

Table 2.

Point, fugitive, and total 1988 emissions by facility for Silver Valley.

FACILITY	SOURCES	MAXIMUM DAILY (lbs) TSP	MAXIMUM DAILY (lbs) PM_{10}	ANNUAL (tons) TSP	ANNUAL (tons) PM_{10}
Kellogg Transfer	POINTS	0.00	0.00	0.00	0.00
	FUGITIVES	68.05	7.87	7.07	0.82
	TOTAL	68.05	7.87	7.07	0.82
Pacific Crown Enaville	POINTS	3.83	0.38	0.48	0.05
	FUGITIVES	40.14	5.02	5.02	0.63
	TOTAL	43.97	5.40	5.50	0.68
Gen Wove	POINTS	0.00	0.00	0.00	0.00
	FUGITIVES	33.16	6.85	4.02	0.87
	TOTAL	33.16	6.85	4.02	0.87
Mine Timber	POINTS	42.00	14.70	3.68	1.29
	FUGITIVES	10.20	1.58	0.54	0.13
	TOTAL	52.20	16.28	4.22	1.42
Pacific Crown Smelterville	POINTS	4.05	0.40	0.51	0.05
	FUGITIVES	2.68	0.83	0.32	0.10
	TOTAL	6.73	1.23	0.83	0.15
Sunshine Mine	POINTS	2.19	1.71	0.27	0.20
	FUGITIVES	309.94	211.42	26.80	17.76
	TOTAL	312.13	213.13	27.07	17.96
Coeur Mine (ASARCO)	POINTS	0.05	0.05	0.01	0.01
	FUGITIVES	33.45	18.25	6.28	3.34
	TOTAL	33.50	18.30	6.29	3.35
Galena Mine (ASARCO)	POINTS	0.07	0.07	0.01	0.01
	FUGITIVES	209.85	85.54	13.29	7.28
	TOTAL	209.92	85.61	13.30	7.29
Zanetti Bros.	POINTS	0.00	0.00	0.07	0.03
	FUGITIVES	1.75	0.88	36.94	22.79
	TOTAL	1.75	0.88	37.01	22.82
Lucky Friday Mine (HECLA)	POINTS	39.97	23.07	5.19	3.00
	FUGITIVES	193.31	74.84	9.69	4.58
	TOTAL	233.28	97.91	14.88	7.58
Combined Plants	POINTS	92.16	40.38	10.22	4.64
	FUGITIVES	902.53	413.08	109.97	58.30
	TOTAL	994.69	453.46	120.19	62.94

VIII. SUMMARY

A point source TSP and PM_{10} emission inventory for Silver Valley was performed by the IAQB, with assistance from PEI Associates, Inc. The primary goal of the inventory with respect to individual facilities was to identify all TSP and PM_{10} emission sources at a facility, both fugitive and point source, and to accurately quantify annual, maximum hourly, and maximum wintertime 24 hour emissions from those emission sources.

The TSP and PM_{10} source facilities were identified by the IAQB, 1988 data were collected, and emission rates were calculated. Quality control measures involved reviewing the raw data submitted, reviewing emission calculation methods used, rechecking the actual calculations, and reviewing the final results for reasonableness.

IX. REFERENCES

1) Dames and Moore, 1988. Bunker Hill Site RI/FS, Task 4.4 Technical Memorandum, Assessment of Dust Source Data. Document No. 15852-PD131/4404. Dames and Moore, Golden, CO.

2) Dames and Moore, 1990. Bunker Hill RI/FS, Task 4 Data Report; Deposition Model Evaluation Document No. 15852-004/PD193/45030. Dames and Moore, Denver, CO.

ATTACHMENT A

TOTAL TSP AND PM_{10} 1988 EMISSION RATES

FACILITY Pacific Crown

LOCATION Enaville

UTM ZONES: H: 557.7 V: 5267.7

	ESTIMATED EMISSIONS					
	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	0.480	3.830	0.480	0.050	0.380	0.050
TOTAL FUGITIVES:	4.848	38.784	4.848	0.554	4.412	0.554
TOTAL:	5.328	42.614	5.328	0.604	4.792	0.604
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL UNPAVED:	0.170	1.360	0.175	0.077	0.612	0.079
TOTAL ROADS:	0.170	1.360	0.175	0.077	0.612	0.079
PLANT TOTALS						
GRAND TOTAL POINTS:	0.480	3.830	0.480	0.050	0.380	0.050
GRAND TOTAL FUGITIVES:	5.018	40.144	5.023	0.631	5.024	0.633
GRAND TOTAL:	5.498	43.974	5.503	0.681	5.404	0.683

FACILITY Kellogg Transfer

LOCATION Enaville

UTM ZONES: H: 556.8 V: 5267.4

	ESTIMATED EMISSIONS					
	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL FUGITIVES:	8.008	65.014	6.751	0.801	6.502	0.675
TOTAL:	8.008	65.014	6.751	0.801	6.502	0.675
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL UNPAVED:	0.380	3.040	0.317	0.171	1.367	0.143
TOTAL ROADS:	0.380	3.040	0.317	0.171	1.367	0.143
PLANT TOTALS						
GRAND TOTAL POINTS:	0.000	0.000	0.000	0.000	0.000	0.000
GRAND TOTAL FUGITIVES:	8.388	68.054	7.068	0.972	7.869	0.818
GRAND TOTAL:	8.388	68.054	7.068	0.972	7.869	0.818

FACILITY Pacific Crown

LOCATION Smelterville

UTM ZONES: H: 560.9 V: 5265.8

	ESTIMATED EMISSIONS					
	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	0.527	4.050	0.506	0.053	0.405	0.051
TOTAL FUGITIVES:	0.134	1.068	0.134	0.013	0.107	0.013
TOTAL:	0.661	5.118	0.640	0.066	0.512	0.064
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL UNPAVED:	0.201	1.608	0.190	0.091	0.723	0.088
TOTAL ROADS:	0.201	1.608	0.190	0.091	0.723	0.088
PLANT TOTALS						
GRAND TOTAL POINTS:	0.527	4.050	0.506	0.053	0.405	0.051
GRAND TOTAL FUGITIVES:	0.335	2.676	0.324	0.104	0.830	0.101
GRAND TOTAL:	0.862	6.726	0.830	0.157	1.235	0.152

FACILITY Gen Wove

LOCATION Smelterville

UTM ZONES: H: 561.5 V: 5265.9

	ESTIMATED EMISSIONS					
	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL FUGITIVES:	4.220	30.016	3.512	0.870	5.436	0.636
TOTAL:	4.220	30.016	3.512	0.870	5.436	0.636
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL UNPAVED:	0.581	3.148	0.508	0.261	1.417	0.230
TOTAL ROADS:	0.581	3.148	0.508	0.261	1.417	0.230
PLANT TOTALS						
GRAND TOTAL POINTS:	0.000	0.000	0.000	0.000	0.000	0.000
GRAND TOTAL FUGITIVES:	4.801	33.164	4.020	1.131	6.853	0.866
GRAND TOTAL:	4.801	33.164	4.020	1.131	6.853	0.866

FACILITY Mine Timber

LOCATION Smelterville

UTM ZONES: H: 562.6 V: 5265.9

	ESTIMATED EMISSIONS					
	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
COMBUSTION SOURCE EMISSIONS						
TOTAL POINTS:	7.000	42.000	3.675	2.450	14.700	1.286
TOTAL FUGITIVES:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL:	7.000	42.000	3.675	2.450	14.700	1.286
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL FUGITIVES:	0.290	8.615	0.345	0.028	0.861	0.034
TOTAL:	0.290	8.615	0.345	0.028	0.861	0.034
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL UNPAVED:	0.198	1.584	0.199	0.089	0.714	0.092
TOTAL ROADS:	0.198	1.584	0.199	0.089	0.714	0.092
PLANT TOTALS						
GRAND TOTAL POINTS:	7.000	42.000	3.675	2.450	14.700	1.286
GRAND TOTAL FUGITIVES:	0.488	10.199	0.544	0.117	1.575	0.126
GRAND TOTAL:	7.488	52.199	4.219	2.567	16.275	1.412

FACILITY Sunshine Mine

LOCATION Big Creek

UTM ZONES: H: 569.8   V: 5260.9

	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	
COMBUSTION SOURCE EMISSIONS						
TOTAL POINTS:	0.036	1.055	0.120	0.036	1.055	
TOTAL FUGITIVES:	0.000	0.000	0.000	0.000	0.000	
TOTAL:	0.036	1.055	0.120	0.036	1.055	
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	0.456	1.137	0.147	0.262	0.654	0.083
TOTAL FUGITIVES:	7.774	31.826	5.305	4.555	18.086	2.884
TOTAL:	8.230	32.963	5.452	4.817	18.740	2.967
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	19.779	272.709	20.800	13.846	190.896	14.560
TOTAL UNPAVED:	0.338	5.408	0.700	0.152	2.434	0.315
TOTAL ROADS:	20.117	278.117	21.500	13.998	193.330	14.875
PLANT TOTALS						
GRAND TOTAL POINTS:	0.492	2.192	0.267	0.298	1.709	0.203
GRAND TOTAL FUGITIVES:	27.891	309.943	26.805	18.553	211.416	17.759
GRAND TOTAL:	28.383	312.135	27.072	18.851	213.125	17.962

FACILITY Asarco, Coeur Mine

LOCATION Shields Gulch, S.E. of Osburn

UTM ZONES: H: 575.6 V: 5259.5

	ESTIMATED EMISSIONS					
	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
COMBUSTION SOURCE EMISSIONS						
TOTAL POINTS:	0.002	0.047	0.008	0.002	0.047	0.008
TOTAL FUGITIVES:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL:	0.002	0.047	0.008	0.002	0.047	0.008
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL FUGITIVES:	4.308	31.208	6.149	2.351	17.235	3.285
TOTAL:	4.308	31.208	6.149	2.351	17.235	3.285
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL UNPAVED:	2.018	2.248	0.132	0.909	1.012	0.059
TOTAL ROADS:	2.018	2.248	0.132	0.909	1.012	0.059
PLANT TOTALS						
GRAND TOTAL POINTS:	0.002	0.047	0.008	0.002	0.047	0.008
GRAND TOTAL FUGITIVES:	6.326	33.456	6.281	3.260	18.247	3.344
GRAND TOTAL:	6.328	33.503	6.289	3.262	18.294	3.352

FACILITY Asarco, Galena Mine

LOCATION Lake Creek, So. of Silverton

UTM ZONES: H: 577.6 V: 5258.4

	ESTIMATED EMISSIONS					
	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
COMBUSTION SOURCE EMISSIONS						
TOTAL POINTS:	0.003	0.067	0.012	0.003	0.067	0.012
TOTAL FUGITIVES:	6.500	156.000	3.120	2.275	54.600	1.092
TOTAL:	6.503	156.067	3.132	2.278	54.667	1.104
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL FUGITIVES:	9.365	53.177	6.494	5.323	30.643	3.657
TOTAL:	9.365	53.177	6.494	5.323	30.643	3.657
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	54.545	0.000	3.510	38.182	0.000	2.457
TOTAL UNPAVED:	0.081	0.672	0.164	0.036	0.302	0.074
TOTAL ROADS:	54.626	0.672	3.674	38.218	0.302	2.531
PLANT TOTALS						
GRAND TOTAL POINTS:	0.003	0.067	0.012	0.003	0.067	0.012
GRAND TOTAL FUGITIVES:	70.491	209.849	13.288	45.816	85.545	7.280
GRAND TOTAL:	70.494	209.916	13.300	45.819	85.612	7.292

FACILITY Zanetti Bros

LOCATION Osburn

UTM ZONES: H: 575.5 V: 5261.2

	ESTIMATED EMISSIONS					
	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
COMBUSTION SOURCE EMISSIONS						
TOTAL POINTS:	1.300	0.000	0.062	0.455	0.000	0.022
TOTAL FUGITIVES:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL:	1.300	0.000	0.062	0.455	0.000	0.022
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	0.024	0.000	0.009	0.018	0.000	0.006
TOTAL FUGITIVES:	72.642	1.750	34.029	45.979	0.875	21.440
TOTAL:	72.666	1.750	34.038	45.997	0.875	21.446
EMISSIONS FROM AGGREGATE HANDLING OF MATERIALS						
TOTAL POINTS:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL FUGITIVES:	5.747	0.000	1.688	2.011	0.000	0.591
TOTAL:	5.747	0.000	1.688	2.011	0.000	0.591
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	3.434	0.000	0.840	2.404	0.000	0.588
TOTAL UNPAVED:	1.174	0.000	0.380	0.530	0.000	0.173
TOTAL ROADS:	4.608	0.000	1.220	2.934	0.000	0.761
PLANT TOTALS						
GRAND TOTAL POINTS:	1.324	0.000	0.071	0.473	0.000	0.028
GRAND TOTAL FUGITIVES:	82.997	1.750	36.937	50.924	0.875	22.792
GRAND TOTAL:	84.321	1.750	37.008	51.397	0.875	22.820

FACILITY Hecla, Lucky Friday Mine

LOCATION Mullan

UTM ZONES: H: 591.6 V: 5257.3

	ESTIMATED EMISSIONS					
	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
COMBUSTION SOURCE EMISSIONS						
TOTAL POINTS:	0.005	0.143	0.019	0.005	0.143	0.019
TOTAL FUGITIVES:	6.500	156.000	3.120	2.275	54.600	1.092
TOTAL:	6.505	156.143	3.139	2.280	54.743	1.111
PROCESSING EQUIPMENT SOURCE EMISSIONS						
TOTAL POINTS:	2.671	39.826	5.177	1.541	22.926	2.978
TOTAL FUGITIVES:	2.043	33.774	6.122	1.097	18.642	3.293
TOTAL:	4.714	73.600	11.299	2.638	41.568	6.271
FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS						
TOTAL PAVED:	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL UNPAVED:	0.280	3.539	0.445	0.127	1.593	0.201
TOTAL ROADS:	0.280	3.539	0.445	0.127	1.593	0.201
PLANT TOTALS						
GRAND TOTAL POINTS:	2.676	39.969	5.196	1.546	23.069	2.997
GRAND TOTAL FUGITIVES:	8.823	193.313	9.687	3.499	74.835	4.586
GRAND TOTAL:	11.499	233.282	14.883	5.045	97.904	7.583

ATTACHMENT B

TSP AND PM_{10} POINT SOURCE EMISSION INVENTORY SPREADSHEETS

FACILITY Pacific Crown

LOCATION Enaville

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS: MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Debarker	logs	8.4	16.8	8	250	F	Debarker	N	None	0.00%	0.024	0.02	lb/ton	0.5		1	1,2	0.168	1.344	0.168	0.084	0.672	0.084
Saws	sawdust	1.26	2.52	8	250	P	Cyclone	N	None	0.00%	0.38	0.38	lb/ton	0.1		1	9,10,12,13	0.480	3.830	0.480	0.050	0.380	0.050
Sawdust Handling	sawdust	1.26	2.52	8	250	F	Sawdust handling	N	None	0.00%	1	1.00	lb/ton	0.1		1	2,10,12,13	1.260	10.080	1.260	0.130	1.010	0.130
Chipper and Chip Handling	chips	2.58	5.16	8	250	F	Chip handling	N	None	0.00%	1	1.00	lb/ton	0.1		1	2,10,12,13	2.580	20.640	2.580	0.260	2.060	0.260
Bark Handling	bark	0.84	1.68	8	250	F	Bark handling	N	None	0.00%	1	1.00	lb/ton	0.1		1	2,10,12,13	0.840	6.720	0.840	0.080	0.670	0.080

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	EMISSIONS: MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Logs In	Truck					8	260	U	H20	50.00%	2.13	1.07		0.45		1	2,3,26	0.044	0.352	0.045	0.020	0.158	0.020
Log Loading	Loader					8	260	U	H20	50.00%	1.09	0.55		0.45		1	2,3,26	0.021	0.168	0.020	0.009	0.076	0.009
Chip Hauling	Truck					8	260	U	H20	50.00%	1.88	0.94		0.45		1	2,3,26	0.017	0.136	0.020	0.008	0.061	0.009
Sawdust Hauling	Truck					8	260	U	H20	50.00%	1.88	0.94		0.45		1	2,3,26	0.008	0.064	0.010	0.004	0.029	0.005
Truck Loading	Lift truck					8	260	U	H20	50.00%	0.76	0.38		0.45		1	2,3,26	0.058	0.464	0.060	0.026	0.209	0.027
Lumber Out	Truck					8	260	U	H20	50.00%	1.85	0.93		0.45		1	2,3,26	0.022	0.176	0.020	0.010	0.079	0.009

UNPAVED ROAD E.F. CALCULATION

PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
Truck		5	5	26.2	18	120	2.13									ERR		0.32	85
Loader		5	5	29.5	4	120	1.09									ERR		0.30	80
Truck		5	5	22	18	120	1.88									ERR		0.14	37
Truck		5	5	22	18	120	1.88									ERR		0.06	18
Lift truck		5	5	17.5	4	120	0.76									ERR		1.22	318
Truck		5	5	21.5	18	120	1.85									ERR		0.19	50

FACILITY Kellogg Transfer

LOCATION Enaville

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Framer saw	Sawdust	0.009	0.00945	16	60	F	Framer	N	None	0.00%	0.875	0.88	Lbs/Ton	0.1		1	1,10,11	0.008	0.139	0.004	0.001	0.014	0.000
Chip Transfers	Chips	8	13.494	8	208	F	Chip Handling	N	None	0.00%	0.08	1.00	Lbs/Ton	0.1		1	1,9,10	8.000	64.875	6.747	0.800	6.488	0.675

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Chip Haul	Truck					8	208	U	011	68.00%	1.12	0.36		0.45		1	2,3,26	0.032	0.256	0.027	0.014	0.115	0.012
Lumber Storage	Truck					8	208	U	011	68.00%	2.64	0.84		0.45		1	2,3,26	0.115	0.920	0.100	0.052	0.414	0.045
Framing	Lift truck					8	208	U	011	68.00%	0.25	0.08		0.45		1	2,3,26	0.002	0.016	0.000	0.001	0.007	0.000
Framing Export	Truck					8	208	U	011	68.00%	4.8	1.54		0.45		1	2,3,26	0.174	1.392	0.140	0.078	0.626	0.063
Pressure Treat	Lift truck					8	208	U	011	68.00%	0.87	0.28		0.45		1	2,3,26	0.000	0.000	0.000	0.000	0.000	0.000
Pressure Treat	Truck					8	208	U	011	68.00%	4.8	1.54		0.45		1	2,3,26	0.057	0.456	0.050	0.026	0.205	0.023

UNPAVED ROAD E.F. CALCULATION

PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
Truck		5	5	16	10	120	1.12									ERR		0.71	149
Truck		5	12	15.5	10	120	2.64									ERR		1.09	227
Lift truck		5	3	7.5	4	120	0.25									ERR		0.17	36
Truck		5	12	24	18	120	4.80									ERR		0.90	188
Lift truck		5	5	16	6	120	0.87									ERR		0.00	1.1
Truck		5	12	24	18	120	4.80									ERR		0.29	62

FACILITY Pacific Crown

LOCATION Smelterville

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*N/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS: MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Resaw	sawdust	0.053	0.105	8	250	P	Resaw Cyclone	N	None	0.00%	0.5	0.50	lb\ton	0.1		1	1,7,8,10,12,13	0.027	0.210	0.026	0.003	0.021	0.003
Planer	shavings	1	1.92	8	250	P	Resaw Cyclone	N	None	0.00%	0.5	0.50	lb\ton	0.1		1	1,8,10,12,13	0.500	3.840	0.480	0.050	0.384	0.048
Sawdust Handling	sawdust	0.134	0.267	8	250	F	Sawdust Hndlng	N	None	0.00%	1	1.00	lb\ton	0.1		1	1,2,10,12,13	0.134	1.068	0.134	0.013	0.107	0.013

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	EMISSIONS: MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Lumber In	Truck		2000	1.8	450	8	250	U	H20	50.00%	2.12	1.06		0.45		1	2,3	0.090	0.720	0.090	0.041	0.324	0.041
Lumber->Resaw	Lift Truck		100	12	3,000	8	250	U	H20	50.00%	0.55	0.28		0.45		1	2,3	0.008	0.064	0.010	0.004	0.029	0.005
Lumber->Planer	Loader		100	15.2	3,800	8	250	U	H20	50.00%	0.79	0.4		0.45		1	2,3	0.014	0.112	0.010	0.006	0.050	0.005
Lumber->Storage	Lift truck		100	18.5	4,600	8	250	U	H20	50.00%	0.55	0.28		0.45		1	2,3	0.012	0.096	0.010	0.005	0.043	0.005
Truck Loading	Lift truck		50	13.7	3,400	8	250	U	H20	50.00%	0.55	0.28		0.45		1	2,3	0.005	0.040	0.000	0.002	0.018	0.000
Lumber Out	Truck		2000	1	255	8	250	U	H20	50.00%	2.12	1.06		0.45		1	2,3	0.050	0.400	0.050	0.023	0.180	0.023
Sawdust Out	Truck		2000	0.5	125	8	250	U	H20	50.00%	1.88	0.94		0.45		1	2,3	0.022	0.176	0.020	0.010	0.079	0.009

UNPAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID
Truck		5	5	26	18	120	2.12	
Lift Truck		5	5	8.4	6	120	0.55	
Loader		5	5	13.9	6	120	0.79	
Lift truck		5	5	8.4	6	120	0.55	
Lift truck		5	5	8.4	6	120	0.55	
Truck		5	5	26	18	120	2.12	
Truck		5	5	22	18	120	1.88	

PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			

FACILITY Gen Wove

LOCATION Smelterville

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Debarker	logs	6	11.2	8	234	F	Debarker	N	None	0.00%	0.024	0.02	lb\ton	0.5		1	1,2,5	0.120	0.957	0.112	0.060	0.479	0.056
Saws	logs	6	11.2	8	234	F	Saws	N	None	0.00%	0.35	0.35	lb\ton	0.1		1	1,2,10	2.100	16.752	1.960	0.210	1.675	0.196
Sawdust Handling	sawdust	1	1.68	8	234	F	Sawdust Handling	N	None	0.00%	1	1.00	lb\ton	0.1		1	1,2,10,12,13	1.000	7.179	0.840	0.100	0.718	0.084
Bark Handling	bark	1	1.2	8	234	F	Bark Handling	N	None	0.00%	1	1.00	lb\ton	0.5		1	1,24,5,13	1.000	5.128	0.600	0.500	2.564	0.300

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Trucks In	Truck		3600	2	450	8	234	U	None	0.00%	2.2	2.2		0.45		0.5	2,3	0.375	1.500	0.338	0.169	0.675	0.152
Log Loading	Loader		300	3.5	800	8	234	U	H20	50.00%	0.65	0.33		0.45		1	2,3	0.008	0.064	0.010	0.004	0.029	0.005
Lumber Storing	Loader		300	2	500	8	234	U	H20	50.00%	0.65	0.33		0.45		1	2,3	0.005	0.040	0.000	0.002	0.018	0.000
Lumber to Truck	Loader		100	2	500	8	234	U	H20	50.00%	0.65	0.33		0.45		1	2,3	0.002	0.016	0.000	0.001	0.007	0.000
Truck Out	Truck		3600	1.5	300	8	234	U	H20	50.00%	2.16	1.08		0.45		1	2,3	0.138	1.104	0.110	0.062	0.497	0.050
Bark Handling	Truck		300	10	2400	8	234	U	H20	50.00%	0.6	0.3		0.45		1	2,3	0.021	0.168	0.020	0.009	0.076	0.009
Sawdust handling	Truck		300	15	3400	8	234	U	H20	50.00%	0.6	0.3		0.45		1	2,3	0.032	0.256	0.030	0.014	0.115	0.014

UNPAVED ROAD E.F. CALCULATION — PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
Truck		5	5	27.5	18	120	2.20									ERR			
Loader		5	3	29.5	4	120	0.65									ERR			
Loader		5	3	29.5	4	120	0.65									ERR			
Loader		5	3	29.5	4	120	0.65									ERR			
Truck		5	5	26.8	18	120	2.16									ERR			
Truck		5	5	9.5	6	120	0.60									ERR			
Truck		5	5	9.5	6	120	0.60									ERR			

FACILITY Mine Timber

LOCATION Smelterville

COMBUSTION SOURCE EMISSIONS

SOURCE DESCRIPTION	FUEL TYPE	FUEL UNITS (UN)	RATED CAP (MMBtu/H)	FUEL RATE MAX HRLY (UNIT/H)	FUEL RATE ACT ANN (UN&M/YR)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	TSP E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Wigwam	Shavings	Tons		1.0	1.05	8	175	P	Wigwam	N	None	0.00%	7	7	lb\ton	0.35		1	1,2,5,12,13	7.000	42.000	3.675	2.450	14.700	1.286

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Shavings Transfer	shavings	0.38	1.05	16	175	F	Burner Cyclone	N	None	0.00%	0.38	0.38	lb/ton	0.1		1	1,9,10,12,13	0.144	2.280	0.200	0.014	0.228	0.020
Rip Saw	sawdust	0.003	0.0006	16	12	F	Rip Saw	N	None	0.00%	0.88	0.88	lb/ton	0.1		1	1,10,11,13	0.003	0.044	0.000	0.000	0.004	0.000
Trim Saw	sawdust	0.044	0.122	16	175	F	Trim Saw	N	Encl	50.00%	0.88	0.44	lb/ton	0.1		1	1,10,11,13	0.019	0.307	0.027	0.002	0.031	0.003
Cut-Up	sawdust	0.022	0.061	16	175	F	Cut-up	N	Encl	50.00%	0.88	0.44	lb/ton	0.1		1	1,10,11,13	0.010	0.153	0.013	0.001	0.015	0.001
Framer	sawdust	0.031	0.018	16	36	F	Framer	N	Encl	50.00%	0.88	0.44	lb/ton	0.1		1	1,10,11,13	0.014	0.220	0.004	0.001	0.022	0.000
Sawdust handling	sawdust	0.1	0.202	16	36	F	Sawdust Handing	N	None	0.00%	1	1.00	lb/ton	0.1		1	1,2,10	0.100	5.611	0.101	0.010	0.561	0.010

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Lumber In	Truck		700	7	800	16	175	U	None	0.00%	1.31	1.31		0.45		0.5	2,3	0.076	0.608	0.069	0.034	0.274	0.031
Lumber->Planer	Lift Truck		510	5	600	16	175	U	None	0.00%	0.69	0.69		0.45		0.5	2,3	0.021	0.168	0.020	0.009	0.076	0.009
Planer->Shed	Lift Truck		450	4	450	16	175	U	None	0.00%	0.69	0.69		0.45		0.5	2,3	0.015	0.120	0.010	0.007	0.054	0.005
Lumber->Cut-up	Lift Truck		270	2.5	420	16	175	U	None	0.00%	0.69	0.69		0.45		0.5	2,3	0.006	0.048	0.010	0.003	0.022	0.005
Cut-up->Shed	Lift Truck		480	2.5	410	16	175	U	None	0.00%	0.69	0.69		0.45		0.5	2,3	0.010	0.080	0.010	0.005	0.036	0.005
Shed->Loadout	Lift Truck		600	6.5	860	16	175	U	None	0.00%	0.69	0.69		0.45		0.5	2,3	0.032	0.256	0.030	0.014	0.115	0.014
Sawdust Handlng	Lift Truck		1200	1.6	280	16	175	U	None	0.00%	0.69	0.69		0.45		0.5	2,3	0.016	0.128	0.020	0.007	0.058	0.009
Lumber Out	Truck		400	3.5	620	16	175	U	None	0.00%	1.31	1.31		0.45		0.5	2,3	0.022	0.176	0.030	0.010	0.079	0.014

UNPAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID
Truck		5	5	20	10	120	1.31	
Lift Truck		5	5	11.5	6	120	0.69	
Lift Truck		5	5	11.5	6	120	0.69	
Lift Truck		5	5	11.5	6	120	0.69	
Lift Truck		5	5	11.5	6	120	0.69	
Lift Truck		5	5	11.5	6	120	0.69	
Lift Truck		5	5	11.5	6	120	0.69	
Truck		5	5	20	10	120	1.31	

PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			

FACILITY Sunshine Mine

LOCATION Big Creek

COMBUSTION SOURCE EMISSIONS

SOURCE DESCRIPTION	FUEL TYPE	FUEL UNITS (UN)	RATED CAP (MMBtu/H)	FUEL RATE MAX HRLY (UNIT/H)	FUEL RATE ACT ANN (UN&M/YR)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	TSP E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Mine Boiler #1	Nat Gas	MCF	10.1000	4.3	26.711	24	364	P	Mine Boiler #1	N	None	0.00%	0.003	0.003	lb/MCF	1		1.5	2,3	0.013	0.330	0.040	0.013	0.330	0.040
Mine Boiler #2	Nat Gas	MCF	5.0000	2.2	13.356	24	364	P	Mine Boiler #2	N	None	0.00%	0.003	0.003	lb/MCF	1		1.5	2,3	0.007	0.165	0.020	0.007	0.165	0.020
Antmy Boiler #1	Nat Gas	MCF	12.6000	2.7	20.245	24	260	P	Antmy Boiler #1	N	None	0.00%	0.003	0.003	lb/MCF	1		1.2	2,3	0.008	0.280	0.030	0.008	0.280	0.030
Antmy Boiler #2	Nat Gas	MCF	12.6000	2.7	20.245	24	260	P	Antmy Boiler #2	N	None	0.00%	0.003	0.003	lb/MCF	1		1.2	2,3	0.008	0.280	0.030	0.008	0.280	0.030

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Primary Crush	ore	250	146.7	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.02	0.0002	lb\ton	0.45		1.00	2,3,16,19	0.050	0.113	0.015	0.023	0.051	0.007
Screen	ore	250	146.7	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.05	0.0005	lb\ton	0.75		1.00	2,3,16,19,27	0.125	0.282	0.037	0.094	0.212	0.028
Secondary Crusher	ore	250	146.7	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.05	0.0005	lb\ton	0.40		1.00	2,3,16,19	0.125	0.282	0.037	0.050	0.113	0.015
Headframe->Ore Bin	ore	127	146.7	16	260	F	Headframe	N	P.Encl	70.00%	0.01	0.0030	lb\ton	0.60		1.00	2,3,16,19	0.381	1.693	0.220	0.229	1.016	0.132
Ore Bin->Cnvr #1	ore	250	146.7	8	260	F	Headframe	N	P.Encl	70.00%	0.01	0.0030	lb\ton	0.60		1.00	2,3,16,19	0.750	1.693	0.220	0.450	1.016	0.132
Cnvr #1->Jaw Crush	ore	250	146.7	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.025	0.056	0.007	0.015	0.034	0.004
Jaw->Cnvr #2	ore	250	146.7	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.025	0.056	0.007	0.015	0.034	0.004
Cnvr #2->Screen	ore	325	190.7	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.033	0.073	0.010	0.020	0.044	0.006
Oversize->Cnvr #3	ore	75	44.01	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.008	0.017	0.002	0.005	0.010	0.001
Cnvr #3->Gyra. Crush	ore	75	44.01	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.008	0.017	0.002	0.005	0.010	0.001
Gyra. Crush->Cnvr #2	ore	75	44.01	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.008	0.017	0.002	0.005	0.010	0.001
Screen->Fine Bin	ore	250	146.7	8	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.025	0.056	0.007	0.015	0.034	0.004
Fine Bin->Cnvr #4	ore	83.3	146.7	24	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.008	0.056	0.007	0.005	0.034	0.004
Cnvr #4->Cnvr #5	ore	83.3	146.7	24	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.008	0.056	0.007	0.005	0.034	0.004
Cnvr #5->Mill	ore	83.3	146.7	24	260	P	Crushing Bghs	N	Bghs	99.00%	0.01	0.0001	lb\ton	0.60		1.00	2,3,16,19	0.008	0.056	0.007	0.005	0.034	0.004
Headframe->Pad	waste rock	52.1	51.27	16	260	F	Headframe	N	P.Encl	70.00%	0.01	0.0030	lb\ton	0.60		1.00	2,3,16	0.156	0.592	0.077	0.094	0.355	0.046
Loader->Truck	waste rock	52.1	51.27	16	260	F	Headframe	N	None	0.00%	0.05	0.0500	lb\ton	0.60		1.00	3,18	2.605	9.860	1.282	1.563	5.916	0.769
Truck->Storage	waste rock	208	51.27	16	65	F	Waste Pile	N	None	0.00%	0.01	0.0100	lb\ton	0.60		1.00	2,3,16	2.080	7.888	0.256	1.248	4.733	0.154
Truck->Ponds	waste rock	69.3	51.27	16	195	F	Tailings Ponds	N	None	0.00%	0.01	0.0100	lb\ton	0.60		0.00	2,3,16	0.693	0.000	0.256	0.416	0.000	0.154
Pile Wind Eros. (Active)	waste rock	0.062	0.26	16	260	F	Waste Pile	N	None	0.00%	13.2	13.20	lb\ton	0.50		0.50	2,3,22	0.818	6.600	1.716	0.409	3.300	0.858
Pile Wind Eros. (Inactive)	waste rock	0.083	0.73	24	365	F	Waste Pile	N	None	0.00%	3.5	3.50	lb\ton	0.50		0.50	2,3,22	0.291	3.500	1.278	0.146	1.750	0.639

(NOTE: Transfers for ore have been assumed to be similar to those at Lucky Friday Mine (HECLA).)

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	EMISSIONS MAX HOURLY TSP (LB/H)	MAX DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Hdframe->Truck	Loader		100	114	29710	16	260	U	H20	50.00%	0.83	0.42		0.45		1		0.000	0.000	0.000	0.000	0.000	0.000
Truck->Pavement	Truck		1000	46	12,000	16	260	U	H20	50.00%	1.24	0.62		0.45		1		0.338	5.408	0.700	0.152	2.434	0.315
Pavement->Dump	Truck		5000	62	4,000	16	65	P	Sweep	70.00%	5.1228	1.54		0.7		1	21,25	5.651	90.416	2.920	3.956	63.291	2.044
Pavement->Ponds	Truck		15000	41	8,000	16	195	P	Sweep	70.00%	5.1228	1.54		0.7		1	21,25	11.211	179.376	17.500	7.848	125.563	12.250
Conc Truk->Hwy	Truck		10000	1	260	1	260	P	Sweep	70.00%	5.1228	1.54		0.7		1	21,25	2.917	2.917	0.380	2.042	2.042	0.266

UNPAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID
Loader		5	5	20	4	120	0.83	
Truck		5	5	18.5	10	120	1.24	
Truck							0.00	
Truck							0.00	
Truck							0.00	

PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
							ERR			
							ERR			
		1	2	7	13300	18.5	5.1228			
		1	2	7	13300	18.5	5.1228			
		1	2	7	13300	18.5	5.1228			

FACILITY Asarco, Coeur Mine

LOCATION Shields Gulch, S.E. of Osburn

COMBUSTION SOURCE EMISSIONS

SOURCE DESCRIPTION	FUEL TYPE	FUEL UNITS (UN)	RATED CAP (MMBtu/H)	FUEL RATE MAX HRLY (UNIT/H)	FUEL RATE ACT ANN (UNAM/YR)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	TSP E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Mine Boiler	Nat Gas	MCF		0.7	5.652	24	364	P	M Boiler	N	None	0.00%	0.003	0.003	lb/MCF	1	0.35	1	2,3	0.002	0.047	0.008	0.002	0.047	0.008

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Jaw Crusher	ore	66.1	144.4	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.02	0.002	lb\ton	0.45		1	2,3,16,19	0.132	1.111	0.144	0.059	0.500	0.065
Screen	ore	66.1	144.4	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.05	0.005	lb\ton	0.75		1	2,3,16,19,27	0.331	2.777	0.361	0.248	2.083	0.271
Cone Crusher	ore	66.1	144.4	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.05	0.005	lb\ton	0.40		1	2,3,16,19	0.331	2.777	0.361	0.132	1.111	0.144
Headframe->Ore Pad	ore	66.1	144.4	8.4	260	F	Headframe	N	P.Encl	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.198	1.666	0.217	0.119	1.000	0.130
Ore Pad->Vib. Feeder #1	ore	66.1	144.4	8.4	260	F	Headframe	N	P.Encl	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.198	1.666	0.217	0.119	1.000	0.130
Feeder->Cnvr #1	ore	66.1	144.4	8.4	260	F	Headframe	N	P.Encl	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.198	1.666	0.217	0.119	1.000	0.130
Cnvr #1->Ore Bin	ore	66.1	144.4	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.066	0.555	0.072	0.040	0.333	0.043
Ore Bin->Vib. Feeder #2	ore	66.1	144.4	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.066	0.555	0.072	0.040	0.333	0.043
Vib. Feeder->Grate	ore	66.1	144.4	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.066	0.555	0.072	0.040	0.333	0.043
Grate->Cnvr #2	ore	33	72.2	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.033	0.278	0.036	0.020	0.167	0.022
Grate->Jaw Crusher	ore	33	72.2	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.033	0.278	0.036	0.020	0.167	0.022
Jaw->Cnvr #2	ore	33	72.2	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.033	0.278	0.036	0.020	0.167	0.022
Cnvr #2->Screen	ore	86	187.7	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.086	0.722	0.094	0.052	0.433	0.056
Screen->Cnvr #3	ore	19.8	43.3	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.020	0.167	0.022	0.012	0.100	0.013
Cnvr #3->Cone Crusher	ore	19.8	43.3	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.020	0.167	0.022	0.012	0.100	0.013
Cone Crusher->Cnvr #2	ore	19.8	43.3	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.020	0.167	0.022	0.012	0.100	0.013
Screen->Fine Bin	ore	66.1	144.4	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.066	0.555	0.072	0.040	0.333	0.043
Fine Bin->Cnvr #8	ore	66.1	144.4	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.066	0.555	0.072	0.040	0.333	0.043
Cnvr #8->Mills	ore	66.1	144.4	8.4	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.066	0.555	0.072	0.040	0.333	0.043
Headframe->Pad	waste rock	13.5	30	8.4	260	F	Headframe	N	None	0.00%	0.01	0.010	lb\ton	0.60		1	2,3,16	0.135	1.154	0.150	0.081	0.692	0.090
Loader->Pile	waste rock	13.5	30	8.4	260	F	Waste Pile	N	None	0.00%	0.01	0.010	lb\ton	0.60		1	2,3,16	0.135	1.154	0.150	0.081	0.692	0.090
Pile Wind Eros. (Active)	waste rock	0.119	0.26	8.4	260	F	Waste Pile	N	None	0.00%	13.2	13.200	lb\ton	0.50		0.5	2,3,16	1.571	6.600	1.716	0.786	3.300	0.858
Pile Wind Eros. (Inactive)	waste rock	0.125	1.095	24	365	F	Waste Pile	N	None	0.00%	3.5	3.500	lb\ton	0.50		0.5	2,3,16	0.438	5.250	1.916	0.219	2.625	0.958

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Hdframe->Pile	Loader		500	12	3,025	24	260	U	Chem	70.00%	0.74	0.22		0.45		1	2,3	0.010	0.240	0.032	0.005	0.108	0.014
Conc->Frontage	Truck		20000	1	103	1	104	U	Chem	70.00%	1.75	0.53		0.45		1	2,3	2.008	2.008	0.100	0.904	0.904	0.045

UNPAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID
Loader		5	3	35	4	120	0.74	
Truck		5	5	30.2	10	120	1.75	

PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
							ERR			
							ERR			

FACILITY Asarco, Galena Mine

LOCATION Lake Creek, So. of Silverton

COMBUSTION SOURCE EMISSIONS

SOURCE DESCRIPTION	FUEL TYPE	FUEL UNITS (UN)	RATED CAP (MMBtu/H)	FUEL RATE MAX HRLY (UNIT/H)	FUEL RATE ACT ANN (UN&M/YR)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	TSP E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Incinerator	Wood&pap	Tons		0.5	0.480	24	40	F	Incinerator	N	None	0.00%	13	13.000	lb/ton	0.35		1	2,5,15	6.500	156.000	3.120	2.275	54.600	1.092
Mine Boiler	Nat Gas	MCF		1.0	8.162	24	364	P	M Boiler	N	None	0.00%	0.003	0.003	lb/MCF	1		1	2,3	0.003	0.067	0.012	0.003	0.067	0.012

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Jaw Crusher	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.02	0.002	lb\ton	0.45		1	2,3,16,19	0.248	1.555	0.202	0.112	0.700	0.091
Screen	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.05	0.005	lb\ton	0.75		1	2,3,16,19,27	0.620	3.887	0.505	0.465	2.915	0.379
Cone Crusher	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.05	0.005	lb\ton	0.40		1	2,3,16,19	0.620	3.887	0.505	0.248	1.555	0.202
Headframe->Ore Bin	ore	124	202.1	6.3	260	F	Headframe	N	P.Encl	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.372	2.332	0.303	0.223	1.399	0.182
Ore Bin->Apron Feeder	ore	124	202.1	6.3	260	F	Headframe	N	P.Encl	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.372	2.332	0.303	0.223	1.399	0.182
Apron Feeder->Jaw Crush	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.124	0.777	0.101	0.074	0.466	0.061
Jaw->Cnvr #1	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.124	0.777	0.101	0.074	0.466	0.061
Cnvr #1->Cnvr #2	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.124	0.777	0.101	0.074	0.466	0.061
Cnvr #2->Cnvr #3	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.124	0.777	0.101	0.074	0.466	0.061
Cnvr #3->Low Head Screen	ore	160	262.7	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.160	1.010	0.131	0.096	0.606	0.079
Oversize->Cnvr #4	ore	37	60.6	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.037	0.233	0.030	0.022	0.140	0.018
Cnvr #4->Cone Crush	ore	37	60.6	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.037	0.233	0.030	0.022	0.140	0.018
Cone Crush->Cnvr #3	ore	37	60.6	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.037	0.233	0.030	0.022	0.140	0.018
Screen->Cnvr #5	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.124	0.777	0.101	0.074	0.466	0.061
Cnvr #5->Fine Bin	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.124	0.777	0.101	0.074	0.466	0.061
Fine Bin->Cnvr #6	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.124	0.777	0.101	0.074	0.466	0.061
Cnvr #6->Cnvr #8	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.124	0.777	0.101	0.074	0.466	0.061
Cnvr #8->Mill	ore	124	202.1	6.3	260	F	Crushing Bldg	N	Encl	90.00%	0.01	0.001	lb\ton	0.60		1	2,3,16,19	0.124	0.777	0.101	0.074	0.466	0.061
Headframe->Pad	waste rock	25	41.1	6.3	260	F	Headframe	N	None	0.00%	0.01	0.010	lb\ton	0.60		1	2,3,16	0.250	1.581	0.206	0.150	0.949	0.124
Loader->Pile	waste rock	25	41.1	6.3	260	F	Waste Pile	N	None	0.00%	0.01	0.010	lb\ton	0.60		1	2,3,16	0.250	1.581	0.206	0.150	0.949	0.124
Loader->Truck	waste rock	50	41.1	6.3	130	F	Waste Pile	N	None	0.00%	0.05	0.050	lb\ton	0.60		1	3,18	2.500	15.808	1.028	1.500	9.485	0.617
Truck->Offsite	waste rock	50	41.1	6.3	130	F	Silver Mtn. Pil	N	None	0.00%	0.01	0.010	lb\ton	0.60		1	2,3,16	0.500	3.162	0.206	0.300	1.897	0.124
Pile Wind Eros. (Active)	waste rock	0.159	0.26	6.3	260	F	Waste Pile	N	None	0.00%	13.2	13.200	lb\ton	0.50		0.5	2,3,16	2.099	6.600	1.716	1.050	3.300	0.858
Pile Wind Eros. (Inactive)	waste rock	0.042	0.105	24	105	F	Waste Pile	N	None	0.00%	3.5	3.500	lb\ton	0.50		0.5	2,3,16	0.147	1.750	0.184	0.074	0.875	0.092

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Hdframe->Pile	Loader		500	16	4,200	24	260	U	H20	50.00%	0.74	0.37		0.45		1	2,3	0.023	0.552	0.074	0.010	0.248	0.033
Pile->Truck	Loader		50	33	4,200	24	260	U	H20	50.00%	0.74	0.37		0.45		1	2,3	0.005	0.120	0.010	0.002	0.054	0.005
Truck->Main Rd	Truck		400	19	2,500	24	260	U	H20	50.00%	1.75	0.88		0.45		0	2,3	0.053	0.000	0.080	0.024	0.000	0.036
Main->Frontage	Truck		20000	19	2,500	1	260	P	Sweep	90.00%	7.2192	0.72		0.7		0	2,3,25	51.818	0.000	3.410	36.273	0.000	2.387
Conc->Frontage	Truck		20000	1	70	1	130	P	Sweep	90.00%	7.2192	0.72		0.7		0	2,3,25	2.727	0.000	0.100	1.909	0.000	0.070

UNPAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID
Loader		5	3	35	4	120	0.74	
Loader		5	3	35	4	120	0.74	
Truck		5	5	30.2	10	120	1.75	
Truck							0.00	
Truck							0.00	

PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
							ERR			
							ERR			
							ERR			
		1	2	7	13300	30.2	7.2192			
		1	2	7	13300	30.2	7.2192			

FACILITY Zanetti Bros

LOCATION Osburn

COMBUSTION SOURCE EMISSIONS

SOURCE DESCRIPTION	FUEL TYPE	FUEL UNITS (UN)	RATED CAP (MMBtu/H)	FUEL RATE MAX HRLY (UNIT/H)	FUEL RATE ACT ANN (UN&M/YR)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	TSP E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS: MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Pit IncineratorWaste		Tons		0.1	0.0096	24	4	P	Pit Incinerator	N	None	0.00%	13	13	lb\ton	0.35		0	2,5,15	1.300	0.000	0.062	0.455	0.000	0.022

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS: MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Jaw Crusher	Aggregate	40	35.2	8	40	F	Rock Crusher	N	None	0.00%	0.018	0.018	lb/ton	0.61		0	2,3	0.720	0.000	0.317	0.439	0.000	0.193
Cone Crusher	Aggregate	40	35.2	8	40	F	Rock Crusher	N	None	0.00%	0.28	0.280	lb/ton	0.61		0	2,3	11.200	0.000	4.928	6.832	0.000	3.006
Screens	Aggregate	40	35.2	8	40	F	Rock Crusher	N	None	0.00%	0.16	0.160	lb/ton	0.75		0	2,3	6.400	0.000	2.816	4.800	0.000	2.112
Roll Crusher & Screens	Aggregate	26	24.5	8	40	F	Rock Crusher	N	None	0.00%	1.85	1.850	lb/ton	0.61		0	2,3	48.100	0.000	22.663	29.341	0.000	13.824
Screens	Aggregate	26	24.5	8	40	F	Rock Crusher	N	None	0.00%	0.16	0.160	lb/ton	0.75		0	2,3	4.160	0.000	1.960	3.120	0.000	1.470
Cement Silo	Cement	16.6	12.9	8	100	P	Concrete Plant	N	Bghs	99.00%	0.07	0.001	lb/cu yd	0.88		0	2,24	0.017	0.000	0.006	0.015	0.000	0.005
Concrete Plant Transfers	Agg & Sand	16.6	12.9	8	100	F	Concrete Plant	N	None	0.00%	0.05	0.050	lb/cu yd	0.70		0	2,24	0.830	0.000	0.323	0.581	0.000	0.226
Weigh Hopper Loading	Agg,Sand,C	16.6	12.9	8	100	P	Concrete Plant	N	Bghs	99.00%	0.04	0.0004	lb/cu yd	0.45		0	2,24	0.007	0.000	0.003	0.003	0.000	0.001
Concrete Truck loading	Mixed Con	16.6	12.9	8	100	F	Concrete Plant	N	None	0.00%	0.04	0.040	lb/cu yd	0.88		0	2,24	0.664	0.000	0.258	0.581	0.000	0.226
Inactive Pile Wind Erosion	Agg & Sand	0.083	0.365	24	365	F	Plant Yard	N	None	0.00%	3.5	3.5	lb/ac-yr	0.5		0.5	2,3,22	0.291	1.750	0.639	0.146	0.875	0.320
Active Pile Wind Erosion	Agg & Sand	0.021	0.019	24	182.5	F	Plant Yard	N	None	0.00%	13.2	13.2	lb/ac-yr	0.5		0	2,3,22	0.277	0.000	0.125	0.139	0.000	0.063

EMISSIONS FROM AGGREGATE HANDLING OF MATERIALS

TRANSFER DESCRIPTION	# OF TRANS	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LBS/T)	CTRL TSP E.F. (LBS/T)	E.F. ID NO	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS: MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Loader->Jaw	1	40	34.2	8	42	F	Crushing Plant	N	None	0.00%	0.0022	0.0022		0.35		0	2,3	0.088	0.000	0.038	0.031	0.000	0.013
Jaw->Cone	2	40	34.2	8	42	F	Crushing Plant	N	None	0.00%	0.0033	0.0033		0.35		0	2,3	0.264	0.000	0.113	0.092	0.000	0.040
Cone->Scrn #1	1	40	34.2	8	42	F	Crushing Plant	N	None	0.00%	0.0059	0.0059		0.35		0	2,3	0.236	0.000	0.101	0.083	0.000	0.035
Scrn #1->Belt #3	2	20	15.4	8	42	F	Crushing Plant	N	None	0.00%	0.0059	0.0059		0.35		0	2,3	0.236	0.000	0.091	0.083	0.000	0.032
Scrn #1->Rolls	2	20	18.8	8	42	F	Crushing Plant	N	None	0.00%	0.0059	0.0059		0.35		0	2,3	0.236	0.000	0.111	0.083	0.000	0.039
Rolls->Scrn #2	1	26	24.5	8	42	F	Crushing Plant	N	None	0.00%	0.0156	0.0156		0.35		0	2,3	0.406	0.000	0.191	0.142	0.000	0.067
Scrn #2->Rolls	3	6	5.6	8	42	F	Crushing Plant	N	None	0.00%	0.0156	0.0156		0.35		0	2,3	0.281	0.000	0.131	0.098	0.000	0.046
Scrn #2->Belt #3	2	20	15.4	8	42	F	Crushing Plant	N	None	0.00%	0.0156	0.0156		0.35		0	2,3	0.624	0.000	0.240	0.218	0.000	0.084
Belt #3->Product piles	1	40	30.8	8	42	F	Crushing Plant	N	None	0.00%	0.0156	0.0156		0.35		0	2,3	0.624	0.000	0.240	0.218	0.000	0.084
Scrn #2->Scrn #3	2	23	3.5	8	2	F	Crushing Plant	N	None	0.00%	0.0156	0.0156		0.35		0	2,3	0.718	0.000	0.055	0.251	0.000	0.019
Scrn #3->Wash Screws	4	19	3	8	2	F	Crushing Plant	N	None	0.00%	0.0156	0.0156		0.35		0	2,3	1.186	0.000	0.094	0.415	0.000	0.033
Wash Screws->Cover Coat Pile	4	19	3	8	2	F	Crushing Plant	N	None	0.00%	0.0013	0.0013		0.35		0	2,3	0.099	0.000	0.008	0.035	0.000	0.003
Scrn #3->Sand Pile	2	4	0.5	8	2	F	Crushing Plant	N	None	0.00%	0.0156	0.0156		0.35		0	2,3	0.125	0.000	0.008	0.044	0.000	0.003
Piles->Loadout	1	40	34.2	8	42	F	Crushing Plant	N	None	0.00%	0.0156	0.0156		0.35		0	2,3	0.624	0.000	0.267	0.218	0.000	0.093

AGGREGATE HANDLING E.F. CALCULATION

MATERIAL TYPE	% H20	AVG WND SPD MPH	UNCTRL TSP E.F. (LB/TON)	E.F. ID
Agg Rock	4	10	0.0022	
Agg Rock	3	10	0.0033	
Agg Rock	2	10	0.0059	
Agg Rock	2	10	0.0059	
Agg Rock	2	10	0.0059	
Agg Rock	1	10	0.0156	
Agg Rock	1	10	0.0156	
Agg Rock	1	10	0.0156	
Agg Rock	1	10	0.0156	
Agg Rock	1	10	0.0156	
Agg Rock	1	10	0.0156	
Agg Rock	6	10	0.0013	
Agg Rock	1	10	0.0156	
Agg Rock	1	10	0.0156	

FACILITY Zanetti Bros

LOCATION Osburn

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	EMISSIONS: MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Raw Rock Dump	Truck		900	22	2,850	8	130	U	H20	50.00%	1.94	0.97		0.45		0	2,3	0.455	0.000	0.000	0.205	0.000	0.000
Crusher Loading	Loader		100	90	3,800	8	42	U	H20	50.00%	0.74	0.37		0.45		0	2,3	0.079	0.000	0.010	0.036	0.000	0.005
Product Loading	Loader		50	30	3,800	8	130	U	H20	50.00%	0.74	0.37		0.45		0	2,3	0.013	0.000	0.010	0.006	0.000	0.005
Product Out	Truck		900	22	2,850	8	130	U	H20	50.00%	1.94	0.97		0.45		0	2,3	0.455	0.000	0.310	0.205	0.000	0.140
Cement Trucks	Truck		300	2	176	1	100	U	H20	50.00%	1.31	0.66		0.45		0	2,3	0.075	0.000	0.050	0.034	0.000	0.023
Cement Trucks	Truck		300	2	176	1	100	P	H20	0.00%	13.199	13.2		0.7		0	2,3,25	1.500	0.000	0.070	1.050	0.000	0.049
Concrete Trucks	Truck		300	19	1881	8	100	U	H20	50.00%	1.43	0.72		0.45		0	2,3	0.097	0.000	0.000	0.044	0.000	0.000
Concrete Trucks	Truck		300	19	1881	8	100	P	H20	0.00%	14.334	14.33		0.7		0	2,3,25	1.934	0.000	0.770	1.354	0.000	0.539

UNPAVED ROAD E.F. CALCULATION / PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
Truck		5	5	35	10	120	1.94									ERR			
Loader		5	3	35	4	120	0.74									ERR			
Loader		5	3	35	4	120	0.74									ERR			
Truck		5	5	35	10	120	1.94									ERR			
Truck		5	5	20	10	120	1.31									ERR			
Truck							0.00				3.5	1	5.5	5900	20	13.199			
Truck		5	5	22.5	10	120	1.43									ERR			
Truck							0.00				3.5	1	5.5	5900	22.5	14.334			

FACILITY Hecla, Lucky Friday Mine
LOCATION Mullan

COMBUSTION SOURCE EMISSIONS

SOURCE DESCRIPTION	FUEL TYPE	FUEL UNITS (UN)	RATED CAP (MMBtu/H)	FUEL RATE MAX HRLY (UNIT/H)	FUEL RATE ACT ANN (UNAM/YR)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	TSP E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Incinerator	wood&pap	Tons		0.5	0.480	24	40	F	Incinerator	N	None	0.00%	13	13.000	lb/ton	0.35		1	2,5,15	6.500	156.000	3.120	2.275	54.600	1.092
Kewanee Boiler	Nat Gas	MCF	1.8000	1.1	7.170	24	364	P	K Boiler	N	None	0.00%	0.003	0.003	lb/MCF	1		1.4	2,3	0.003	0.083	0.011	0.003	0.083	0.011
Highlander Boil	Nat Gas	MCF	1.3000	0.8	5.180	24	364	P	H Boiler	N	None	0.00%	0.003	0.003	lb/MCF	1		1.4	2,3	0.002	0.060	0.008	0.002	0.060	0.008

PROCESSING EQUIPMENT SOURCE EMISSIONS

SOURCE DESCRIPTION	PROCESS MATERIAL	THROUGHPUT MAX HRLY (TON/HR)	THROUGHPUT ACT ANN (T*M/Y)	OPERATION H/D	OPERATION D/Y	EMISS TYPE (P/F)	EMISSION POINT DESCRIPTION	STACK TEST (Y/N)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F.	CTRL TSP E.F.	E.F. UNITS	PM-10 FRAC FACTOR	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	ESTIMATED EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Jaw Crush	ore	37.5	156	16	260	P	Spray tower	N	Spray	70.00%	0.02	0.006	lb\ton	0.45		1	2,3,16,19	0.225	3.600	0.468	0.101	1.620	0.211
Screen	ore	37.5	156	16	260	P	Spray tower	N	Spray	70.00%	0.05	0.015	lb\ton	0.75		1	2,3,16,19,27	0.563	9.000	1.170	0.422	6.750	0.878
Gyratory Crusher	ore	37.5	156	16	260	P	Spray tower	N	Spray	70.00%	0.05	0.015	lb\ton	0.40		1	2,3,16,19	0.563	9.000	1.170	0.225	3.600	0.468
Headframe->Ore Bin	ore	29.3	156	24	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.088	1.800	0.234	0.053	1.080	0.140
Ore Bin-> Cnvr #1	ore	44	156	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.132	1.800	0.234	0.079	1.080	0.140
Cnvr #1->Jaw Crush	ore	44	156	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.132	1.800	0.234	0.079	1.080	0.140
Jaw->Cnvr #2	ore	44	156	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.132	1.800	0.234	0.079	1.080	0.140
Cnvr #2->Screen	ore	57.2	202.8	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.172	2.340	0.304	0.103	1.404	0.182
Oversize->Cnvr #3	ore	13.2	46.8	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.040	0.540	0.070	0.024	0.324	0.042
Cnvr #3->Gyra. Crush	ore	13.2	46.8	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.040	0.540	0.070	0.024	0.324	0.042
Gyra. Crush->Cnvr #2	ore	13.2	16.8	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.040	0.194	0.025	0.024	0.116	0.015
Screen->Fine Bin	ore	44	156	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.132	1.800	0.234	0.079	1.080	0.140
Fine Bin->Cnvr #4	ore	44	156	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.132	1.800	0.234	0.079	1.080	0.140
Cnvr #4->Cnvr #5	ore	44	156	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.132	1.800	0.234	0.079	1.080	0.140
Cnvr #5->Mill	ore	44	156	16	260	P	Spray tower	N	Spray	70.00%	0.01	0.003	lb\ton	0.60		1	2,3,16,19	0.132	1.800	0.234	0.079	1.080	0.140
Headframe->Pad	waste rock	10.4	65	24	260	F	Headframe	N	None	0.00%	0.01	0.010	lb\ton	0.60		1	2,3,16	0.104	2.500	0.325	0.062	1.500	0.195
Loader->Pile	waste rock	10.4	65	24	260	F	Waste Pile	N	None	0.00%	0.01	0.010	lb\ton	0.60		1	2,3,16	0.104	2.500	0.325	0.062	1.500	0.195
Loader->Truck	waste rock	10.4	65	24	260	F	Waste Pile	N	None	0.00%	0.05	0.050	lb\ton	0.60		1	3,18	0.520	12.500	1.625	0.312	7.500	0.975
Pile Wind Emissions	waste rock	0.083	0.52	24	260	F	Waste Pile	N	None	0.00%	13.2	13.200	lb\ton	0.50		0.5	2,3,22	1.096	13.200	3.432	0.548	6.600	1.716
Cnvr->Pile	waste grav	0.44	0.65	16	260	F	N Gravel Pile	N	None	0.00%	0.01	0.010	lb\ton	0.60		1	2,3,16	0.004	0.025	0.003	0.002	0.015	0.002
Loader->Roadside Pile	waste grav	0.44	0.65	1	260	F	S Gravel Pile	N	None	0.00%	0.01	0.010	lb\ton	0.60		1	2,3,16	0.004	0.025	0.003	0.002	0.015	0.002
Loader->Truck	waste grav	0.44	0.65	2	130	F	S Gravel Pile	N	None	0.00%	0.05	0.050	lb\ton	0.60		0	3,18	0.022	0.000	0.016	0.013	0.000	0.010
Sand->Sand Cnvr #1	Tailings	21	87.4	16	260	F	Confil Bldg	N	Encl	90.00%	0.029	0.003	lb\ton	0.50		1	2,3	0.063	1.008	0.131	0.032	0.504	0.066
Cnvr #1->Pile	Tailings	21	87.4	16	260	F	Confil Bldg	N	Encl	90.00%	0.029	0.003	lb\ton	0.50		1	2,3	0.063	1.008	0.131	0.032	0.504	0.066
Pile->Cnvr #2	Tailings	21	87.4	16	260	F	Confil Bldg	N	Encl	90.00%	0.029	0.003	lb\ton	0.50		1	2,3	0.063	1.008	0.131	0.032	0.504	0.066
Cnvr #2->Cement Batcher	Tailings	21	87.4	16	260	P	Cement Bghs	N	Bghs	99.00%	0.029	0.000	lb\ton	0.70		1	2,3,20	0.000	0.000	0.000	0.000	0.000	0.000
Cement->Silo	Cement	2.52	9.17	1	260	P	Cement Bghs	N	Bghs	99.00%	0.27	0.003	lb\ton	0.70		1	2,3,20	0.008	0.106	0.014	0.006	0.074	0.010
Silo->Batcher	Cement	2.52	9.17	16	260	P	Cement Bghs	N	Bghs	99.00%	0.27	0.003	lb\ton	0.70		1	2,3,20	0.008	0.106	0.014	0.006	0.074	0.010

FUGITIVE EMISSIONS FROM VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS

SOURCE DESCRIPTION	VEHICLE DESC	ROAD SEGMNT	DIST PER TRIP (FT)	# OF TRIPS PER DAY	# OF TRIPS PER YR	OPERATION H/D	OPERATION D/Y	PAVED/ UNPAVED (P/U)	CTRL TYPE	EST CTRL EFF (%)	UNCTRL TSP E.F. (LB/VMT)	CTRL TSP E.F. (LB/VMT)	EF ID	PM-10 FRAC FACT	PM-10 EMISSION FACTOR	DAILY SEAS FACT	FN	EMISSIONS MAX HOURLY TSP (LB/H)	MAX WINTER DAILY TSP (LB/D)	ANNUAL TSP (T/Y)	MAX HOURLY PM-10 (LB/H)	MAX WINTER DAILY PM-10 (LB/D)	ANNUAL PM-10 (T/Y)
Hdframe->Pile	Loader		1000	50	13,000	24	260	U	Chem	68.00%	0.76	0.24		0.45		1	2,3	0.095	2.280	0.295	0.043	1.026	0.133
Pile->Truck	Loader		100	50	13,000	24	260	U	Chem	68.00%	0.45	0.14		0.45		1	2,3	0.006	0.144	0.020	0.003	0.065	0.009
Truck->Highway	Truck		600	31.2	8,125	24	260	U	Chem	68.00%	0.92	0.29		0.45		1	2,3	0.043	1.032	0.130	0.019	0.464	0.059
Mill->Grvl Pile	Loader		700	1	260	1	260	U	Chem	68.00%	0.56	0.18		0.45		1	2,3	0.024	0.024	0.000	0.011	0.011	0.000
Grvl Pile->Truk	Loader		100	2	260	2	130	U	Chem	68.00%	0.34	0.11		0.45		1	2,3	0.002	0.004	0.000	0.001	0.002	0.000
Gravel truck	Truck		1000	1	130	0.5	130	U	Chem	68.00%	0.92	0.29		0.45		1	2,3	0.110	0.055	0.000	0.050	0.025	0.000

UNPAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	SILT %	AVG VEH SPD MPH	AVG VEH WT (TON)	NO. OF WHEELS	# DAYS >0.01 PPT	UNCTRL TSP E.F. (LB/VMT)	E.F. ID
Loader		5	5	17.5	4	120	0.76	
Loader		5	3	17.5	4	120	0.45	
Truck		5	5	12	10	120	0.92	
Loader		5	5	11.5	4	120	0.56	
Loader		5	3	11.5	4	120	0.34	
Truck		5	5	12	10	120	0.92	

PAVED ROAD E.F. CALCULATION

VEHICLE DESCRIPT	ROAD SEGMENT	IND AVG FACT	NO. TRAFFI LANES	SILT (%)	SURFACE DUST LOADING	AVE VEHICLE WT (TON)	UNCTRL TSP E.F. (LB/VMT)	E.F. ID	MILES TRAVE PER DAY	MILES TRAVELLED PER YEAR
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			
							ERR			

Footnotes For Attachment B

Note: Many of the factors use are based on general properties of Douglas fir, Larch, and Ponderosa pine.

1) Maximum hourly rate based on annual rates and operating hours.

2) TSP factor from AP-42 (sections used listed under reference 6).

3) PM_{10} factor from AP-42 (ref. 6).

4) TSP factor from reference 3.

5) PM_{10} factor from reference 3.

6) Number of vehicle trips calculated from vehicle capacity and the annual amount transferred.

7) Assumed resaw processes 50% of lumber.

8) Oregon DEQ TSP factor (ref. 7).

9) Oregon DEQ emission factor which has been modified to account for 30% moisture (dry basis) (ref. 7).

10) PM_{10} fraction calculated from Oregon DEQ data (ref. 7).

11) AP-42 factor (0.35 lbs/Tons of logs processed) recalculated to represent lbs/Tons of sawdust processed. Assumes 0.4 Tons of sawdust per 1 Ton of logs (ref. 1).

12) Densities (ref. 1,2; fn. 14):

Solid Green Wood	40 lbs/ft^3
Sawdust (Green)	15 lbs/ft^3
Logs	2.8 Tons/10^3 Boardfeet (MBF)
Rough Green Lumber	1.75 Tons/MBF
Surfaced Green Lumber	1.35 Tons/MBF
Surfaced Dry Lumber	1.0 Tons/MBF

13) Production Factors ref. 1,3:

Shavings	0.32 Tons/MBF
Sawdust	0.42 Tons/MBF (for mills processing logs)
	2% of mass sawn (for mills processing only lumber)
Chips	0.86 Tons/MBF (for mills processing logs)
Bark	10% of log mass (Including Bark)

14) Moisture content of green wood products assumed 50%.

15) Assumed 1/2 the pit volume is wood at 40 lbs/ft^3.

16) High moisture ore (6% or greater).

17) Assumed 1% of milled ore is waste gravel.

18) TSP factor from reference 4.

19) 100% capture efficiency assumed since emission points are vented and inside building.

20) Assumed that PM_{10} fraction is 70% of TSP (engineering judgement).

21) PM_{10} fraction determined from industrial paved road equations in AP-42, and the parameters given there for "sand and gravel processing" roads (ref. 6).

22) Piles which were active or inactive during the winter were given seasonal factors of 0.5 because of snow and prevalent moisture. Pile sizes were estimated from site visits. All pile sizes were estimated as follows:

COMPANY	ACTIVE (Acres)	INACTIVE (Acres)
Sunshine	1	2
ASARCO-Coeur	1	3
ASARCO-Galena	1	1
Zanetti	0.1	1
HECLA	2	0

23) Pile sizes estimated from overhead photo hanging in the Zanetti Bros. main office, and from site visit.

24) PM_{10} fraction generated from AP-42 TSP factors and PM_{10} factors from reference 5.

25) Paved road parameters taken from AP-42 data for a Rock Crushing Plant.

26) Actual VMT used to calculate emissions.

27) Sand and Gravel Processing factor from AP-42 multiplied by (1-0.7) to account for moisture content or ore.

REFERENCES

1) Dobie, J. and D.M. Wright. 1975. Conversion Factors for the Forest-Products Industry in Western Canada. Forintek Canada Corp., Vancouver, B.C.

2) Hartman, D.A., W.A. Atkinson, B.S. Bryant, R.O. Woodfin. 1981. Conversion Factors for the Pacific Northwest Forest Industry. Institute of Forest Resources, Univ. of Washington, Seattle, WA.

3) PEI Boise and Silver Valley emission inventory calculations. On file at Idaho Air Quality Bureau, Central Office, Boise.

4) Orlemann, J.A., T.J. Kalman, J.A. Cummings, and E.Y. Lim. 1983. Fugitive Dust Control Technology. Noyes Data Corporation, Park Ridge, NJ.
   * Table 2.1.1-3
     - Controlling road dust with water
   * Table 2.18-2
     - Controlling handling emissions with enclosure and baghouse

5) USEPA. 1988. NEDS Source Classification Codes and Emission factor Listing- PM_{10}, Second Edition. USEPA, OAQPS, Technical Support Division, National Air Data Branch, Research Triangle Park, NC.

6) USEPA. 1990 (Updated). Compilation of Air Pollutant Emission Factors, AP-42. USEPA, OAQPS, Research Triangle Park, NC.
   * Table 1.4-1
     - Natural gas combustion
   * Table 2.1-3
     - Wood combustion in trench
   * Table 8.10-1
     - Concrete Batching
   * Table 8.19.1-1
     - Sand and gravel processing
   * Table 8.19.2-1
     - Crushed stone processing (crushing dry material)
   * Table 8.23-1
     - Ore processing
   * Table 10.3-1
     - Lumber processing
   * Section 11.2.1
     - Equation for unpaved road fugitives
   * Table 11.2.1-1
     - Parameters for "sand and gravel processing"
   * Section 11.2.3
     - Aggregate transfer equation
   * Section 11.2.6
     - Equations 1 and 2 (industrial paved roads)
   * Table 11.2.6-1
     - Parameters for "sand and gravel processing"
     - Parameters for "concrete batching"

7) Oregon Department of Environmental Quality. Emission Factor Reference Sheets.

APPENDIX C

EMISSION INVENTORY AREA & MOBILE SOURCES

Pinehurst PM_{10}
Air Quality Improvement Plan
February 5, 1992

APPENDIX C

Silver Valley Emission Inventory

Area and Mobile Sources

TABLE OF CONTENTS

I. INTRODUCTION

A. Background

The U. S. Environmental Protection Agency (EPA) has promulgated new federal ambient air quality standards for inhalable particulate matter with an aerodynamic particle diameter less than or equal to 10 micrometers (PM_{10}). This standard replaced the total suspended particulate (TSP) standard.

The Silver Valley has been identified as a problem area for PM_{10}. Therefore, EPA has designated the Silver Valley as a Group I PM_{10} area, having a greater than 95% probability of violating the PM_{10} standards.

Idaho is required by Section 110 of the Federal Clean Air Act to submit a State Implementation Plan (SIP) for the Silver Valley. This SIP must show strategies for attainment and maintenance of PM_{10} standards. Development of comprehensive emission inventories is an integral part of the SIP.

B. Approach

This report, prepared by the Idaho Air Quality Bureau (IAQB), serves to summarize the procedures and results of a 1988 TSP and PM_{10} area and mobile source emission inventory of the Silver Valley. TSP and PM_{10} emissions were inventoried to account for any problems resulting from the transition from TSP to PM_{10} standards.

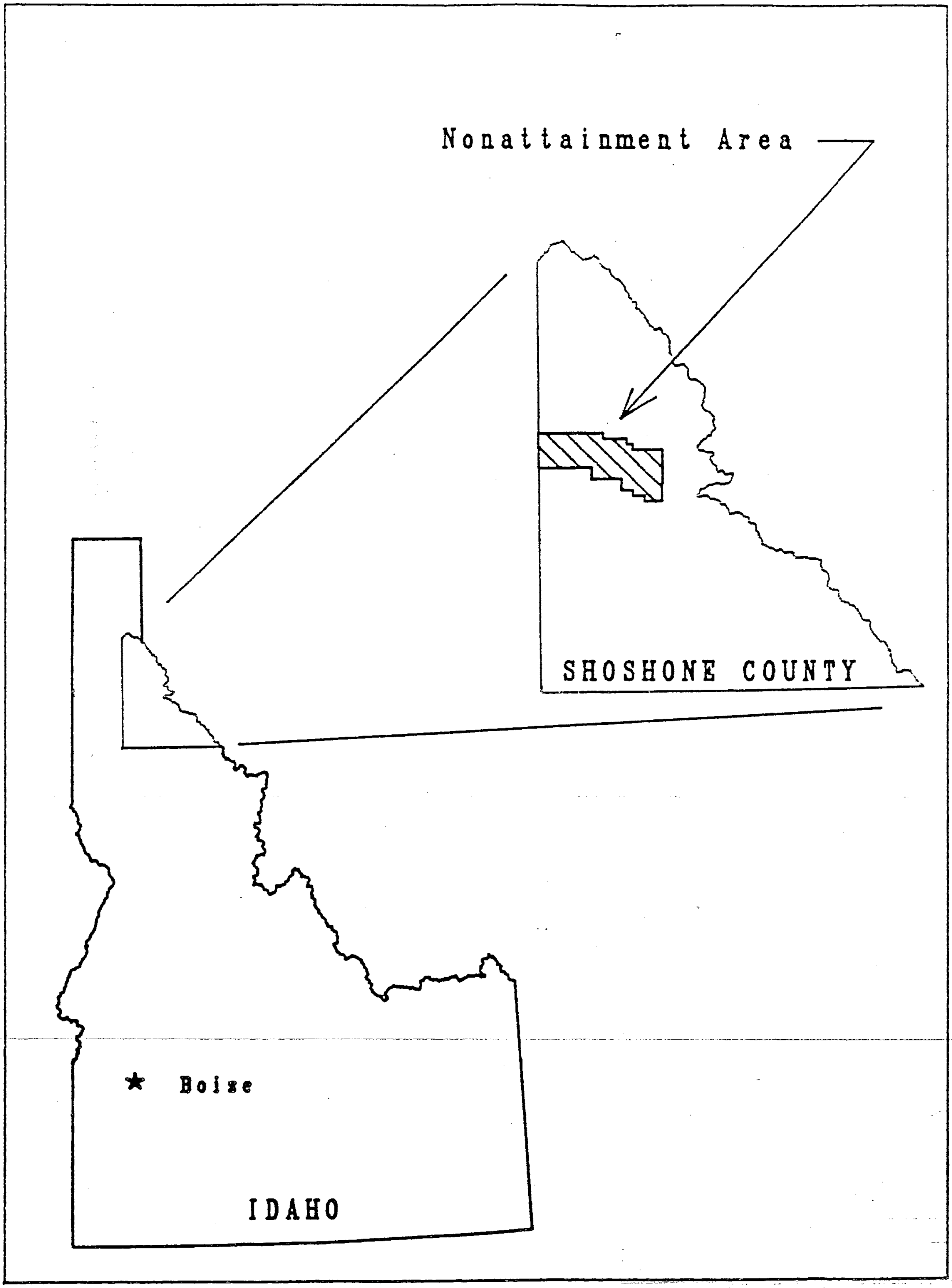
The Silver Valley area and mobile source PM_{10} emission inventory is of crucial importance since these sources constitute the highest contribution to the Silver Valley's particulate problems. The procedures for completing the emission inventory included identifying the emission sources, collecting data, and calculating emissions from these sources.

The geographic area in the inventory ranged from Pinehurst to Wallace. This is where the highest TSP and PM_{10} monitored values for the county were recorded. Figure C-1 shows the area inventoried. The inventoried area was further divided into grid cells for modeling purposes.

C. Area and Mobile Sources

Table 1 shows the complete inventory of area and mobile sources applicable to the Silver Valley. These sources were identified by consulting the following documents: 1) Procedures for Emission Inventory Preparation Volume III: Area Sources, EPA-450/4-81-026c, September 1981, and 2) Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, EPA-450/4-81-026d, December 1988.

Figure C - 1



Location of Proposed Silver Valley Nonattainment Area

Area sources were divided into the following categories: 1) residential, commercial and industrial fuel combustion, 2) open burning, and 3) fugitive dusts from construction activities.

Mobile sources were segregated into the following categories: 1) fugitive road dust, 2) vehicle traffic (tail pipe emissions), 3) transportation tire and brake wear, 4) aircraft emissions, and 5) railroad locomotives.

TABLE 1

AREA AND MOBILE SOURCE CATEGORIES APPLICABLE TO THE SILVER VALLEY

- Area Sources

  Residential, commercial, and industrial fuel combustion
  - coal combustion (bituminous and subbituminous)
  - home heating oil combustion (distillate #1 and #2)
  - natural gas combustion
  - woodstove/fire place

  Open burning
  - forest wild fires
  - structural fires
  - managed burning (slash/leaves/prescribed burning)

  Fugitive dust from construction activities
  - building construction
  - road construction

- Mobile Sources

  Fugitive road dust
  - vehicle traffic on paved roads
  - vehicle traffic on unpaved roads
  - vehicle traffic on roads applied with sand

  Vehicle traffic (tailpipe emissions)
  - light duty gasoline
  - light duty trucks 1
  - light duty trucks 2
  - heavy duty gasoline
  - heavy duty diesel

  Transportation tire and brake wear

  Aircraft emissions
  - civil
  - military

  Railroad Locomotives

II. IDENTIFIED SOURCES

The sources identified in the Silver Valley represent non-point sources that are emitted within the boundary of the inventory area. These sources are area sources, such as residential heating, and mobile sources generated by vehicular traffic and other transportation modes.

A. Stationary Area Sources

These sources represent combustion sources and sources due to construction activities.

1. Residential, Commercial, and Industrial Fuel Combustion

Residential fuel combustion involved usage of coal, oil, natural gas and wood. Coal can be bituminous or subbituminous type. Heating oil generally used in the Silver Valley is of two types-distillate #1 or #2.

2. Fugitive Dust from Construction Activities

These emissions resulted from the disturbance of earth due to road construction and residential, commercial, and industrial building construction activities.

3. Open Burning

Open burning emissions consisted of forest wild fires, structural fires and managed burning. The open burning emissions vary by season, with the exception of structural fires.

B. Mobile Sources

These sources result from combustion of fuels by vehicles and fugitive road dust due to vehicular traffic.

1. Fugitive Road Dust

Fugitive road dust is generated due to vehicular traffic on paved and unpaved roads. Wintertime road sanding increases the quantity of dust on paved roads, and therefore, enhances emissions generated by vehicular traffic on the roadway.

2. Vehicle Tailpipe Emissions

Tailpipe emissions result from the combustion of gasoline/diesel fuel used by automobiles and trucks. In this analysis, cars, light duty trucks and heavy duty trucks are considered.

3. Transportation Tire and Brake Wear Emissions

The particles emitted from vehicle tires and brakes are known to be related to the traffic type and use. These sources are considered in our analysis.

4. Aircraft Emissions

The emissions from aircraft are based on the landing, idle and take off cycles performed by the different aircraft at the Shoshone County airport.

5. Railroad Locomotive Emissions

The emissions from railroad locomotives are a function of fuel usage and the emission factor.

III. PRIMARY DATA COLLECTION

A. Household Data

1. Approach

For some area sources the effect of emissions to the environment is dependent upon the number of households (occupied dwelling units) within the area of concern. Such sources include residential woodstoves, fireplaces, gas furnaces, oil furnaces, and coal furnaces.

The number of housing units was obtained from data collected by Intermountain Demographics. According to Intermountain Demographics, household data are available from several sources. The USGS topographic map and the Idaho Transportation Department (ITD) aerial map were used to count dwelling units. Subsequently, an occupancy factor for each grid cell was applied.

The total number of occupied houses in 1988 was counted as 3,325. This data would be crucial for determining emissions from area sources including residential woodstoves, fireplaces, gas furnaces, oil furnaces, and coal furnaces.

2. Quality Assurance

The housing counts were verified by the Shoshone County Assessor's office. Some of the data were field checked for quality assurance. The other source of information was the Idaho Department of Health and Welfare's Superfund division map. Once the household was counted from the Superfund map, the data can be verified by the subdivision counts performed by the Superfund division.

The household data were rated excellent or reasonable by Intermountain Demographics. Most or all of the data was field checked. Other quality control measures taken included double checking all manual calculations, ensuring that traffic zones splitting into several cells were fully accounted for, and reviewing and cross checking the computer files.

B. VEHICLE MILES TRAVELED DATA

1. Approach

Vehicle miles traveled (VMT) is required to compute the emissions due to vehicular traffic on roads, vehicle tailpipe, and brake and tire wear. The VMT is usually obtained for paved and unpaved roads. Paved roads were categorized as local, collector, artery and highway.

VMT with respect to roadway categories was obtained from Intermountain Demographics. According to Intermountain Demographics, VMT was available from two sources. The Idaho Transportation Department (ITD) has VMT for the interstate and state highways and secondary roads in the Shoshone County. These data cover most of the roads in the county.

For other areas not covered by ITD data, VMT was estimated by Intermountain Demographics. The estimation for a zone was based on the number of households in that zone, trip rate (number of trips per day), and the average trip or segment length. The number of households was counted from the United States Geological Survey (USGS) topographic map and verified with Shoshone County Assessor data. The mileage was calculated from USGS maps, ITD maps, and maps generated by the Idaho Department of Health and Welfare's Superfund group.

The ITD data and the estimation of VMT were collected into grids with coordinates to signify the area. The data were summed up and the total VMT by road type for the Silver Valley was as follows: 19,500 VMT/day for local streets, 79,100 VMT/day for collectors and arteries, and 158,100 VMT/day for highways.

It was assumed that 80% of collectors and arteries would be artery VMT. This would provide 15,800 VMT/day for collectors and 63,300 VMT/day for arteries.

The VMT for unpaved roads in the Silver Valley was obtained in a similar way as that of the paved roads. For unpaved roads, the summation yielded 350 VMT/day. This would be assumed as unpaved local streets. The VMT on unpaved collectors and arteries is negligible.

2. Quality Assurance

Traffic count data from the ITD were verified by Intermountain Demographics with the mileage calculated from the USGS topographic map, Superfund maps, and ITD maps. The number of households counted from the USGS map was checked with the Shoshone County Assessor data.

IV. EMISSION CALCULATIONS

A. Emissions From Residential Wood Combustion

The combustion of wood in woodstoves and fireplaces results in emissions of TSP, PM_{10}, and other pollutants. The collection of data and calculation of emissions are presented below.

1. Data Collection

Data for households possessing wood burning devices were obtained from a survey performed by ES Field Services. The survey was conducted in the spring of 1991 and contacted 350 households in the Silver Valley from Kingston to Wallace. From the survey, the average annual wood consumption for homes in the Silver Valley was also determined. The survey questionnaire and a compilation of the results are presented in the reference section at the end of this Appendix.

A total of 62.6% of the households surveyed had some type of wood burning device on their property as presented in the 1991 Silver Valley Residential Wood Combustion Survey - ES Field Services, April 1991. It was assumed that this distribution of wood burners did not change significantly from 1988 to the present and that this factor can be applied to the 1988 population. The number of wood burning households in the Silver Valley was calculated to be 2081 out of a total of 3325 households in 1988.

The survey identified that a large number of the wood burning households had multiple heating devices. This not only included those houses that had multiple wood burning devices but also the households that had other heat sources such as natural gas or electrical heaters in conjunction with the wood burning device. Table 2 shows the distribution of households with wood burning devices and the total number of devices.

The total number of wood burning devices was calculated to be 311. This number is slightly higher than the value shown in the survey report because the survey findings were grouped by zip code and not all outlying households were captured in the report's summary. The 311 devices located in the Silver Valley correlates to a ratio of 1.4 wood burning devices per wood burning household. Assuming that the relationship of wood burning devices (311) to the total households (350) surveyed is the same for the population at large in the Silver Valley, the number of devices is computed to be 2955.

(3325 households) x (311 devices) / (350 households surveyed) = 2955 devices.

TABLE 2

NUMBER OF WOOD BURNING DEVICES IN THE SURVEYED POPULATION

Type of Device	Number of Households with one or more Wood Burning Device 1	2	>2	Total Number of Wood Burning devices
Woodstoves	130	19	2	174
Fireplaces	48	12	0	72
Fireplace Inserts	34	5	0	44
Furnaces	9	0	0	9
Pellet Stoves	11	0	0	11
Boilers	1	0	0	1
Total	233	36	2	311

The distribution of wood burning devices was further organized into categories similar to those presented in the Guidance Document for Residential Wood Combustion Emission Control Measures, EPA-450/2-89-015, February 1989. Conventional stoves and fireplace inserts are kept separate and not grouped together as presented in the guidance document. The survey results provided data on the wood usage rates for each category and it was assumed that this separation would result in a more accurate emission calculation. The summarized data are presented in Table 3.

The survey responses show that the distribution of wood burning devices is 70.1% woodstoves/inserts, 23.2% fireplaces, 3.2% furnaces/boilers, and 3.5% pellet stoves. Of those with woodstoves and inserts, 92.7% had conventional woodstoves/inserts and 7.3% had certified devices. The survey showed that a large percentage of the conventional woodstoves (18%) were homemade stoves. It was assumed that these homemade stoves performed comparable to the conventional woodstoves when operated under similar conditions.

Data were not directly available on the number of certified devices which were catalytic. However, from a review of the brand names, it appears that approximately 67% of the certified stoves and inserts were catalytic and 33% were noncatalytic.

From the survey, it was determined that the wood consumption per household for the winter of 1990-1991 was 4.2 cords. For the previous winter of 1989-1990, the average wood consumption was 4.9 cords. The average of these two values is 4.6 cords and since most people tend to overestimate their wood consumption by 20%, as reported in the EPA Guidance Document referenced earlier, this mean value was reduced to 3.6 cords per household per year. This value probably did not change significantly for previous years and therefore was taken to be representative for the 1988 emission inventory.

TABLE 3

DISTRIBUTION OF WOOD BURNING DEVICES BY EMISSION CATEGORY IN SILVER VALLEY

Type of Device	Number of Devices from Survey	Percent of Wood Burning Devices	Estimated Number for Valley
Fireplaces	72	23.2	684
Conventional Woodstoves	166	53.4	1577
Conventional Fireplace Inserts	36	11.6	342
Noncatalytic Certified Woodstoves/inserts	5	1.6	47
Catalytic Certified Woodstoves/inserts	11	3.5	105
Furnaces/Boilers	10	3.2	95
Pellet Stoves	11	3.5	105
TOTAL	311	100	2955

More importantly, the average number of cords burned per appliance over the two winter seasons is computed to be 3.05 cords/appliance /year. The total number of cords burned per year is obtained from the 1991 survey report.

(882 cords + 1013 cords) / (311 appliances) / (2 years) =

3.05 cords/appliance/year.

Applying the 20% over-estimation factor to this value reduces the cords/appliance/year value to 2.44. The mean value of the wood usage rates (Silver Valley) is 2.31 cords/appliance/year. These two values are very similar, therefore no correction factor is applied to the wood usage rates in order to normalize the two values.

The average consumption of pellets is 2.4 tons/household for the past two winters. It was assumed that the consumption of pellets did not change significantly from year to year and that 2.4 tons/year will represent the consumption in 1988.

Wood usage values for specific burning devices were available from the EPA and the 1991 survey performed by ES Field Services. The survey results were nearly identical to the EPA values for most devices and are presented in Table 4. Except for airtight stoves, the specific wood usage values obtained from the survey were used in the calculation of emissions. It was assumed that the households with wood-fired boilers burned the same quantity of wood as those with wood-fired furnaces.

TABLE 4

WOOD USAGE VALUES OBTAINED FROM EPA AND SILVER VALLEY SURVEY

Device Type	EPA Values cord/appliance/year	1991 Survey Values cord/appliance/year
Fireplace	0.8	1.16
Non-airtight stove	1.8	2.15
Fireplace insert	2.3	2.32
Airtight stove	2.8	2.8[a]
Furnace	3.7	3.11

[a] EPA value, did not obtain from survey

Using the wood usage values, the total amount of wood consumed in the Silver Valley for winter of 1988 was calculated to be 5698 cords. The calculation is presented in Table 5.

Data obtained from the U.S. Forest Service indicated that the amount of wood removed from the Wallace Ranger District through the permit system was 2254 cords for 1990. This compares relatively well with the amount of wood consumed when other factors are considered such as the percent of wood users who buy their wood supply and also the number of people who cut wood from private land.

2. Activity Levels

Silver Valley

To translate cords of wood burned into cubic feet burned, a conversion factor of 1 cord = 80 ft^3 is used as suggested in the EPA

Guidance Document referenced earlier. The mass of wood burned is then obtained by using specific wood density factors for the different types of softwood species burned. The wood density factors were obtained from the U.S. Department of Agriculture, Forest Products Laboratory, Wood Handbook, Agricultural Handbook No. 72, Washington, DC, 1974. An average wood density of 32.0 lb/ft^3 is used for hardwoods. The mass of wood burned was then converted to kilograms to correspond to units used in the emission factors. Wood usage is summarized in Table 6.

TABLE 5

TOTAL NUMBER OF CORDS CONSUMED IN THE SILVER VALLEY

Type of Device	Cords/ Appliance/ Year	Number of Wood Burning Devices	Wood Consumed (cords/year)
Fireplace	1.16	684	793
Conventional Woodstove	2.15	1577	3391
Conv. Fireplace Inserts	2.32	342	793
Noncatalytic Certified Woodstoves/Inserts	2.80	47	133
Catalytic Certified Woodstoves/Inserts	2.80	105	293
Furnace/Boiler	3.11	95	295
	TOTAL	2850[a]	5698

[a] Total does not include pellet stoves

A temperature and population dependent usage factor is then calculated by dividing the total usage by the effective heating degree days in a normal year, excluding July and August, and the total number of households in the Silver Valley for 1988.

Effective heating degree days (HDD) are calculated by assuming it takes 1.5 times the amount of wood/degree day for heating during January and February, and 0.5 times the amount in May through June and September through October. The actual heating degree days/month are then multiplied by the appropriate factor (0.5, 1.0 or 1.5) and added together to generate effective heating degree days. In the Silver Valley, the number of annual effective heating degree days is calculated to be 6547 for 1988. To calculate the usage factor in terms of Kg/effective degree day/household, the method is as follows:

$(532.5 \times 10^4$ Kg/yr) / (6547 effective HDD) / (3325 households) = 0.2446 Kg/HDD/household.

TABLE 6

ANNUAL RESIDENTIAL WOOD USAGE

Species Burned	Percent Distribution	Number of Cords Burned Annually	Dry Wood Density ($lbs./ft^3$)	Dry Mass Wood Consumed (10^4 Kg)
Douglas Fir	19.3	1099	26.7	106.4
Grand Fir[a]	13.4	762	21.1	58.3
Western Hemlock	1.5	88	25.0	8.0
W. White Pine	17.0	967	21.1	74.0
Lodgepole Pine	6.2	351	22.8	29.1
Western Larch	40.1	2285	28.9	239.7
Other Hardwoods	2.6	146	32.0	17.0
Total		5698		532.5

[a] includes White Fir and other fir species

This factor is calculated using the total number of households in the Silver Valley and not the number of households using wood as a source of heat. The total number of households is used so that the wood burning emissions can be distributed to each occupied grid space in the air quality model. The number of actual heating degree days is based on the average temperature per month in 1988 for the Kellogg area as provided in Climatological Data Annual Summary for Idaho 1988, National Oceanic and Atmospheric Administration. The total number of heating degree days in 1988 is 6032.

To calculate the wintertime maximum daily usage for the Silver Valley, the maximum daily heating degree days are determined (heating degree days are calculated by taking the average of the daily high and low temperature, then subtracting that value from 65). The maximum number of heating degree days is calculated to be 53 in Kellogg (12/27/87) for the 1988 winter season. The residential wood consumption on a day with 53 heating degree days is equal to 43,100 Kg.

(0.2446 Kg/effective HDD/household) x (53 HDD) x (3325 households) x (1.0 winter factor) = 43,100 Kg.

Pinehurst

For the Pinehurst area, a heating degree-day value was calculated from meteorological data collected during a stagnation event recorded in January 1988. The average heating degree-day for a ten day stagnation period was calculated to be 35.7 for the 1988 winter season. The residential wood consumption during such a stagnation period is 9,137 kg/day for the 1988 base year. The wood consumption in Pinehurst is approximately 21% of the total Silver Valley wood consumption for a worst case winter day scenario. The following is a summary of the calculations used to determine the Pinehurst wood consumption value.

Total number of households in the Pinehurst area is 677.

Percent of wood burning households is 62.57%.

Number of devices per wood burning household is 1.42 devices.

TABLE 3A

Distribution of Wood Burning Devices in Pinehurst

Type of Device	Percent	Number
Fireplace	18.1	109
Conventional Woodstoves/inserts	71.5	430
Noncatalytic Cert stoves/inserts	1.8	11
Catalytic Cert. stoves/inserts	3.9	23
Furnaces/boilers	1.9	11
Pellet Stoves	2.9	17
Total	100	602

Note that the distribution of wood burning devices in Pinehurst is slightly different from the population of the entire Silver Valley. The results of the survey indicated that Pinehurst had a slightly greater occurrence of conventional woodstoves/inserts and fewer fireplaces than the Silver Valley. The distribution of the other wood burning devices varied less significantly (± 1%).

The total annual mass of wood burned for Pinehurst is calculated using the same approach as the Silver Valley. It was assumed that the species of wood burned in Pinehurst is the same as the survey results for all of the Silver Valley. The calculation of total annual wood burned is 111.7×10^4 kg/year for Pinehurst in 1988.

To calculate the wood burning usage factor for Pinehurst in terms of Kg/effective degree-day/household, the method is as follows:

$$(111.7 \times 10^4 \text{ kg/year}) / (677 \text{ households}) / (6547 \text{ effect. HDD})$$
$$= 0.2520 \text{ kg/HDD/household.}$$

TABLE 6A

Annual Wood Consumption in Pinehurst

Type of Device	Total Number Cords	% Dist.	Mass Wood Consumed (Kg/yr)
Fireplace	126.3	10.6	118034
Conventional Woodstoves/inserts	937.5	78.4	876053
Noncatalytic Cert stoves/inserts	30.3	2.5	28334
Catalytic Cert. stoves/inserts	65.7	5.5	61389
Furnaces/boilers	35.5	3.0	33219
Pellet Stoves	41.9 tons pellets		37983
Total	1195 cords		111.7×10^4 Kg

The daily residential wood consumption in Pinehurst during a winter stagnation period is as follows:

(0.2520 kg/HDD/hh)(677 households)(35.7 max HDD)(1.5 seasonal heating factor) = 9,137 kg/day

This total (9,137 kg/day) does not include pellet stove data. Pellet stove activity was derived from the wood burning survey and emissions were calculated independently. The calculations for pellet stove emissions followed the same format as the other wood burning devices.

3. Emission Factors and Calculations

Silver Valley

PM_{10} emission factors were obtained for each wood burning device from the Guidance Document referenced earlier. Emission factors for certified stoves and inserts were given for Phase II stoves. Since essentially all certified stoves and inserts in use in 1988 are Phase I stoves, these emission factors were adjusted. Emission rates, in grams per hour, are available for both Phase I and Phase II stoves as per the Guidance Document referenced earlier. A Phase I emission factor, in grams per kilogram of wood burned, is calculated by multiplying the Phase II emission factor (g/kg) by the ratio of the g/hr Phase I factor to the g/hr Phase II factor. The estimation that 95% of TSP is PM_{10} is used to compute the TSP emission value. This estimation is obtained from Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, AP-42, Fourth Edition, September 1985.

The annual emissions for residential wood combustion are calculated to be 85.2 tons per year for PM_{10} and 89.7 tons per year for TSP. A similar calculation for a worst case wintertime day with 53 heating degree days is equal to 1,448 lb/day for PM_{10} and 1,524 lb/day for TSP emissions. Tables 7 and 8 summarize the emissions from residential wood combustion.

TABLE 7

EMISSIONS FROM RESIDENTIAL WOOD COMBUSTION - SILVER VALLEY

	TSP	PM_{10}
Annual, tons/year	89.7	85.2
Wintertime Daily, lb/day	1,524	1,448

TABLE 8

ANNUAL EMISSIONS FROM RESIDENTIAL WOOD COMBUSTION - SILVER VALLEY

Type of Device	Mass Wood Burned (10^4 Kg/yr)	PM-10 Emission Factor (g/Kg)	PM-10 Emissions per device (tons/yr)	TSP Emissions per device (tons/yr)
Fireplace	74.15	14.0	11.44	12.04
Conv. Woodstoves	316.85	15.0	52.38	55.13
Conv. Fplc. Inserts	74.15	15.0	12.26	12.90
Noncatalytic cert. stove/insert	12.43	10.9	1.49	1.57
Catalytic cert. stove/insert	27.34	8.9	2.68	2.82
Furnaces/Boilers	27.61	15.0	4.56	4.80
Pellet Stoves	22.75	1.6	0.40	0.42
		Total	85.20	89.70

Pinehurst

The same approach that was used to calculate Silver Valley emissions was also used to calculate Pinehurst wood burning emissions. Once the activity level was determined for the two different time periods, annual and wintertime daily, the emissions are calculated using the appropriate PM_{10} emission factors. The calculation of Pinehurst residential wood burning emissions are as follows:

TABLE 8A

Annual Emissions from Residential Wood Combustion

Type of Device	Mass Wood Burned (10^4kg)	PM_{10} Emission Factor (g/Kg)	PM_{10} Emissions per Device (tons/yr)
Fireplace	11.8	14.0	1.82
Conventional Woodstoves/inserts	87.6	15.0	14.48
Noncatalytic Cert stoves/inserts	2.8	10.9	0.34
Catalytic Cert. stoves/inserts	6.1	8.9	0.60
Furnaces/boilers	3.3	15.0	0.55
Pellet Stoves	3.8	1.6	0.07
Total	111.7		17.9

TABLE 8B

Wintertime Daily Emissions From Residential Wood Combustion

Type of Device	Mass Wood Burned (kg/day)	PM_{10} Emission Factor (g/Kg)	PM_{10} Emissions per Device (lbs/day)
Fireplace	965	14.0	29.80
Conventional Woodstoves/inserts	7166	15.0	236.96
Noncatalytic Cert stoves/inserts	232	10.9	5.57
Catalytic Cert. stoves/inserts	502	8.9	9.85
Furnaces/boilers	272	15.0	8.99
Pellet Stoves	311	1.6	1.10
Total	9137		292.26

B. Emissions From Residential Heating Oil Usage

The combustion of heating oil generates TSP and PM_{10} which are estimated below.

1. Data Collection

Estimates of residential heating oil usage were obtained from suppliers in the Silver Valley. There are five distributors in the county. They were contacted to determine the total fuel oil supplied in 1988 to the residents in the county and the number of residents served. The data are presented in Table 9.

TABLE 9

DATA OBTAINED FROM FUEL OIL DISTRIBUTORS

Distributors	Number of Residents Served	Total Fuel Oil Supplied, GPY
Exxon Heating Oil	250	479,000
Gravley Furnace & Fuel Oils	- *	101,000
Ross Oil	200-300	150,000
Twin City Fuel	150	25,000
TOTAL		755,000

*data not available

According to the distributors, a resident can obtain fuel oil from different distributors depending on the price per gallon quoted by the distributors. Therefore, it can be assumed that two distributors may have supplied to the same resident in the Silver Valley in a year. The total number of residents using heating oil is assumed to be 500.

2. Calculations of Emission Factors and Emissions

The TSP emission factor of 2.5 lb/1000 gallons of distillate oil for residential furnaces is obtained from AP-42, Volume I, Page 1.3-2. The PM_{10} emission factor of 1.25 lb/1000 gallons is taken from PM_{10} Emission Factor Listing Developed by Technology Transfer and AIRS Source Classification Codes with Documentation, EPA-450/4-89-022, November 1989, Page 5, SCC 1-05-002-05.

Dividing the total gallons of heating oil used by the total number of households using heating oil yields 755,000/500 = 1,510 gal/yr/household. To generate a temperature and population dependent usage factor, the gallons per year value was divided by the effective normal heating degree days/year (excluding July and August) and the total number of households in the Silver Valley.

The method for calculating annual effective heating degree days was described previously and is to be 6547. To calculate gal/effective degree day/household, the approach is as follows:

(755,000 gals/yr)/(6,547 effective degree days)/3,325 households = 0.0347.

This factor is calculated using the total number of households or dwellings in the Silver Valley and not the number of households using fuel oil. The total number of households is used so that the fuel oil emissions can be distributed to each grid square in the air quality modeling.

Estimated total fuel oil use in 1988 can be back-calculated by multiplying the use factor of 0.0347 by the total number of households and by the number of normal degree days per year.

(0.0347 gal/effective degree day/household * 3,325 households * 6,032 degree days/yr = 695,957 gal/yr of fuel oil.

The worst case daily wintertime fuel oil use is calculated by assuming a heating requirement of 53 heating degree days in Kellogg.

(0.0347 gal/effective degree day/household) * 3,325 households * 53 degree days/day = 6,115 gal/day of fuel oil consumed in the worst case day.

TSP and PM_{10} emissions are computed as follows:

TSP = 695,957 x 2.5 lb/1000 gal x 1/2000 lb/ton = 0.87 ton/yr.
PM_{10} = 695,957 x 1.25 lb/1000 gal x 1/2000 lb/ton = 0.44 ton/yr.

The daily worst case winter emissions are calculated in the following way:

TSP = 6,115 * 2.5 lb/1000 gal = 15.29 lb/day.
PM_{10} = 6,115 * 1.25 lb/1000 gal = 7.64 lb/day.

Table 10 summarizes the fuel oil consumption and calculations of TSP and PM_{10} emissions.

TABLE 10

RESIDENTIAL HEATING FUEL OIL USE AND EMISSIONS

Activity	Fuel Oil Use	TSP	PM_{10}
Annual	695,957 gal/yr	0.87 ton/yr	0.44 ton/yr
Wintertime worst case daily	6,115 gal/day	15.29 lb/day	7.64 lb/day

C. Emissions From Residential Coal Usage

The combustion of coal generates particulates and other pollutants which are eventually emitted through the chimney.

1. Data Collection

Data on coal usage in the Silver Valley were obtained from Twin City Fuel Company, the only distributor in the area ranging from Cataldo to Mullen. According to the company, the coal used by the Silver Valley residents of the county was 174 tons. The number of households served was 30.

2. Calculations of Emission Factors and Emissions

The emission factor for TSP is 16 lb/ton of bituminous coal burned and is obtained from AP-42, Volume I, page 1.1-2 for uncontrolled overfeed stoker. The PM_{10} emission factor is 52 per cent of TSP as provided in <u>PM_{10} Emission Factor Listing Developed by Technology Transfer and AIRS Source Classification Codes with Documentation, EPA-450/4-89-022, November 1989, Pg.37.</u> The emission factor for PM_{10} is 8.3 lb/ton of coal burned.

Two approaches for estimating the emission of TSP are followed. One of the methods is the straight-forward approach.

TSP emissions = 16 lb/ton of coal * 174 ton/yr = 1.4 ton/yr and
PM_{10} emissions = 8.3 lb/ton of coal * 174 ton/yr = 0.72 ton/yr.

The other method is based on the household data and the number of degree days (heating) in a year. The tons of coal used per year can be obtained by using the equation:

$$F_C = 0.003874 \exp(7.6414 - 1000/D)\, S_C.$$

Where: F_C = Fuel use in tons/yr;
D = Number of degree days; and
S_C = Number of housing units using coal.

This equation is obtained from <u>Procedures for Emission Inventory Preparation, Volume III: Area Sources, EPA-450/4-81-026c, September, 1981</u>. The number of degree days was calculated earlier to be 6032.

$$F_C = 0.003874 \exp(7.6414 - 1000/6032)30 = 205 \text{ tons/yr.}$$

The emissions of TSP and PM_{10} are as follows:

TSP = 16 * 205 = 1.64 tons/yr.
PM_{10} = 8.3 * 205 = 0.85 tons/yr.

To generate a temperature and population dependent usage factor, pound/effective degree day/household is calculated as follows:

205 tons/yr * 1/6547 effective degree days * 1/3325 households * 2000 lb/ton = 0.0188 lb/effective degree day/household.

The factor 0.0188 is computed using the total number of households in the Silver Valley. The total number of households is used so that coal emissions could be equally distributed to each grid square in the air quality model. The worst case daily wintertime coal use was calculated by assuming a heating requirement of 53 heating degree days.

0.0188 * 3325 * 53/2000 lb/ton = 1.66 tons/day.

The daily emissions of TSP and PM_{10} are as follows:

TSP = 16 * 1.66 = 26.56 lb/day.
PM_{10} = 8.3 * 1.66 = 13.78 lb/day.

Table 11 summarizes the emissions from coal usage:

TABLE 11

EMISSIONS FROM RESIDENTIAL COAL COMBUSTION

	TSP	PM_{10}
Annual, tons/yr	1.64	0.85
Daily (worst), lb/day	26.56	13.78

D. Emissions From Natural Gas Usage

The combustion of natural gas emits TSP and PM_{10}. The collection of data and calculations of emissions are presented below.

1. Data Collection

The information on natural gas usage in the Silver Valley for 1988 was obtained from the Washington Water Power Company. There were a total of 2716 customers, 2333 as residential, 374 as commercial and 9 as industrial using natural gas as a heating source. No information could be obtained for the number of customers using natural gas for water heating or cooking.

To obtain the number of customers using natural gas for non-heating purposes, the Shoshone County Assessor's office was contacted. The total number of residential customers using natural gas for space heating was 90% of total residential customers. This is equal to 2,100 customers. There were a total of 50% of the total residential customers using natural gas for water heating in the Silver Valley. This is equal to 1,167 customers.

Data obtained from the Washington Water Power Company indicated that the residential Therms used were 2 million, the commercial Therm used was 1.9 million and the industrial Therm used was 1.5 million. This amounts to a total of 5.4 million Therms.

2. Calculations of Emission Factors and Emissions

Residential natural gas usage can be estimated by using the following equation from Procedures for Emission Inventory Preparation, Volume III: Area Source, EPA-450/4-81-026c, September, 1981, Page 2-6.

$F_{NG} = 47.5\ AD^{0.367}(S_{NG}/W_{NG})^{0.588}\ R^{0.125}$.

Where:
- F_{NG}= Fuel use in Therms/yr (1 Therm = 10^5 Btu);
- A = Total number of natural gas customers (2333);
- D = Number of degree days (6032);
- S_{NG}= Number of housing units using natural gas for space heating (2100);
- W_{NG}= The larger of the number of housing units using natural gas for water heating or cooking (1167);
- R = Average number of rooms in housing units (5.5 obtained from the above reference); and
- F_{NG}= $(47.5)(2333)(6032)^{0.367}\ (2100/1167)^{0.588}\ (5.5)^{0.125}$ = 4,730,000 Therms/yr.

The total residential natural gas usage per year is calculated to be 4,730,000 Therms. However, the total Therms used for residential purpose as provided by the Washington Water Power Company was 2 million. The above equation overestimates the residential natural gas usage. Therefore, the natural gas usage patterns as furnished by the Washington Water Power Company are utilized.

To calculate Therms/effective degree day/household, the computation is as follows:

(2,000,000 Therms/yr)/(6,547 effective degree days)/(3,325 households) = 0.0919.

This factor is calculated using the total number of households or dwellings in the Silver Valley and not the number of households using natural gas. The total number of households is used so that the natural gas emissions can be distributed to each occupied grid square in the air quality model.

The annual natural gas usage can be calculated as follows: (0.0919 Therms/effective degree day/household) * 3,325 households * 6,032 degree days/yr = 1,840,000 Therms/yr. The contribution of commercial and industrial natural gas usage was provided by the Washington Water Power Company and were 1.9 million Therms/yr and 1.5 million Therms/yr respectively. The total natural gas usage is equal to 5,240,000 Therms/yr.

The emission factor for particulates for external natural gas combustion obtained from AP-42, Table 1.4-1 is 1 to 5 lb. of TSP per million cubic feet of natural gas used. A value of 3 lb. of PM_{10} per million cubic feet of natural gas used is derived from PM_{10} Emission Factor Listing Developed by Technology Transfer and AIRS Source Classification Codes with Documentation, EPA-450/4-89-022, SCC1-05-001-06 for external combustion space heaters. It is assumed that 100% of TSP emissions is equivalent to PM_{10}. To convert the emission factor to lb/Therm, the calculation is as follows:

$3\ lb/10^6\ ft^3 * 1\ ft^3/1050\ Btu * 10^5\ Btu/Therm * 1000$
$= 0.2857\ lb/1000\ Therm.$

Total annual emissions of TSP and PM_{10} are as follows:

0.2857 lb/1000 Therm * 5,240,000 Therm/yr/2000 lb/ton
= 0.7485 ton/yr.

To calculate the daily emissions, the factor, Therm/effective degree day/number of residential and commercial customers is determined as follows:

(3,900,000 Therms/yr)/(6,547 effective degree days)/(2,707 residential and commercial customers) = 0.2201.

This factor is multiplied by the number of residential and commercial customers and the worst case heating degree days to obtain the worst case daily wintertime natural gas usage.

0.2201 * 2707 * 53 = 32,000 Therms/day.

The daily emissions of TSP and PM_{10} are as follows:

0.2857 lb/1000 Therm * 32,000 Therms/day = 9.1 lb/day.

Table 12 summarizes the emissions from natural gas usage.

TABLE 12

EMISSIONS FROM NATURAL GAS COMBUSTION

POLLUTANT	ANNUAL, tons/yr	DAILY WORST, lb/hr
TSP	0.7	9.1
PM_{10}	0.7	9.1

E. Fugitive Emissions From Construction Activities

Construction activities can result in dust emissions that may impact on local air quality. Building and road construction are the principal emission sources under this category.

1. Residential, Commercial, and Industrial Construction

Building construction emissions are generated from land clearing, blasting, ground excavation, cut and fill operations, and the construction of the particular facility itself.

Data Collection

According to the Shoshone County Building Inspector, the number of building permits issued in 1988 was as follows:

Single-Family	Multi-Family	Commercial	Industrial
118	2	6	5

The average lot size was equal to 0.18 acre per lot for single-family dwellings as obtained from the Shoshone County Assessor's Office. The duration of construction activity for a residential dwelling unit was six months and for non-residential buildings was eleven months. These values were obtained from Cowherd, C. C., Jr., C. M. Guenther, and D. D. Wallace, Emissions Inventories of Agricultural Tilling, Unpaved Roads, and Air Strips and Construction Sites, EPA-450/3-74-085, U.S. EPA, Research Triangle Park, NC, November, 1974. It was assumed that the average lot size for multi-family dwelling was 0.5 acre/lot.

Construction area for commercial and industrial building construction varied considerably from site to site. To account for this, the area under construction was calculated as a function of building value. Factors of 3.7 acres per 10^6 dollars for commercial buildings and 4.0 acres per 10^6 dollars for industrial buildings were used. These values are presented in AQMP Appendix L-87, 1983 Base Year Emission Inventory Documentation, Ventura County Air Pollution Control District, January, 1988. The average values of building construction in 1988 were $161,874 for commercial and $24,190 for industrial as obtained from the Shoshone County Building Inspector.

Construction activity did not occur evenly throughout the year. The Shoshone County Building Inspector indicated that the activity was reduced by 3% of the total during the winter season.

Calculations of Emission Factors and Emissions

An emission factor of 1.2 tons per acre of construction per month of activity is used. This value applies to construction operations with 1) medium activity level, 2) moderate silt content (~30%) and 3) semiarid climate. This is obtained from AP-42, Pg. 11.2.4-1. The fraction of PM_{10} is assumed to be 36%, which is the value used for emissions from unpaved roadways. Emissions from building construction activities are assumed to be reduced by 50% through watering of the construction site.

The calculation of emissions is performed in Tables 13 and 14. The daily emissions in lb/day assume that the construction activity is performed 5 days per week, 52 weeks a year. However, during the winter season, the activity is reduced by 3%.

TABLE 13

CALCULATION OF BUILDING CONSTRUCTION

Type of Building	No. of Permits	Basis of Estimate	Factors for Estimate	Time of Construction Months	Acres Month
Single Family	118	0.18 acre/lot	-	6	127.44
Multi Family	2	0.5 acre/lot	-	6	6.00
Commer-cial	6	$161,874/lot	3.7 acres/10^6 $	11	39.53
Indus-trial	5	$ 24,190/lot	4.0 acres/10^6 $	11	5.32
				TOTAL	178.29

TABLE 14

BUILDING CONSTRUCTION FUGITIVE EMISSIONS

	Annual	Daily	
		Non-winter	Winter
TSP	107.0 tons	823 lb.	24.69 lb.
PM_{10}	38.5 tons	296 lb.	8.88 lb.

2. Roadway Construction

Emissions from roadway construction are due to land clearing, blasting, ground excavation, and other related activities.

Data Collection

The Idaho Transportation Department provided the information on centerline miles of road construction. A total of 8 miles of gravel road was constructed in the Shoshone County in 1988. According to the Shoshone County Public Works, the time for constructing 16 miles of road took 2 months. Also, the activity during wintertime is usually reduced to zero according to the Shoshone County Public Works. The gravel roads which were constructed in 1988 had a total of 12 feet wide road with a total of 4 feet wide shoulders.

Calculations of Emission Factors and Emissions

An emission factor of 1.2 tons TSP/acre-month for heavy construction operation is used. This is obtained from AP-42, Pg. 11.2.4-1. The above value applies to construction operations with: 1) medium activity level, 2) moderate silt content (~30%), and 3) semiarid climate. The fraction of PM_{10} was assumed to be 36%, which is the value used for emissions from unpaved roadways. By the application of water, the emissions are reduced by 50%.

The calculation to determine acres/mile is equal to 16 feet wide road * 5280 ft./mile * 2.2957 * 10^{-5} acre/ft.^{2} = 1.94 acre/mile. The construction time is equal to 2 months/16 miles = 0.125 month. The annual emission of TSP is equal to 1.2 * 1.94 * 0.125 * 8 * (1-0.5) = 1.16 tons.

The fugitive emissions due to roadway construction are presented in Table 15 for annual and daily emissions. The daily emissions (non-winter) for the month of April through October are based on 5 days of work conducted per week and 31 weeks per year. Due to the lack of road construction activities during the winter, winter daily emission estimates are insignificant.

TABLE 15

ROADWAY CONSTRUCTION FUGITIVE EMISSIONS

	Annual	Daily (non-winter)	Daily (winter)
TSP	1.16 tons	14.97 lb.	0 lb.
PM_{10}	0.42 tons	5.42 lb.	0 lb.

F. Emissions From Open Burning

Open burning is performed in fields, yards, open dumps, and pits. In this section, open burning also includes wildfires and prescribed burning.

1. Data Collection

Data on the size and frequency of open burning were obtained through phone surveys of local fire departments, including Kellogg, Osburn and Wallace. All data for 1988 were collected. Information was also gathered from the United States Forest Service and the Department of Lands.

The Kellogg fire department provided data on structural fires from Cataldo to Kellogg. No major fires were reported in Wallace and Osburn. The United States Forest Service provided data on prescribed burning and wildfires in the Silver Valley. However, none of the activities occurred in the inventoried area. The information provided by the Department of Lands covered wildfires and slash burning.

There were 7 structural fires in winter and 17 in non-winter according to the Kellogg fire department. Data provided by the Department of Lands were 2.7 acres of wildfires and a total of 1.5 million board feet of slash burned (equivalent to 34.44 acres). In addition, there were 72,000 board feet of miscellaneous burning, usually containing garden debris and grass clippings (equivalent to 1.65 acres).

Fuel loading factors for wildfires and miscellaneous burning are estimated to be 3.2 tons/acre. This factor is obtained from AP-42, Table 2.4-2 for unspecified weed control burning. The amount of material burned during a structural fire is estimated to be 6.8 tons. This factor is obtained from Research and Development: Anthropogenic Emissions Data for the 1985 NAPAP Inventory, USEPA. The wildfires occur only during the non-winter months. The slash burning, according to the Department of Lands, happened during the period of May through October when permits are required. However, private logging contractors burned 1.1 million board feet of slash during the month of November (equivalent to 25.25 acres).

2. Calculations of Emission Factors and Emissions

An emission factor for TSP of 15 lb. per ton of material burned is used for miscellaneous burning and wildfires. This emission factor is derived from AP-42, Table 2.4-2 for unspecified weed control. It was indicated in AP-42 that particulate matter from most agricultural refuse burning has been found to be in the submicrometer size range. Therefore, it is assumed that emissions of TSP from miscellaneous burning and wildfires are equal to total emissions due to PM_{10}.

TABLE 16

SUMMARY OF OPEN BURNING DATA

Type of Burning	Acres Burned/No. of Fires Non-winter	Winter	Fuel Loading Factor/Amount of Material Burned*	Emission Factor lb/Ton TSP	PM_{10}
Wildfires	2.7	-	3.2	15	15
Structural Fire	17	7	6.8	11	4.18
Slash Burning	9.19	25.25	3.2	15	15
Miscellaneous	1.65	-	3.2	15	15

*Fuel loading factor is expressed in tons per acre and amount of material burned is presented in tons.

An emission factor of TSP for structural fires is equal to 11 lb. per ton of material burned. This emission factor is obtained from AQMP Appendix L-87, 1983 Base Year Emission Inventory Documentation, Ventura County Air Pollution Control District, January, 1988. This is generated from results of burning model wood buildings. The PM_{10} factor is assumed to be 38% of TSP.

TABLE 17

EMISSIONS FROM OPEN BURNING

Type of Burning	Annual, Tons/yr TSP	PM_{10}	Daily, lb/day* Winter TSP	Winter PM_{10}	Non-winter TSP	Non-winter PM_{10}
Wildfires	0.06	0.06	-	-	0.61	0.61
Structural Fire	0.90	0.34	3.47	1.32	5.94	2.26
Slash Burning	0.83	0.83	8.03	8.03	2.06	2.06
Miscellaneous	0.04	0.04	-	-	0.37	0.37
TOTAL	1.83	1.27	11.50	9.35	8.98	5.30

*The daily emissions are obtained from annual emissions by dividing the amount by 214 days for non-winter months and 151 days for winter months.

G. Vehicle Related Emissions

The emissions from vehicles operating on roadways are divided into three categories:

1. Fugitive dust from paved and unpaved roads;
2. Vehicle tailpipe emissions; and
3. Transportation tire and brake wear emissions. These categories are discussed below.

1. Fugitive Dust from Paved and Unpaved Roads

Fugitive dust results from vehicular traffic on paved and unpaved roads. Sanding of roads during wintertime enhances the quantity of dirt on paved roads and thereby increases the emissions from vehicular traffic on the roadway.

Data Collection

Vehicular traffic data and road sanding information were obtained from Shoshone County Public Works. It was estimated by the Shoshone County Public Works that 250 miles of the roads in the county are normally sanded out of a total of 350 miles during the winter season. The total amount of sand applied in 1988 was 7,000 tons. The data were classified into residential streets, collectors, arterials, and highways. Paved and unpaved roads were considered in this classification. However, unpaved roads were not sanded or cleaned during the winter season.

Calculations of Emission Factors

The emission factors for paved and unpaved roads are obtained from AP-42, Pgs. 11.2.1-1 and 11.2.5-1. The following empirical expressions are used for the quantity of dust emissions due to a vehicular traffic on a paved and unpaved roadway. The emission factor is expressed in pounds per vehicle mile traveled (lb/VMT).

$E = k_1 (sL/0.7)^{P1}$ for paved roads* (*see note below*).

$E = k_2(5.9)(s/12)(S/30)(W/3)^{0.7}(w/4)^{0.5}(365-P2/365)$ for unpaved roads.

Where:
- E = Particulate emission factor, lb/VMT;
- s = Surface silt content in %, fraction of particles <75 um in diameter;
- L = Total road surface dust loading, grains/ft^2;
- k_1 = Base emission factor, lb/VMT (0.0208 for TSP and 0.0081 for PM_{10});
- P_1 = Exponent (0.9 for TSP and 0.8 for PM_{10});
- k_2 = Particle size multiplier (0.8 for TSP and 0.36 for PM_{10});
- S = Mean vehicle speed, miles per hour (mph);
- W = Mean vehicle weight, ton;

w = Mean number of wheels; and
P_2 = Number of days with at least 0.01 inch of precipitation per year.

* - Factors include emissions for vehicle exhaust and tire/brake wear.

Based on the equation for paved roads, the emission factors in the lb/VMT for residential or local streets, collector, artery, and highway are presented in Table 18.

TABLE 18

FUGITIVE DUST EMISSION FACTORS FROM PAVED ROADWAYS (NON-WINTERTIME)

Roadway Category	TSP* lb/VMT	PM_{10}* lb/VMT	Silt Loading (gr/ft^2)
Local	0.0530	0.01800	2.02
Collector	0.0350	0.01300	1.32
Artery	0.0160	0.00640	0.52
Highway	0.0012	0.00067	0.03

These values are obtained by assuming the default silt loadings (sL) in AP-42 for local, collector, artery, and highway as 2.02, 1.32, 0.52 and 0.03 grains/ft^2 respectively. These emission factors can be applied for non-winter conditions.

However, for winter conditions due to the application of sand/salt, the emissions are expected to be higher. As reported in AP-42, chapter 11.2.5, p. 11.2.5-5, the road surface silt loadings (sL) often increases by 5 to 6 times the average values used above.

This information is based on studies conducted in Montana. Since the Silver Valley has less severe winters than many areas in Montana, the default silt loadings were increased by a factor of 3. Therefore, the silt loadings (sL) for local, collector, artery, and highway are 6.06, 3.96, 1.56 and 0.09 grains/ft^2 respectively. Based on these computed values, the emission factors for sanded paved roads are presented in Table 19.

For unpaved roads, several factors are involved in computing the emission factor in lb/VMT. The silt content for gravel roads is assumed to be 5% (mean value-see Table 11.2.1-1, AP-42). The mean vehicle speed on an unpaved gravel road ranges from 13 to 40 miles per hour (assume 20 mph). The mean vehicle weight ranges from 3 to

157 tons (assume 10 tons). The number of wheels is considered to be 4. The number of days with at least 0.01 inch of precipitation per year is 120. All of these values are taken from AP-42, chapter 11.2.1, pages 11.2.1-1 to 11.2.1-8. * These values in the equation are presented in Table 20.

TABLE 19

FUGITIVE DUST EMISSION FACTORS FROM SANDED PAVED ROADWAYS (WINTERTIME)

Roadway Category	TSP lb/VMT	PM_{10} lb/VMT	Silt Loading (gr/ft^2)
Local	0.1451	0.0455	6.06
Collector	0.0989	0.0324	3.96
Artery	0.0428	0.0154	1.56
Highway	0.0033	0.0016	0.09

TABLE 20

FUGITIVE DUST EMISSION FACTORS FROM UNPAVED ROADWAYS

Type of Pollutant	Emission Factor lb/VMT
TSP	2.0442
PM_{10}	0.9199

*The result of substituting.

Emission Calculations

The emissions during non-winter days from April through October are calculated in Table 21.

Since 250 miles of a total of 350 miles of roadway are sanded, the daily VMT on sanded roads is estimated to be 13,900 for local streets, 11,300 for collector streets, 45,200 for arteries, and 113,000 for highways as presented in Table 22. The road sanding occurs from November through March according to the Shoshone County Public Works.

TABLE 21

DAILY NON-WINTER PAVED ROAD FUGITIVE EMISSIONS

Roadway Category	TSP lb/day	PM_{10} lb/day
Local	1,034	351
Collector	553	205
Artery	1,013	405
Highway	190	106
Total	2,790	1,067

TABLE 22

NON-WINTER AND WINTER VMT

Roadway Category	Non-winter VMT	Winter VMT
Local	19,500	13,900
Collector	15,800	11,300
Arterial	63,300	45,200
Highway	158,100	113,000
Unpaved	350	0

Based on information obtained from Climatological Data Annual Summary for Idaho 1987-1988, National Oceanic and Atmospheric Administration, Kellogg received 16.54 inches of precipitation from November through March, and Wallace received 20.03 inches for the same time period. The total precipitation values are water equivalent totals which is the total of liquid and melted frozen precipitation.[5] The number of days with precipitation recorded at trace levels and higher was determined for each site also. The total number of days with precipitation for Kellogg and Wallace are 83 and 98, respectively as presented in Table 23. It was assumed that an average of the two values would best represent the amount of precipitation throughout the entire valley. The average number of days with precipitation recorded is 90.5 days.

Rather than assuming the amount of time that a road surface would stay wet after a precipitation event (snow or rain), it was assumed that were no emissions during a day which had any recorded level of precipitation. Table 23 shows the number of days with precipitation ≥0.01 inches and the number of days with trace levels of precipitation recorded.

TABLE 23

PRECIPITATION DATA FOR KELLOGG AND WALLACE

Site	Total Precip. inches	No. of days w/ precip. ≥0.01 inch	No. of days w/ trace precip.	Total No. of days w/ precip.
Kellogg	16.54	71	12	83
Wallace	20.03	79	19	98

Therefore, there were no fugitive roadway emissions from sanded paved roads for a total of 91 days during the 1987-88 winter season. Also, there were probably no emissions from any of the unsanded roads during the winter season due to persistent wet conditions. Daily winter sanded paved road fugitive emission data are presented in Table 24.

TABLE 24

DAILY WINTER SANDED PAVED ROAD FUGITIVE EMISSIONS

Roadway Category	TSP lb/day	PM_{10} lb/day
Local	2,017	632
Collector	1,118	366
Artery	1,935	696
Highway	373	181
Total	5,443	1,875

For annual paved road emissions, presented in Table 25, the daily non-winter paved road fugitive emissions are multiplied by 214 days of the non-winter period from April to October. Reductions are not accounted for in any precipitation during the summer time period because high summer temperatures can dry the road surface in a short time period. The daily winter sanded paved road fugitive emissions are multiplied by 60 days during which the road surface would be considered dry. There are 91 days during which the road surface would be wet out of a total of 151 winter days.

TABLE 25

ANNUAL PAVED ROAD FUGITIVE EMISSIONS

TSP	380 tons
PM_{10}	142 tons

In addition, the annual fugitive dust emissions from paved roads were further reduced by a factor of 50% due to prevailing moist winter conditions. The 50% reduction factor is obtained from Bohn R., T.Cuscius Jr., and C. Cowherd Jr., Fugitive Emissions from Integrated Iron and Steel Plants, Midwest Research Institute, Kansas City, Missouri, EPA-600/2-78-050, March 1978. During the 1987 winter season, there were 107 days recorded with at least 1.0 inches of snow on the ground in Wallace. These reductions are supported by observations from field personnel and are further validated by chemical analysis of PM_{10} filters from the Silver Valley.

During winter months, the unpaved roads would be snow-covered and the fugitive emissions are expected to be zero due to moist conditions. However, during the month of April to October, daily emissions for unpaved roads are presented in Tables 26 and 27.

These calculations assume that there are no emissions during the winter. The total fugitive dust from roadways is presented in Table 28.

TABLE 26

DAILY Non-winter UNPAVED ROAD FUGITIVE EMISSIONS

Type of Pollutant	Emissions
TSP	715 lb/day
PM_{10}	322 lb/day

TABLE 27

ANNUAL UNPAVED ROAD FUGITIVE EMISSIONS

TSP	77 tons/yr
PM_{10}	34 tons/yr

TABLE 28

TOTAL FUGITIVE DUST FROM ROADWAYS

Type of Pollutant	Winter Daily, lb/day	Non-winter Daily, lb/day	Annual tons/yr
TSP	5,443	3,505	457
PM_{10}	1,875	1,389	176

2. Vehicle Tailpipe Emissions

Tailpipe emissions occur from the combustion of fuel for light duty vehicles and heavy duty trucks.

Data Collection

To compute the tailpipe emissions, data on VMT/day, emission factors, and vehicle mix data are required. The VMT/day for each of the four roadway types is presented in Section III.B. The determination of emission factors is discussed in the next section. Vehicle mix data were obtained from two sources - ITD and Shoshone County Registry of Motor Vehicles. In the vehicle mix data, light duty gasoline cars (LDG), light duty trucks (LDT1 up to 6000 lbs.), light duty trucks (LDT2 above 6000 lbs. to 8500 lbs.), heavy duty gasoline trucks (HDG), and heavy duty diesel trucks (HDD) are considered. The data are presented in Table 29.

Calculation of Emission Factors and Emissions

Vehicle tailpipe emission factors for each vehicle type and roadway category are calculated using AP-42, Appendix L, Size Specific Total Particulate Emission Factors for Mobile Sources. The emission factors for LDG, LDT1, LDT2, HDG, and HDD are based on several default values obtained from AP-42. The lead content of fuel, misfueling ratios, fuel economy, and pollution control equipment are the parameters whose values are derived from AP-42.

The emission factors for each year of vehicle in a vehicle class are grouped together into one emission factor for each roadway type. It was assumed that the cars and light-duty trucks use unleaded gasoline and heavy-duty trucks use either leaded gasoline or diesel. The cars and trucks are assumed 1975 and newer.

Based on these assumptions, TSP and PM_{10} emission factors for specific vehicle types and roadway categories are listed in Table 30.

TABLE 29

VEHICLE MIX DATA

ROADWAY CATEGORY	LDG	LDT1	LDT2	HDG	HDD
Local	0.604	0.194	0.194	0.007	-
Collector	0.476	0.159	0.159	0.007	0.200
Artery	0.5470	0.2897	0.0493	0.0901	0.024
Highway	0.5487	0.3008	0.0595	0.078	0.013

TABLE 30

VEHICLE TAILPIPE EMISSION FACTORS (lb/1000 VMT)

ROADWAY CATEGORY		LDG	LDT1	LDT2	HDG	HDD
Local	TSP	0.0822	0.1065	0.1058	0.7416	3.95
	PM_{10}	0.0693	0.0798	0.0785	0.4747	3.95
Collector/ Artery	TSP	0.0836	0.1078	0.1082	0.7416	3.95
	PM_{10}	0.0709	0.0813	0.0813	0.4747	3.95
Highway	TSP	0.0833	0.1076	0.1080	0.7416	3.95
	PM_{10}	0.0709	0.0811	0.0811	0.4747	3.95

The total emissions are calculated for each roadway category by multiplying the vehicle mix data, vehicle tailpipe emission factor, and VMT/day for each type of vehicle. Annual emissions are calculated by multiplying the daily emissions by 365. The emission rates are presented in Table 31.

TABLE 31

VEHICLE TAILPIPE EMISSIONS

ROADWAY CATEGORY	DAILY EMISSIONS lb/day		ANNUAL EMISSIONS ton/yr	
	TSP	PM_{10}	TSP	PM_{10}
Local	1.87	1.48	0.34	0.27
Collector	13.74	13.48	2.51	2.46
Artery	15.44	12.91	2.82	2.36
Highway	30.62	24.74	5.59	4.52
TOTAL	61.67	52.61	11.26	9.61

3. Brake and Tire Wear Emissions

Particulate emissions resulting from the wear and tear of vehicle brakes and tires are considered.

Data Collection

The VMT/day required is presented in Section III.B.

Calculations of Emission Factors and Emissions

An emission factor of 0.0282 lb. TSP/1000 VMT and 0.0276 lb. PM_{10}/1000 VMT for vehicle brake wear and 0.004 lb/1000 VMT for TSP and PM_{10} for vehicle tire wear is obtained from AP-42, Appendix L, Size Specific Total Particulate Emission Factors for Mobile Sources. The daily TSP and PM_{10} emissions are constant throughout the year.

The annual emissions are obtained by multiplying the daily emissions by 365 days in a year as presented in Table 32.

TABLE 32

BRAKE AND TIRE WEAR EMISSIONS

Category	Daily, lb/day		Annual, ton/yr	
	TSP	PM_{10}	TSP	PM_{10}
Brake Wear	7.24	7.08	1.32	1.29
Tire Wear	1.03	1.03	0.19	0.19
TOTAL	8.27	8.11	1.51	1.48

4. Fugitive Road Dust Corrections

Recent investigations into how AP-42 emission factors were developed has led to some interesting discoveries. Apparently, the methodology used to develop the fugitive dust emission factors in AP-42 inherently includes emissions from other vehicle related sources such as tailpipe exhaust and component wear. When the calculated emissions from vehicle exhaust and tire/brake wear are included in the inventory in addition to the fugitive road dust emissions, the vehicle emissions are counted twice in the inventory.

Until the AP-42 emission factors are corrected, one solution to this problem is to subtract the vehicle emission components, exhaust and tire/brake wear, from the fugitive road dust emissions to compute true fugitive road dust emissions. These true road dust emissions would include only the particulates that are aerosolized from the road surface. Table 33 shows the computation for correcting the fugitive road dust emissions.

TABLE 33

CORRECTED FUGITIVE ROAD DUST EMISSIONS

A. **PM_{10}**	Winter Daily Emissions, lb/day	Annual Emissions,tons/yr
Fugitive Road Dust	1,875	176
Vehicle Tailpipe	-52.61	-9.61
Tire/Brake Wear	-8.11	-1.48
Corrected Fug. Road Dust	1,814 lb/day	165 tons/yr
B. **TSP**		
Fugitive Road Dust	5,443	457
Vehicle Tailpipe	-61.67	-11.26
Tire/Brake Wear	-8.27	-1.51
Corrected Fug. Road Dust	5,373 lb/day	444 tons/yr

H. Emissions From Aircraft

1. Data Collection

Aircraft activity data for Shoshone County Airport were obtained from the Airport Development Group, Aeronautic Bureau, Idaho Department of Transportation in Boise, Idaho. The data of interest include the annual landing/take off (LTO) cycle for each type of aircraft used at the airport. The annual LTO cycles reported were 9,050. The airport was generally used by single engine and corporate twin engine aircraft (the distribution estimated was 80 to 20 respectively). A small fraction of usage was by military helicopters (50 LTO cycles).

2. Calculations of Emission Factors

The emission factors for TSP for specific aircraft as a function of LTO cycle are obtained from AP-42, Tables II-1-9 and II-1-10. Daily emission rates are computed by dividing the annual estimate by 365, assuming the air traffic to be constant throughout the year.

For estimation of the PM_{10} emissions, 96% of the total TSP emissions is considered to be contributed by PM_{10} emissions. This fraction is obtained from PM_{10} Emission Factor Listing Developed by Technology Transfer and AIRS Source Classification Codes with Documentation, EPA-450/4-89-022, November, 1989, Reference 62 for jet engine testing.

3. Calculations of Emissions

The emissions of TSP and PM_{10} are calculated based on the LTO cycles provided by the airport development group. The computed values are presented in Table 34.

TABLE 34

EMISSIONS OF TSP AND PM_{10} BY AIRCRAFT TYPE

AIRCRAFT	LTO CYCLE	TSP EMISSION FACTOR LB/LTO CYCLE	TSP EMISSIONS LB/YR	PM_{10} EMISSIONS LB/YR
Private Aircraft				
- Single Engine	7,240	0.46*	3,330.4	3,197.2
- Twin Engine	1,810	0.46	832.6	799.3
Military				
- Helicopter	50	0.40	20.0	19.2
Total, lb/yr			4,183.0	4,016.0
Ton/yr			2.1	2.0
Daily Emissions, lb/day			11.5	11.0

* Estimated to be identical to twin engine

I. Emissions From Railroad Locomotives

1. Data collection

The activity data of railroad locomotives were obtained from ITD. This information related to miles traveled daily, frequency of travel, fuel economy, and seasonal changes of traffic. In 1988, the frequency of travel was one round trip per week. Assuming the train travels a day from Pinehurst to Wallace, the fuel used was 320 gallons.

2. Calculation of Emission Factors

The emission factor for railroad locomotives is obtained from AP-42, Table II-2.1. The emission factor of particulate for locomotives is 25 lb/1000 gallons of diesel fuel.

For estimation of the PM_{10} emissions, 96% of the total TSP emissions is considered to be contributed by PM_{10} emissions. This fraction is obtained from PM_{10} Emission Factor Listing Developed by Technology Transfer and AIRS Source Classification Codes with Documentation, EPA-450/4-89-022, November, 1989, Reference 67 for reciprocating diesel engine testing.

3. Emission Calculations

Daily and annual emissions due to combustion of fuel by locomotives are computed in Table 35.

TABLE 35

EMISSIONS OF TSP AND PM_{10} BY RAILROAD LOCOMOTIVES

Type of Pollutant	Emission Factor lb/1000 gallon	Daily Usage, gallons/day	Wintertime Emissions lb/day	tons/yr*
TSP	25	320	8.0	1.46
PM_{10}	24	320	7.68	1.40

*Annual emissions are calculated by multiplying the daily emissions by 365.

V. Results

The total area and mobile sources estimated in the previous section are summarized according to categories listed in Table 36.

The total TSP and PM_{10} emissions from different sources are presented in Tables 37, 38, 39. The table presents the annual emissions in tons and daily emissions for winter and non-winter conditions in pounds in descending order of magnitude. The fugitive road dust and woodstoves/fireplaces are considered to be significant sources during winter months. This results in these two sources being key elements for the annual emissions.

TABLE 36

AREA AND MOBILE SOURCE CATEGORIES

AREA SOURCES

- Combustion sources
  - woodstoves/fireplaces
  - heating oil
  - coal
  - natural gas
- Construction activities
  - building
  - roadway
- Open burning

MOBILE SOURCES

- Fugitive road dust
- Aircraft
- Railroad locomotives

TABLE 37

ANNUAL EMISSIONS, TONS/YEAR

Source	TSP	Percent of Total	PM_{10}	Percent of Total
Fugitive Road Dust*	444.0	67.0	165.0	53.8
Woodstoves/ Fireplaces	89.7	13.5	85.2	27.8
Building Construction	107.0	16.1	38.5	12.5
Tailpipe	11.3	1.7	9.6	3.1
Aircraft	2.1	0.3	2.0	0.6
Open Burning	1.8	0.3	1.3	0.4
Coal Combustion	1.6	0.2	0.9	0.3
Brake & Tire Wear	1.5	0.2	1.5	0.5
Railroad Locomotives	1.5	0.2	1.4	0.5
Road Construction	1.2	0.2	0.4	0.1
Heating Oil Combustion	0.9	0.1	0.4	0.1
Natural Gas Combustion	0.7	0.1	0.7	0.2
Total	663.3	100.0	306.9	100.0

*Corrected to remove vehicle exhaust and wear emissions

TABLE 38

WINTER DAILY EMISSIONS, LBS/DAY

Source	TSP	Percent of Total	PM_{10}	Percent of Total
Fugitive Road Dust*	5,373.0	76.0	1,814.0	53.5
Woodstoves/ Fireplaces	1,525.0	21.6	1,449.0	42.7
Tailpipe	61.7	0.9	52.6	1.6
Coal Combustion	26.6	0.4	13.8	0.4
Building Construction	24.7	0.4	8.9	0.3
Heating Oil Combustion	15.3	0.2	7.6	0.2
Aircraft	11.5	0.2	11.0	0.3
Open Burning	11.5	0.2	9.4	0.3
Natural Gas Combustion	9.1	0.1	9.1	0.3
Brake & Tire Wear	8.3	0.1	8.1	0.2
Railroad Locomotives	8.0	0.1	7.7	0.2
Road Construction	0	0	0	0
Total	7,074.7	100.0	3,391.2	100.0

* - Corrected to remove vehicle exhaust and wear emissions

TABLE 39

NON-WINTER DAILY EMISSIONS, LBS/DAY

Source	TSP	Percent of Total	PM_{10}	Percent of Total
Fugitive Road Dust*	3,425.0	78.6	1,328.0	77.5
Building Construction	823.0	18.8	296.0	17.3
Tailpipe	61.7	1.4	52.6	3.1
Road Construction	15.0	0.3	5.4	0.3
Aircraft	11.5	0.3	11.0	0.6
Open Burning	9.0	0.2	5.3	0.3
Brake & Tire Wear	8.3	0.2	8.1	0.5
Railroad Locomotives	8.0	0.2	7.7	0.4
Heating Oil Combustion	-		-	
Natural Gas Combustion	-		-	
Coal Combustion	-		-	
Woodstoves/ Fireplaces	-		-	
Total	4371.5	100.0	1,714.1	100.0

*-Corrected to remove vehicle exhaust and wear emissions

VI. QUALITY ASSURANCE

All of the data collected from different sources are checked for quality control, if possible. The data, when transferred to forms used for calculating emissions, are reviewed by IAQB staff for accuracy and precision. Any conversion factors and emission factors are verified to assure accuracy.

Some of the emission calculations involving large data sets are verified by personal computer using Lotus 1-2-3 spreadsheets. This approach significantly reduces the chance of calculational errors and makes data changes and corrections quite simple. To ensure that the spreadsheets are calculating properly, all calculations are manually checked. All manual calculations are performed twice for accuracy and precision, and subsequently verified by IAQB staff not involved in the determination of the emission inventory for Shoshone County. The verification involves reasonableness of computed emissions and assumptions based on good engineering and scientific judgment.

If emissions from a source can be calculated by multiple methods, all of the methods are used to compute the emissions. All of the results are analyzed in detail to determine the reasons for the difference in results, if any, and a decision is reached to utilize one of the methods for that particular source.

VII. REFERENCES

1. Procedures for Emission Inventory Preparation Volume III: Area Sources, EPA-450/4-81-026c, September, 1981.

2. Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, EPA-450/4-81-026d, December, 1988.

3. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, AP-42, Fourth Edition, September, 1985.

4. PM_{10} Emission Factor Listing Developed by Technology Transfer and AIRS Source Classification Codes with Documentation, EPA-450/4-89-022, November, 1989.

5. Climatological Data Annual Survey for Idaho 1988, National Oceanic and Atmospheric Administration.

6. Cowherd, C. C., Jr., C. M. Guenther and D. D. Wallace, Emissions Inventories of Agricultural Tilling, Unpaved Roads, and Air Strips and Construction Sites, EPA-450/3-74-085, USEPA, Research Triangle Park, NC, November, 1974.

7. AQMP Appendix L-87, 1983 Base Year Emission Inventory Documentation, Ventura County Air Pollution Control District, January, 1988.

8. Personal communication with Steve Bilte, Exxon Heating Oil Company, February, 1991.

9. Personal communication with Theresa Healey, Gravley Furnace and Fuel Oils, February, 1991.

10. Personal communication with Larry Ross, Ross Oil Company, February, 1991.

11. Personal communication with Elsie Mutch, Twin City Fuel Company, February, 1991.

12. Personal communication with Harold Van Asche, Shoshone County Building Inspector, January, 1991.

13. Personal communication with Larry Watson, Shoshone County Assessor's Office, January, 1991.

14. Personal communication with Dick Palmer, Idaho Transportation Department, Boise, January, 1991.

15. Personal communication with Randy Murray, Shoshone County Public Works, January, 1991.

16. Personal communication with Susan Chastain, Shoshone County Registry of Motor Vehicles, January, 1991.

17. Personal communication with Wayne Pickerill, Airport Development, Aeronautics Bureau, Idaho Transportation Department, Boise, January, 1991.

18. Personal communication with Ron Kerr, Idaho Transportation Department, Boise, February, 1991.

19. Personal communication with Hank Nelson, Washington Water Power Company, March, 1991.

20. Personal communication with Larry Watson, Shoshone County Assessor's Office, March, 1991.

21. 1991 Silver Valley Residential Wood Combustion Survey. ES Field Services, April 1991.

22. Guidance Document for Residential Wood Combustion Emission Control Measures, EPA-450/2-89-015, February, 1989.

23. Personal communication with Stan Parks, U.S. Forest Service, Wallace Ranger District, February, 1991.

24. U.S. Department of Agriculture, Forest Products Laboratory, Wood Handbook, Agricultural Handbook No. 72, Washington, DC. 1974.

25. Bohn, R., T. Cuscius Jr., and C. Cowherd Jr., Fugitive Emissions from Integrated Iron and Steel Plants, Midwest Research Institute, Kansas City, Missouri, EPA-600/2-78-050, March 1978.

FUTURE PROJECTIONS FOR AREA AND MOBILE EMISSIONS

YEAR 1990

YEAR 1994

YEAR 2000

RESIDENTIAL WOOD COMBUSTION

Residential wood combustion emissions are assumed to increase with the increase in the number of occupied households. The population of the Silver Valley and Pinehurst is predicted to decrease from 1990 to 1994 and then increase again by the year 2000. The IMD report presents the population and occupied household projections for 1990, 1994 and 2000. The assumptions used to calculate projected residential wood combustion emissions are simplified down to adjusting for changes in the number of occupied households. All other distributions and activity levels are assumed to remain constant. This is a conservative approach that will result in a maximum estimate of the residential wood combustion emissions for each of the projected years.

RESIDENTIAL HEATING OIL COMBUSTION

Residential heating oil combustion emissions are assumed to increase with the increase in the number of households. Since residential building construction appears to be low, the increase in the number of households would be insignificant. This is the current situation in the Shoshone County. It is conservative to assume that the same proportions of heating oil to households be utilized for the projected years 1990, 1994 and 2000. This assumption considers that none of the existing homes would convert from heating oil to another type of fuel and newly constructed homes will utilize heating oil as their fuel.

RESIDENTIAL COAL USAGE

Residential coal usage is insignificant in 1988. The situation has not changed in 1990. It was assumed that coal consumption would not increase in the Silver Valley and probably would decline in the future due to households switching over to cleaner, cheaper fuels. Therefore, coal usage for the projected years was kept at the 1988 level. This is a conservative assumption since it is likely that more homes will switch from coal to another type of fuel than the number of new homes that will be built utilizing coal or change to coal for heating.

RESIDENTIAL NATURAL GAS COMBUSTION

The increase in emissions from natural gas is assumed to be proportional to the increase in the number of households. However, since the building construction appears to have stabilized, the emissions due to natural gas for 1990 are expected to be the same as in 1988. But for years 1994 and 2000, the emissions from natural gas combustion are assumed to be proportional to the number of households in 1994 and 2000 respectively.

BUILDING CONSTRUCTION

Building construction stabilized in 1990. Therefore, the emissions are no different than in 1988. However, for 1994 and 2000, the emissions can be calculated by multiplying the 1988 emissions by the number of households in the projected year divided by the number of households in 1988.

ROAD CONSTRUCTION

Idaho Transportation Department is currently working on the construction of I-90 in Wallace. This construction would add 3 miles to the highway. The only other significant change reported by the Shoshone County Public Works is an addition of 30 miles of paved road by 1992. This road is currently unpaved and is operated by the United States Forest Service.

OPEN BURNING

No significant changes above the 1988 level of emissions are expected for open burning in the projected years.

FUGITIVE ROAD DUST

According to the Idaho Transportation Department and the Shoshone County Public Works, there appears to be 3 miles of additional highway by the end of 1990 and 30 miles of additional local street by the end of 1992. These changes would increase the VMT of local streets and highways.

TAILPIPE, BRAKE AND TIRE WEAR

Mobile source emissions due to tailpipe, brake and tire wear are proportional to changes in VMT in all projected years.

AIRCRAFT

According to the Airport Development Group, Aeronautics Bureau, Idaho Transportation Department, there will be no change during the projected years.

RAILROAD LOCOMOTIVES

Based on information provided by the Idaho Transportation Department, no significant change is expected for the projected years.

APPENDIX D

RECEPTOR MODELING

Pinehurst PM_{10}
Air Quality Improvement Plan
February 5, 1992

APPENDIX D

PM_{10} Receptor (CMB) Modeling

For the Silver Valley

I. CHEMICAL MASS BALANCE (CMB) RECEPTOR MODELING FOR THE SILVER VALLEY

A. Introduction

The Chemical Mass Balance (CMB) air quality model is one of several receptor models which have been applied to air resources management. The CMB model uses the chemical composition of particles measured in source emissions and on ambient PM_{10} filter samples (receptors) to identify and quantify the contributions from potential sources that affect the measured ambient PM_{10} concentrations. Receptor models are generally contrasted with dispersion models which use estimates of pollutant emissions rates, meteorological transport, and chemical transformation mechanisms to estimate the contribution of each source to receptor concentrations. The two types of models are complementary, with each type having strengths which compensate for the weaknesses of the other.

This study utilized receptor data from the three PM_{10} particulate monitoring projects that have been undertaken in the Silver Valley. A total of 12 PM_{10} filters from Pinehurst were analyzed and the sources affecting these filters apportioned by CMB receptor analysis. An additional 10 filters collected from other communities in the Silver Valley were also analyzed and modeled.

There is currently no significant industrial activity in the Silver Valley. Historically, heavy metals have been mined and smelted in the Silver Valley. The smelter area, near Smelterville a few miles east of Pinehurst, is a CERCLA Superfund site currently under remediation. The smelter was closed in 1981. A few silver mines remain open in the valley. However, the level of activity at these mines is limited. Qualitative information has indicated that PM_{10} standard violations in Pinehurst are caused by residential wood burning emissions and/or wind blown dust.

B. Receptor PM_{10} Data

Exceedances of the 24 hour PM_{10} standard occur during the winter months at the Pinehurst State and Local Air Monitoring System (SLAMS) monitoring site. This is the only SLAMS PM_{10} monitoring location in the Silver Valley. Because more information was needed regarding the air quality throughout the valley, a saturation study was conducted in 1989. Also, a short term monitoring project utilizing dichotomous samplers located at the same site as the Pinehurst SLAMS unit was conducted in 1988. Filters run during high PM_{10} episodes that were selected for analysis are from these three different monitoring efforts.

1. SLAMS Filters

The SLAMS PM_{10} monitor located the Pinehurst Elementary School has recorded three PM_{10} 24 hour standard violations between 1988 and

1990. One of the exceedances was 306 ug/m^3 seen on September 25, 1988. This value has been determined to be an exceptional event due to a dust storm. The 1988-1990 data are representative of current conditions in Pinehurst and are addressed in the PM_{10} SIP analysis. The guidelines for CMB modeling suggest that the results from a minimum of five samples need to be compared for a representative view of the source influences in an area. Therefore, in addition to the two filters indicating PM_{10} standard exceedances (The filter influenced by the exceptional event was not analyzed.), three other high, winter PM_{10} concentration filters from Pinehurst were selected for analysis. The filter concentrations and the sample dates are listed in Table D-1. All SLAMS samples ran from midnight to midnight.

TABLE D-1

SLAMS Filters From Pinehurst School Selected for CMB Analysis

Date	Concentration
1-21-88	154 ug/m^3
1-28-88	183 ug/m^3
2-24-88	164 ug/m^3
1-20-89	131 ug/m^3
2-28-90	142 ug/m^3

Elemental analysis of 35 elements, sulfur through uranium, was done by X-ray fluorescence analysis (XRF). Aluminum, silica and phosphorus are not available from the XRF analysis of particulates on quartz filters. Therefore, information for these elements is not available on SLAMS filters. However, the aluminum and silica data from the 2-24-88 NEA Teflon filter was incorporated in to the 2-24-88 SLAMS data set for comparison. Sulfate ($SO4^=$) and nitrate (NO_3^-) ion concentrations were determined by ion chromatography (IC), the potassium (K^+) ion concentrations were determined by atomic absorption (AA), and the ammonium (NH_4^+) concentrations were determined by automatic colorimetry (AC). Organic and elemental carbon were found by thermal/optical carbon (TOR) analysis.

2. Saturation Study Filters

EPA Region 10 funded the Idaho Air Quality Bureau (IAQB) to conduct an air quality saturation study in the Silver Valley from January through March 1989. Fifteen portable monitors were located in the valley between Bowman's Addition and Wallace. The monitors utilized in this study were not a designated reference method for monitoring ambient PM_{10} levels . These monitors ran 24 hours beginning at noon or at a mid-morning hour. The majority of the Saturation Study data set includes low PM_{10} concentration samples as well as samples flagged because of monitor operation problems. Filters from three days of relatively high concentration, problem-free, PM_{10} data were chosen for analysis from selected sampling locations in the valley. CMB analyses of samples that were taken on the same day from multiple sites provide the opportunity to determine if the air quality in the various communities in the Silver Valley is influenced by related PM_{10} sources. Table D-2 lists the filters selected for analysis. The listed PM_{10} concentrations may differ from those found in the Lane Regional Air Pollution Control Authority (LRAPCA) report. The changes are the result of using corrected run times in the PM_{10} concentration calculation. In addition to the recalculation of PM_{10} concentrations, a review of the data indicated that the Kellogg and Wallace data from 2-10-88 should be flagged due to operational problems. Because of the uncertainty associated with these PM_{10} concentrations, CMB results would be of no value. As a result the Kellogg and Wallace data have been deleted from consideration in this receptor analysis, but are available for review in the attached CMB model runs. Figure D-1 is a map locating the sites from which these filters were chosen.

TABLE D-2

Saturation Study Filters Selected For CMB Analysis

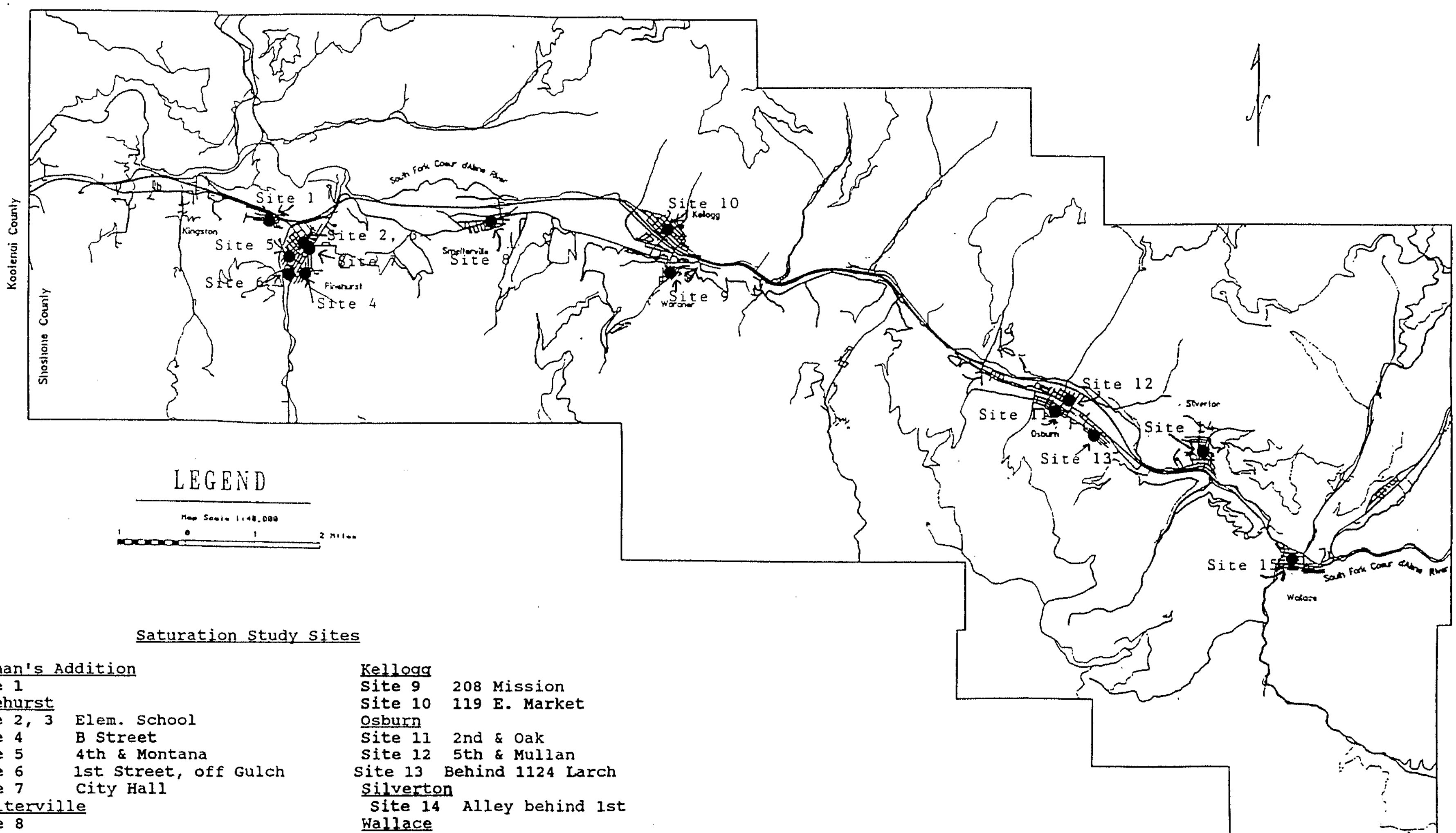
2-7-89	Site 3	Pinehurst, Elementary School	116 ug/m^3
	Site 11	Osburn, 2nd & Oak	150 ug/m^3+
	Site 13	Osburn, behind 1124 Larch	103 ug/m^3+
2-9-89	Site 2	Pinehurst, Elementary School	118 ug/m^3+
	Site 7	Pinehurst, City Hall	132 ug/m^3
	Site 11	Osburn, 2nd & Oak	176 ug/m^3
	Site 14	Silverton, alley behind 1st	102 ug/m^3
2-10-89	Site 2	Pinehurst, Elementary School	163 ug/m^3
	Site 5	Pinehurst, 4th & Montana	142 ug/m^3
	Site 8	Smelterville	83 ug/m^3
	Site 10	Kellogg, 119 E. Market	55 ug/m^3*
	Site 11	Osburn, 2nd & Oak	187 ug/m^3
	Site 12	Osburn, 5th & Mullan	115 ug/m^3
	Site 14	Silverton, alley behind 1st	74 ug/m^3
	Site 15	Wallace, 319 Cedar	83 ug/m^3*

* - flagged data, not included in this Silver Valley CMB analysis
+ - concentrations adjusted from those found in LRAPCA's report

Analysis of the Saturation Study filters was conducted in the same manner as the SLAMS filters discussed above. Elemental analysis

Figure D-1

Saturation Study Monitor Locations in the Silver Valley



Saturation Study Sites

Bowman's Addition		**Kellogg**	
Site 1		Site 9	208 Mission
Pinehurst		Site 10	119 E. Market
Site 2, 3	Elem. School	**Osburn**	
Site 4	B Street	Site 11	2nd & Oak
Site 5	4th & Montana	Site 12	5th & Mullan
Site 6	1st Street, off Gulch	Site 13	Behind 1124 Larch
Site 7	City Hall	**Silverton**	
Smelterville		Site 14	Alley behind 1st
Site 8		**Wallace**	
		Site 15	319 Cedar

of 35 elements, sulfur through uranium, was done by X-ray fluorescence analysis (XRF). Aluminum, silica and phosphorus are not available from the XRF analysis of particulates on quartz filters, and therefore information on these elements is not available on the Saturation Study filters. Sulfate ($SO4^{=}$) and nitrate (NO_3^-) ion concentrations were determined by ion chromatography (IC), the potassium (K^+) ion concentrations were determined by atomic absorption (AA), and the ammonium (NH_4^+) concentrations were determined by automatic colorimetry (AC). Organic and elemental carbon were found by thermal/optical carbon (TOR) analysis.

3. NEA Dicot Filters

NEA, Inc. ran a short-term PM_{10} particulate monitoring project for the IAQB in the Silver Valley between February and March 1988. Two dicots were located on the roof of the Pinehurst Elementary School near the SLAMS PM_{10} monitor and collected fine (0-2.5 u) and coarse (2.5-10 u) particulates on Teflon filters. The dicots ran midnight to midnight. The PM_{10} concentrations were generally low during this project. Filters from two days with relatively elevated PM_{10} concentrations were selected for analysis. The monitoring intervals only coincided with the SLAMS schedule twice during the sampling effort. The SLAMS filter from one of these days, 2-24-88, was also analyzed. The analyzed filters are listed below in Table D-3.

TABLE D-3

Dicot Filters Selected For CMB Analysis

2-24-88	coarse	37 ug/m³	
	fine	62 ug/m³	
		99 ug/m³	Total PM_{10}
3-2-88	coarse	35 ug/m³	
	fine	99 ug/m³	
		134 ug/m³	Total PM_{10}

The dicot filter analyses were conducted by a different contractor than the analyses on the SLAMS and Saturation Study filters. Therefore, the analyses were carried out in a slightly different manner, but the quality of the data is equal. Elemental analysis was completed for 35 elements, from aluminum through lead, by X-ray fluorescence (XRF). Sulfate ($SO4^{=}$), nitrate (NO_3^-), potassium (K^+), fluoride (F^-), chloride (Cl^-), bromide (Br^-), sodium (Na^+), and ammonium (NH_4^+) were analyzed for by ion chromatography (IC). Because the dicot filters were Teflon, aluminum, silica, and phosphorus are able to be analyzed by XRF. However, Teflon filters are not suitable for carbon analyses. Carbon information from the SLAMS filter on 2-24-88 is available and was incorporated into the fine data set for the 2-24-88 dicot sample.

C. SOURCE PROFILE DATA

Emission inventory results indicate that the major PM_{10} sources in the Silver Valley are area sources. There are no significant industrial point sources presently operating in the valley. Residential wood burning, reintrained dirt from highways and unpaved dirt roads, and vehicle tailpipe exhaust profiles were the expected major sources in the CMB receptor model. Secondary nitrate and sulfate were also considered as sources in the CMB analysis.

1. Residential Wood burning

A wood burning profile was not developed specifically for the Silver Valley. The Pocatello wood burning profile from the Pacific Northwest Source Profile Library was used in the CMB modeling. This profile is referred to as RWPOKY in the CMB model results. The wood species burned in the Silver Valley are different than those used in Pocatello; however, no other more appropriate wood burning profile is available. The differences in the residential wood burning emission profiles for each area is not expected to be significant.

2. Fugitive Dust

Six geologic material samples were taken at the time of the NEA dicot study in 1988. The five road samples were sweep samples and one was a bulk sample taken from a pile of slag/sanding material. The six samples were resuspended in the laboratory, collected using dicots and analyzed for the same elements and ions as those listed above for the dicot study filters. Organic and elemental carbon concentrations were also determined for each of the six geologic sources. The available fugitive dust sources are listed in Table D-4.

3. Vehicle Tailpipes

A mobile source profile from Denver was used in this Silver Valley analysis. The profile is made up of a mixture of diesel, leaded and unleaded fuel emissions. It is referred to as MD7515US in the CMB results.

4. Secondary NO_3^- and $SO_4^=$

Sulfate and nitrate, as $SO_4^=$ and NO_3^- respectively, were included as source types in the CMB modeling effort. Ammonium sulfate and ammonium nitrate were also available as secondary source profiles.

Since the general environment in the Silver Valley is acidic, the ionic sulfate and nitrate are expected to be the profiles which fit in the CMB model.

Data from the ambient quartz filter analyses indicate that the sulfate and nitrate are not balanced with the ammonium concentrations. This is not unexpected since the soils in the Silver Valley tend to be naturally slightly acidic. In some areas, the soil's acidity may be enhanced by the emissions from the past smelting activities. Secondary nitrate and secondary sulfate are referred to in the CMB results as NO_3^- and $SO_4^=$.

TABLE D-4

Geologic Source Profiles from the Silver Valley

CMB Name	Description
RDSAND	Road sanding material from the side of I-90, Pinehurst Exit of I-90
RDDST49	Road dirt, I-90 at milepost 49 west of Pinehurst
RDDST47	Road dirt, I-90 at milepost 47 east of Pinehurst
SMELTER	Bulk sample from piles of slag-looking material at Smelterville, thought to be used for winter traction material on local roads and highways
DIVMAP	Paved road dirt, intersection of Division and Maple Streets, Pinehurst
WEIRGUL	Road dust from Weir Gulch Road near the highway, Pinehurst

The ammonium and the sulfate and nitrate are balanced on the dicot filters, however. The reason for this difference between what was seen on the two types of filters is unknown. Ammonium sulfate and ammonium nitrate are used in the dicot filter CMB analyses and are referred to as NH4SO4 and NH4NO3, respectively.

C. RESULTS AND DISCUSSION

The CMB results for each ambient data set are discussed separately and compared to the results other filter sets when appropriate.

The CMB output for each model run is attached at the end of this report.

1. SLAMS Data

The ambient SLAMS data and the source data resulted in excellent CMB model performance. All the model diagnostics that indicate acceptability of the model results were well within the target ranges. For all SLAMS samples, the percent total mass recovery by the model was near or above 90%. The generalized results of the CMB modeling of the SLAMS filters are found in Figure D-2. The source contributions are based on the amount of PM_{10} calculated by the model, but are factored to a total of 100% recovery rate.

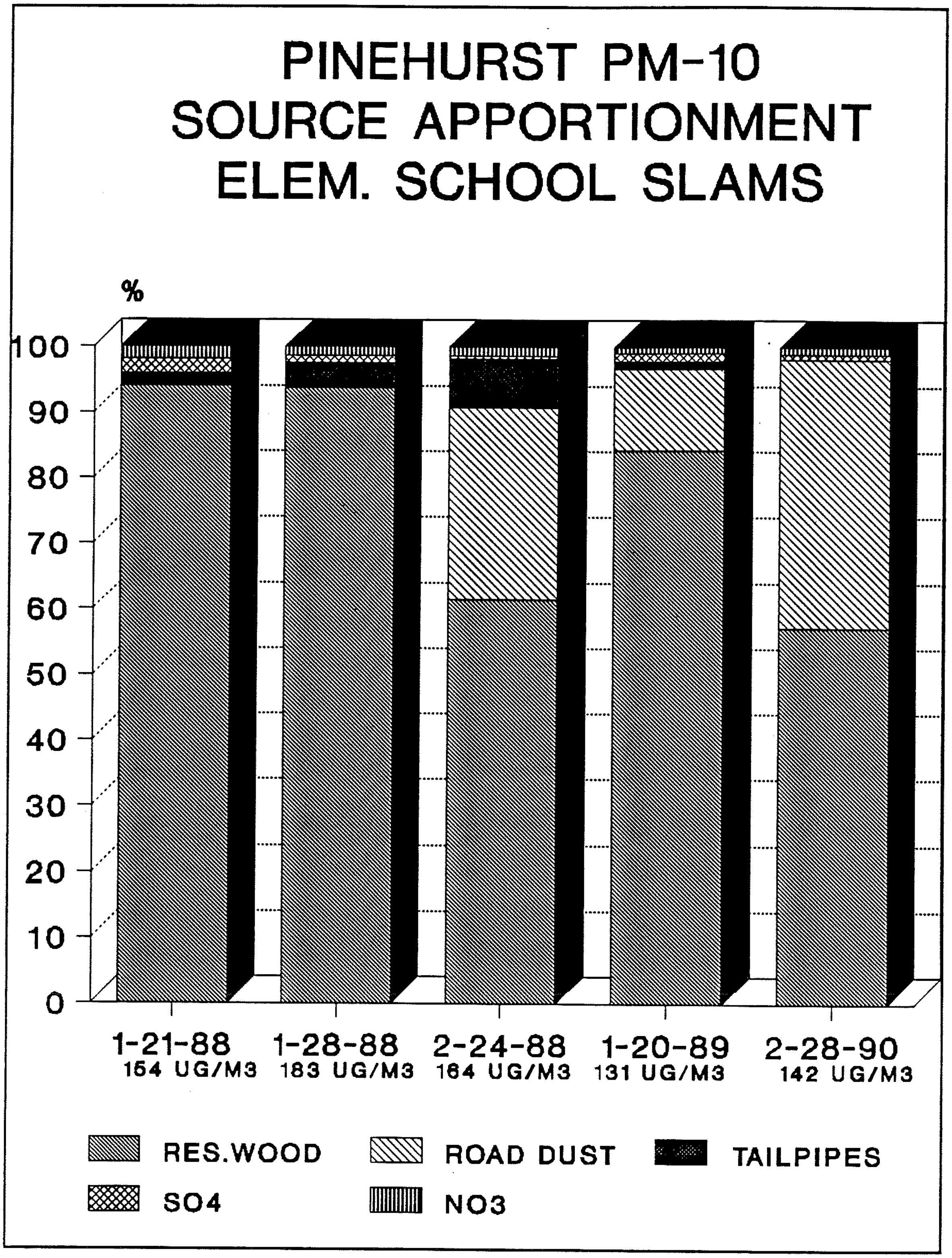
Residential wood burning is the predominate source of PM_{10} on all the analyzed days in Pinehurst. However, some days appear to have a larger fugitive road dust source impact than other days. On 2-28-90 the fugitive road dust contribution approaches the amount contributed by wood smoke. The two samples from late February have the highest fugitive dirt impacts. This increase in the fugitive road dust influence may indicate the beginning of the spring thaw. In all cases the road dust profiles, rather than the slag material, fit the best in the model. RDDST47, RDDST49 and WEIRGUL are used in the CMB analyses. The results appear very similar no matter which road dust profile was used. Because of the similarity in the fugitive dust profiles, it is impossible to determine which particular source profile is impacting the PM_{10} levels. Vehicle tailpipe emissions have a small influence on the PM_{10} levels as do secondary sulfate and nitrate. The actual percent contributions and their uncertainties as calculated in the CMB model are listed in Table D-5.

TABLE D-5

CMB Model Results with (Uncertainties)
Percent Source Contributions to PM_{10} in Pinehurst

	PM_{10} ug/m^3	Res. Wood	Fugitive Road Dust	Tailpipes	SO4	NO3	Calc.% PM_{10}
1-21-88	154	88.4 (15.3)	-	2.0 (.4)	1.8 (.3)	1.8 (.2)	94.0
1-28-88	183	86.6 (15.1)	-	3.5 (.7)	1.1 (.2)	1.2 (.1)	92.4
2-24-88	164	56.0 (11.1)	26.6 (1.6)	6.7 (1.6)	0.5 (.1)	1.1 (.1)	90.9
1-20-89	131	76.3 (12.7)	11.4 (.8)	1.0 (.4)	1.1 (.2)	0.8 (.1)	90.6
2-28-90	142	50.4 (9.3)	36.1 (1.5)	-	0.6 (.1)	1.0 (.1)	88.1

Figure D-2



PINEHURST PM-10
SOURCE APPORTIONMENT
ELEM. SCHOOL SLAMS
%
100
90
80
70
60
50
40
30
20
10
0
1-21-88
154 UG/M3
1-28-88
183 UG/M3
2-24-88
164 UG/M3
1-20-89
131 UG/M3
2-28-90
142 UG/M3
RES.WOOD
ROAD DUST
TAILPIPES
SO4
NO3

2. Dicot Data

The dicot data provides the opportunity to look at the size distribution of the particulates within the PM_{10} samples. Table D-6 indicates that most of the PM_{10} particulates in the samples selected for analysis are found in the fine fraction, 0-2.5 u.

TABLE D-6

Dicot Data CMB Results
Percent Contributions with (Uncertainties)

	Conc. ug/m^3	Res. Wood	Fugitive Road Dust	Tailpipes	NH4SO4	NH4NO3	Calc% PM_{10}
2-24-88 *	62 F	74.6 (12.6)	2.2 (.2)	0.9 (.2)	0.6 (.2)	1.6 (.3)	79.9
	37 C	-	75.0 (4.6)	-	-	-	75.0
	99 Tot	46.7 (12.6)	29.4 (4.6)	0.5 (.2)	0.4 (.2)	1.0 (.3)	78.0
2-24-88 **	62 F	165.5 (47.9)	2.2 (.2)	0.6 (.2)	0.5 (.2)	1.5 (.3)	170.3
	37 C	-	75.0 (4.6)	-	-	-	75.0
	99 Tot						
3-2-88 **	98 F	182.0 (47.8)	1.7 (.2)	1. 6 (.5)	1.0 (.2)	1.7 (.3)	188.0
	35 C	-	78.2 (1.8)	-	-	-	78.2
	133 Tot						

* - Organic and elemental carbon From the 2-24-88 SLAMS filter analysis inserted in the dicot data set.

** - No organic and elemental carbon data used in the CMB analysis

Since emissions from combustion sources are mainly fine particulates, <2.5 u, vehicle exhaust and residential wood burning are potentially major contributors to the high PM_{10} levels found in the Silver Valley. The emission's inventory indicates that wood burning, rather than vehicle tailpipe emissions, is likely the cause of the high PM_{10} concentrations in the winter in Pinehurst. The majority of the road dust emissions is found in the coarse, 2.5-10 u fraction.

The actual CMB results for the two dicot filters, with their related uncertainties, are found in Table 6. The dicot data did not seem to work as well in the CMB model as the SLAMS data. The CMB model diagnostics indicated that the model performed within the suggested ranges except for the percent of the mass recovered by the model. The CMB User's Manual suggests that an acceptable mass recovery guideline would be 100+/-20% of the gravimetrically determined mass. When elemental and organic carbon data are used in the model mass recoveries are just below 80% for both the fine and coarse fractions on both modeled days. There are several reasons why this relatively low recovery may have occurred.

The reasons for the lower recovery include 1) a missing source or 2) poor source and/or receptor data. Missing source is unlikely in the lightly industrialized Silver Valley. A reasonable cause for the lower performance level is the lack of size fractionated source profiles. The profiles used in the CMB model were PM_{10} profiles. To run the dicot data, these profiles had to be attributed to the fine or coarse fractions based upon knowledge of where the majority of particulates in each emissions data set would be found. Some error is introduced by utilizing this method. For example, although the majority of the fugitive road dust is expected in the coarse profile, a small but significant portion of the elements are found in different percentages in the fine and coarse profiles. This analysis assumed that all the elements were found in the same proportion in both size fractions.

Although the mass recovery was less than 80%, the values are close enough to the ideal acceptable range to compare the relative source contributions to those found in other data sets. The source contributions from the dicot and SLAMS filters on 2-24-88 are similar as shown in Table D-7. The data has been factored to 100% of mass recovery. The percent of the ambient PM_{10} attributed to wood burning and secondary nitrate and sulfate is very close on both filters. There is a slight difference in that the dicot data did not indicate as much vehicle exhaust as did the SLAMS filter analysis. The difference between the two samples is made up in the fugitive road dust contribution. This difference is likely due to how well lead (Pb) fit in the CMB model runs. The lead fit well when the vehicle exhaust source profile was used with the SLAMS data. However, lead never fit in the dicot data analysis whether the tailpipe profile was used or not. The reason for this is unknown. Overall, the CMB results from the two filters are comparable. This adds to the confidence in the accuracy of the SLAMS CMB results.

TABLE D-7

Comparison of 2-24-88 Dicot and SLAMS Data
Percent Source Contributions

	Res. Wood	Fugitive Road Dust	Tailpipes	NO3	SO4
Dicot	59.9	37.1	0.8	1.3	0.6
SLAMS	61.6	29.2	7.4	1.1	0.5

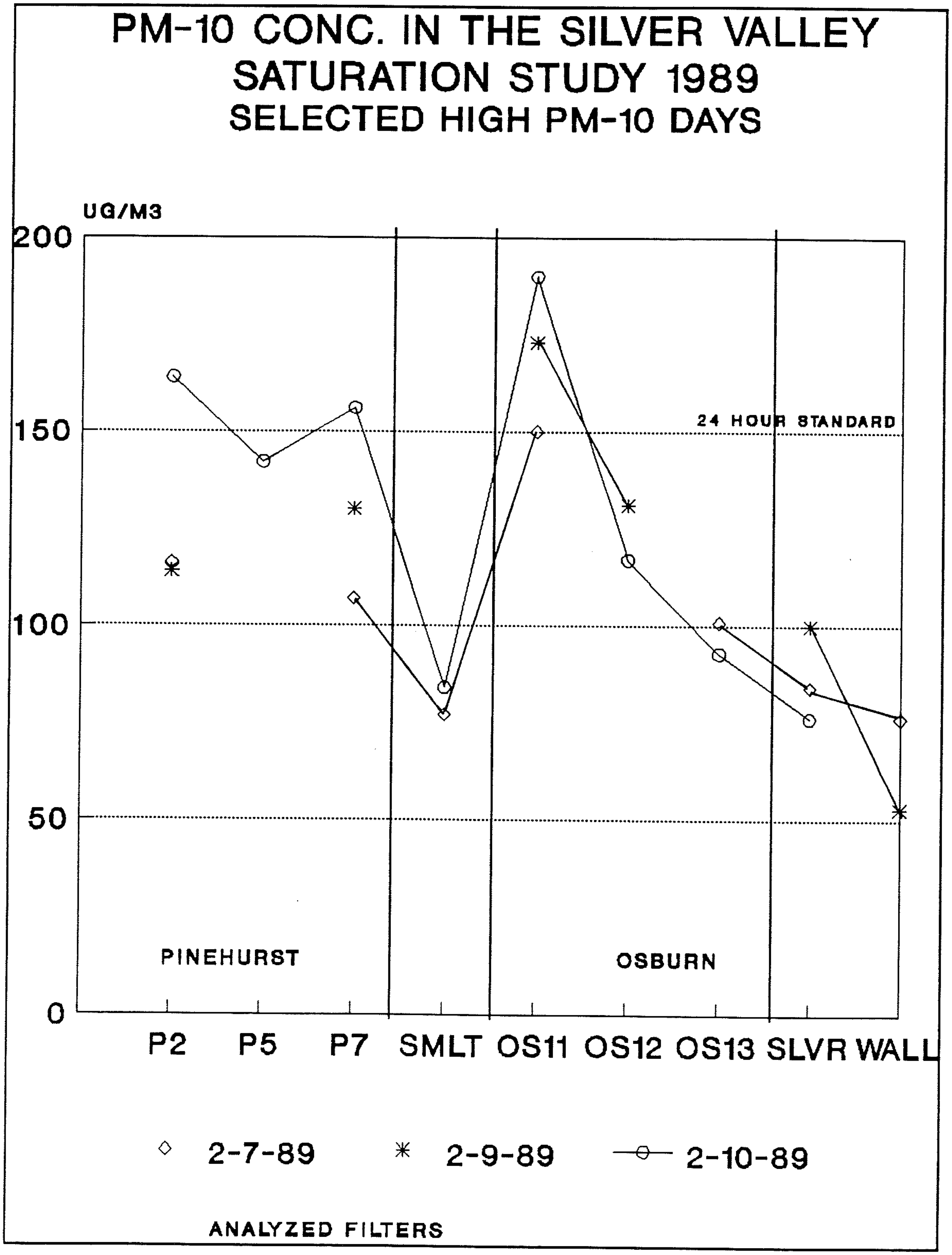
Table D-6 also shows how the CMB model reacted when no carbon data were used in the analysis. On both the modeled days, the mass recovered by the CMB model was close to 200% when no carbon data were present in the analysis. When the SLAMS elemental and organic carbon data from 2-24-88, factored according to the total PM_{10} dicot mass, were added to the 2-24-88 dicot data set, the CMB model ran more acceptably. The wood burning component was greatly exaggerated without the carbon data, but contributions from the other source types remained about the same. The model apparently had difficulty handling a high PM_{10} percentage of wood burning when no elemental and organic carbon data were available.

3. Saturation Study Data

Much of the Saturation Study data is flagged due to operational problems with the portable monitors during the extreme cold weather. In addition to these problems, the study took place during a winter of relatively low ambient PM_{10} concentrations. However, there were 24 hour standard violations recorded on two days with relatively problem-free operations. The PM_{10} concentrations (unflagged) from these days as well as one other high PM_{10} day are presented in Figure D-3. The SLAMS PM_{10} values from Pinehurst on 2-7-89 and 2-9-89 were 124 ug/m^3 and 122 ug/m^3, respectively. These PM_{10} concentrations closely agreed with the values collected by the collocated Saturation Study monitors: 116 ug/m^3 on 2-7-89 and 118 on 2-9-89. There is no corresponding SLAMS value for 2-10-89.

The Saturation Study indicated that 24 hour PM_{10} standard violations occurred in Pinehurst and Osburn. All other monitoring locations with acceptable data show PM_{10} levels well under 150 ug/m^3. Despite the sketchiness of reliable data in this saturation study, the PM_{10} exceedances in the Silver Valley appear to be confined to Pinehurst and Osburn. The CMB source apportionments for all the Silver Valley Saturation Study analyses are given in Table D-8.

Figure D-3



PM-10 CONC. IN THE SILVER VALLEY
SATURATION STUDY 1989
SELECTED HIGH PM-10 DAYS
UG/M3
200
150
100
50
0
24 HOUR STANDARD
PINEHURST
OSBURN
P2
P5
P7
SMLT
OS11
OS12
OS13
SLVR
WALL
2-7-89
2-9-89
2-10-89
ANALYZED FILTERS

TABLE D-8

Saturation Study CMB Results in the Silver Valley
Percent Contribution with (Uncertainties)

	PM_{10} ug/m^3	Res. Wood	Fugitive Road Dirt	Tailpipes	SO4	NO3	Calc.% PM_{10}
2-7-89							
Site 3	116	71.7 (14.0)	16.1 (1.3)	-	3.0 (.4)	1.3 (.2)	92.1
Site 11	150	58.2 (11.8)	35.4 (2.3)	-	4.3 (.6)	1.1 (1.9)	99.0
Site 13	101	80.3 (15.5)	11.3 (1.2)	-	4.6 (.6)	1.1 (.2)	85.7
2-9-89							
Site 2	114	74.1 (16.8)	11.4 (2.0)	9.5 (3.1)	2.8 (.4)	1.7 (.3)	96.2
Site 7	130	64.9 (12.9)	30.3 (2.1)	-	3.1 (.4)	1.6 (.3)	98.4
Site 11	173	51.1 (11.5)	28.2 (2.3)	5.0 (1.6)	3.0 (.4)	1.0 (.2)	86.8
Site 14	100	26.1 (9.9)	50.4 (3.9)	9.1 (2.4)	5.0 (.7)	1.0 (.2)	89.9
2-10-89							
Site 2	164	75.6 (13.9)	23.7 (1.6)	-	1.9 (.3)	1.8 (.3)	103.7
Site 5	142	80.7 (14.8)	12.7 (1.2)	-	2.1 (.3)	1.8 (.3)	97.3
Site 8	84	41.4 (12.8)	25.2 (2.4)	7.1 (2.9)	3.4 (.5)	2.1 (.3)	80.1
Site 11	190	27.7 (7.5)	43.6 (3.0)	5.0 (1.5)	2.1 (.3)	1.1 (.2)	80.7
Site 12	117	49.4 (11.9)	22.3 (1.9)	4.0 (1.9)	3.6 (.5)	1.4 (.2)	80.7
Site 14	76	17.7 (7.8)	76.5 (4.9)	-	2.6 (.4)	0.7 (.2)	100.2

Figure D-4 presents the results of the CMB analysis for the Pinehurst sites factored to 100% mass recovery by the CMB model. All the CMB model diagnostics indicated acceptable model runs with all PM_{10} mass recoveries within +/-10% of the gravimetrically determined masses. The Pinehurst CMB analyses indicate that wood burning accounts for about 70-75% the PM_{10} mass on the elevated PM_{10} concentration days. Fugitive road dust constitutes about 20-25% of the PM_{10} mass on these days. The remainder is made up of vehicle tailpipe exhaust and secondary sulfate and nitrate.

Figure D-5 presents the Osburn CMB analysis results in the same manner as described above for Pinehurst. The apportionments in the relatively low recovery samples are considered representative of the conditions on the sampled day. Since it is unlikely that there are sources in the valley that are missing in the model, the lower recoveries are likely due to poor profile definition. The wood burning and vehicle tailpipe exhaust profiles were not developed for this particular area and may be somewhat different than the actual emissions, causing slightly lower mass recoveries.

The Osburn data shows that wood burning is the major source of PM_{10} mass. The mean wood burning contribution of the analyzed, high concentration days is close to that seen in Pinehurst, 55-60%, but the standard deviation in that calculation is greater than that for Pinehurst. The apportionment results show that fugitive road dust is a larger and more variable source in Osburn than in Pinehurst. Fugitive road dust contributes on average about 30-35% to the ambient PM_{10} levels. Site 11, 2nd & Oak, on 2-10-89 is the only modeled day and site in Osburn that indicates fugitive road dust as the largest contributing source to the PM_{10} levels. Pinehurst and Osburn may both be experiencing 24 hour PM_{10} violations, but each community appears to have a unique mix of wood burning and fugitive road dust sources contributing to the PM_{10} problem. Figure D-6 provides a comparison of average Pinehurst and Osburn source apportionments from 2-10-89 as an example of the similarities and differences in the composition of the sources affecting the PM_{10} mass in both communities.

The source apportionments for all the modeled sites on 2-10-89 are shown in Figure D-7. As the wood smoke contribution increases or decreases, the fugitive dirt contribution follows equally in the opposite direction. Smelterville and Silverton have PM_{10} concentrations below the standard, but with different source mixes. On this particular day, wood smoke appears to have the greatest impact in Smelterville, and fugitive road dust is the largest contributor in Silverton.

Figure D-4

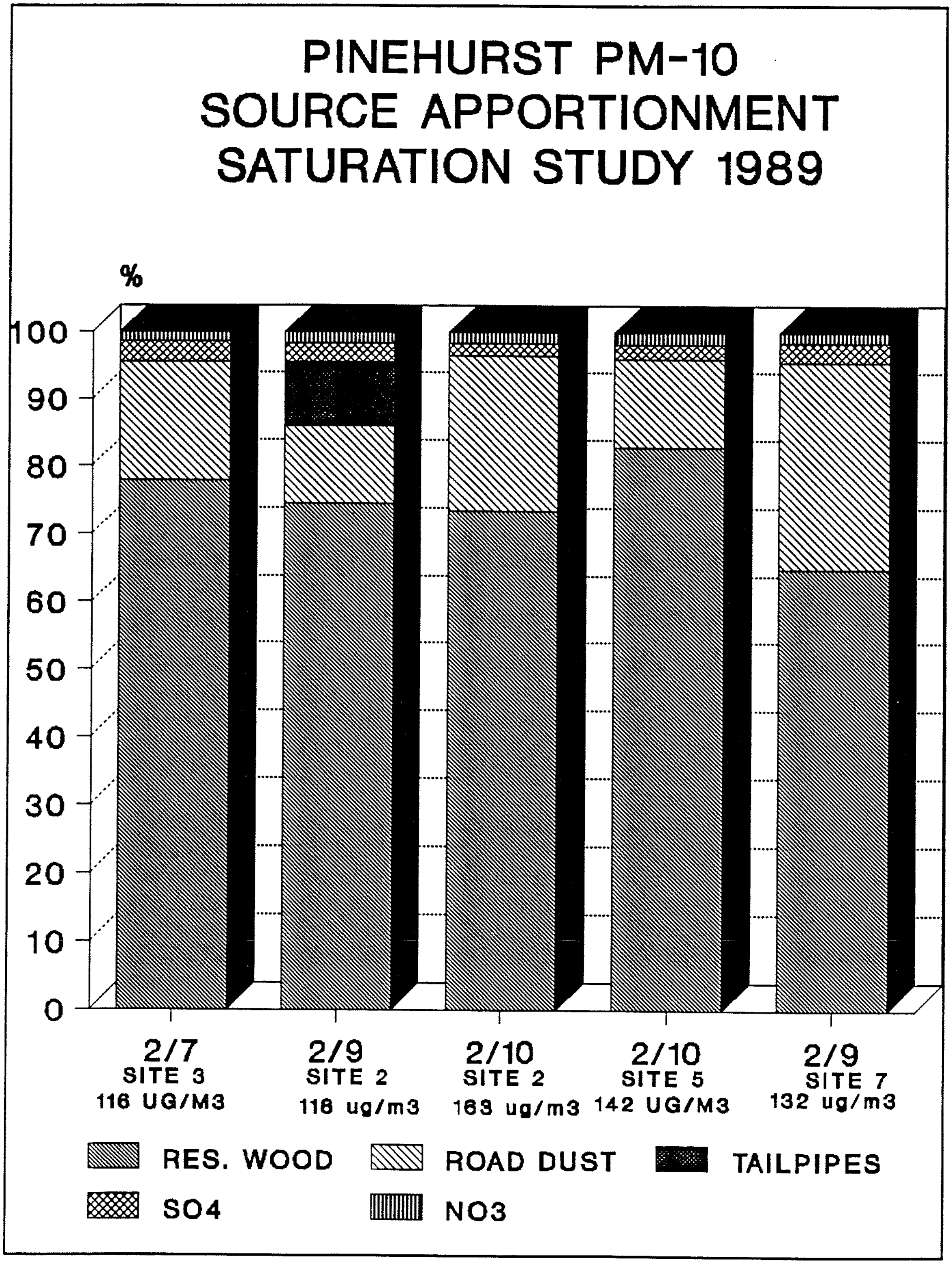

PINEHURST PM-10
SOURCE APPORTIONMENT
SATURATION STUDY 1989
%
100
90
80
70
60
50
40
30
20
10
0
2/7
SITE 3
116 UG/M3
2/9
SITE 2
118 ug/m3
2/10
SITE 2
163 ug/m3
2/10
SITE 5
142 UG/M3
2/9
SITE 7
132 ug/m3
RES. WOOD
ROAD DUST
TAILPIPES
SO4
NO3

Figure D-5

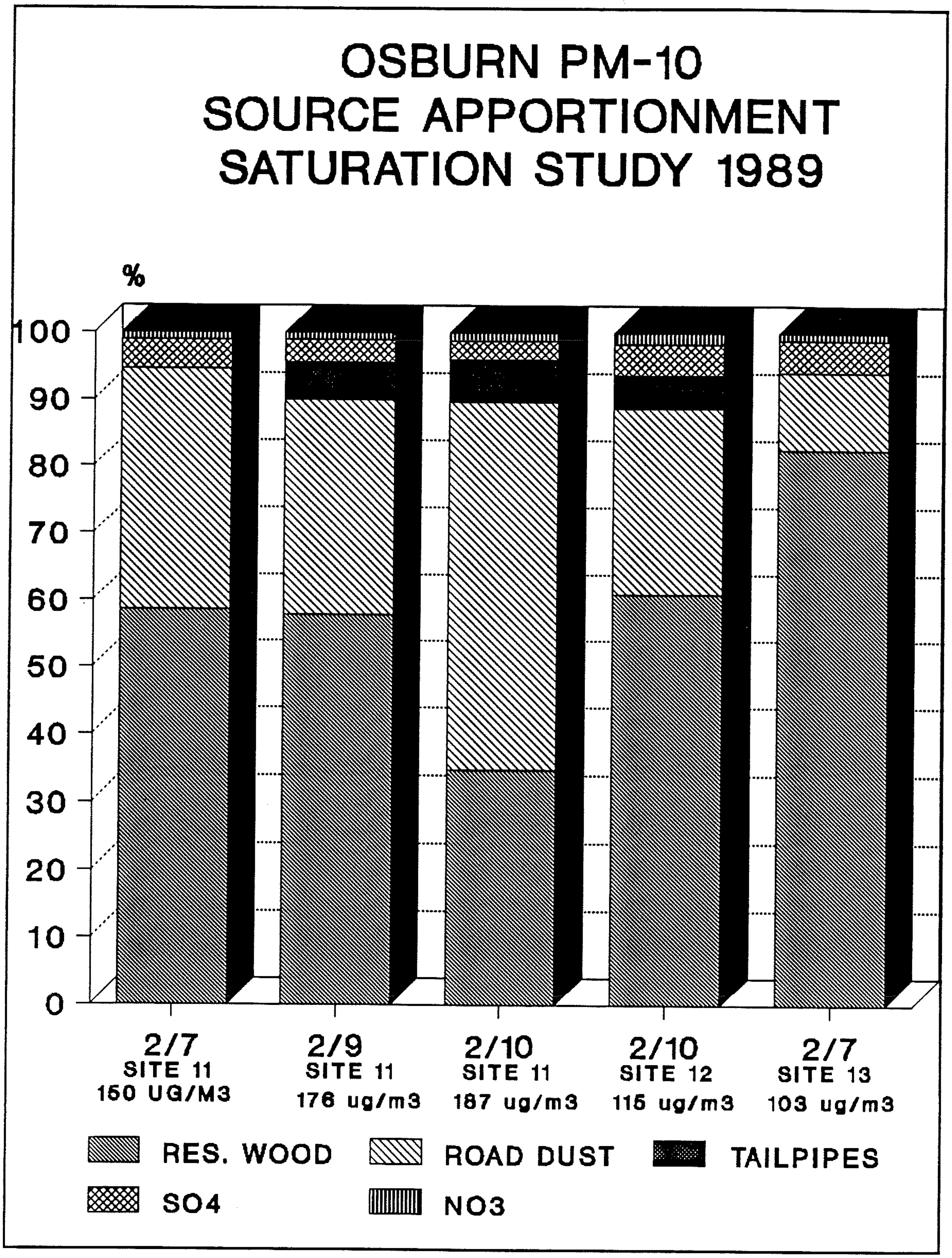

OSBURN PM-10
SOURCE APPORTIONMENT
SATURATION STUDY 1989
%
100
90
80
70
60
50
40
30
20
10
0
2/7 SITE 11 150 UG/M3
2/9 SITE 11 176 ug/m3
2/10 SITE 11 187 ug/m3
2/10 SITE 12 115 ug/m3
2/7 SITE 13 103 ug/m3
RES. WOOD
ROAD DUST
TAILPIPES
SO4
NO3

Figure D-6

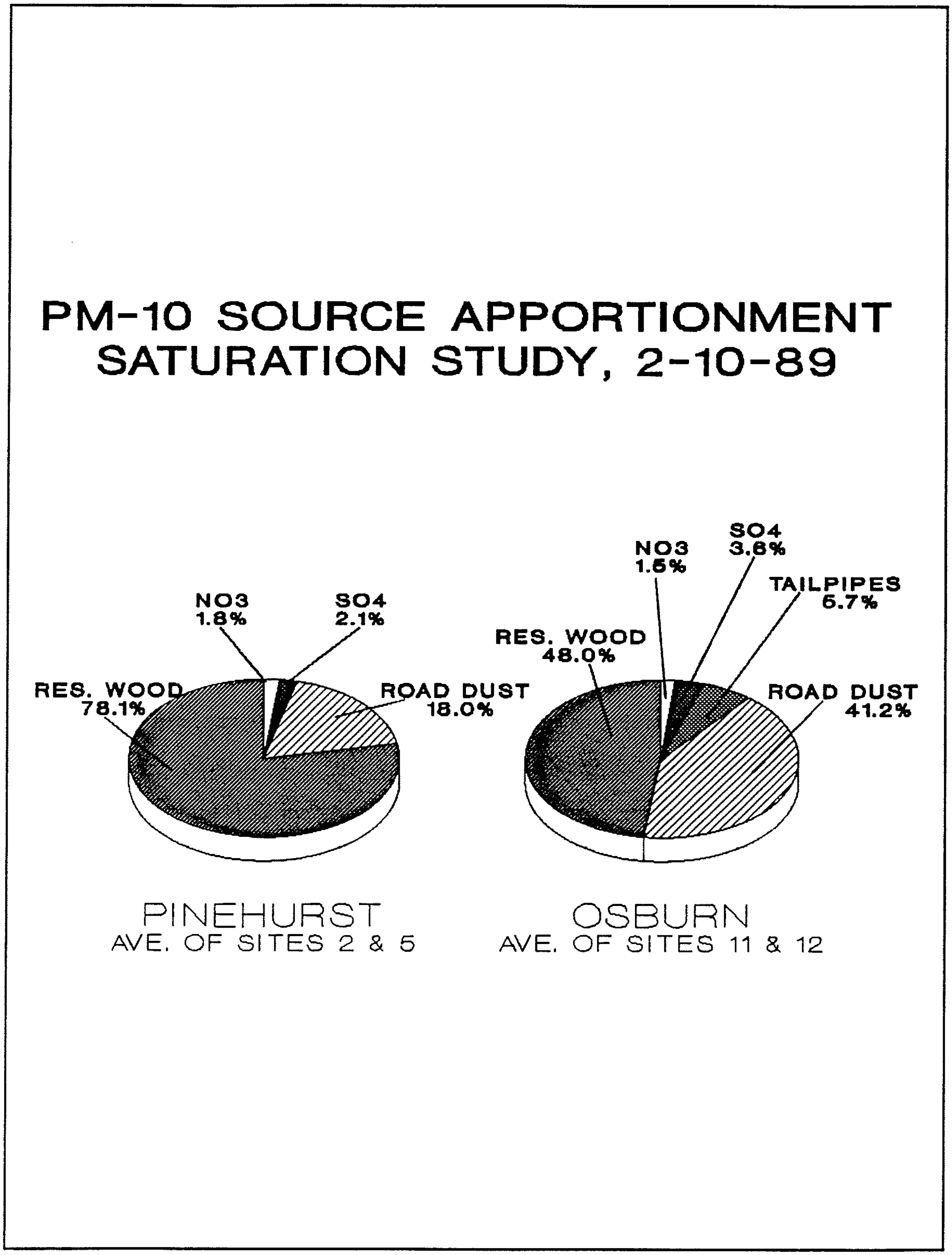
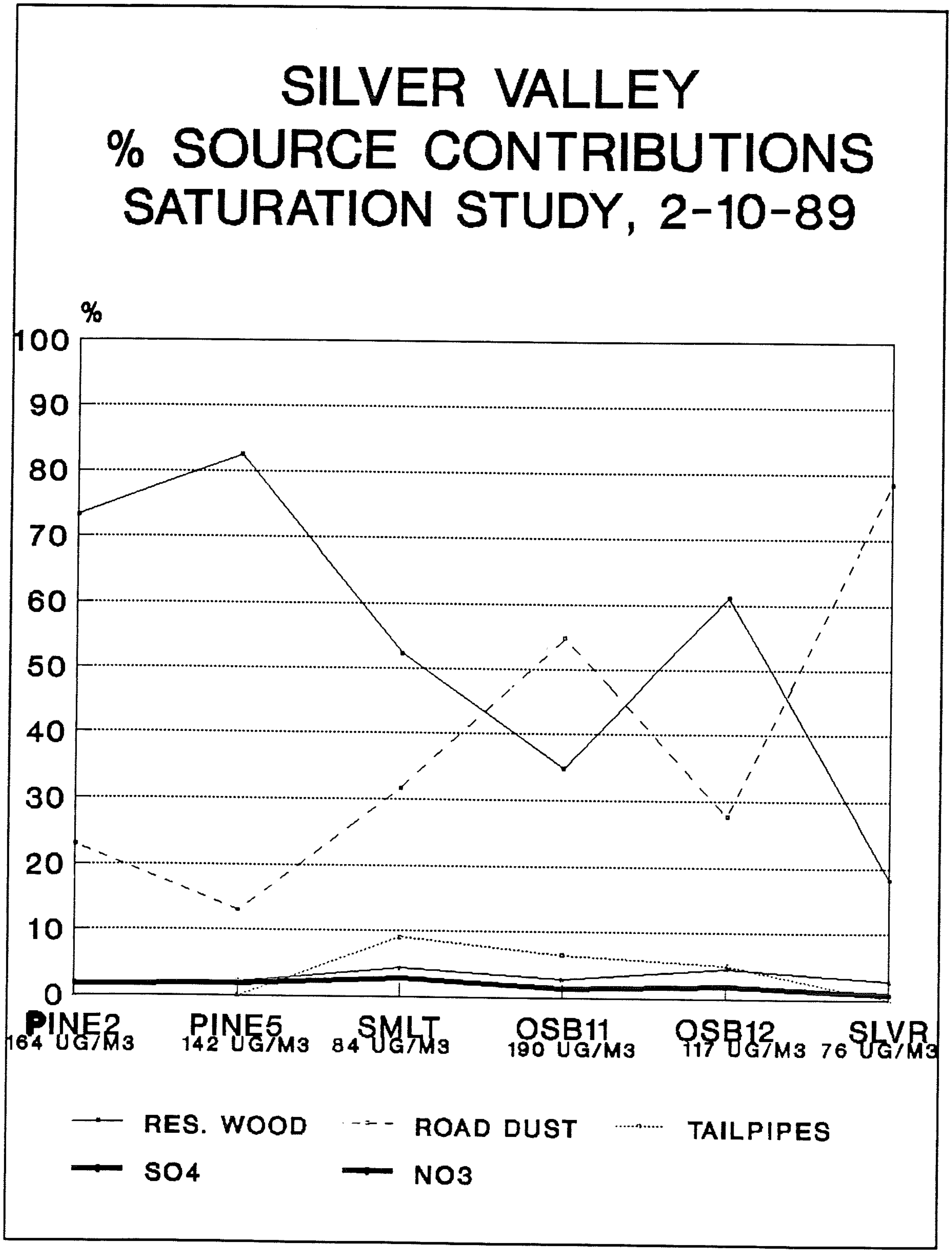

PM-10 SOURCE APPORTIONMENT
SATURATION STUDY, 2-10-89
NO3
1.8%
SO4
2.1%
RES. WOOD
78.1%
ROAD DUST
18.0%
PINEHURST
AVE. OF SITES 2 & 5
NO3
1.5%
SO4
3.6%
TAILPIPES
5.7%
RES. WOOD
48.0%
ROAD DUST
41.2%
OSBURN
AVE. OF SITES 11 & 12

Figure D-7



SILVER VALLEY
% SOURCE CONTRIBUTIONS
SATURATION STUDY, 2-10-89
%
100
90
80
70
60
50
40
30
20
10
0
PINE2
164 UG/M3
PINE5
142 UG/M3
SMLT
84 UG/M3
OSB11
190 UG/M3
OSB12
117 UG/M3
SLVR
76 UG/M3
RES. WOOD
ROAD DUST
TAILPIPES
SO4
NO3

4. Limitations of the Silver Valley CMB Analysis

The CMB model results are only as good as the quality of data used in the model. The vehicle and wood burning source data were not particular to the Silver Valley and likely contain some proportions of chemical species that are different than the emissions that exist in the Silver Valley. However, source characterizations are expensive and cannot be conducted for every area. Representative profiles from other areas must be used and the validity of the results evaluated.Overall, the source profiles used in the CMB model appear to adequately define the source mix in the Silver Valley. A questionable area may be the apportionment of the vehicle tailpipe emissions and the fugitive road dust emissions. Significant concentrations of lead are found in the local road dust samples as well as in vehicle exhaust. The model may have confused some of the apportionment between these sources, although no colinearity between tailpipes and fugitive road dust occurred in any of the CMB model runs. In all cases, the CMB model indicated the vehicle contributions to the PM_{10} concentrations were low. This agrees with the emissions inventory which suggests that tailpipe emissions are much lower than the fugitive dust sources. Soluble potassium (K^+), an indicator of wood burning, did not fit in the model. This is likely due to the use of the Pocatello wood burning profile. The kinds of wood available in Pocatello differ from that burned in the Silver Valley. The K^+ concentrations are dependent on the types of wood that is burned. Calcium and zinc rarely were used in the model. It is probable that the majority of these elements is found in the fugitive road dust. Either the source profile analysis or the filter analysis (or both) did not adequately measure their presence, causing their poor fit in the model. The wood burning and tailpipe emissions from other areas may account for the occasional lower mass recoveries by the model.

The source mix in the SIlver Valley is a relatively simple one. Therefore, despite the above shortcomings, the CMB model was able to successfully distinguish between the chemically distinct area sources present in the Silver Valley. Also, the apportionment results from the filters from the different each monitoring projects support the other data sets' results. This adds additional confidence in the accuracy of the CMB model's apportionments.

D. Conclusions

The following conclusions are supported by this receptor analysis:

1. Residential wood burning emissions are the largest source of PM_{10} in Pinehurst and Osburn on winter days when the ambient PM_{10} concentration approaches or exceeds the 24 hour standard during the winter.

2. Fugitive road dust is the second largest contributor to PM_{10} on high PM_{10} concentration days during the winter in Pinehurst and Osburn. The relative contribution of fugitive dust appears to be greater in Osburn than in Pinehurst.

3. Wood burning and road dust are the major contributors to the PM_{10} concentrations in the other communities in the Silver Valley, but these sources vary in the significance of their influence in each community.

4. Since the Saturation Study data is limited, additional monitoring needs to be conducted in the Silver Valley, particularly, Osburn, to determine the extent of violations of the 24 hour standard for PM_{10}.

REFERENCES

Interim Soil Survey of Silver Valley Area, Idaho, Part of Shoshone County, U.S. Department of Agriculture, Soil Conservation Service, Boise, ID, June 1989.

Idaho PM_{10} Saturation Sampling Projects, Pocatello and Northern Idaho, Lane Regional Air Pollution Control Agency.

Pacific Northwest Source Profile Library, Project Final Report Appendix, Volume 3, sponsored by: USEPA Region 10; State of Oregon, DEQ; State of Washington Dept. of Ecology; State of Idaho, IAQB; Lane Regional Air Pollution Authority; and, Puget Sound Air Pollution Authority, September 1989.

Protocol for Reconciling Differences Among Receptor and Dispersion Models, EPA 450/4-87-008, March 1987.

Receptor Model Technical Series Volume 111: (1989 Revision) CMB User's Manual (Version 7.0), Desert Research Institute (DRI), DRI Document No. 8100.1D1, Draft Report, August 1989, prepared for the Office of Air Quality and Planning and Standards, USEPA.

PINEHURST SLAMS

CMB MODEL RUNS

1-21-88

1-28-88

2-24-88

1-20-89

2-28-90

SLAMS

SOURCE CONTRIBUTION ESTIMATES - SITE: PINEHURST DATE: 01/21/88 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .98 PERCENT MASS 94.0
CHI SQUARE .94 DF 5

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	136.0812	23.5360	5.7818
67	md7515us	3.1270	.6024	5.1910
77	SO4	2.8435	.3812	7.4584
78	NO3	2.7126	.3095	8.7652

MEASURED CONCENTRATION FOR SIZE: T
154.0+- 7.7

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: PINEHURST DATE: 01/21/88 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .98 PERCENT MASS 94.0
CHI SQUARE .94 DF 5

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	154.00000+-	7.70000	144.76430+-	23.43515	.94+-	.16	-.4
C204	NO3	*	2.77450+-	.14050	2.77450+-	.26972	1.00+-	.11	.0
C203	SO4	*	3.02300+-	.24100	3.02300+-	.28356	1.00+-	.12	.0
C206	NH4		.72100+-	.04210	.12242+-	.04672	.17+-	.07	-9.5
C208	K		.36790+-	.01920	.19936+-	.07327	.54+-	.20	-2.2
C201	OC	*	65.06330+-	5.76960	62.81789+-	12.07451	.97+-	.20	-.2
C202	EC	*	11.70090+-	1.91920	12.60909+-	2.98877	1.08+-	.31	.3
C16	S		.21910+-	.08500	.11278+-	.04286	.51+-	.28	-1.1
C17	CL		.06020+-	.02590	.12644+-	.01700	2.10+-	.95	2.1
C19	K	*	.17340+-	.08240	.16077+-	.03062	.93+-	.47	-.1
C20	CA		.18520<	.39190	.01598<	.00367	.09<	.18	-.4
C22	TI		.00580<	.03660	.00000<	.00592	.00<	1.02	-.2
C23	V		.00000<	.01470	.00000<	.00243	.00<	.00	.0
C24	CR		.00000<	.00440	.00041<	.00080	.00<	.00	.1
C25	MN	*	.00680+-	.00260	.01156+-	.00309	1.70+-	.79	1.2
C26	FE	*	.04820+-	.02700	.01627+-	.03182	.34+-	.69	-.8
C27	CO		.00000<	.00230	.00000<	.00069	.00<	.00	.0
C28	NI		.00000<	.00230	.00127<	.00327	.00<	.00	.3
C29	CU		.01130+-	.00170	.00026+-	.00060	.02+-	.05	-6.1
C30	ZN		.02750<	.53430	.03301<	.01188	1.20<	23.33	.0
C31	GA		.00000<	.00360	.00000<	.00110	.00<	.00	.0
C33	AS		.00050<	.01030	.00000<	.00502	.00<	10.03	-.0
C34	SE		.00000<	.00280	.00000<	.00058	.00<	.00	.0
C35	BR	*	.01060+-	.00190	.01191+-	.00268	1.12+-	.32	.4
C37	RB		.00020<	.00540	.00000<	.00071	.00<	3.56	-.0
C38	SR		.00360<	.00950	.00000<	.00058	.00<	.16	-.4
C39	Y		.00000<	.00310	.00000<	.00074	.00<	.00	.0
C40	ZR		.00000<	.00500	.00000<	.00085	.00<	.00	.0
C42	MO		.00000<	.00740	.00000<	.00132	.00<	.00	.0
C46	PD		.00980<	.01870	.00000<	.00223	.00<	.23	-.5
C47	AG		.00000<	.02120	.00000<	.00270	.00<	.00	.0
C48	CD		.00000<	.02090	.00082<	.00297	.00<	.00	.0
C49	IN		.00000<	.02370	.00000<	.00344	.00<	.00	.0
C50	SN		.00120<	.03460	.00000<	.00452	.00<	3.77	-.0
C51	SB		.00000<	.03740	.00041<	.00506	.00<	.00	.0
C56	BA		.00000<	.92690	.00259<	.01881	.00<	.00	.0
C57	LA		.00000<	.13530	.01511<	.02042	.00<	.00	.1
C80	HG		.00000<	.00650	.00000<	.00146	.00<	.00	.0
C82	PB	*	.05060+-	.00550	.03269+-	.01002	.65+-	.21	-1.6

52 Ans

SOURCE CONTRIBUTION ESTIMATES - SITE: PINEHURST DATE: 01/28/88 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .99 PERCENT MASS 92.4
CHI SQUARE .53 DF 5

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	158.4807	27.6850	5.7244
67	md7515us	6.3664	1.2559	5.0694
77	SO4	1.9133	.2774	6.8971
78	NO3	2.3075	.2671	8.6396

MEASURED CONCENTRATION FOR SIZE: T
183.0+- 9.1

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: PINEHURST DATE: 01/28/88 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .99 PERCENT MASS 92.4
CHI SQUARE .53 DF 5

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	183.00000+-	9.15000	169.06790+-	27.51029	.92+-	.16	-.5
C204	NO3	*	2.40630+-	.12180	2.40630+-	.23214	1.00+-	.11	.0
C203	SO4	*	2.18950+-	.17690	2.18950+-	.20233	1.00+-	.12	.0
C206	NH4		.51490+-	.03010	.16055+-	.05820	.31+-	.11	-5.4
C208	K		.44310+-	.02310	.23217+-	.08547	.52+-	.19	-2.4
C201	OC	*	71.73760+-	6.34250	74.11397+-	14.06795	1.03+-	.22	.2
C202	EC	*	18.82810+-	3.07660	16.31408+-	3.57779	.87+-	.24	-.5
C16	S		.10280+-	.05170	.16498+-	.08680	1.60+-	1.17	.6
C17	CL		.06740+-	.02710	.15450+-	.02038	2.29+-	.97	2.6
C19	K	*	.16500+-	.08050	.18775+-	.03567	1.14+-	.60	.3
C20	CA		.13820<	.38440	.02233<	.00634	.16<	.45	-.3
C22	TI	*	.01060<	.03590	.00000<	.00732	.00<	.69	-.3
C23	V		.00000<	.01440	.00000<	.00298	.00<	.00	.0
C24	CR		.00000<	.00430	.00084<	.00113	.00<	.00	.2
C25	MN		.00810+-	.00250	.02294+-	.00623	2.83+-	1.16	2.2
C26	FE	*	.08070+-	.02680	.03301+-	.06478	.41+-	.81	-.7
C27	CO		.00000<	.00240	.00000<	.00110	.00<	.00	.0
C28	NI		.00000<	.00230	.00258<	.00660	.00<	.00	.4
C29	CU		.01690+-	.00180	.00052+-	.00070	.03+-	.04	-8.5
C30	ZN		.03910<	.52490	.04196<	.01453	1.07<	14.41	.0
C31	GA		.00000<	.00360	.00000<	.00140	.00<	.00	.0
C33	AS		.00000<	.01620	.00000<	.01012	.00<	.00	.0
C34	SE		.00000<	.00270	.00000<	.00062	.00<	.00	.0
C35	BR	*	.01820+-	.00200	.02354+-	.00539	1.29+-	.33	.9
C37	RB		.00000<	.00540	.00000<	.00104	.00<	.00	.0
C38	SR		.00270<	.00930	.00000<	.00060	.00<	.22	-.3
C39	Y		.00000<	.00310	.00000<	.00095	.00<	.00	.0
C40	ZR		.00000<	.00490	.00000<	.00106	.00<	.00	.0
C42	MO		.00000<	.00720	.00000<	.00157	.00<	.00	.0
C46	PD		.00250<	.01840	.00000<	.00263	.00<	1.05	-.1
C47	AG		.00000<	.02080	.00000<	.00331	.00<	.00	.0
C48	CD		.00280<	.02050	.00095<	.00364	.34<	2.81	-.1
C49	IN		.00000<	.02330	.00000<	.00402	.00<	.00	.0
C50	SN		.00000<	.03400	.00000<	.00528	.00<	.00	.0
C51	SB		.00000<	.03670	.00048<	.00591	.00<	.00	.0
C56	BA		.00000<	.91060	.00301<	.02320	.00<	.00	.0
C57	LA		.06890<	.13300	.01759<	.02378	.26<	.60	-.4
C80	HG		.00020<	.00640	.00000<	.00178	.00<	8.91	-.0
C82	PB	*	.08640+-	.00650	.06655+-	.02031	.77+-	.24	-.9

SOURCE CONTRIBUTION ESTIMATES - SITE: PINEHURST DATE: 02/24/88 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .99 PERCENT MASS 90.9
CHI SQUARE .48 DF 13

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	91.8059	18.1173	5.0673
12	WEIRGUL	43.5506	2.6007	16.7460
67	md7515us	10.9883	2.6692	4.1167
77	SO4	.8146	.2033	4.0067
78	NO3	1.8627	.2320	8.0287

MEASURED CONCENTRATION FOR SIZE: T
164.0+- 8.2

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: PINEHURST DATE: 02/24/88 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .99 PERCENT MASS 90.9
CHI SQUARE .48 DF 13

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	164.00000+-	8.20000	149.02210+-	17.72161	.91+-	.12	-.8
C204	NO3	*	1.94640+-	.09860	1.94640+-	.20540	1.00+-	.12	.0
C203	SO4	*	1.62880+-	.13410	1.62880+-	.14106	1.00+-	.12	.0
C206	NH4	*	.22350+-	.01310	.14117+-	.09739	.63+-	.44	-.8
C208	K		.30940+-	.01620	.13450+-	.23626	.43+-	.76	-.7
C201	OC	*	44.17680+-	3.96690	46.42056+-	8.19055	1.05+-	.21	.2
C202	EC	*	12.17770+-	1.99600	13.81646+-	2.64388	1.13+-	.29	.5
C13	AL	*	3.66800+-	.58340	4.06679+-	.54493	1.11+-	.23	.5
C14	SI	*	12.35930+-	1.96630	11.09653+-	1.46548	.90+-	.19	-.5
C16	S		.40510+-	.14560	.27439+-	.14996	.68+-	.44	-.6
C17	CL	*	.15240+-	.04790	.10892+-	.01579	.71+-	.25	-.9
C19	K	*	2.05520+-	.41470	1.62786+-	.15137	.79+-	.18	-1.0
C20	CA	*	.81420+-	.40120	.78187+-	.07648	.96+-	.48	-.1
C22	TI	*	.18170+-	.03470	.18574+-	.01173	1.02+-	.21	.1
C23	V		.02410+-	.01330	.00496+-	.00326	.21+-	.18	-1.4
C24	CR	*	.01640+-	.00360	.00990+-	.00175	.60+-	.17	-1.6
C25	MN	*	.15820+-	.00880	.15815+-	.01238	1.00+-	.10	.0
C26	FE	*	3.05900+-	.15510	3.17745+-	.19359	1.04+-	.08	.5
C27	CO		.01480<	.03970	.00000<	.00183	.00<	.12	-.4
C28	NI		.00130<	.00250	.01817<	.01141	13.98<	28.27	1.4
C29	CU		.03030+-	.00220	.31368+-	.01639	10.35+-	.93	17.1
C30	ZN		.28640<	.51590	.03371<	.01220	.12<	.22	-.5
C31	GA		.00120<	.00390	.00000<	.00156	.00<	1.30	-.3
C33	AS		.00650<	.02950	.00105<	.01766	.16<	2.81	-.2
C34	SE		.00080<	.00270	.00000<	.00060	.00<	.75	-.3
C35	BR		.00450+-	.00180	.03954+-	.00928	8.79+-	4.08	3.7
C37	RB	*	.01010+-	.00500	.00941+-	.00165	.93+-	.49	-.1
C38	SR	*	.01150+-	.00920	.00854+-	.00076	.74+-	.60	-.3
C39	Y		.00050<	.00340	.00052<	.00125	1.05<	7.54	.0
C40	ZR	*	.00640+-	.00400	.00736+-	.00146	1.15+-	.75	.2
C42	MO		.00000<	.00710	.00078<	.00152	.00<	.00	.1
C46	PD		.00000<	.01820	.00070<	.00338	.00<	.00	.0
C47	AG		.00390<	.02060	.00000<	.00443	.00<	1.14	-.2
C48	CD		.00680<	.02020	.00704<	.00497	1.04<	3.16	.0
C49	IN		.00000<	.02300	.00000<	.00464	.00<	.00	.0
C50	SN		.01110<	.03350	.00771<	.00542	.69<	2.15	-.1
C51	SB		.00050<	.03620	.00398<	.00605	7.95<	*****	.1
C56	BA		.01340<	.89480	.07360<	.02749	5.49<	*****	.1
C57	LA		.00000<	.13070	.01019<	.02814	.00<	.00	.1
C80	HG		.00240<	.00630	.00000<	.00174	.00<	.72	-.4
C82	PB	*	.16240+-	.00940	.16886+-	.03512	1.04+-	.22	.2

SOURCE CONTRIBUTION ESTIMATES - SITE: PINEHURST DATE: 01/20/89 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .98 PERCENT MASS 90.6
CHI SQUARE 1.29 DF 7

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	99.9108	16.6747	5.9918
9	RDDST47	14.8869	1.0856	13.7127
67	md7515us	1.4059	.4688	2.9986
77	SO4	1.4409	.2067	6.9702
78	NO3	1.0462	.1279	8.1822

MEASURED CONCENTRATION FOR SIZE: T
131.0+- 6.6

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: PINEHURST DATE: 01/20/89 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .98 PERCENT MASS 90.6
CHI SQUARE 1.29 DF 7

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	131.00000+-	6.55000	118.69080+-	16.62511	.91+-	.13	-.7
C204	NO3	*	1.10250+-	.05580	1.10250+-	.11221	1.00+-	.11	.0
C203	SO4	*	1.68300+-	.13820	1.68300+-	.14615	1.00+-	.12	.0
C206	NH4		.29080+-	.01700	.08401+-	.04841	.29+-	.17	-4.0
C208	K		.33340+-	.01740	.14637+-	.15130	.44+-	.45	-1.2
C201	OC	*	40.75330+-	3.67360	46.76040+-	8.86458	1.15+-	.24	.6
C202	EC	*	15.53790+-	2.54180	8.72536+-	2.17554	.56+-	.17	-2.0
C16	S		.19180+-	.07590	.11336+-	.02036	.59+-	.26	-1.0
C17	CL	*	.07520+-	.02850	.09127+-	.01246	1.21+-	.49	.5
C19	K	*	.62740+-	.14410	.72160+-	.07208	1.15+-	.29	.6
C20	CA		.00000<	.37930	.13425<	.01442	.00<	.00	.4
C22	TI	*	.05190+-	.03360	.06833+-	.00560	1.32+-	.86	.5
C23	V		.00580<	.01430	.00211<	.00189	.36<	.96	-.3
C24	CR	*	.00550+-	.00350	.00663+-	.00067	1.21+-	.78	.3
C25	MN	*	.03590+-	.00310	.03022+-	.00197	.84+-	.09	-1.5
C26	FE	*	.63680+-	.04110	.63973+-	.03645	1.00+-	.09	.1
C27	CO		.00210<	.00850	.00192<	.00043	.91<	3.71	-.0
C28	NI		.00210+-	.00190	.00359+-	.00150	1.71+-	1.70	.6
C29	CU		.00720+-	.00160	.02504+-	.00145	3.48+-	.80	8.3
C30	ZN		.05890<	.51580	.02309<	.00858	.39<	3.44	-.1
C31	GA		.00000<	.00350	.00000<	.00075	.00<	.00	.0
C33	AS		.00360<	.00980	.00174<	.00312	.48<	1.58	-.2
C34	SE		.00000<	.00270	.00016<	.00036	.00<	.00	.1
C35	BR	*	.00530+-	.00180	.00559+-	.00122	1.05+-	.43	.1
C37	RB		.00210<	.00500	.00298<	.00046	1.42<	3.38	.2
C38	SR		.00000<	.00940	.00085<	.00039	.00<	.00	.1
C39	Y		.00000<	.00300	.00009<	.00051	.00<	.00	.0
C40	ZR		.00010<	.00480	.00263<	.00064	26.35<	*****	.5
C42	MO		.00000<	.00710	.00016<	.00098	.00<	.00	.0
C46	PD		.00630<	.01810	.00000<	.00192	.00<	.31	-.3
C47	AG		.00250<	.02050	.00188<	.00232	.75<	6.22	-.0
C48	CD		.00460<	.02010	.00240<	.00261	.52<	2.35	-.1
C49	IN		.00270<	.02280	.00000<	.00301	.00<	1.12	-.1
C50	SN		.00180<	.03340	.00000<	.00384	.00<	2.14	-.1
C51	SB		.00350<	.05810	.00030<	.00440	.09<	1.54	-.1
C56	BA		.00640<	.89480	.01219<	.01636	1.90<	*****	.0
C57	LA		.00590<	.13080	.02322<	.01947	3.94<	87.32	.1
C80	HG		.00060<	.00630	.00000<	.00105	.00<	1.75	-.1
C82	PB	*	.04790+-	.00530	.05574+-	.00510	1.16+-	.17	1.1

SOURCE CONTRIBUTION ESTIMATES - SITE: PINEHURST DATE: 02/28/90 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.99	PERCENT MASS	88.1		
CHI SQUARE	1.12	DF	9		

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	71.6113	13.1868	5.4305
8	RDDST49	51.2341	2.1500	23.8293
77	SO4	.8723	.1586	5.4986
78	NO3	1.3522	.1963	6.8879

MEASURED CONCENTRATION FOR SIZE: T
142.0+- 7.1

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: PINEHURST DATE: 02/28/90 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.99	PERCENT MASS	88.1		
CHI SQUARE	1.12	DF	9		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	142.00000+-	7.10000	125.06980+-	13.28477	.88+-	.10	-1.1
C204	NO3	*	1.37810+-	.06980	1.37810+-	.17991	1.00+-	.14	.0
C203	SO4	*	1.31490+-	.11090	1.31490+-	.10637	1.00+-	.12	.0
C206	NH4		.23050+-	.01350	.05357+-	.12181	.23+-	.53	-1.4
C208	K		.23860+-	.01260	.10491+-	.48314	.44+-	2.03	-.3
C201	OC	*	30.23650+-	2.78080	35.10141+-	6.36275	1.16+-	.24	.7
C202	EC	*	8.12500+-	1.33800	5.65128+-	1.55315	.70+-	.22	-1.2
C16	S		.31720+-	.11650	.09641+-	.01552	.30+-	.12	-1.9
C17	CL		.14880+-	.04710	.06216+-	.00990	.42+-	.15	-1.8
C19	K	*	2.39140+-	.48080	2.06633+-	.22335	.86+-	.20	-.6
C20	CA	*	.41800+-	.39020	.47925+-	.05376	1.15+-	1.08	.2
C22	TI	*	.21910+-	.03580	.23148+-	.01226	1.06+-	.18	.3
C23	V		.01970+-	.01360	.00809+-	.00279	.41+-	.32	-.8
C24	CR	*	.01460+-	.00360	.02198+-	.00142	1.51+-	.38	1.9
C25	MN	*	.08760+-	.00560	.08464+-	.00441	.97+-	.08	-.4
C26	FE	*	2.51440+-	.12850	2.30161+-	.11702	.92+-	.07	-1.2
C27	CO		.01030<	.03270	.00430<	.00065	.42<	1.33	-.2
C28	NI		.00210+-	.00190	.00973+-	.00075	4.64+-	4.21	3.7
C29	CU		.04580+-	.00280	.08341+-	.00447	1.82+-	.15	7.1
C30	ZN		.16170<	.52490	.01525<	.00610	.09<	.31	-.3
C31	GA		.00000<	.00380	.00000<	.00059	.00<	.00	.0
C33	AS		.01490<	.02260	.00430<	.00683	.29<	.63	-.4
C34	SE		.00100<	.00280	.00000<	.00034	.00<	.34	-.4
C35	BR		.00520+-	.00180	.00043+-	.00042	.08+-	.09	-2.6
C37	RB	*	.01470+-	.00520	.00958+-	.00072	.65+-	.24	-1.0
C38	SR		.00000<	.00960	.00256<	.00049	.00<	.00	.3
C39	Y		.00280+-	.00230	.00087+-	.00061	.31+-	.34	-.8
C40	ZR	*	.01070+-	.00410	.00840+-	.00096	.79+-	.31	-.5
C42	MO		.00000<	.00730	.00097<	.00098	.00<	.00	.1
C46	PD		.00980<	.01850	.00154<	.00290	.16<	.42	-.4
C47	AG		.00000<	.02100	.00031<	.00355	.00<	.00	.0
C48	CD		.00710<	.02070	.00514<	.00394	.72<	2.18	-.1
C49	IN		.00000<	.02350	.00000<	.00429	.00<	.00	.0
C50	SN		.00730<	.03430	.00026<	.00505	.04<	.71	-.2
C51	SB		.00070<	.03700	.01097<	.00586	15.68<	*****	.3
C56	BA		.12450<	.90770	.02370<	.02258	.19<	1.40	-.1
C57	LA		.02720<	.13350	.04561<	.02920	1.68<	8.30	.1
C30	HG		.00000<	.00650	.00000<	.00090	.00<	.00	.0
C82	PB	*	.12280+-	.00780	.13357+-	.00710	1.09+-	.09	1.0

PINEHURST DICOT

CMB MODEL RUNS

2-24-88
- FINE, WITH CARBON DATA
- FINE, WITHOUT CARBON DATA
- COARSE

3-2-88
- FINE, WITHOUT CARBON DATA
- COARSE

Pinehurst El. School Dist

SOURCE CONTRIBUTION ESTIMATES - SITE: MN583 DATE: 02/24/88 VERSION: 7.
SAMPLE DURATION 00 START HOUR 00 SIZE: FINE
R SQUARE .96 PERCENT MASS 79.9
CHI SQUARE 1.00 DF 7

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	46.2586	7.7915	5.9371
8	RDDST49	1.3930	.1315	10.5909
67	md7515us	.5306	.1503	3.5306
71	nh4no3	.9931	.1537	6.4598
72	nh4so4	.3986	.0912	4.3680

MEASURED CONCENTRATION FINE/COARSE/TOTAL:
62.1+- 6.2/ 36.9+- 3.7/ 99.0+- 7.2

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: MN583 DATE: 02/24/88 VERSION: 7.0
SAMPLE DURATION 00 START HOUR 00 SIZE: FINE
R SQUARE .98 PERCENT MASS 79.9
CHI SQUARE 1.00 DF 7

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	62.06000+-	6.22100	49.57397+-	7.75156	.80+-	.15	-1.3
C206	NH4	*	.39000+-	.06000	.37037+-	.03152	.95+-	.17	-.3
C204	NO3	*	.78000+-	.11000	.80294+-	.07890	1.03+-	.18	.2
C9	F		.13000+-	.02000	.00000+-	.02399	.00+-	.18	-4.2
C203	SO4	*	.39000+-	.06000	.39769+-	.03380	1.02+-	.18	.1
C11	NA		.04000+-	.01000	.00319+-	.01185	.08+-	.30	-2.4
C208	K		.17000+-	.02000	.06777+-	.02751	.40+-	.17	-3.0
C201	OC	*	16.70000+-	1.50100	21.33848+-	4.10405	1.28+-	.27	1.1
C202	EC	*	4.60000+-	.75500	3.96790+-	1.00547	.86+-	.26	-.5
C13	AL	*	.11320+-	.01910	.12654+-	.01696	1.12+-	.24	
C14	SI	*	.30380+-	.05050	.34921+-	.04636	1.15+-	.24	
C15	P		.00000<	.00120	.00022<	.00111	.00<	.00	.1
C16	S		.23600+-	.03600	.13244+-	.01220	.56+-	.10	-2.7
C17	CL		.02320+-	.00470	.04156+-	.00572	1.79+-	.44	2.5
C19	K		.24400+-	.03670	.11863+-	.01272	.49+-	.09	-3.2
C20	CA		.03930+-	.00610	.02200+-	.00220	.56+-	.10	-2.7
C22	TI	*	.00660+-	.00080	.00736+-	.00200	1.11+-	.33	.4
C23	V		.00000<	.00030	.00020<	.00080	.00<	.00	.2
C24	CR		.00020+-	.00020	.00160+-	.00024	7.98+-	8.08	4.4
C25	MN	*	.00600+-	.00070	.00590+-	.00058	.98+-	.15	-.1
C26	FE	*	.09830+-	.01110	.08720+-	.00708	.89+-	.12	-.8
C27	CO		-99.90000+-	-99.90000	.00000+-	.00022	.00+-	.00	1.0
C28	NI		.00000<	.00030	.00067<	.00057	.00<	.00	1.0
C29	CU		.00290+-	.00040	.00061+-	.00018	.21+-	.07	-5.2
C30	ZN	*	.02360+-	.00270	.01413+-	.00396	.60+-	.18	-2.0
C31	GA		.00000<	.00030	.00000<	.00035	.00<	.00	.0
C32	GE		.00000<	.00020	.00000<	.00463	.00<	.00	.0
C33	AS		.00360+-	.00190	.00024+-	.00092	.07+-	.26	-1.6
C34	SE		.00000<	.00020	.00000<	.00018	.00<	.00	.0
C35	BR	*	.00200+-	.00040	.00216+-	.00047	1.08+-	.32	.3
C37	RB		.00020<	.00030	.00025<	.00019	1.25<	2.11	.1
C38	SR		.00000<	.00040	.00000<	.00018	.00<	.00	.0
C39	Y		.00000<	.00050	.00007<	.00022	.00<	.00	.1
C40	ZR		.00050<	.00060	.00019<	.00026	.38<	.69	-.5
C42	MO		.00000<	.00080	.00005<	.00044	.00<	.00	.1
C46	PD		.00350+-	.00190	.00002+-	.00077	.01+-	.22	-1.7
C47	AG		.00000<	.00240	.00000<	.00091	.00<	.00	.0
C48	CD		.00150<	.00290	.00033<	.00101	.22<	.80	-.4
C49	IN		.00000<	.00360	.00000<	.00119	.00<	.00	.0
C50	SN		.00000<	.00440	.00004<	.00156	.00<	.00	.0
C51	SB		.00160<	.00530	.00152<	.00175	.95<	3.33	-.0
C56	BA		.00000<	.02110	.00088<	.00640	.00<	.00	[illegible]
C57	LA		.00000<	.02860	.00845<	.00720	.00<	.00	[illegible]
C80	HG		.00000<	.00040	.00000<	.00048	.00<	.00	.0
C82	PB		.03520+-	.00410	.01096+-	.00176	.31+-	.06	-5.4

SOURCE CONTRIBUTION ESTIMATES - SITE: MN583 DATE: 02/24/88 VERSION: 7.

SAMPLE DURATION	00	START HOUR	00	SIZE:	FINE
R SQUARE	.99	PERCENT MASS	170.3		
CHI SQUARE	.34	DF	6		

w/o OC+EC

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	102.6586	29.7027	3.4562
8	RDDST49	1.3935	.1351	10.3110
67	md7515us	.4213	.1501	2.8068
71	nh4no3	.9406	.1584	5.9388
72	nh4so4	.2908	.1105	2.6315

MEASURED CONCENTRATION FINE/COARSE/TOTAL:
62.1+- 6.2/ 36.9+- 3.7/ 99.0+- 7.2

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: MN583 DATE: 02/24/88 VERSION: 7.0

SAMPLE DURATION	00	START HOUR	00	SIZE:	FINE
R SQUARE	.99	PERCENT MASS	170.3		
CHI SQUARE	.34	DF	6		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	62.06000+-	6.22100	105.70480+-	29.56853	1.70+-	.51	1.4
C206	NH4	*	.39000+-	.06000	.37060+-	.04249	.95+-	.18	-.3
C204	NO3	*	.78000+-	.11000	.79912+-	.07905	1.02+-	.18	.1
C9	F		.13000+-	.02000	.00000+-	.02569	.00+-	.20	-4.0
C203	SO4	*	.39000+-	.06000	.39710+-	.04070	1.02+-	.19	.1
C11	NA		.04000+-	.01000	.00708+-	.01241	.18+-	.31	-2.1
C208	K	*	.17000+-	.02000	.15039+-	.05646	.88+-	.35	-.3
C201	OC		16.70000+-	1.50100	46.88083+-	9.10718	2.81+-	.60	3.3
C202	EC		4.60000+-	.75500	8.35336+-	2.22450	1.82+-	.57	1.6
C13	AL	*	.11320+-	.01910	.12918+-	.01739	1.14+-	.25	.6
C14	SI	*	.30380+-	.05050	.34992+-	.04636	1.15+-	.24	.7
C15	P		.00000<	.00120	.00024<	.00229	.00<	.00	.1
C16	S		.23600+-	.03600	.13576+-	.00995	.58+-	.10	-2.7
C17	CL		.02320+-	.00470	.09023+-	.01264	3.89+-	.96	5.0
C19	K		.24400+-	.03670	.18501+-	.02423	.76+-	.15	-1.3
C20	CA		.03930+-	.00610	.02671+-	.00268	.68+-	.13	-1.9
C22	TI	*	.00660+-	.00080	.00736+-	.00434	1.12+-	.67	.2
C23	V		.00000<	.00030	.00020<	.00175	.00<	.00	.1
C24	CR		.00020+-	.00020	.00158+-	.00044	7.91+-	8.21	2.9
C25	MN	*	.00600+-	.00070	.00581+-	.00052	.97+-	.14	-.2
C26	FE	*	.09830+-	.01110	.08672+-	.00628	.88+-	.12	-.9
C27	CO		-99.90000+-	-99.90000	.00000+-	.00028	.00+-	.00	1.0
C28	NI		.00000<	.00030	.00063<	.00049	.00<	.00	1.1
C29	CU		.00290+-	.00040	.00060+-	.00033	.21+-	.12	-4.5
C30	ZN	*	.02360+-	.00270	.02601+-	.00874	1.10+-	.39	.3
C31	GA		.00000<	.00030	.00000<	.00073	.00<	.00	.0
C32	GE		.00000<	.00020	.00000<	.01027	.00<	.00	.0
C33	AS		.00360+-	.00190	.00024+-	.00089	.07+-	.25	-1.6
C34	SE		.00000<	.00020	.00000<	.00032	.00<	.00	.0
C35	BR	*	.00200+-	.00040	.00211+-	.00042	1.06+-	.30	.2
C37	RB		.00020<	.00030	.00025<	.00033	1.25<	2.50	.1
C38	SR		.00000<	.00040	.00000<	.00032	.00<	.00	.0
C39	Y		.00000<	.00050	.00007<	.00043	.00<	.00	.1
C40	ZR		.00050<	.00060	.00019<	.00053	.38<	1.15	-.4
C42	MO		.00000<	.00080	.00005<	.00093	.00<	.00	.0
C46	PD		.00350+-	.00190	.00002+-	.00165	.01+-	.47	-1.
C47	AG		.00000<	.00240	.00000<	.00196	.00<	.00	.
C48	CD		.00150<	.00290	.00067<	.00217	.45<	1.69	-.
C49	IN		.00000<	.00360	.00000<	.00258	.00<	.00	.0
C50	SN		.00000<	.00440	.00004<	.00340	.00<	.00	.
C51	SB		.00160<	.00530	.00169<	.00382	1.05<	4.23	.
C56	BA		.00000<	.02110	.00195<	.01384	.00<	.00	.
C57	LA		.00000<	.02860	.01471<	.01552	.00<	.00	.
C80	HG		.00000<	.00040	.00000<	.00103	.00<	.00	.
C82	PB		.03520+-	.00410	.00982+-	.00161	.28+-	.06	-5.

Pinehurst Dicot

SOURCE CONTRIBUTION ESTIMATES - SITE: MN582 DATE: 02/24/88 VERSION: 7.
SAMPLE DURATION 00 START HOUR 00 SIZE: COARS
R SQUARE .99 PERCENT MASS 75.1
CHI SQUARE .21 DF 7

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
8	RDDST49	27.7425	1.6923	16.3935

MEASURED CONCENTRATION FINE/COARSE/TOTAL:
62.1+- 6.2/ 36.9+- 3.7/ 99.0+- 7.2

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: MN582 DATE: 02/24/88 VERSION: 7.0
SAMPLE DURATION 00 START HOUR 00 SIZE: COARS
R SQUARE .99 PERCENT MASS 75.1
CHI SQUARE .21 DF 7

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	36.94000+-	3.72000	27.74249+-	1.69229	.75+-	.09	-2.3
C206	NH4		.00000<	.04000	.00000<	.02774	.00<	.00	.0
C204	NO3		.17000+-	.02000	.00000+-	.02774	.00+-	.16	-5.0
C9	F		.00000<	.09000	.00000<	.05548	.00<	.00	.0
C203	SO4		.17000+-	.02000	.08323+-	.00832	.49+-	.08	-4.0
C11	NA		.00000<	.04000	.00000<	.02774	.00<	.00	.0
C208	K		.04000+-	.01000	.00000+-	.02774	.00+-	.69	-1.4
C201	OC		.00000<	.00010	.98208<	.08045	.00<	.00	12.2
C202	EC		.00000<	.00010	.00000<	.01942	.00<	.00	.0
C13	AL	*	2.10100+-	.35220	2.46437+-	.33097	1.17+-	.25	
C14	SI	*	7.15700+-	1.18700	7.72074+-	1.02231	1.08+-	.23	
C15	P		.00000<	.00250	.00000<	.00153	.00<	.00	.0
C16	S		.08420+-	.01580	.01945+-	.00682	.23+-	.09	-3.8
C17	CL		.00000<	.00390	.00000<	.00200	.00<	.00	.0
C19	K	*	1.05600+-	.15850	1.02869+-	.11516	.97+-	.18	-.1
C20	CA		.57020+-	.08570	.23678+-	.02677	.42+-	.08	-3.7
C22	TI	*	.12150+-	.01360	.12071+-	.00605	.99+-	.12	-.1
C23	V	*	.00430+-	.00150	.00447+-	.00128	1.04+-	.47	.1
C24	CR		.00140+-	.00050	.00785+-	.00050	5.61+-	2.03	9.1
C25	MN		.08970+-	.01010	.03892+-	.00197	.43+-	.05	-4.9
C26	FE		1.91900+-	.21420	1.15076+-	.05729	.60+-	.07	-3.5
C27	CO		-99.90000+-	-99.90000	.00000+-	.00277	.00+-	.00	1.0
C28	NI		.00000<	.00050	.00086<	.00022	.00<	.00	1.6
C29	CU		.00720+-	.00100	.00397+-	.00028	.55+-	.09	-3.1
C30	ZN		.16320+-	.01840	.03937+-	.00205	.24+-	.03	-6.7
C31	GA		.00000<	.00050	.00000<	.00017	.00<	.00	.0
C32	GE		.00000<	.00030	.00000<	.00011	.00<	.00	.0
C33	AS		.00500+-	.00360	.00180+-	.00327	.36+-	.70	-.7
C34	SE		.00050+-	.00030	.00000+-	.00008	.00+-	.17	-1.6
C35	BR		.00000<	.00030	.00000<	.00017	.00<	.00	.0
C37	RB	*	.00580+-	.00080	.00524+-	.00031	.90+-	.14	-.7
C38	SR		.00530+-	.00080	.00169+-	.00017	.32+-	.06	-4.4
C39	Y		.00000<	.00060	.00028<	.00019	.00<	.00	.4
C40	ZR	*	.00430+-	.00090	.00472+-	.00039	1.10+-	.25	.4
C42	MO		.00000<	.00090	.00044<	.00028	.00<	.00	.5
C46	PD		.00100<	.00310	.00094<	.00108	.94<	3.12	-.0
C47	AG		.00000<	.00370	.00019<	.00130	.00<	.00	.0
C48	CD		.00860+-	.00440	.00286+-	.00144	.33+-	.24	-1.2
C49	IN		.00000<	.00470	.00000<	.00147	.00<	.00	.0
C50	SN		.00000<	.00530	.00000<	.00164	.00<	.00	.0
C51	SB		.00250<	.00640	.00108<	.00189	.43<	1.34	-.2
C56	BA		.01800<	.02400	.01476<	.00738	.82<	1.17	-
C57	LA		.04150+-	.03260	.01038+-	.00957	.25+-	.30	
C80	HG		.00000<	.00070	.00000<	.00022	.00<	.00	.0
C82	PB	*	.06750+-	.00770	.06453+-	.00330	.96+-	.12	-.4

Pipehurst Elem. School

SOURCE CONTRIBUTION ESTIMATES - SITE: MN597 DATE: 03/02/88 VERSION: 7.
SAMPLE DURATION 00 START HOUR 00 SIZE: FINE
R SQUARE .99 PERCENT MASS 188.0
CHI SQUARE .52 DF 6

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	179.0903	46.8182	3.8252
8	RDDST49	1.6449	.1981	8.3030
67	md7515us	1.5738	.4597	3.4235
71	nh4no3	1.6701	.2872	5.8141
72	nh4so4	.9871	.2403	4.1084

MEASURED CONCENTRATION FINE/COARSE/TOTAL:
98.4+- 9.8/ 35.2+- 3.5/ 133.6+- 10.5

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: MN597 DATE: 03/02/88 VERSION: 7.0
SAMPLE DURATION 00 START HOUR 00 SIZE: FINE
R SQUARE .99 PERCENT MASS 188.0
CHI SQUARE .52 DF 6

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	98.40000+-	9.84900	184.96610+-	46.56142	1.88+-	.51	1.8
C206	NH4	*	.78000+-	.11000	.78958+-	.07669	1.01+-	.17	.1
C204	NO3	*	1.43000+-	.20000	1.42074+-	.13927	.99+-	.17	-.0
C9	F		.00000<	.04000	.00000<	.03307	.00<	.00	.0
C203	SO4	*	1.04000+-	.15000	1.03368+-	.09432	.99+-	.17	-.0
C11	NA		.00000<	.04000	.01236<	.01557	.00<	.00	.3
C208	K	*	.26000+-	.04000	.26237+-	.09735	1.01+-	.41	.0
C201	OC		-99.90000+-	-99.90000	81.98234+-	15.88799	.00+-	.00	1.8
C202	EC		-99.90000+-	-99.90000	15.07428+-	3.88694	.00+-	.00	1.2
C13	AL	*	.12290+-	.02100	.15514+-	.02129	1.26+-	.28	1.1
C14	SI	*	.45910+-	.07620	.42257+-	.05621	.92+-	.20	-.4
C15	P		.00000<	.00160	.00070<	.00411	.00<	.00	.2
C16	S		.59830+-	.09020	.36090+-	.03284	.60+-	.11	-2.5
C17	CL		.08190+-	.01340	.15964+-	.02208	1.95+-	.42	3.0
C19	K		.33600+-	.05050	.28676+-	.04121	.85+-	.18	-.8
C20	CA	*	.04760+-	.00740	.03798+-	.00410	.80+-	.15	-1.1
C22	TI	*	.00830+-	.00100	.00869+-	.00758	1.05+-	.92	.1
C23	V		.00070+-	.00030	.00024+-	.00307	.34+-	4.39	-.1
C24	CR		.00050+-	.00020	.00201+-	.00078	4.02+-	2.24	1.9
C25	MN		.00630+-	.00080	.01089+-	.00161	1.73+-	.34	2.6
C26	FE	*	.11310+-	.01270	.10798+-	.01691	.95+-	.18	-.2
C27	CO		-99.90000+-	-99.90000	.00000+-	.00050	.00+-	.00	1.0
C28	NI		.00000<	.00030	.00118<	.00168	.00<	.00	.7
C29	CU		.00750+-	.00090	.00080+-	.00058	.11+-	.08	-6.3
C30	ZN	*	.03400+-	.00390	.04442+-	.01528	1.31+-	.47	.7
C31	GA		.00000<	.00030	.00000<	.00128	.00<	.00	.0
C32	GE		.00000<	.00020	.00000<	.01791	.00<	.00	.0
C33	AS		.01020+-	.00330	.00028+-	.00268	.03+-	.26	-2.3
C34	SE		.00000<	.00020	.00000<	.00057	.00<	.00	.0
C35	BR	*	.00650+-	.00080	.00666+-	.00139	1.02+-	.25	.1
C37	RB		.00100+-	.00040	.00030+-	.00061	.30+-	.62	-1.0
C38	SR		.00000<	.00040	.00000<	.00057	.00<	.00	.0
C39	Y		.00000<	.00050	.00008<	.00076	.00<	.00	.1
C40	ZR		.00000<	.00060	.00022<	.00093	.00<	.00	.2
C42	MO		.00150+-	.00080	.00006+-	.00163	.04+-	1.09	-.8
C46	PD		.00000<	.00190	.00002<	.00288	.00<	.00	.0
C47	AG		.00000<	.00250	.00000<	.00343	.00<	.00	.0
C48	CD		.00000<	.00300	.00114<	.00379	.00<	.00	.2
C49	IN		.00000<	.00370	.00000<	.00449	.00<	.00	.0
C50	SN		.00140<	.00460	.00004<	.00593	.03<	4.23	-.2
C51	SB		.00000<	.00560	.00217<	.00664	.00<	.00	.2
C56	BA		.02030<	.02170	.00340<	.02417	.17<	1.20	-.5
C57	LA		.05240+-	.03020	.02379+-	.02696	.45+-	.58	-.7
C80	HG		.00000<	.00040	.00000<	.00181	.00<	.00	.0
C82	PB		.05820+-	.00660	.02284+-	.00523	.39+-	.10	-4.2

Pinehurst Elem. School

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SOURCE CONTRIBUTION ESTIMATES -  SITE: MN596         DATE: 03/02/88  VERSION: 7.
SAMPLE DURATION          00       START HOUR        00        SIZE:     COARS
     R SQUARE           .99     PERCENT MASS      78.2
   CHI SQUARE           .29               DF         7
```

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
8	RDDST49	27.5222	1.6326	16.8579

MEASURED CONCENTRATION FINE/COARSE/TOTAL:
98.4+- 9.8/ 35.2+- 3.5/ 133.6+- 10.5

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

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SPECIES CONCENTRATIONS -  SITE: MN596         DATE: 03/02/88  VERSION: 7.0
SAMPLE DURATION          00       START HOUR        00        SIZE:     COARS
     R SQUARE           .99     PERCENT MASS      78.2
   CHI SQUARE           .29               DF         7
```

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	35.19000+-	3.54600	27.52215+-	1.63260	.78+-	.09	-2.0
C206	NH4		.00000<	.04000	.00000<	.02752	.00<	.00	.0
C204	NO3		.30000+-	.04000	.00000+-	.02752	.00+-	.09	-6.2
C9	F		.00000<	.09000	.00000<	.05504	.00<	.00	.0
C203	SO4		.26000+-	.04000	.08257+-	.00826	.32+-	.06	-4.3
C11	NA		.04000+-	.01000	.00000+-	.02752	.00+-	.69	-1.4
C208	K		.09000+-	.01000	.00000+-	.02752	.00+-	.31	-3.1
C201	OC		-99.90000+-	-99.90000	.97428+-	.07981	.00+-	.00	1.0
C202	EC		-99.90000+-	-99.90000	.00000+-	.01927	.00+-	.00	1.0
C13	AL	*	2.07600+-	.34800	2.44479+-	.32834	1.18+-	.25	.8
C14	SI	*	7.08900+-	1.17600	7.65941+-	1.01419	1.08+-	.23	[illegible]
C15	P		.00000<	.00250	.00000<	.00151	.00<	.00	
C16	S		.13500+-	.02230	.01929+-	.00677	.14+-	.06	-5.[illegible]
C17	CL		.00240<	.00400	.00000<	.00198	.00<	.83	-.5
C19	K	*	1.06300+-	.15960	1.02052+-	.11424	.96+-	.18	-.2
C20	CA		.55430+-	.08330	.23490+-	.02656	.42+-	.08	-3.7
C22	TI	*	.12670+-	.01420	.11975+-	.00600	.95+-	.12	-.5
C23	V	*	.00390+-	.00150	.00443+-	.00127	1.14+-	.54	.3
C24	CR		.00140+-	.00050	.00779+-	.00050	5.56+-	2.02	9.1
C25	MN		.08030+-	.00900	.03861+-	.00195	.48+-	.06	-4.5
C26	FE		1.72900+-	.19310	1.14162+-	.05683	.66+-	.08	-2.9
C27	CO		-99.90000+-	-99.90000	.00000+-	.00275	.00+-	.00	1.0
C28	NI		.00000<	.00040	.00085<	.00022	.00<	.00	1.9
C29	CU		.00830+-	.00100	.00394+-	.00028	.47+-	.07	-4.2
C30	ZN		.13340+-	.01500	.03905+-	.00204	.29+-	.04	-6.2
C31	GA		.00000<	.00040	.00000<	.00017	.00<	.00	.0
C32	GE		.00000<	.00030	.00000<	.00011	.00<	.00	.0
C33	AS		.00370+-	.00360	.00179+-	.00325	.48+-	1.00	-.4
C34	SE		.00000<	.00020	.00000<	.00008	.00<	.00	.0
C35	BR		.00040+-	.00030	.00000+-	.00017	.00+-	.41	-1.2
C37	RB	*	.00480+-	.00060	.00520+-	.00030	1.08+-	.15	.6
C38	SR		.00330+-	.00050	.00168+-	.00017	.51+-	.09	-3.1
C39	Y		.00000<	.00050	.00028<	.00019	.00<	.00	.5
C40	ZR	*	.00530+-	.00090	.00468+-	.00039	.88+-	.17	-.6
C42	MO		.00020<	.00070	.00044<	.00028	2.20<	7.83	.3
C46	PD		.00310+-	.00250	.00094+-	.00107	.30+-	.42	-.2
C47	AG		.00000<	.00300	.00019<	.00129	.00<	.00	.1
C48	CD		.00060<	.00340	.00283<	.00143	4.72<	26.88	.6
C49	IN		.00000<	.00380	.00000<	.00146	.00<	.00	.0
C50	SN		.00790+-	.00450	.00000+-	.00162	.00+-	.21	-1.7
C51	SB		.00000<	.00530	.00107<	.00187	.00<	.00	.2
C56	BA		.00790<	.02080	.01464<	.00732	1.85<	4.97	.3
C57	LA		.02930+-	.02810	.01029+-	.00950	.35+-	.47	-[illegible]
C80	HG		.00000<	.00060	.00000<	.00022	.00<	.00	
C82	PB	*	.08770+-	.00770	.08402+-	.00328	.95+-	.12	-[illegible]

SATURATION STUDY

CMB MODEL RUNS

2-7-89

2-9-89

2-10-89

FEBRUARY 7, 1989

SITE 3 - PINEHURST ELEM. SCHOOL

SITE 11 - OSBURN, 2nd & OAK

SITE 13 - OSBURN, BEHIND 1124 LARCH

Pinehurst El. School

SOURCE CONTRIBUTION ESTIMATES - SITE: 3   DATE: 02/07/89   VERSION: 7.0
SAMPLE DURATION 24   START HOUR 0   SIZE: T
R SQUARE .99   PERCENT MASS 92.1
CHI SQUARE .29   DF 5

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	83.2153	16.2193	5.1306
8	RDDST49	18.6830	1.5190	12.2998
77	SO4	3.4372	.4800	7.1603
78	NO3	1.4978	.2463	6.0809

MEASURED CONCENTRATION FOR SIZE: T
116.0+- 5.3

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0   SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 3   DATE: 02/07/89   VERSION: 7.0
SAMPLE DURATION 24   START HOUR 0   SIZE: T
R SQUARE .99   PERCENT MASS 92.1
CHI SQUARE .29   DF 5

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	116.00000+-	5.25000	106.83330+-	16.21245	.92+-	.15	-.5
C204	NO3	*	1.52910+-	.18570	1.52910+-	.15538	1.00+-	.16	.0
C203	SO4	*	3.61650+-	.32560	3.61650+-	.33864	1.00+-	.13	.0
C206	NH4		.16830+-	.01050	.06225+-	.05155	.37+-	.31	-2.0
C208	K		.27790+-	.03850	.12191+-	.18124	.44+-	.65	-.8
C201	OC	*	35.44360+-	4.67610	38.69894+-	7.38334	1.09+-	.25	.4
C202	EC	*	8.09740+-	1.58610	6.56702+-	1.80260	.81+-	.27	-.6
C13	AL		-99.90000+-	-99.90000	1.66504+-	.22346	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	5.09629+-	.67593	.00+-	.00	1.1
C16	S		.63800+-	.36720	.06628+-	.00646	.10+-	.06	-1.6
C17	CL		.07020<	.16440	.07223<	.01037	1.03<	2.41	.0
C19	K	*	.75610+-	.19000	.82071+-	.08336	1.09+-	.29	.3
C20	CA		.37790<	.56810	.17968<	.01965	.48<	.72	-.3
C22	TI		.01300<	.12390	.08441<	.00558	6.49<	61.89	.6
C23	V		.00000<	.05870	.00295<	.00173	.00<	.00	.1
C24	CR		.00780<	.02720	.00801<	.00071	1.03<	3.58	.0
C25	MN	*	.04610+-	.01750	.03115+-	.00166	.68+-	.26	-.9
C26	FE	*	.83500+-	.05830	.83936+-	.04267	1.01+-	.09	.1
C27	CO	*	.00000<	.01820	.00157<	.00047	.00<	.00	.1
C28	NI		.00090<	.01330	.00355<	.00049	3.94<	58.29	.2
C29	CU		.00950<	.01120	.03042<	.00169	3.20<	3.78	1.8
C30	ZN		.07600+-	.01310	.01772+-	.00708	.23+-	.10	-3.9
C31	GA		.00000<	.02460	.00000<	.00070	.00<	.00	.0
C33	AS		.00520<	.03720	.00157<	.00255	.30<	2.21	-.1
C34	SE		.00230<	.01930	.00000<	.00046	.00<	.20	-.1
C35	BR		.00670<	.01620	.00050<	.00043	.07<	.19	-.4
C37	RB		.00000<	.01650	.00349<	.00051	.00<	.00	.2
C38	SR		.00000<	.02050	.00093<	.00047	.00<	.00	.0
C39	Y		.00000<	.02220	.00032<	.00054	.00<	.00	.0
C40	ZR		.01390<	.03040	.00306<	.00064	.22<	.48	-.4
C42	MO		.00700<	.05450	.00035<	.00088	.05<	.41	-.1
C46	PD		.00000<	.12980	.00056<	.00169	.00<	.00	.0
C47	AG		.00060<	.14980	.00011<	.00202	.19<	46.77	.0
C48	CD		.01480<	.16340	.00222<	.00223	.15<	1.66	-.1
C49	IN		.00000<	.18930	.00000<	.00255	.00<	.00	.0
C50	SN		.00960<	.26720	.00009<	.00321	.01<	.43	-.0
C51	SB		.00000<	.27160	.00417<	.00364	.00<	.00	.0
C56	BA		.28490<	.85550	.00973<	.01342	.03<	.11	-.3
C57	LA		.16400<	1.00220	.02297<	.01594	.14<	.86	-.1
C80	HG		.00010<	.04440	.00000<	.00093	.00<	9.32	.0
C82	PB	*	.06170+-	.04240	.04871+-	.00269	.79+-	.54	-.3

CSBURN - 2nd + Chk

SOURCE CONTRIBUTION ESTIMATES - SITE: 11 DATE: 02/07/89 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .98 PERCENT MASS 99.0
CHI SQUARE 1.19 DF 6

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	87.2739	17.6836	4.9353
9	RDDST47	53.1652	3.4981	15.1982
77	SO4	6.4748	.8810	7.3493
78	NO3	1.6211	.2917	5.5575

MEASURED CONCENTRATION FOR SIZE: T
150.0+- 12.4

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 11 DATE: 02/07/89 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .98 PERCENT MASS 99.0
CHI SQUARE 1.19 DF 6

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	150.00000+-	12.35000	148.53500+-	17.89869	.99+-	.14	-.1
C204	NO3	*	1.65310+-	.20170	1.65310+-	.20387	1.00+-	.17	.0
C203	SO4	*	6.86140+-	.58170	6.86140+-	.63703	1.00+-	.13	.0
C206	NH4		.31610+-	.01910	.06528+-	.12798	.21+-	.41	-1.9
C208	K		.30020+-	.04290	.12786+-	.50725	.43+-	1.69	-.3
C201	OC	*	35.00150+-	4.91090	42.98275+-	7.75110	1.23+-	.28	.9
C202	EC	*	11.52630+-	2.16500	6.88731+-	1.89208	.60+-	.20	-1.6
C13	AL		-99.90000+-	-99.90000	4.33863+-	.58690	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	14.39486+-	1.91836	.00+-	.00	1.1
C16	S		1.23530+-	.54000	.19595+-	.02102	.16+-	.07	-1.9
C17	CL		.13250<	.14570	.07862<	.01214	.59<	.66	-.4
C19	K	*	2.41020+-	.49630	2.25884+-	.24535	.94+-	.22	-.3
C20	CA		.35760<	.63490	.44941<	.05096	1.26<	2.24	.1
C22	TI	*	.20970+-	.10400	.24403+-	.01355	1.16+-	.58	.3
C23	V		.02550<	.06560	.00755<	.00316	.30<	.77	-.3
C24	CR	*	.02810+-	.02300	.02302+-	.00181	.82+-	.67	-.2
C25	MN	*	.11370+-	.02030	.08912+-	.00499	.78+-	.15	-1.2
C26	FE	*	2.14820+-	.11660	2.25849+-	.11973	1.05+-	.08	.7
C27	CO		.00860<	.03230	.00686<	.00114	.80<	3.00	-.1
C28	NI		.00270<	.01480	.01079<	.00110	4.00<	21.91	.5
C29	CU		.02310+-	.01250	.08900+-	.00505	3.85+-	2.10	4.9
C30	ZN		.14950+-	.01590	.01859+-	.00747	.12+-	.05	-7.5
C31	GA		.00080<	.02730	.00000<	.00098	.00<	1.22	-.0
C33	AS		.04620<	.05450	.00622<	.00759	.13<	.23	-.7
C34	SE		.00000<	.02130	.00058<	.00078	.00<	.00	.0
C35	BR		.00600<	.01790	.00052<	.00084	.09<	.30	-.3
C37	RB		.00880<	.01820	.01063<	.00107	1.21<	2.50	.1
C38	SR		.00820<	.02260	.00303<	.00096	.37<	1.03	-.2
C39	Y		.00730<	.02460	.00032<	.00110	.04<	.21	-.3
C40	ZR		.02330<	.03350	.00941<	.00142	.40<	.58	-.4
C42	MO		.02220<	.06030	.00058<	.00156	.03<	.10	-.4
C46	PD		.00000<	.14600	.00000<	.00403	.00<	.00	.0
C47	AG		.00000<	.16830	.00670<	.00491	.00<	.00	.0
C48	CD		.02400<	.18330	.00696<	.00571	.29<	2.23	-.1
C49	IN		.00000<	.21230	.00000<	.00638	.00<	.00	.0
C50	SN		.00000<	.29960	.00000<	.00762	.00<	.00	.0
C51	SB		.00000<	.30450	.00026<	.00912	.00<	.00	.0
C56	BA		.00000<	.95600	.03840<	.03478	.00<	.00	.0
C57	LA		.00000<	1.11870	.05302<	.04629	.00<	.00	.0
C80	HG		.00190<	.04920	.00000<	.00133	.00<	.70	-.0
C82	PB	*	.21130+-	.04840	.14658+-	.00830	.69+-	.16	-1.3

SOURCE CONTRIBUTION ESTIMATES - SITE: 13 DATE: 02/07/89 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .97 PERCENT MASS 85.7
CHI SQUARE 1.17 DF 5

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	65.3885	15.8781	4.1182
8	RDDST49	10.6051	1.7764	5.9699
67	md7515us	6.5960	2.9206	2.2584
77	SO4	4.5943	.6290	7.3044
78	NO3	1.1205	.1932	5.7992

MEASURED CONCENTRATION FOR SIZE: T
103.0+- 8.4

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 13 DATE: 02/07/89 VERSION: 7.0
SAMPLE DURATION 24 START HOUR 0 SIZE: T
R SQUARE .97 PERCENT MASS 85.7
CHI SQUARE 1.17 DF 5

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	103.00000+-	8.35000	88.30431+-	14.99047	.86+-	.16	-.9
C204	NO3	*	1.17750+-	.14970	1.17750+-	.11643	1.00+-	.16	.0
C203	SO4	*	4.76370+-	.41470	4.76370+-	.45453	1.00+-	.13	.0
C206	NH4		.23180+-	.01410	.09243+-	.04198	.40+-	.18	-3.1
C208	K		.16960+-	.03740	.09579+-	.10589	.56+-	.64	-.7
C201	OC	*	35.75840+-	4.73340	32.51444+-	5.82409	.91+-	.20	-.4
C202	EC	*	7.43170+-	1.48760	9.10492+-	1.76042	1.23+-	.34	.7
C13	AL		-99.90000+-	-99.90000	.94597+-	.12695	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	2.94273+-	.38756	.00+-	.00	1.0
C16	S		.85600+-	.42100	.12896+-	.08979	.15+-	.13	-1.7
C17	CL		.00000<	.16510	.07430<	.01019	.00<	.00	.4
C19	K	*	.46210+-	.14970	.48850+-	.04841	1.06+-	.36	.2
C20	CA		.00000<	.60760	.11257<	.01267	.00<	.00	.2
C22	TI		.02150<	.12360	.04791<	.00487	2.23<	12.81	.2
C23	V		.00470<	.05870	.00168<	.00184	.36<	4.47	-.1
C24	CR		.00360<	.02740	.00542<	.00110	1.51<	11.46	.1
C25	MN	*	.01760+-	.01760	.04072+-	.00652	2.31+-	2.34	1.2
C26	FE	*	.51910+-	.04880	.51050+-	.07135	.98+-	.17	-.1
C27	CO	*	.00000<	.01630	.00089<	.00116	.00<	.00	.1
C28	NI	*	.00000<	.01340	.00469<	.00685	.00<	.00	.3
C29	CU		.01060<	.01140	.01781<	.00114	1.68<	1.81	.6
C30	ZN		.06170+-	.01310	.02242+-	.00792	.36+-	.15	-2.6
C31	GA		.00680<	.02460	.00000<	.00106	.00<	.16	-.3
C33	AS		.01010<	.04870	.00089<	.01056	.09<	1.13	-.2
C34	SE		.00130<	.01920	.00000<	.00058	.00<	.44	-.1
C35	BR		.01040<	.01610	.02380<	.00559	2.29<	3.58	.8
C37	RB		.00000<	.01640	.00198<	.00105	.00<	.00	.1
C38	SR		.00000<	.02030	.00053<	.00057	.00<	.00	.0
C39	Y		.00040<	.02210	.00018<	.00086	.45<	24.99	.0
C40	ZR		.01190<	.03020	.00174<	.00089	.15<	.38	-.3
C42	MO		.03290<	.05440	.00020<	.00098	.01<	.03	-.6
C46	PD		.02480<	.12960	.00032<	.00143	.01<	.09	-.2
C47	AG		.01970<	.14970	.00006<	.00204	.00<	.11	-.1
C48	CD		.03410<	.16370	.00137<	.00222	.04<	.20	-.2
C49	IN		.00000<	.18980	.00000<	.00200	.00<	.00	.0
C50	SN		.00000<	.26850	.00005<	.00248	.00<	.00	.0
C51	SB		.00000<	.27160	.00242<	.00277	.00<	.00	.0
C56	BA		.00000<	.85930	.00587<	.01373	.00<	.00	.0
C57	LA		.03600<	1.00510	.01505<	.01133	.42<	11.68	-.0
C80	HG		.00870<	.04430	.00000<	.00113	.00<	.13	-.2
C82	PB	*	.18750+-	.04390	.09660+-	.02106	.52+-	.16	-1.9

FEBRUARY 9, 1989

SITE 2 - PINEHURST ELEM. SCHOOL

SITE 7 - PINEHURST CITY HALL

SITE 11 - OSBURN, 2nd & OAK

SITE 14 - SILVERTON

SOURCE CONTRIBUTION ESTIMATES - SITE: 2 DATE: 02/09/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.96	PERCENT MASS	96.2		
CHI SQUARE	1.52	DF	5		

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	84.5088	19.1357	4.4163
8	RDDST49	13.0004	2.3278	5.5849
67	md7515us	10.7856	3.5425	3.0446
77	SO4	3.1814	.4663	6.8224
78	NO3	1.9829	.3200	6.1961

MEASURED CONCENTRATION FOR SIZE: T
118.0+- 5.7

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 2 DATE: 02/09/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.96	PERCENT MASS	96.2		
CHI SQUARE	1.52	DF	5		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	118.00000+-	5.70000	113.45910+-	18.39678	.96+-	.16	-.2
C204	NO3	*	2.05890+-	.24100	2.05890+-	.20192	1.00+-	.15	.0
C203	SO4	*	3.48310+-	.31560	3.48310+-	.32702	1.00+-	.13	.0
C206	NH4	*	.11800+-	.00780	.13438+-	.05938	1.14+-	.51	.3
C208	K		.25940+-	.03840	.12381+-	.13077	.48+-	.51	-1.0
C201	OC	*	36.80420+-	4.78480	42.77915+-	7.54477	1.16+-	.25	.7
C202	EC	*	23.63420+-	4.08190	13.11936+-	2.50464	.56+-	.14	-2.2
C13	AL		-99.90000+-	-99.90000	1.15983+-	.15571	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	3.62774+-	.47877	.00+-	.00	1.0
C16	S		.65170+-	.37150	.19380+-	.14676	.30+-	.28	-1.1
C17	CL		.03840<	.16450	.10204<	.01453	2.66<	11.39	.4
C19	K	*	.65850+-	.17560	.60447+-	.05965	.92+-	.26	-.3
C20	CA		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C22	TI		.03510<	.12410	.05874<	.00696	1.67<	5.92	.2
C23	V		.00830<	.05890	.00205<	.00266	.25<	1.79	-.1
C24	CR		.00290<	.02750	.00700<	.00162	2.41<	22.90	.1
C25	MN	*	.03640+-	.01750	.05933+-	.01059	1.63+-	.84	1.1
C26	FE	*	.69570+-	.05370	.63974+-	.11368	.92+-	.18	-.4
C27	CO		.00210<	.01740	.00109<	.00176	.52<	4.39	-.1
C28	NI		.00020<	.01340	.00684<	.01117	34.19<	*****	.4
C29	CU	*	.01280+-	.01130	.02205+-	.00141	1.72+-	1.52	.8
C30	ZN		.08880+-	.01340	.03189+-	.01167	.36+-	.14	-3.2
C31	GA		.00080<	.02470	.00000<	.00152	.00<	1.90	-.0
C33	AS		.00000<	.04300	.00109<	.01718	.00<	.00	.0
C34	SE		.00000<	.01940	.00000<	.00063	.00<	.00	.0
C35	BR		.01200<	.01210	.03877<	.00911	3.23<	3.35	1.8
C37	RB		.00000<	.01650	.00243<	.00156	.00<	.00	.1
C38	SR		.00000<	.02050	.00065<	.00059	.00<	.00	.0
C39	Y		.00000<	.02230	.00022<	.00120	.00<	.00	.0
C40	ZR		.00550<	.03040	.00213<	.00124	.39<	2.15	-.1
C42	MO		.00000<	.05470	.00025<	.00133	.00<	.00	.0
C46	PD		.00000<	.13070	.00039<	.00189	.00<	.00	.0
C47	AG		.02670<	.15070	.00008<	.00292	.00<	.11	-.2
C48	CD		.03910<	.16430	.00170<	.00318	.04<	.20	-.2
C49	IN		.02740<	.19050	.00000<	.00260	.00<	.09	-.1
C50	SN		.02220<	.26890	.00007<	.00322	.00<	.15	-.1
C51	SB		.00000<	.27330	.00298<	.00358	.00<	.00	.0
C56	BA		.00000<	.86080	.00727<	.02014	.00<	.00	.0
C57	LA		.05250<	1.00850	.01894<	.01447	.36<	6.93	-.0
C80	HG		.00000<	.04460	.00000<	.00159	.00<	.00	.0
C82	PB	*	.13500+-	.04300	.14663+-	.03439	1.09+-	.43	.2

SOURCE CONTRIBUTION ESTIMATES - SITE: 7 DATE: 02/09/89 VERSION: 7.0

SAMPLE DURATION 24 START HOUR 0 SIZE: T

R SQUARE .99 PERCENT MASS 98.4

CHI SQUARE .98 DF 5

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	84.4297	16.7348	5.0452
8	RDDST49	39.4354	2.6879	14.6713
77	SO4	3.9600	.5578	7.0989
78	NO3	2.0291	.3335	6.0842

MEASURED CONCENTRATION FOR SIZE: T

132.0+- 6.6

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 7 DATE: 02/09/89 VERSION: 7.0

SAMPLE DURATION 24 START HOUR 0 SIZE: T

R SQUARE .99 PERCENT MASS 98.4

CHI SQUARE .98 DF 5

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	132.00000+-	6.60000	129.85410+-	16.83806	.98+-	.14	-.1
C204	NO3	*	2.05270+-	.24230	2.05270+-	.22105	1.00+-	.16	.0
C203	SO4	*	4.27610+-	.38020	4.27610+-	.39169	1.00+-	.13	.0
C206	NH4		.15760+-	.01000	.06315+-	.09612	.40+-	.61	-1.0
C208	K		.24630+-	.04070	.12369+-	.37347	.50+-	1.52	-.3
C201	OC	*	36.49480+-	4.92960	40.31158+-	7.49494	1.10+-	.25	.4
C202	EC	*	8.61490+-	1.68660	6.66285+-	1.82973	.77+-	.26	-.8
C13	AL		-99.90000+-	-99.90000	3.51032+-	.47162	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	10.75480+-	1.42673	.00+-	.00	1.1
C16	S		.80810+-	.42340	.09018+-	.01221	.11+-	.06	-1.7
C17	CL		.06820<	.17770	.07328<	.01096	1.07<	2.80	.0
C19	K	*	1.28420+-	.28460	1.62497+-	.17251	1.27+-	.31	1.0
C20	CA		.30190<	.61290	.37141<	.04139	1.23<	2.50	.1
C22	TI	*	.10260+-	.10020	.17817+-	.00982	1.74+-	1.70	.8
C23	V		.00690<	.06370	.00623<	.00245	.90<	8.34	-.0
C24	CR		.01500<	.02950	.01692<	.00120	1.13<	2.22	.1
C25	MN	*	.09220+-	.01940	.06529+-	.00342	.71+-	.15	-1.4
C26	FE	*	1.77040+-	.09880	1.77160+-	.09007	1.00+-	.08	.0
C27	CO		.00000<	.02800	.00331<	.00067	.00<	.00	.1
C28	NI		.00170<	.01440	.00749<	.00073	4.41<	37.34	.4
C29	CU		.01700+-	.01210	.06420+-	.00347	3.78+-	2.70	3.7
C30	ZN		.15300+-	.01560	.01798+-	.00720	.12+-	.05	-7.9
C31	GA		.00000<	.02670	.00000<	.00077	.00<	.00	.0
C33	AS		.00000<	.04590	.00331<	.00528	.00<	.00	.1
C34	SE		.00000<	.02090	.00000<	.00054	.00<	.00	.0
C35	BR		.01020<	.01750	.00051<	.00055	.05<	.10	-.6
C37	RB		.00110<	.01780	.00737<	.00072	6.70<	*****	.4
C38	SR		.00300<	.02210	.00197<	.00060	.66<	4.85	-.0
C39	Y		.00420<	.02400	.00067<	.00068	.16<	.93	-.1
C40	ZR		.02140<	.03290	.00647<	.00091	.30<	.47	-.5
C42	MO		.01450<	.05900	.00075<	.00104	.05<	.22	-.2
C46	PD		.00000<	.14250	.00118<	.00250	.00<	.00	.0
C47	AG		.00000<	.16430	.00024<	.00302	.00<	.00	.0
C48	CD		.00000<	.17870	.00413<	.00334	.00<	.00	.0
C49	IN		.00000<	.20690	.00000<	.00369	.00<	.00	.0
C50	SN		.00000<	.29150	.00020<	.00444	.00<	.00	.0
C51	SB		.00000<	.29700	.00853<	.00511	.00<	.00	.0
C56	BA		.00000<	.92970	.01880<	.01938	.00<	.00	.0
C57	LA		.15720<	1.08870	.03836<	.02444	.24<	1.70	-.1
C80	HG		.00330<	.04810	.00000<	.00103	.00<	.31	-.1
C82	PB	*	.13990+-	.04630	.10281+-	.00550	.73+-	.25	-.8

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: 11              DATE: 02/09/89  VERSION: 7.0
SAMPLE DURATION          24        START HOUR         0          SIZE:     T
       R SQUARE        1.00      PERCENT MASS      86.8
     CHI SQUARE         .25                DF         5
```

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	88.4540	19.8757	4.4504
9	RDDST47	48.8232	3.9064	12.4981
67	md7515us	8.5936	2.8101	3.0582
77	SO4	5.1918	.7282	7.1297
78	NO3	1.7127	.3034	5.6443

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MEASURED CONCENTRATION FOR SIZE: T
     176.0+-      8.8

       UNCERTAINTY/SIMILARITY CLUSTERS  VERSION: 7.0     SUM OF CLUSTER SOURCES
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SPECIES CONCENTRATIONS -  SITE: 11            DATE: 02/09/89  VERSION: 7.0
SAMPLE DURATION          24        START HOUR         0          SIZE:     T
       R SQUARE        1.00      PERCENT MASS      86.8
     CHI SQUARE         .25                DF         5
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SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	176.00000+-	8.80000	152.77530+-	19.65051	.87+-	.12	-1.1
C204	NO3	*	1.78510+-	.21450	1.78510+-	.20710	1.00+-	.17	.0
C203	SO4	*	5.69740+-	.48990	5.69740+-	.51697	1.00+-	.13	.0
C206	NH4		.28030+-	.01700	.12286+-	.12298	.44+-	.44	-1.3
C208	K		.36740+-	.04320	.12959+-	.46632	.35+-	1.27	-.5
C201	OC	*	44.45180+-	5.50050	46.25561+-	7.88299	1.04+-	.22	.2
C202	EC	*	13.22370+-	2.42980	12.11981+-	2.35192	.92+-	.24	-.3
C13	AL		-99.90000+-	-99.90000	3.98467+-	.53901	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	13.28386+-	1.76313	.00+-	.00	1.1
C16	S		.83890+-	.43110	.29059+-	.11846	.35+-	.23	-1.2
C17	CL		.13130<	.14130	.10227<	.01449	.78<	.85	-.2
C19	K	*	2.43270+-	.49960	2.08578+-	.22547	.86+-	.20	-.6
C20	CA		.36690<	.61520	.42517<	.04744	1.16<	1.95	.1
C22	TI	*	.17670+-	.10070	.22410+-	.01319	1.27+-	.73	.5
C23	V		.01380<	.06400	.00693<	.00341	.50<	2.34	-.1
C24	CR		.01620<	.02960	.02227<	.00204	1.37<	2.52	.2
C25	MN	*	.12140+-	.01980	.11178+-	.00955	.92+-	.17	-.4
C26	FE	*	2.09340+-	.11360	2.11839+-	.14048	1.01+-	.09	.1
C27	CO		.00970<	.03150	.00630<	.00169	.65<	2.12	-.1
C28	NI		.00330<	.01450	.01339<	.00895	4.06<	18.04	.6
C29	CU		.01760+-	.01210	.08243+-	.00466	4.68+-	3.23	5.0
C30	ZN		.16670+-	.01600	.02991+-	.01052	.18+-	.07	-7.1
C31	GA		.00000<	.02680	.00000<	.00140	.00<	.00	.0
C33	AS		.01150<	.05220	.00571<	.01529	.50<	2.62	-.1
C34	SE		.00000<	.02100	.00054<	.00076	.00<	.00	.0
C35	BR	*	.02970+-	.01320	.03102+-	.00729	1.04+-	.53	.1
C37	RB		.00500<	.01790	.00976<	.00152	1.95<	7.00	.3
C38	SR		.00170<	.02220	.00278<	.00089	1.64<	21.38	.0
C39	Y		.00310<	.02410	.00029<	.00130	.09<	.85	-.1
C40	ZR		.02090<	.03300	.00864<	.00154	.41<	.66	-.4
C42	MO		.01380<	.05910	.00054<	.00165	.04<	.21	-.2
C46	PD		.00000<	.14220	.00000<	.00384	.00<	.00	.0
C47	AG		.00630<	.16400	.00615<	.00490	.98<	25.43	.0
C48	CD		.04430<	.17850	.00644<	.00565	.15<	.60	-.2
C49	IN		.00000<	.20670	.00000<	.00599	.00<	.00	.0
C50	SN		.00000<	.29130	.00000<	.00715	.00<	.00	.0
C51	SB		.00000<	.29680	.00027<	.00853	.00<	.00	.0
C56	BA		.10520<	.93210	.03542<	.03470	.34<	3.00	-.1
C57	LA		.00000<	1.09230	.04961<	.04288	.00<	.00	.0
C80	HG		.00000<	.04820	.00000<	.00161	.00<	.00	.0
C82	PB	*	.19660+-	.04690	.22443+-	.02840	1.14+-	.31	.5

SOURCE CONTRIBUTION ESTIMATES - SITE: 14 DATE: 02/09/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.98	PERCENT MASS	89.9		
CHI SQUARE	1.48	DF	5		

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	26.1241	9.8893	2.6417
9	RDDST47	50.4389	3.8928	12.9570
67	md7515us	9.1473	2.3814	3.8411
77	SO4	5.0078	.6989	7.1648
78	NO3	1.0089	.2123	4.7535

MEASURED CONCENTRATION FOR SIZE: T
102.0+- 5.1

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 14 DATE: 02/09/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.98	PERCENT MASS	89.9		
CHI SQUARE	1.48	DF	5		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	102.00000+-	5.10000	91.72709+-	9.95437	.90+-	.11	-.9
C204	NO3	*	1.05390+-	.13680	1.05390+-	.15745	1.00+-	.20	.0
C203	SO4	*	5.44930+-	.46740	5.44930+-	.49932	1.00+-	.13	.0
C206	NH4		.16260+-	.01020	.07989+-	.12400	.49+-	.76	-.7
C208	K		.11750+-	.03650	.03827+-	.47945	.33+-	4.08	-.2
C201	OC	*	19.73720+-	3.68640	18.28298+-	2.45071	.93+-	.21	-.3
C202	EC	*	6.03890+-	1.26810	7.53213+-	1.55835	1.25+-	.37	.7
C13	AL		-99.90000+-	-99.90000	4.11354+-	.55684	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	13.72386+-	1.82157	.00+-	.00	1.1
C16	S		.97180+-	.44890	.26796+-	.12595	.28+-	.18	-1.5
C17	CL		.00590<	.16480	.04973<	.01059	8.43<	*****	.3
C19	K	*	1.65770+-	.34980	2.07805+-	.23210	1.25+-	.30	1.0
C20	CA		.86710+-	.58850	.43400+-	.04902	.50+-	.34	-.7
C22	TI	*	.15300+-	.09370	.23151+-	.01316	1.51+-	.93	.8
C23	V		.01570<	.05950	.00716<	.00321	.46<	1.74	-.1
C24	CR		.00640<	.02760	.02305<	.00208	3.60<	15.53	.6
C25	MN	*	.13850+-	.01890	.11609+-	.01010	.84+-	.14	-1.0
C26	FE	*	2.29520+-	.12190	2.18982+-	.14685	.95+-	.08	-.6
C27	CO		.00840<	.03330	.00651<	.00176	.77<	3.08	-.1
C28	NI		.00370<	.01350	.01394<	.00952	3.77<	13.99	.6
C29	CU		.01850+-	.01130	.08518+-	.00481	4.60+-	2.82	5.4
C30	ZN		.29120+-	.01930	.01735+-	.00814	.06+-	.03	-13.1
C31	GA		.00130<	.02500	.00000<	.00131	.00<	1.01	-.1
C33	AS		.00000<	.04590	.00590<	.01617	.00<	.00	.1
C34	SE		.00000<	.01950	.00055<	.00070	.00<	.00	.0
C35	BR	*	.05120+-	.01240	.03261+-	.00775	.64+-	.22	-1.3
C37	RB		.00000<	.01680	.01009<	.00156	.00<	.00	.6
C38	SR		.00000<	.02070	.00288<	.00085	.00<	.00	.1
C39	Y		.00000<	.02250	.00030<	.00130	.00<	.00	.0
C40	ZR		.01500<	.03070	.00893<	.00153	.60<	1.22	-.2
C42	MO		.00000<	.05510	.00055<	.00151	.00<	.00	.0
C46	PD		.00000<	.13150	.00000<	.00371	.00<	.00	.0
C47	AG		.00000<	.15170	.00636<	.00480	.00<	.00	.0
C48	CD		.00000<	.16530	.00626<	.00555	.00<	.00	.0
C49	IN		.02480<	.19150	.00000<	.00578	.00<	.23	-.1
C50	SN		.01190<	.27030	.00000<	.00679	.00<	.57	-.0
C51	SB		.00000<	.27500	.00008<	.00820	.00<	.00	.0
C56	BA		.00000<	.86530	.03535<	.03403	.00<	.00	.0
C57	LA		.24270<	1.01410	.04401<	.04231	.18<	.78	-.2
C80	HG		.00000<	.04490	.00000<	.00142	.00<	.00	.0
C82	PB	*	.15910+-	.04340	.23468+-	.03015	1.48+-	.44	1.4

FEBRUARY 10, 1989

SITE 2 - PINEHURST ELEM. SCHOOL

SITE 5 - PINEHURST, 4th & MONTANA

SITE 8 - SMELTERVILLE

SITE 10 - KELLOGG

SITE 11 - OSBURN, 2nd & OAK

SITE 12 - OSBURN, 5th & MULLAN

SITE 14 - SILVERTON

SITE 15 - WALLACE

SOURCE CONTRIBUTION ESTIMATES - SITE: 2 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.99	PERCENT MASS	103.7		
CHI SQUARE	.76	DF	6		

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	123.9211	22.8049	5.4340
9	RDDST47	38.9211	2.6945	14.4448
77	SO4	3.2029	.4657	6.8780
78	NO3	2.9516	.4638	6.3634

MEASURED CONCENTRATION FOR SIZE: T
163.0+- 8.1

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 2 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.99	PERCENT MASS	103.7		
CHI SQUARE	.76	DF	6		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	163.00000+-	8.15000	168.99680+-	22.82079	1.04+-	.15	.2
C204	NO3	*	2.98670+-	.33800	2.98670+-	.30635	1.00+-	.15	.0
C203	SO4	*	3.60110+-	.32470	3.60110+-	.31852	1.00+-	.13	.0
C206	NH4	*	.18680+-	.01160	.09269+-	.10006	.50+-	.54	-.9
C208	K		.31000+-	.03940	.18154+-	.37571	.59+-	1.21	-.3
C201	OC	*	55.60300+-	6.18910	58.69373+-	10.99663	1.06+-	.23	.2
C202	EC	*	10.39630+-	1.94560	9.77936+-	2.68469	.94+-	.31	-.2
C13	AL		-99.90000+-	-99.90000	3.17898+-	.42968	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	10.53967+-	1.40440	.00+-	.00	1.1
C16	S		.83030+-	.41230	.17617+-	.01594	.21+-	.11	-1.6
C17	CL		.05300<	.16490	.10967<	.01580	2.07<	6.44	.3
C19	K	*	1.32210+-	.28760	1.72430+-	.18120	1.30+-	.32	1.2
C20	CA	*	.45660<	.57300	.33417<	.03735	.73<	.92	-.2
C22	TI		.08490<	.12530	.17865<	.01087	2.10<	3.11	.7
C23	V		.00090<	.05940	.00553<	.00293	6.14<	*****	.1
C24	CR		.00300<	.02750	.01685<	.00138	5.62<	51.50	.5
C25	MN	*	.09270+-	.01810	.06554+-	.00365	.71+-	.14	-1.5
C26	FE	*	1.65760+-	.09240	1.65346+-	.08765	1.00+-	.08	-.0
C27	CO		.00950<	.02610	.00502<	.00083	.53<	1.45	-.2
C28	NI		.00580<	.01350	.00790<	.00080	1.36<	3.17	.2
C29	CU		.01010<	.01130	.06515<	.00370	6.45<	7.23	4.6
C30	ZN		.17600+-	.01540	.02640+-	.01055	.15+-	.06	-8.0
C31	GA		.00000<	.02490	.00000<	.00101	.00<	.00	.0
C33	AS		.00000<	.04040	.00455<	.00558	.00<	.00	.1
C34	SE		.00000<	.01950	.00043<	.00062	.00<	.00	.0
C35	BR		.01000<	.01630	.00074<	.00061	.07<	.14	-.6
C37	RB		.00240<	.01660	.00778<	.00082	3.24<	22.44	.3
C38	SR		.00200<	.02060	.00222<	.00074	1.11<	11.43	.0
C39	Y		.00000<	.02240	.00023<	.00088	.00<	.00	.0
C40	ZR		.01130<	.03060	.00689<	.00114	.61<	1.65	-.1
C42	MO		.01060<	.05490	.00043<	.00147	.04<	.25	-.2
C46	PD		.00000<	.13220	.00000<	.00340	.00<	.00	.0
C47	AG		.03250<	.15240	.00490<	.00412	.15<	.72	-.2
C48	CD		.00470<	.16590	.00545<	.00473	1.16<	40.97	.0
C49	IN		.00000<	.19210	.00000<	.00537	.00<	.00	.0
C50	SN		.00000<	.27080	.00000<	.00658	.00<	.00	.0
C51	SB		.00000<	.27580	.00037<	.00775	.00<	.00	.0
C56	BA		.24560<	.86490	.02925<	.02917	.12<	.44	-.3
C57	LA		.01500<	1.01350	.04548<	.03744	3.03<	*****	.0
C80	HG		.00000<	.04480	.00000<	.00142	.00<	.00	.0
C82	PB	*	.10390+-	.04280	.10731+-	.00613	1.03+-	.43	.1

Pinehurst - [illegible]

SOURCE CONTRIBUTION ESTIMATES - SITE: 5 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.98	PERCENT MASS	97.3		
CHI SQUARE	.82	DF	5		

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	114.5907	21.0474	5.4444
9	RDDST47	18.0130	1.6271	11.0709
77	SO4	3.0437	.4403	6.9134
78	NO3	2.5822	.4058	6.3629

MEASURED CONCENTRATION FOR SIZE: T
142.0+- 7.1

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 5 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.98	PERCENT MASS	97.3		
CHI SQUARE	.82	DF	5		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	142.00000+-	7.10000	138.22950+-	20.99628	.97+-	.16	-.2
C204	NO3	*	2.61700+-	.30320	2.61700+-	.25950	1.00+-	.15	.0
C203	SO4	*	3.27720+-	.30740	3.27720+-	.30111	1.00+-	.13	.0
C206	NH4	*	.14000+-	.00910	.08571+-	.05677	.61+-	.41	-.9
C208	K		.25160+-	.04330	.16788+-	.18189	.67+-	.73	-.4
C201	OC	*	43.99970+-	5.62900	53.12513+-	10.16634	1.21+-	.28	.8
C202	EC	*	12.52340+-	2.33490	9.04304+-	2.48208	.72+-	.24	-1.0
C13	AL		-99.90000+-	-99.90000	1.47389+-	.19890	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	4.87927+-	.64997	.00+-	.00	1.0
C16	S		.40770+-	.36750	.11273+-	.00834	.28+-	.25	-.8
C17	CL		.03820<	.18920	.10044<	.01423	2.63<	13.03	.3
C19	K	*	.62780+-	.18360	.86539+-	.08678	1.38+-	.43	1.2
C20	CA		.00000<	.69070	.15958<	.01737	.00<	.00	.2
C22	TI		.05390<	.14380	.08268<	.00654	1.53<	4.09	.2
C23	V		.00430<	.06820	.00256<	.00219	.59<	9.45	-.0
C24	CR	*	.00570<	.03170	.00780<	.00083	1.37<	7.61	.1
C25	MN	*	.03410+-	.02010	.03062+-	.00174	.90+-	.53	-.2
C26	FE	*	.79360+-	.06160	.76529+-	.04057	.96+-	.09	-.4
C27	CO		.00540<	.02000	.00232<	.00055	.43<	1.60	-.2
C28	NI		.00000<	.01550	.00366<	.00054	.00<	.00	.2
C29	CU		.00970<	.01650	.03015<	.00177	3.11<	5.29	1.2
C30	ZN		.11600+-	.01570	.02441+-	.00975	.21+-	.09	-5.0
C31	GA		.00000<	.02860	.00000<	.00090	.00<	.00	.0
C33	AS		.00000<	.04880	.00211<	.00265	.00<	.00	.0
C34	SE		.00070<	.02240	.00020<	.00054	.28<	9.09	-.0
C35	BR		.01180<	.01880	.00069<	.00049	.06<	.10	-.6
C37	RB		.00000<	.01910	.00360<	.00059	.00<	.00	.2
C38	SR		.00000<	.02370	.00103<	.00057	.00<	.00	.0
C39	Y		.00000<	.02570	.00011<	.00067	.00<	.00	.0
C40	ZR		.00200<	.03520	.00319<	.00080	1.59<	28.06	.0
C42	MO		.01600<	.06310	.00020<	.00117	.01<	.09	-.3
C46	PD		.00000<	.15250	.00000<	.00226	.00<	.00	.0
C47	AG		.03070<	.17590	.00227<	.00270	.07<	.43	-.2
C48	CD		.00000<	.19120	.00287<	.00304	.00<	.00	.0
C49	IN		.00000<	.22130	.00000<	.00353	.00<	.00	.0
C50	SN		.00000<	.31210	.00000<	.00448	.00<	.00	.0
C51	SB		.00000<	.31810	.00034<	.00514	.00<	.00	.0
C56	BA		.00000<	.99610	.01462<	.01895	.00<	.00	.0
C57	LA		.00000<	1.16680	.02740<	.02284	.00<	.00	.0
C80	HG		.01050<	.05150	.00000<	.00124	.00<	.12	-.2
C82	PB		.14630+-	.04950	.04966+-	.00297	.34+-	.12	-1.9

SOURCE CONTRIBUTION ESTIMATES - SITE: 8 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.99	PERCENT MASS	80.1		
CHI SQUARE	.46	DF	5		

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	34.7987	10.7620	3.2335
9	RDDST47	21.0781	2.0534	10.2651
67	md7515us	5.9537	2.4717	2.4088
77	SO4	2.8658	.4138	6.9261
78	NO3	1.7935	.2883	6.2209

MEASURED CONCENTRATION FOR SIZE: T
83.0+- 4.2

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 8 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.99	PERCENT MASS	80.1		
CHI SQUARE	.46	DF	5		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	83.00000+-	4.15000	66.48977+-	10.08261	.80+-	.13	-1.5
C204	NO3	*	1.81640+-	.21520	1.81640+-	.18455	1.00+-	.16	.0
C203	SO4	*	3.09910+-	.28560	3.09910+-	.28642	1.00+-	.13	.0
C206	NH4	*	.04860+-	.00420	.06531+-	.05596	1.34+-	1.16	.3
C208	K		.13430+-	.03580	.05098+-	.20119	.38+-	1.50	-.4
C201	OC	*	19.79100+-	3.61880	19.21976+-	3.12542	.97+-	.24	-.1
C202	EC	*	6.18100+-	1.27730	6.30674+-	1.20816	1.02+-	.29	.1
C13	AL		-99.90000+-	-99.90000	1.72012+-	.23273	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	5.75168+-	.76216	.00+-	.00	1.1
C16	S		.63680+-	.36360	.15131+-	.08139	.24+-	.19	-1.3
C17	CL		.08390<	.16250	.04718<	.00737	.56<	1.09	-.2
C19	K	*	.73610+-	.18580	.89692+-	.09728	1.22+-	.33	.8
C20	CA		.00000<	.58830	.18633<	.02090	.00<	.00	.3
C22	TI		.06530<	.12290	.09675<	.00608	1.48<	2.79	.3
C23	V		.01640<	.05830	.00299<	.00173	.18<	.66	-.2
C24	CR		.00080<	.02710	.00991<	.00112	12.39<	*****	.3
C25	MN	*	.06060+-	.01740	.05605+-	.00614	.92+-	.28	-.2
C26	FE	*	.99290+-	.06380	.92613+-	.07696	.93+-	.10	-.7
C27	CO		.00000<	.01950	.00272<	.00106	.00<	.00	.1
C28	NI		.00210<	.01330	.00669<	.00618	3.19<	20.39	.3
C29	CU	*	.02400+-	.01110	.03577+-	.00205	1.49+-	.69	1.0
C30	ZN		.14060+-	.01430	.01508+-	.00589	.11+-	.04	-8.1
C31	GA		.00000<	.02450	.00000<	.00087	.00<	.00	.0
C33	AS		.00530<	.04100	.00247<	.00990	.47<	4.06	-.1
C34	SE		.00000<	.01920	.00023<	.00044	.00<	.00	.0
C35	BR		.00710<	.01610	.02133<	.00504	3.00<	6.85	.8
C37	RB		.00020<	.01640	.00422<	.00095	21.08<	*****	.2
C38	SR		.00000<	.02030	.00120<	.00048	.00<	.00	.1
C39	Y		.00160<	.02210	.00013<	.00077	.08<	1.19	-.1
C40	ZR		.00000<	.03020	.00373<	.00085	.00<	.00	.1
C42	MO		.00390<	.05410	.00023<	.00086	.06<	.85	-.1
C46	PD		.00000<	.12970	.00000<	.00172	.00<	.00	.0
C47	AG		.02860<	.14950	.00266<	.00232	.09<	.49	-.2
C48	CD		.00860<	.16270	.00276<	.00265	.32<	6.08	-.0
C49	IN		.00000<	.18830	.00000<	.00261	.00<	.00	.0
C50	SN		.02100<	.26560	.00000<	.00309	.00<	.15	-.1
C51	SB		.00000<	.27100	.00010<	.00367	.00<	.00	.0
C56	BA		.04620<	.85100	.01523<	.01633	.33<	6.08	-.0
C57	LA		.12840<	.99850	.02104<	.01837	.16<	1.28	-.1
C80	HG		.00000<	.04410	.00000<	.00091	.00<	.00	.0
C82	PB	*	.11570+-	.04210	.12035+-	.01924	1.04+-	.41	.1

SOURCE CONTRIBUTION ESTIMATES - SITE: 10 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION 24 START HOUR 0 SIZE: T

R SQUARE .98 PERCENT MASS 89.9

CHI SQUARE 1.36 DF 5

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	21.6054	6.8545	3.1520
9	RDDST47	24.0067	1.8791	12.7755
77	SO4	2.6340	.3793	6.9437
78	NO3	1.1959	.2042	5.8575

MEASURED CONCENTRATION FOR SIZE: T

55.0+- 2.8

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 10 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION 24 START HOUR 0 SIZE: T

R SQUARE .98 PERCENT MASS 89.9

CHI SQUARE 1.36 DF 5

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	55.00000+-	2.75000	49.44187+-	7.03621	.90+-	.14	-.7
C204	NO3	*	1.19110+-	.15260	1.19110+-	.13058	1.00+-	.17	.0
C203	SO4	*	2.78930+-	.26600	2.78930+-	.25915	1.00+-	.13	.0
C206	NH4		.02120+-	.00350	.01616+-	.05675	.76+-	2.68	-.1
C208	K		.07030+-	.03830	.03165+-	.22836	.45+-	3.26	-.2
C201	OC	*	7.94790+-	3.26880	11.33408+-	1.92394	1.43+-	.63	.9
C202	EC	*	2.95250+-	.81890	1.70501+-	.46945	.58+-	.23	-1.3
C13	AL		-99.90000+-	-99.90000	1.95828+-	.26501	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	6.49953+-	.86623	.00+-	.00	1.1
C16	S		.65520+-	.38730	.07878+-	.00940	.12+-	.07	-1.5
C17	CL		.02700<	.17420	.02005<	.00369	.74<	4.79	-.0
C19	K	*	.87610+-	.21400	.99902+-	.11054	1.14+-	.31	.5
C20	CA		.32010<	.60680	.20140<	.02300	.63<	1.19	-.2
C22	TI		.08630<	.13170	.11019<	.00596	1.28<	1.95	.2
C23	V		.01700<	.06250	.00341<	.00131	.20<	.74	-.2
C24	CR		.00750<	.02910	.01039<	.00080	1.39<	5.38	.1
C25	MN	*	.04650+-	.01870	.04015+-	.00225	.86+-	.35	-.3
C26	FE	*	1.01820+-	.06700	1.01980+-	.05406	1.00+-	.08	.0
C27	CO		.00040<	.02050	.00310<	.00050	7.74<	*****	.1
C28	NI		.00410<	.01420	.00487<	.00048	1.19<	4.12	.1
C29	CU		.01920+-	.01200	.04019+-	.00228	2.09+-	1.31	1.7
C30	ZN		.12580+-	.01480	.00460+-	.00187	.04+-	.02	-8.1
C31	GA		.00390<	.02610	.00000<	.00037	.00<	.09	-.1
C33	AS		.00000<	.04600	.00281<	.00342	.00<	.00	.1
C34	SE		.00220<	.02050	.00026<	.00033	.12<	1.13	-.1
C35	BR		.00940<	.01710	.00013<	.00036	.01<	.05	-.5
C37	RB		.00000<	.01740	.00480<	.00047	.00<	.00	.3
C38	SR		.00720<	.02160	.00137<	.00041	.19<	.57	-.3
C39	Y		.01270<	.02350	.00014<	.00047	.01<	.04	-.5
C40	ZR	*	.02470+-	.02420	.00425+-	.00061	.17+-	.17	-.8
C42	MO		.01220<	.05780	.00026<	.00063	.02<	.11	-.2
C46	PD		.00330<	.13890	.00000<	.00174	.00<	.53	-.0
C47	AG		.00210<	.16020	.00302<	.00212	1.44<	*****	.0
C48	CD		.00650<	.17470	.00303<	.00248	.47<	12.55	-.0
C49	IN		.00000<	.20240	.00000<	.00276	.00<	.00	.0
C50	SN		.01970<	.28580	.00000<	.00326	.00<	.17	-.1
C51	SB		.00000<	.29030	.00008<	.00393	.00<	.00	.0
C56	BA		.00000<	.91380	.01700<	.01507	.00<	.00	.0
C57	LA		.06580<	1.06980	.02196<	.02031	.33<	5.44	-.0
C80	HG		.00000<	.04710	.00000<	.00049	.00<	.00	.0
C82	PB	*	.14820+-	.04580	.06619+-	.00374	.45+-	.14	-1.8

SOURCE CONTRIBUTION ESTIMATES - SITE: 11 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.99	PERCENT MASS	80.7		
CHI SQUARE	.65	DF	5		

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	52.5754	14.2276	3.6953
9	RDDST47	82.7511	5.6500	14.6463
67	md7515us	9.5876	2.8407	3.3751
77	SO4	4.0444	.6018	6.7205
78	NO3	2.0220	.3776	5.3547

MEASURED CONCENTRATION FOR SIZE: T
187.0+- 9.4

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 11 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.99	PERCENT MASS	80.7		
CHI SQUARE	.65	DF	5		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	187.00000+-	9.35000	150.98040+-	14.62578	.81+-	.09	-2.1
C204	NO3	*	2.07040+-	.24380	2.07040+-	.28006	1.00+-	.18	.0
C203	SO4	*	4.78780+-	.41890	4.78780+-	.41230	1.00+-	.12	.0
C206	NH4		.14410+-	.00930	.10259+-	.19850	.71+-	1.38	-.2
C208	K		.23180+-	.03990	.07702+-	.78669	.33+-	3.39	-.2
C201	OC	*	30.70360+-	4.50030	32.50039+-	4.75897	1.06+-	.22	.3
C202	EC	*	11.91200+-	2.21090	9.88284+-	1.90334	.83+-	.22	-.7
C13	AL		-99.90000+-	-99.90000	6.74920+-	.91352	.00+-	.00	1.1
C14	SI		-99.90000+-	-99.90000	22.47525+-	2.98697	.00+-	.00	1.2
C16	S		1.11150+-	.49690	.37800+-	.13433	.34+-	.19	-1.4
C17	CL		.18430+-	.14420	.07561+-	.01411	.41+-	.33	-.8
C19	K	*	3.70930+-	.74740	3.41969+-	.38084	.92+-	.21	-.3
C20	CA		.47950<	.60760	.70545<	.07975	1.47<	1.87	.4
C22	TI	*	.28710+-	.09990	.37983+-	.02091	1.32+-	.47	.9
C23	V		.03360<	.06390	.01175<	.00473	.35<	.68	-.3
C24	CR		.02170<	.02200	.03710<	.00293	1.71<	1.74	.7
C25	MN	*	.19320+-	.02110	.17165+-	.01212	.89+-	.12	-.9
C26	FE	*	3.57900+-	.18420	3.56471+-	.21034	1.00+-	.08	-.1
C27	CO		.00970<	.04910	.01067<	.00212	1.10<	5.57	.0
C28	NI		.00440<	.01440	.02068<	.01002	4.70<	15.55	.9
C29	CU		.02820+-	.01200	.13931+-	.00782	4.94+-	2.12	7.8
C30	ZN		.23060+-	.01770	.02355+-	.00936	.10+-	.04	-10.3
C31	GA		.00000<	.02680	.00000<	.00145	.00<	.00	.0
C33	AS		.00970<	.06290	.00968<	.01921	1.00<	6.77	.0
C34	SE		.00260<	.02090	.00091<	.00079	.35<	2.83	-.1
C35	BR	*	.02780+-	.01300	.03433+-	.00814	1.23+-	.65	.4
C37	RB		.00910<	.01780	.01655<	.00188	1.82<	3.56	.4
C38	SR		.00000<	.02210	.00472<	.00115	.00<	.00	.2
C39	Y		.00850<	.02410	.00050<	.00165	.06<	.25	-.3
C40	ZR		.01400<	.03280	.01465<	.00212	1.05<	2.46	.0
C42	MO		.01790<	.05870	.00091<	.00213	.05<	.20	-.3
C46	PD		.00000<	.14120	.00000<	.00595	.00<	.00	.0
C47	AG		.04060<	.16280	.01043<	.00748	.26<	1.05	-.2
C48	CD		.03220<	.17680	.01033<	.00872	.32<	1.78	-.1
C49	IN		.00000<	.20480	.00000<	.00942	.00<	.00	.0
C50	SN		.01770<	.28860	.00000<	.01111	.00<	.63	-.1
C51	SB		.00000<	.29470	.00016<	.01342	.00<	.00	.0
C56	BA		.02840<	.92340	.05818<	.05335	2.05<	66.63	.0
C57	LA		.11330<	1.08290	.07328<	.06955	.65<	6.21	-.0
C80	HG		.00000<	.04790	.00000<	.00177	.00<	.00	.0
C82	PB	*	.27820+-	.04720	.32836+-	.03311	1.18+-	.23	.9

SOURCE CONTRIBUTION ESTIMATES - SITE: 12 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	1.00	PERCENT MASS	82.3		
CHI SQUARE	.10	DF	6		

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	57.8145	13.9178	4.1540
8	RDDST49	26.1579	2.2239	11.7621
67	md7515us	4.6961	2.2087	2.1262
77	SO4	4.2504	.5893	7.2131
78	NO3	1.6932	.2783	6.0832

MEASURED CONCENTRATION FOR SIZE: T
115.0+- 5.8

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 12 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	1.00	PERCENT MASS	82.3		
CHI SQUARE	.10	DF	6		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	115.00000+-	5.75000	94.61220+-	13.41837	.82+-	.12	-1.4
C204	NO3	*	1.72700+-	.20720	1.72700+-	.17880	1.00+-	.16	.0
C203	SO4	*	4.49780+-	.39510	4.49780+-	.42003	1.00+-	.13	.0
C206	NH4	*	.10560+-	.00710	.07423+-	.06658	.70+-	.63	-.5
C208	K		.17270+-	.03800	.08470+-	.24788	.49+-	1.44	-.4
C201	OC	*	29.12610+-	4.32270	29.20838+-	5.14518	1.00+-	.23	.0
C202	EC	*	6.99330+-	1.41560	7.37097+-	1.45732	1.05+-	.30	.2
C13	AL		-99.90000+-	-99.90000	2.32852+-	.31285	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	7.16904+-	.94717	.00+-	.00	1.1
C16	S		.87810+-	.43030	.11879+-	.06438	.14+-	.10	-1.7
C17	CL		.00000<	.16920	.06267<	.00868	.00<	.00	.4
C19	K	*	1.20620+-	.26830	1.08090+-	.11448	.90+-	.22	-.4
C20	CA		.02900<	.61830	.25293<	.02779	8.72<	*****	.4
C22	TI	*	.10710+-	.09610	.11818+-	.00693	1.10+-	.99	.1
C23	V		.01600<	.06130	.00413<	.00191	.26<	1.00	-.2
C24	CR		.02220+-	.02130	.01184+-	.00109	.53+-	.51	-.5
C25	MN	*	.06300+-	.01830	.05966+-	.00513	.95+-	.29	-.2
C26	FE	*	1.17480+-	.07230	1.19936+-	.07650	1.02+-	.09	.2
C27	CO		.00330<	.02160	.00220<	.00093	.67<	4.37	-.1
C28	NI		.00360<	.01390	.00687<	.00490	1.91<	7.49	.2
C29	CU		.01550+-	.01160	.04297+-	.00235	2.77+-	2.08	2.3
C30	ZN		.11210+-	.01420	.01836+-	.00636	.16+-	.06	-6.0
C31	GA		.00000<	.02580	.00000<	.00086	.00<	.00	.0
C33	AS		.00110<	.04350	.00220<	.00823	2.00<	79.35	.0
C34	SE		.00000<	.02020	.00000<	.00053	.00<	.00	.0
C35	BR	*	.01400+-	.01250	.01701+-	.00400	1.21+-	1.12	.2
C37	RB		.00100<	.01730	.00489<	.00088	4.89<	84.63	.2
C38	SR		.00380<	.02140	.00131<	.00056	.34<	1.94	-.1
C39	Y		.00000<	.02330	.00044<	.00074	.00<	.00	.0
C40	ZR		.00420<	.03180	.00429<	.00084	1.02<	7.74	.0
C42	MO		.00670<	.05700	.00050<	.00090	.07<	.65	-.1
C46	PD		.00520<	.13650	.00078<	.00177	.15<	3.98	-.0
C47	AG		.01740<	.15730	.00016<	.00228	.01<	.15	-.1
C48	CD		.04380<	.17120	.00275<	.00250	.06<	.25	-.2
C49	IN		.01900<	.19830	.00000<	.00254	.00<	.13	-.1
C50	SN		.00000<	.27950	.00013<	.00304	.00<	.00	.0
C51	SB		.00000<	.28520	.00567<	.00348	.00<	.00	.0
C56	BA		.00000<	.89550	.01250<	.01472	.00<	.00	.0
C57	LA		.04830<	1.05020	.02564<	.01637	.53<	11.55	-.0
C80	HG		.00000<	.04650	.00000<	.00096	.00<	.00	.0
C82	PB	*	.12570+-	.04430	.11728+-	.01539	.93+-	.35	-.2

SOURCE CONTRIBUTION ESTIMATES - SITE: 14 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.98	PERCENT MASS	100.2		
CHI SQUARE	1.60	DF	5		

SOURCE #	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	13.4589	5.8951	2.2831
9	RDDST47	58.1679	3.7130	15.6662
77	SO4	2.0109	.3201	6.2823
78	NO3	.4999	.1693	2.9520

MEASURED CONCENTRATION FOR SIZE: T
74.0+- 3.7

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 14 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.98	PERCENT MASS	100.2		
CHI SQUARE	1.60	DF	5		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	74.00000+-	3.70000	74.13749+-	6.75933	1.00+-	.10	.0
C204	NO3	*	.50080+-	.08190	.50080+-	.14505	1.00+-	.33	.0
C203	SO4	*	2.42000+-	.23650	2.42000+-	.20413	1.00+-	.13	.0
C206	NH4		.02400+-	.00350	.01007+-	.13648	.42+-	5.69	-.1
C208	K		.04750+-	.03710	.01972+-	.55264	.42+-	11.64	-.1
C201	OC	*	5.71690+-	3.10300	9.82317+-	1.26085	1.72+-	.96	1.2
C202	EC	*	2.30780+-	.70550	1.06212+-	.30529	.46+-	.19	-1.6
C13	AL		-99.90000+-	-99.90000	4.74311+-	.64212	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	15.74732+-	2.09887	.00+-	.00	1.2
C16	S		.54110+-	.35810	.16968+-	.02269	.31+-	.21	-1.0
C17	CL		.25880+-	.15060	.01482+-	.00639	.06+-	.04	-1.6
C19	K	*	2.21470+-	.45640	2.37484+-	.26759	1.07+-	.25	.3
C20	CA		.59450<	.59580	.48465<	.05573	.82<	.82	-.2
C22	TI	*	.17870+-	.09670	.26699+-	.01426	1.49+-	.81	.9
C23	V		.02550<	.06140	.00826<	.00298	.32<	.79	-.3
C24	CR		.01830<	.02840	.02519<	.00182	1.38<	2.14	.2
C25	MN	*	.13000+-	.01930	.09709+-	.00541	.75+-	.12	-1.6
C26	FE	*	2.41510+-	.12800	2.47093+-	.13099	1.02+-	.08	.3
C27	CO		.00060<	.03490	.00750<	.00101	12.51<	*****	.2
C28	NI		.00560<	.01390	.01181<	.00095	2.11<	5.24	.4
C29	CU		.03090+-	.01170	.09737+-	.00547	3.15+-	1.21	5.1
C30	ZN		.27850+-	.01910	.00287+-	.00130	.01+-	.00	-14.4
C31	GA		.00000<	.02570	.00000<	.00047	.00<	.00	.0
C33	AS		.00000<	.04880	.00681<	.00826	.00<	.00	.1
C34	SE		.00000<	.02010	.00064<	.00041	.00<	.00	.0
C35	BR		.00890<	.01680	.00008<	.00056	.01<	.07	-.5
C37	RB		.00470<	.01710	.01163<	.00090	2.48<	9.01	.4
C38	SR		.00560<	.02120	.00332<	.00073	.59<	2.25	-.1
C39	Y		.00000<	.02310	.00035<	.00090	.00<	.00	.0
C40	ZR		.01520<	.03150	.01030<	.00130	.68<	1.41	-.2
C42	MO		.02400<	.05660	.00064<	.00130	.03<	.08	-.4
C46	PD		.00000<	.13640	.00000<	.00408	.00<	.00	.0
C47	AG		.01070<	.15720	.00733<	.00501	.68<	10.07	-.0
C48	CD		.01670<	.17120	.00712<	.00589	.43<	4.38	-.1
C49	IN		.00000<	.19810	.00000<	.00653	.00<	.00	.0
C50	SN		.00000<	.27950	.00000<	.00769	.00<	.00	.0
C51	SB		.00000<	.28470	.00004<	.00932	.00<	.00	.0
C56	BA		.00000<	.89360	.04045<	.03588	.00<	.00	.0
C57	LA		.00000<	1.04700	.04890<	.04861	.00<	.00	.0
C80	HG		.00000<	.04620	.00000<	.00085	.00<	.00	.0
C82	PB	*	.17830+-	.04480	.16037+-	.00902	.90+-	.23	-.4

SOURCE CONTRIBUTION ESTIMATES - SITE: 15 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.97	PERCENT MASS	76.2		
CHI SQUARE	2.09	DF	5		

SOURCE *	TYPE	SCE(UG/M3)	STD ERR	TSTAT
2	rwcpoky	19.3405	6.5752	2.9414
9	RDDST47	40.7017	2.7947	14.5637
77	SO4	2.4994	.3689	6.7749
78	NO3	.7094	.1589	4.4657

MEASURED CONCENTRATION FOR SIZE: T
83.0+- 4.2

UNCERTAINTY/SIMILARITY CLUSTERS VERSION: 7.0 SUM OF CLUSTER SOURCES

SPECIES CONCENTRATIONS - SITE: 15 DATE: 02/10/89 VERSION: 7.0

SAMPLE DURATION	24	START HOUR	0	SIZE:	T
R SQUARE	.97	PERCENT MASS	76.2		
CHI SQUARE	2.09	DF	5		

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
C1	TMAC	T	83.00000+-	4.15000	63.25100+-	7.01438	.76+-	.09	-2.4
C204	NO3	*	.71090+-	.10200	.71090+-	.11837	1.00+-	.22	.0
C203	SO4	*	2.77780+-	.26230	2.77780+-	.24782	1.00+-	.13	.0
C206	NH4		.05550+-	.00460	.01447+-	.09566	.26+-	1.72	-.4
C208	K		.12860+-	.03680	.02833+-	.38681	.22+-	3.01	-.3
C201	OC	*	6.73210+-	3.07150	11.37417+-	1.73900	1.69+-	.81	1.3
C202	EC	*	3.49960+-	.86900	1.52627+-	.42367	.44+-	.16	-2.0
C13	AL		-99.90000+-	-99.90000	3.31934+-	.44931	.00+-	.00	1.0
C14	SI		-99.90000+-	-99.90000	11.01909+-	1.46864	.00+-	.00	1.1
C16	S		.63780+-	.37120	.12414+-	.01589	.19+-	.12	-1.4
C17	CL		.02850<	.16660	.01899<	.00493	.67<	3.90	-.1
C19	K	*	2.20980+-	.45470	1.67342+-	.18728	.76+-	.18	-1.1
C20	CA		.43390<	.57820	.33998<	.03899	.78<	1.05	-.2
C22	TI	*	.19360+-	.09460	.18682+-	.01001	.96+-	.47	-.1
C23	V		.01980<	.06050	.00578<	.00212	.29<	.90	-.2
C24	CR		.01630<	.02800	.01762<	.00129	1.08<	1.86	.0
C25	MN	*	.07580+-	.01810	.06799+-	.00379	.90+-	.22	-.4
C26	FE	*	1.64640+-	.09210	1.72899+-	.09166	1.05+-	.08	.6
C27	CO		.00450<	.02620	.00525<	.00074	1.17<	6.80	.0
C28	NI		.00400<	.01570	.00828<	.00070	2.07<	7.08	.3
C29	CU		.01530+-	.01140	.06813+-	.00384	4.45+-	3.33	4.4
C30	ZN		.11430+-	.01400	.00412+-	.00171	.04+-	.02	-7.8
C31	GA		.00000<	.02520	.00000<	.00041	.00<	.00	.0
C33	AS		.00000<	.04930	.00476<	.00579	.00<	.00	.1
C34	SE		.00000<	.01970	.00045<	.00036	.00<	.00	.0
C35	BR		.00810<	.01650	.00012<	.00045	.01<	.06	-.5
C37	RB		.00390<	.01680	.00814<	.00067	2.09<	8.99	.3
C38	SR		.00000<	.02090	.00232<	.00056	.00<	.00	.1
C39	Y		.00800<	.02270	.00024<	.00067	.03<	.12	-.3
C40	ZR		.03690+-	.02310	.00720+-	.00094	.20+-	.12	-1.3
C42	MO		.01900<	.05550	.00045<	.00095	.02<	.09	-.3
C46	PD		.00000<	.13440	.00000<	.00288	.00<	.00	.0
C47	AG		.01700<	.15490	.00513<	.00353	.30<	2.76	-.1
C48	CD		.00000<	.16840	.00504<	.00414	.00<	.00	.0
C49	IN		.00000<	.19490	.00000<	.00459	.00<	.00	.0
C50	SN		.00520<	.27460	.00000<	.00542	.00<	1.04	-.0
C51	SB		.00000<	.28030	.00006<	.00656	.00<	.00	.0
C56	BA		.13830<	.87820	.02849<	.02521	.21<	1.32	-.1
C57	LA		.33500<	1.02980	.03532<	.03411	.11<	.34	-.3
C80	HG		.00000<	.04530	.00000<	.00066	.00<	.00	.0
C82	PB	*	.18660+-	.04400	.11221+-	.00632	.60+-	.15	-1.7

APPENDIX E

ROLLBACK/STAGNATION MODELING

Pinehurst PM_{10}
Air Quality Improvement Plan
February 5, 1992

APPENDIX E

Rollback/Stagnation Modeling

I. STAGNATION MODELING

A. Introduction

The IAQB utilized version 3.06 of WYNDvalley stagnation model to simulate PM_{10} concentrations in the Pinehurst during a wintertime stagnation episode. WYNDvalley was chosen because of the model's ability to handle both light wind conditions and complex terrain. Wintertime stagnation events are responsible for the exceedances of PM_{10} standard in Pinehurst. An official exceedance of the PM_{10} standard was measured at IAQB's Pinehurst PM_{10} monitoring site on January 28, 1988. This exceedance value, 183 ug/m^3, was the highest wintertime value measured in Pinehurst during the three-year period which this document addresses, 1988-1990.

The IAQB has gained EPA approval for rollback modeling in Pinehurst. The stagnation modeling is presented here only to supplement the rollback modeling in the following two ways. First to demonstrate that the IAQB monitoring site in Pinehurst is located where the highest predicted concentrations occur. Secondly to show that stagnation modeling results are in good agreement with those produced by rollback techniques. Due to the limited use of stagnation modeling in Pinehurst, only the worst case wintertime event occurring during the three years of interest, was modeled using the WYNDvalley 3.06 stagnation model.

The modeled stagnation event began on January 20, 1988 and continued through January 30, 1988. The event eventually broke up on January 30, 1988 (see Silver Valley Meteorological Description). Due to sampling frequency, only one official exceedance was documented during the event. However, nephelometer estimated PM_{10} concentrations showed values above the PM_{10} standard on consecutive days from January 23 through January 28.

B. Pinehurst Emissions

A detailed PM_{10} emission inventory was prepared for the Pinehurst. Emission sources included wood burning, natural gas, open burning, aircraft, vehicles, fugitive road dust, building construction, and industrial sources. Total emissions for Pinehurst during the late January episode were estimated to be 230 kg/day. Woodstove emissions are based on the number of heating degree days (53) occurring on the coldest day of the 1987-1988 winter season.

Emission factors were assigned to ¼ mile by ¼ mile area grid cells. Figure 1, page E-8, shows the source strength for each cell.

During WYNDvalley model runs, source strength was varied to account for diurnal variations of emissions. Emissions were modulated to account for diurnal fluctuations in wood burning, transportation, and other sources. The other category consists of the open burning, railroads, building construction, coal, natural gas, and heating oil. This is examined further in the section entitled Diurnal Source Modulation.

C. Diurnal Source Modulation

Emissions strength for the three individual source types are varied to reflect the diurnal patterns in activities producing the emissions. This is done through the WYNDvalley input file PIN.SKD. These variations are plotted in Figure 2, page E-9. Wood smoke emission coefficients depict an increase during morning hours as people stoke their fires to heat their homes. During the daytime hours emissions drop as temperatures increase and people leave their homes for daytime activities. In the evening usage increases again until bedtime at which time a gradual burn-down occurs. Evening increases in emissions are a result of dropping temperatures and people being home in the evenings. Automotive emissions show distinct peaks during the morning and evening rush hours and a less significant peak during the noon hour. The "other" source category shows more activity during daytime hours but less overall diurnal variation.

D. Boundary Conditions

The WYNDvalley model allows for the specification of up to four different types of boundary conditions. Proper designation of these boundaries is integral to realistic modeling. Only two types of these boundary conditions were specified in the Pinehurst application. They were the "barrier" boundary and the "leaky" boundary. The "barrier" boundary permits no transport of pollutants across the boundary. The "leaky" boundary assumes that the grid cells immediately outside each boundary grid cell contain the tracer concentrations at background plus one half the concentration in that boundary grid cell.

Pinehurst is situated in a bowl encircled by steep and rugged terrain. Nearly all boundary cells were defined as "barrier". Only those two boundary cells which reside on the Pine Creek valley floor at the extreme northern and southern boundaries of the modeled domain were designated as "leaky". Any pollutant transport across the model boundary is expected to occur along the valley corridor at these extreme boundaries of the model domain.

E. Receptors

Eight receptors were defined for WYNDvalley simulations. This is the maximum number allowed by WYNDvalley 3.06. This allows for excellent spatial coverage of modeling results in Pinehurst. Model results from receptor #3 are given in comparisons with actual data as it best represents the location of the IAQB monitoring site.

F. WYNDvalley Input Settings

WYNDvalley requires setting values for many parameters before a model simulation can be attempted. These values are supplied to WYNDvalley by the input file PIN.DAT. This file is shown in Figure 3, page E-10. A brief description of each of these input parameters shown in Figure 3 follows.

The first line from the figure is simply the location where the meteorological data were collected. "PINE.MET" is the name of the meteorological input file. The data (pin.dat), grid network (pin.net), and the source (pin.sor) files are then specified.

The grid cell option chosen was "big". "Big" provides the best resolution available in the model. A background value of zero ug/m^3 is shown as input. A background value of 19 ug/m^3 is added to model results after model runs to insure that the background contribution is not altered by WYNDvalley. Justification for this background number is discussed in this document under the section **Background PM$_{10}$ concentrations.**

The meander velocity, dry deposition velocity and washout ratio values were all default values selected by WYNDvalley. It should be noted that no precipitation data were collected at the Pinehurst site and so no pollutant washout is calculated in model simulations. A surface 'roughness' of 0.75 was chosen as a compromise between the lower roughness values (<.5 m) characteristic of the non-forested area of the valley floor and the higher values (1-2 m) indicative of the heavy forested areas occurring on the hillsides. The horizontal cell dimension of 402 meters was based on the resolution of the emission inventory grid cells (1/4 mile by 1/4 mile). Four vertical levels were chosen with vertical cell dimension of 60.0 meters.

The last three lines of the file specify in which cells the receptors are located, that the receptors are located in level one, and finally the contour intervals values which are chosen for data display. Eight receptors were defined for model runs.

G. WV3 Meteorological Input File

WYNDvalley 3.06 requires only wind speed and wind direction as meteorological input over the increments of time to be modeled. Meteorological data used as model input was collected with a Climatronics Electronic Weather System (EWS) at the IAQB Pinehurst School meteorological site. Meteorological parameters used as input to the model were surface wind speed and wind direction. All other pertinent meteorological parameters required as model input were calculated by internal WYNDvalley routines.

Meteorological data and conditions are described in detail in the Pinehurst SIP section **Silver Valley Meteorological Description.**

The WYNDvalley meteorological file allows for the variation of up to four emission sources types for each time increment. These four modulation coefficients were set to 1, no hourly variation, for the Pinehurst application. Diurnal variations of sources did apply and were input into the model in the input file PIN.SKD. Ky and Kz, the horizontal and vertical eddy diffusivity coefficients are estimated internally by WYNDvalley as actual data were not available. Vc, the ventilation coefficient, controls the diffusive transport of pollutants out of the upper most layer of the model. This parameter is set to -99 to invoke a "stagnation switch" that reduces Kz by 1/2 and sets Vc to zero. This is a reasonable assumption in the Silver Valley during wintertime stagnation episodes as the strong low-level inversion present essentially caps all vertical diffusion. No rainfall data was available for calculation of wet deposition. This should not impact results as stagnation conditions do not occur when significant precipitation is occurring. An example portion of the meteorological file is shown in Table 1.

Table 1
Example of Meteorological File

time hours	U mph	dir deg	e1 ..	e2 ..	e3 ..	e4 ..	yK ¦-m^2/s	zK -¦	Vf/S ..	rain mm/hr
>--starts Julian 020, 1988 (Friday January 20th) at 0000 hrs----<										
1.00	1.00	245.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00
2.00	.60	148.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00
3.00	.50	202.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00
4.00	.50	193.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00
5.00	.30	161.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00
6.00	.80	150.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00
7.00	.40	198.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00
8.00	1.20	179.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00
9.00	.40	149.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00
10.00	1.20	191.0	1.00	1.00	1.00	1.00	-1.00	-1.00	-99.0	.00

H. Digitization of Terrain Features

WYNDvalley 3.06 provides digitization software which can be used to overlay terrain features on the model grid. A contour representing 200 feet above the valley bottom was digityzed for the Pinehurst application. This contour assists in the visualization of the steep and rugged nature of the terrain encircling Pinehurst and the terrain obstructs valley wind flow pattern and enhances pollutant accumulation.

I. The January 28, 1988 Episode

1. Discussion

On January 28, 1988 a 24 hour PM_{10} concentration of 183 ug/m^3 was measured at Pinehurst. Evaluation of the meteorology showed that a stagnation event began on January 20 and continued through the 28th. The situation finally broke on January 30th, as high pressure gave way to a Pacific trough. A detailed discussion of the meteorology during this event is covered in the section **Silver Valley Meteorological Description.**

A model simulation of this stagnation event was performed for the entire period. The simulation begins with January 20, 1988 and proceeds through January 30, 1988 to include the entire buildup period and the eventual breakdown ~~of~~ the meteorological conditions responsible for the air pollution episode.

Figure 4 on page E-12 is a time series plot relating the meteorological parameters temperature, wind speed and wind direction to nephelometer estimated PM_{10} concentrations at Pinehurst. Nephelometer bscat values were converted to PM_{10} concentrations using the relationship ($PM_{10} = 17 * bscat - 8$). This relationship is based on the best fit regression line between measured 24 hour PM_{10} concentrations and 24 hour Nephelometer bscat values measured at the Pinehurst site. This relationship is based on several years of data. The correlation coefficient between PM_{10} and nephelometer relationship is about 0.7.

The particulate levels showed a distinct diurnal nature with buildup overnight and ventilation during the afternoon hours. As the event progressed, the number of hours of high PM_{10} values on a given day increased as afternoon ventilation decreased in duration. Some improvement of air quality began on January 29th with complete clear out occurring on January 30th.

Temperatures show cold air associated with a strong surface based inversion early in the episode which trapped pollutants near the surface. As the event progressed, this cold air mass moderated and temperatures were notably warmer by January 28th. Wind speeds were generally light through the period. Peak winds of 6 mph were noted on the 20th and late on the 22nd. Winds were light (<3mph) for the period from 24th through the 30th although some increase in wind speed was experienced starting on the 29th. It was during this period of light winds and cold nighttime temperatures when the highest PM_{10} concentrations were noted. Wind directions generally demonstrated a southerly component which is likely tied to terrain induced drainage flows.

2. Model Results

During the stagnation period, direct PM_{10} measurements at Pinehurst were only available for January 21st, January 25th, and January 28th. Nephelometer estimated values were used to supplement the limited PM_{10} data set and to aid in interpretation of model results. Additionally the nephelometer provided hourly PM_{10} estimates which were compared to instantaneous values generated as model output, allowing an examination of short term PM_{10} trends.

Figure 5 on page E-13 is a time series display of hourly nephelometer implied PM_{10} concentrations and model predicted concentrations for corresponding times. The model predicted concentrations shown are for receptor 3 which corresponds to the Pinehurst monitoring site. No other comparisons were made as monitoring data was only available at the Pinehurst school site. Generally the model was in excellent agreement with measured concentrations. Both curves trend together illustrating a strong diurnal cycle typified by an overnight build up and afternoon dissipation. Many fine scale features seen in the particulate monitoring data are also picked up by the model demonstrating WYNDvalley's ability to handle short term meteorological perturbations. Despite the strong agreement in trends, the model tends to smooth results, producing an underestimate of concentrations at the peaks, and to a lesser extent, an overestimate of minimum concentrations. This smoothing may be the result of comparing a point measurement with the model output which does not represent a point receptor but rather a 1/4 mile by 1/4 mile area receptor.

A comparison of 24 hour average values for Pinehurst determined by three distinct methods are shown in Figure 6 on page E-14. Nephelometer values during this event are in good agreement with actual PM_{10} concentrations measured by the particulate samplers. This is expected as estimates of PM_{10} concentrations by nephelometry are good in areas where wood smoke predominates as in Pinehurst. Model results trend well with the 24 hour averaged nephelometer values. The only significant disagreement between modeled and measured concentrations occur at the beginning and ending of the stagnation event.

Figure 7, page E-15, shows the model predicted 24 hour PM_{10} concentrations for the entire model domain for January 28th. The model predicted concentration at Pinehurst School is 176.8 ug/m^3 which is within about 3% of the measured value of 183 ug/m^3. Figure 8, page E-16, shows predicted estimates for the same meteorological event but based upon 1994 projected emissions. It predicts a value of 167.7 ug/m^3 for January 28th, or about a 5% decrease in impacts. Interestingly, a 2% decrease in estimated emissions from 1988 to 1994 produced a 5% decrease in PM_{10} concentration on the Design Day at the receptor representing the Pinehurst School site. The diurnal weighting factors given to the 3 source types may explain this non-linearity between total emissions and modeled concentrations.

3. Conclusions

As shown, WYNDvalley 3.06 performs well in predicting PM_{10} concentrations in Pinehurst during the January 1988 Silver Valley air pollution episode.

In Pinehurst, hourly trend agreement was excellent in terms of predicting the timing of maxima and minima during a given day as well as smaller scale fluctuations. WYNDvalley does tend to slightly underestimate the maximums and overestimate the minimums. Model calculated twenty-four hour averages trended very well with measured values and nephelometer estimated values in Pinehurst.

Spatial variation in model predicted concentrations also agreed well with measured data. Maximum values occurred at or near Pinehurst school agreeing with results found in the 1989 saturation study. The model predicted concentration at Pinehurst School is 176.8 ug/m^3, which is within about 3% of the measured value of 183 ug/m^3. The 1994 model projections of 167.7 ug/m^3 agreed within 10% of the rollback modeling prediction of 181 ug/m^3.

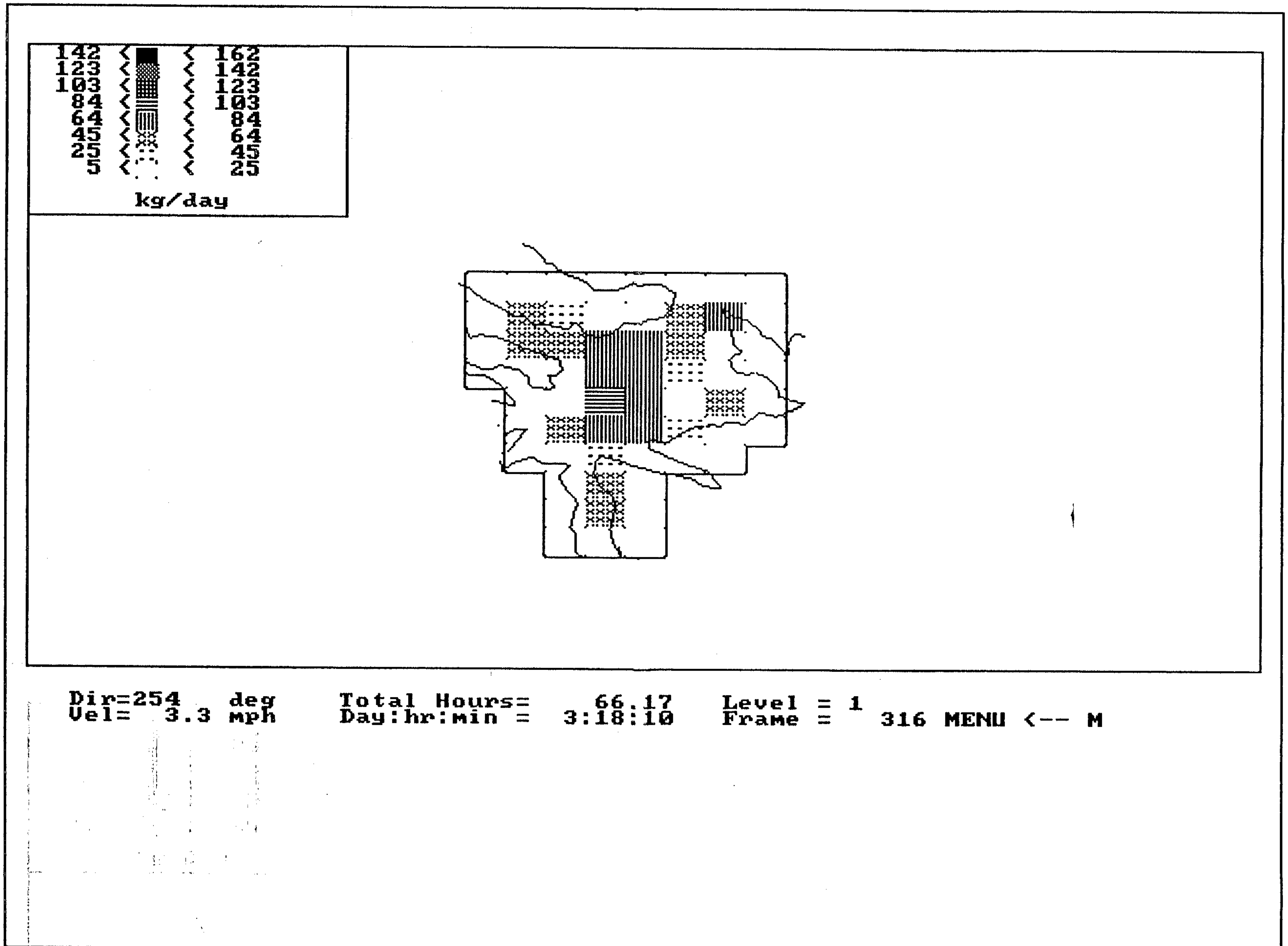

Figure 1: Spatial Distribution of Pinehurst Emissions

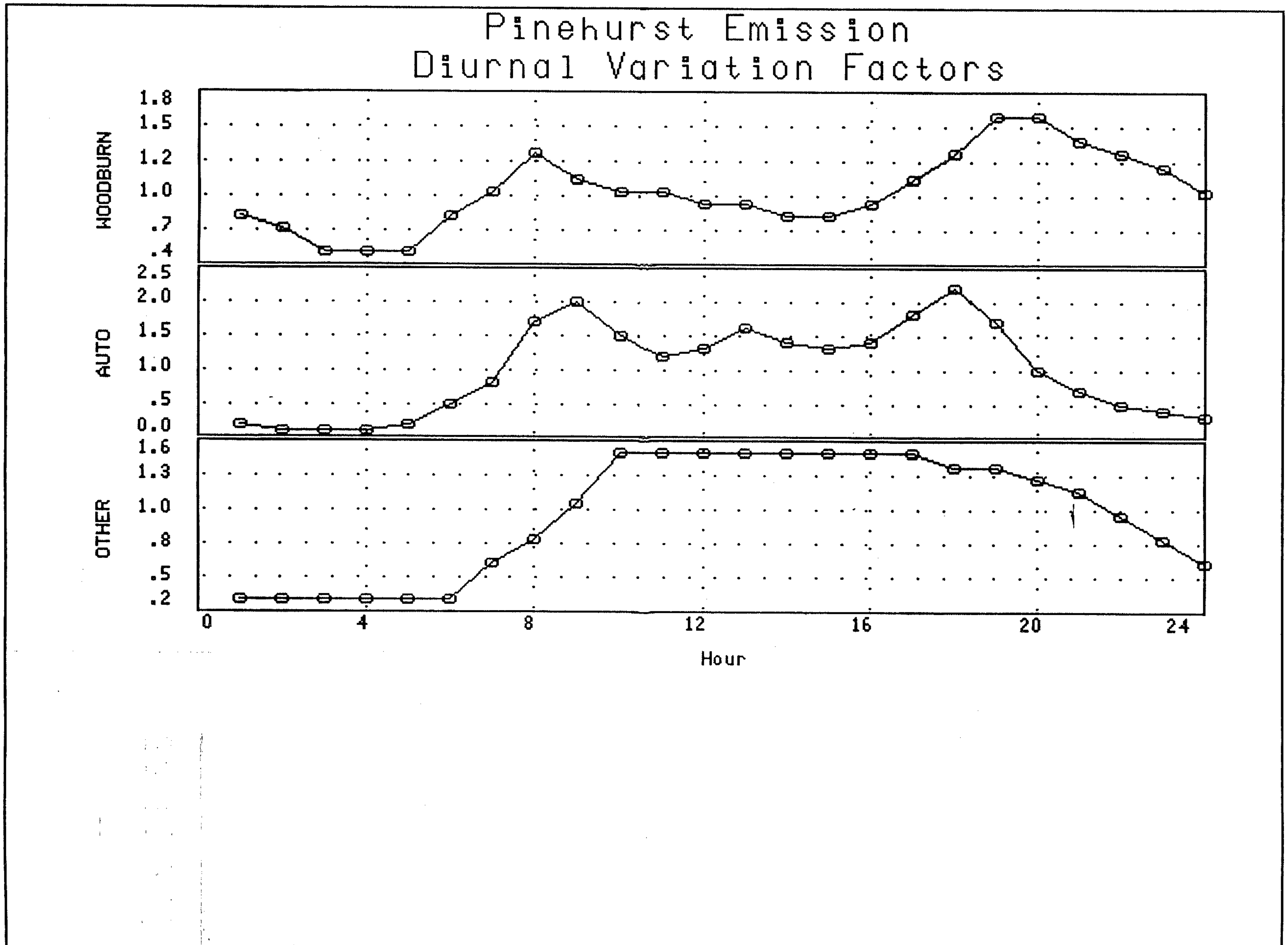

Figure 2: Diurnal Modulation of Pinehurst Emissions by Source Category

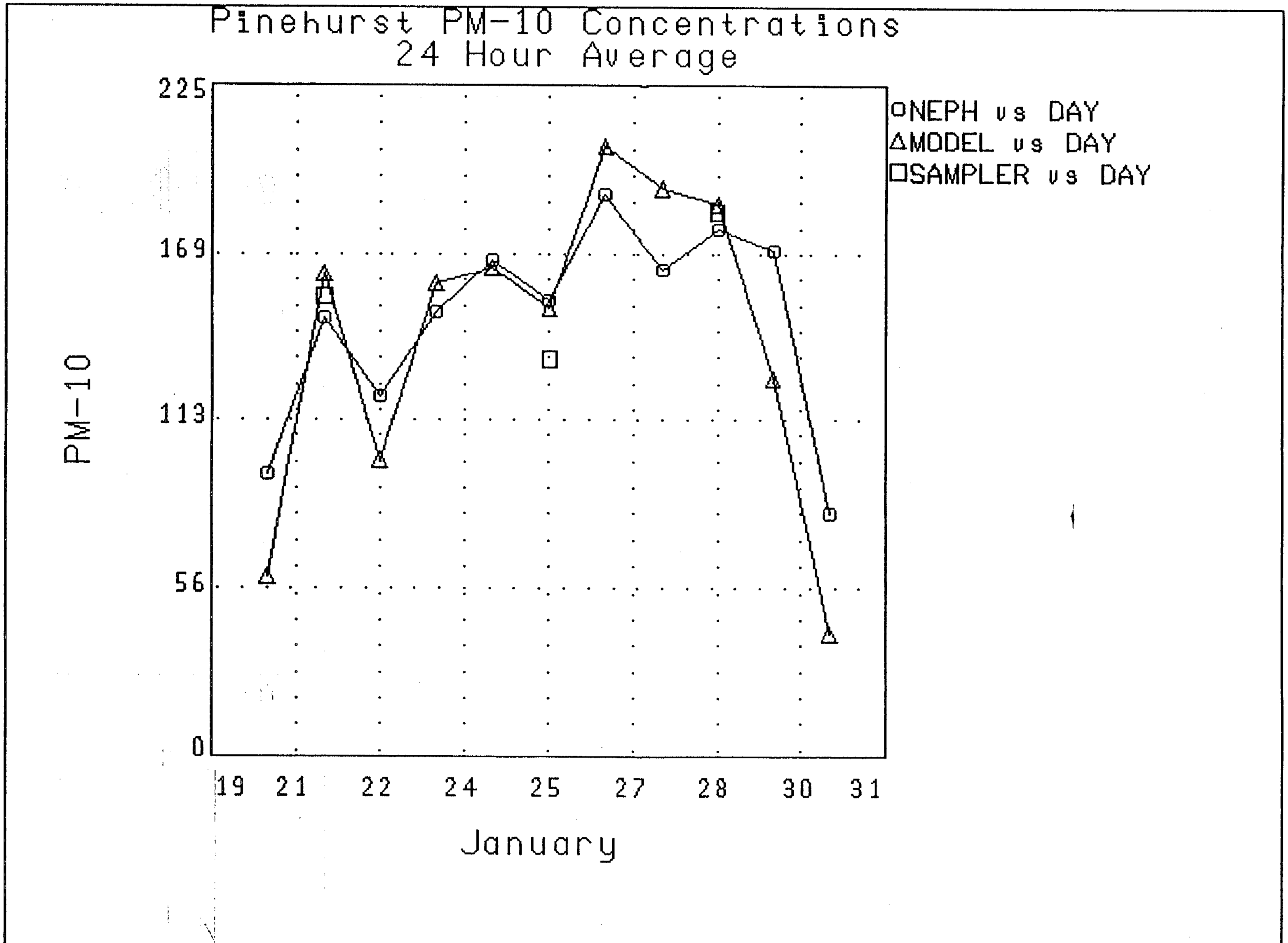

Figure 3: WYNDvalley 3.06 Input Information

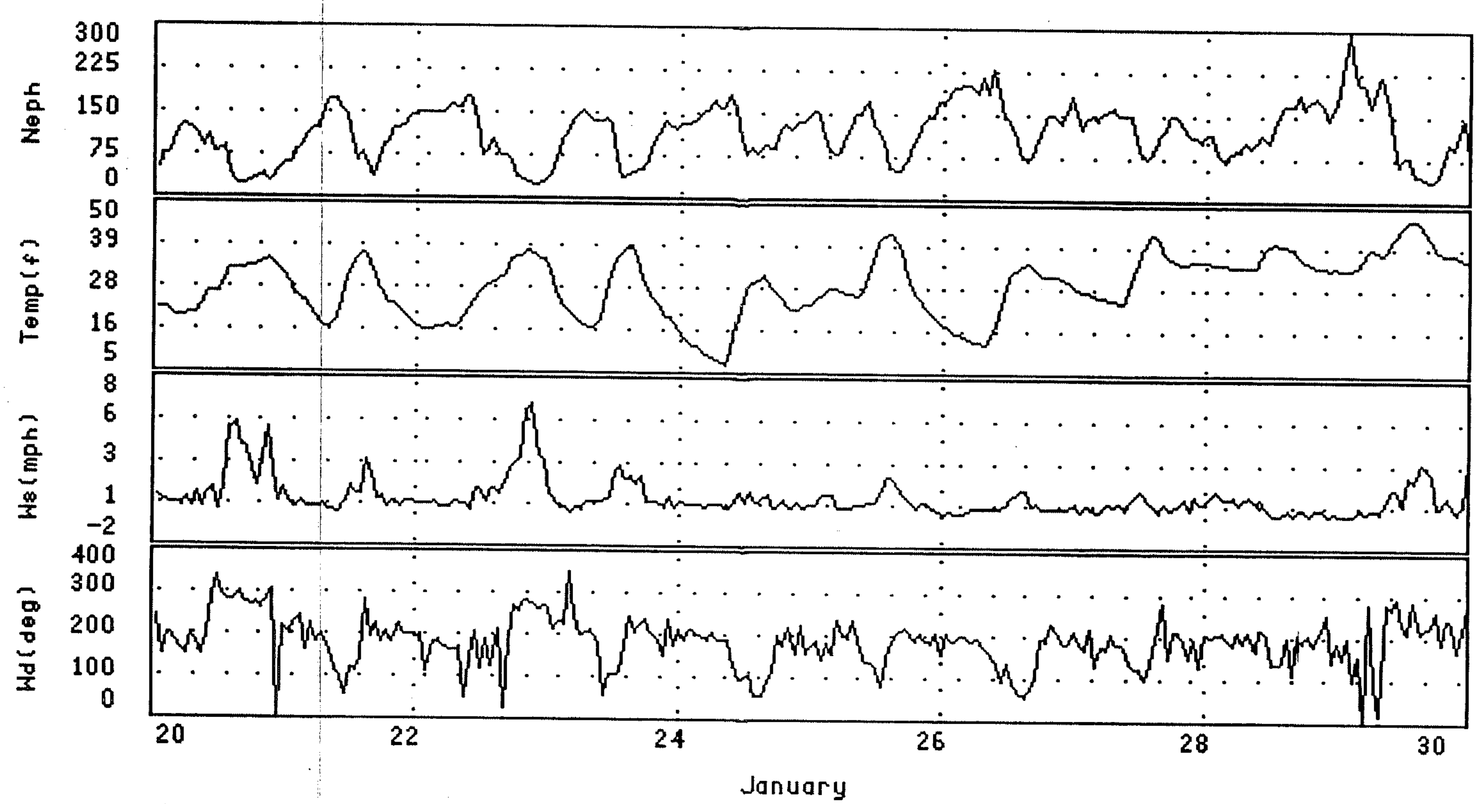

Figure 4: Hourly Pinehurst PM_{10} Concentrations and Meteorology

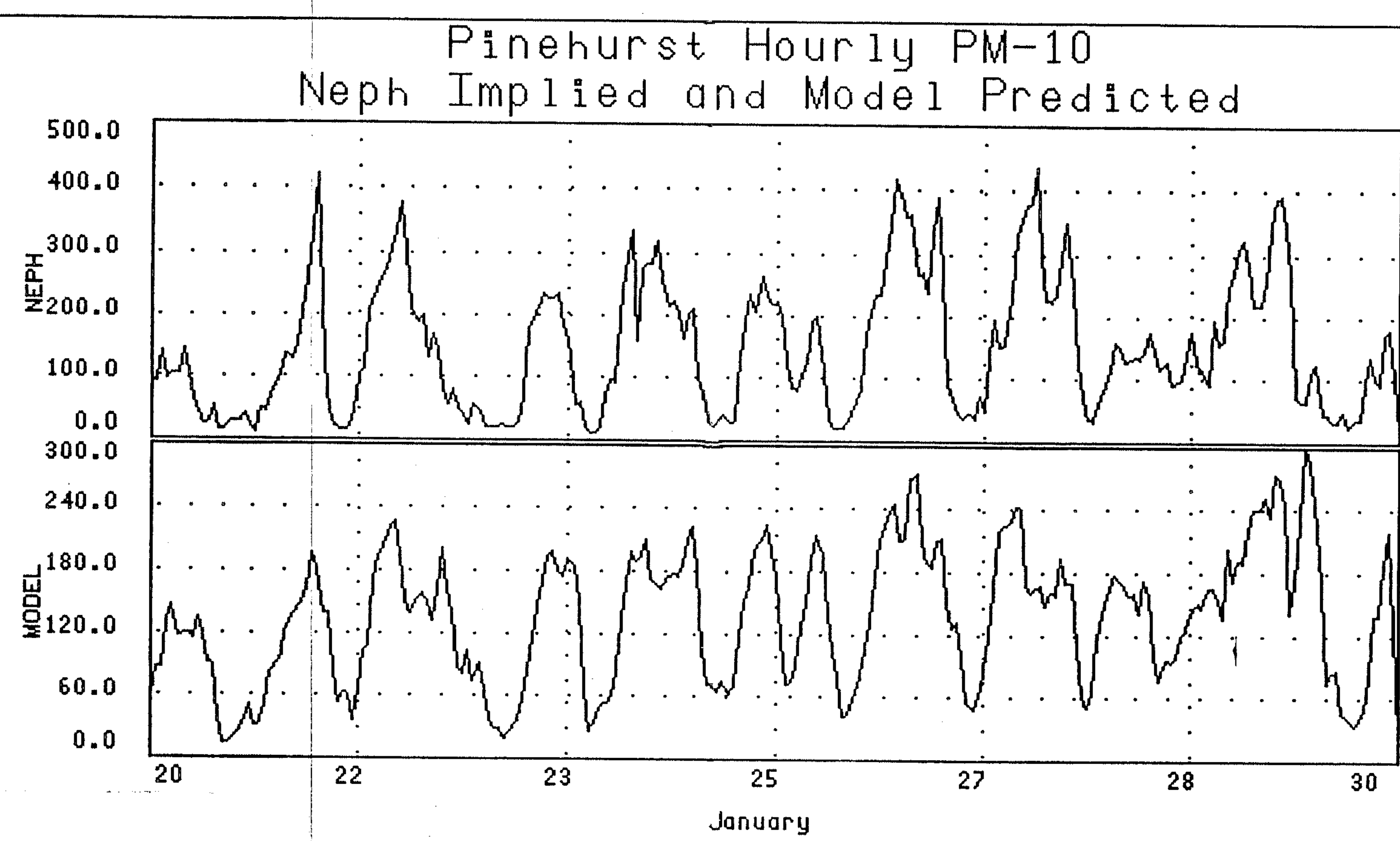

Figure 5: Time Series of Model and Nephelometer Implied PM_{10} Concentrations

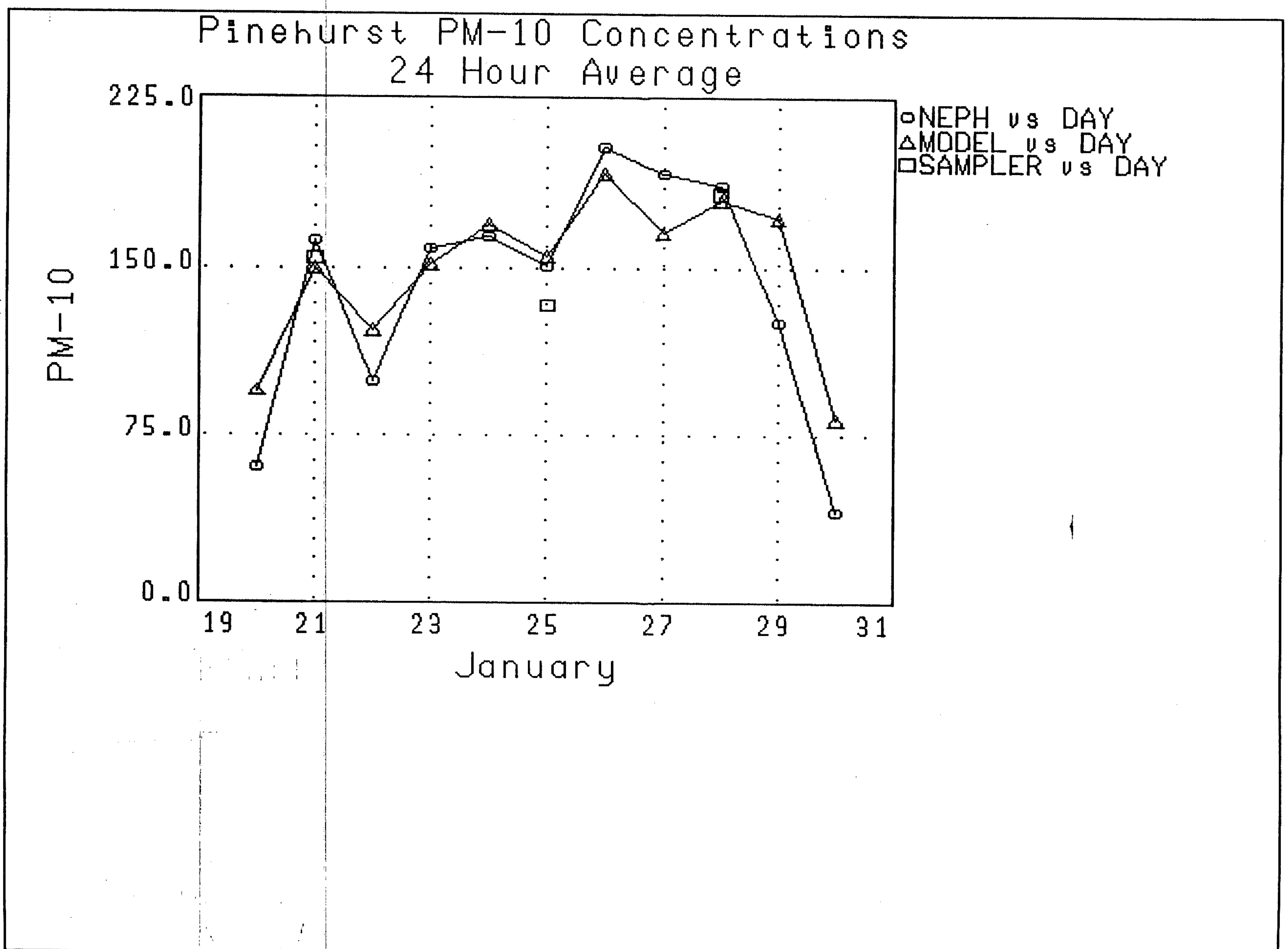

Figure 6: Pinehurst PM_{10} Concentrations, Actual, Nephelometer Implied, Model Predicted

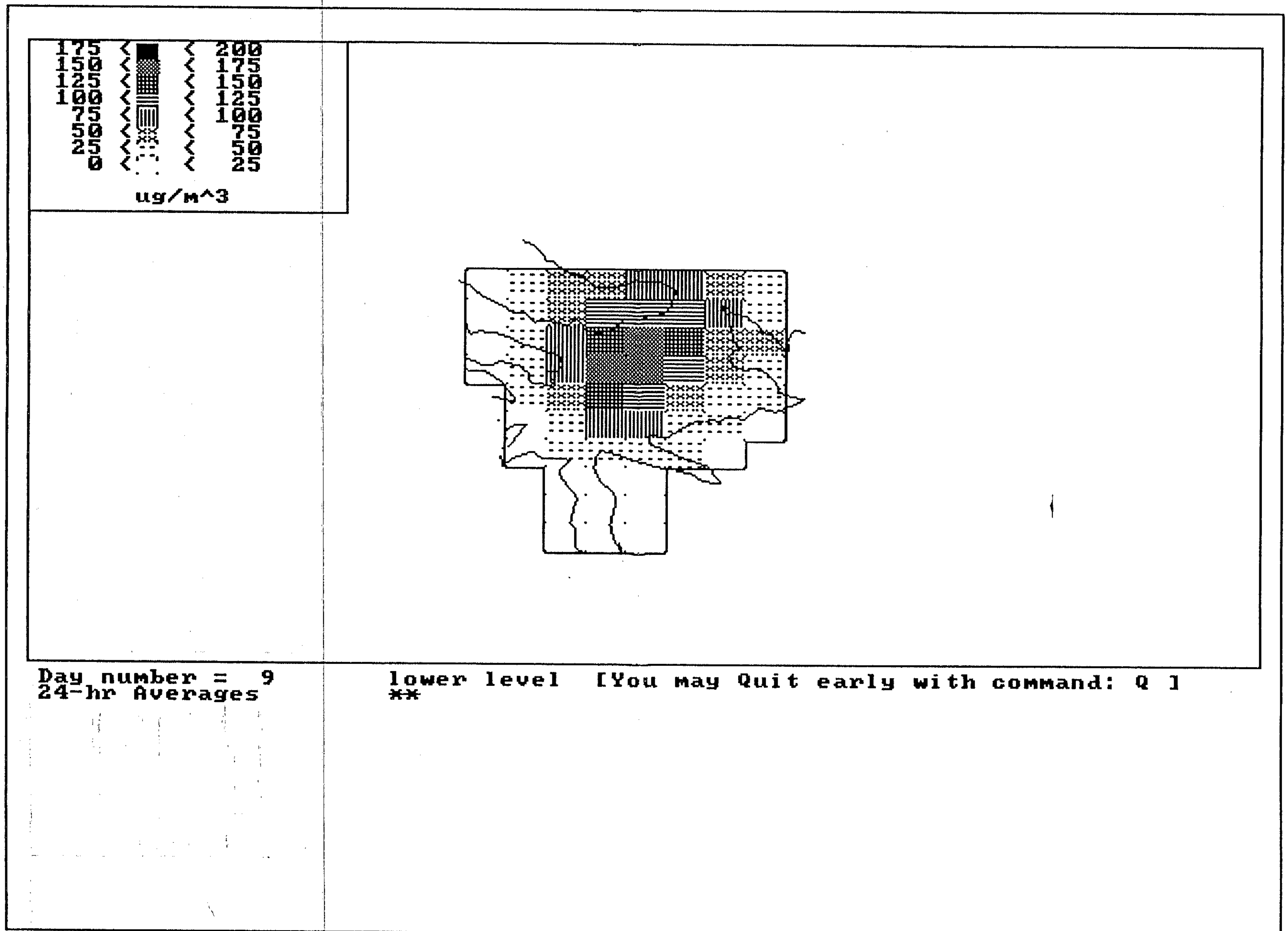

Figure 7: Model Predicted Impacts January 28, 1988

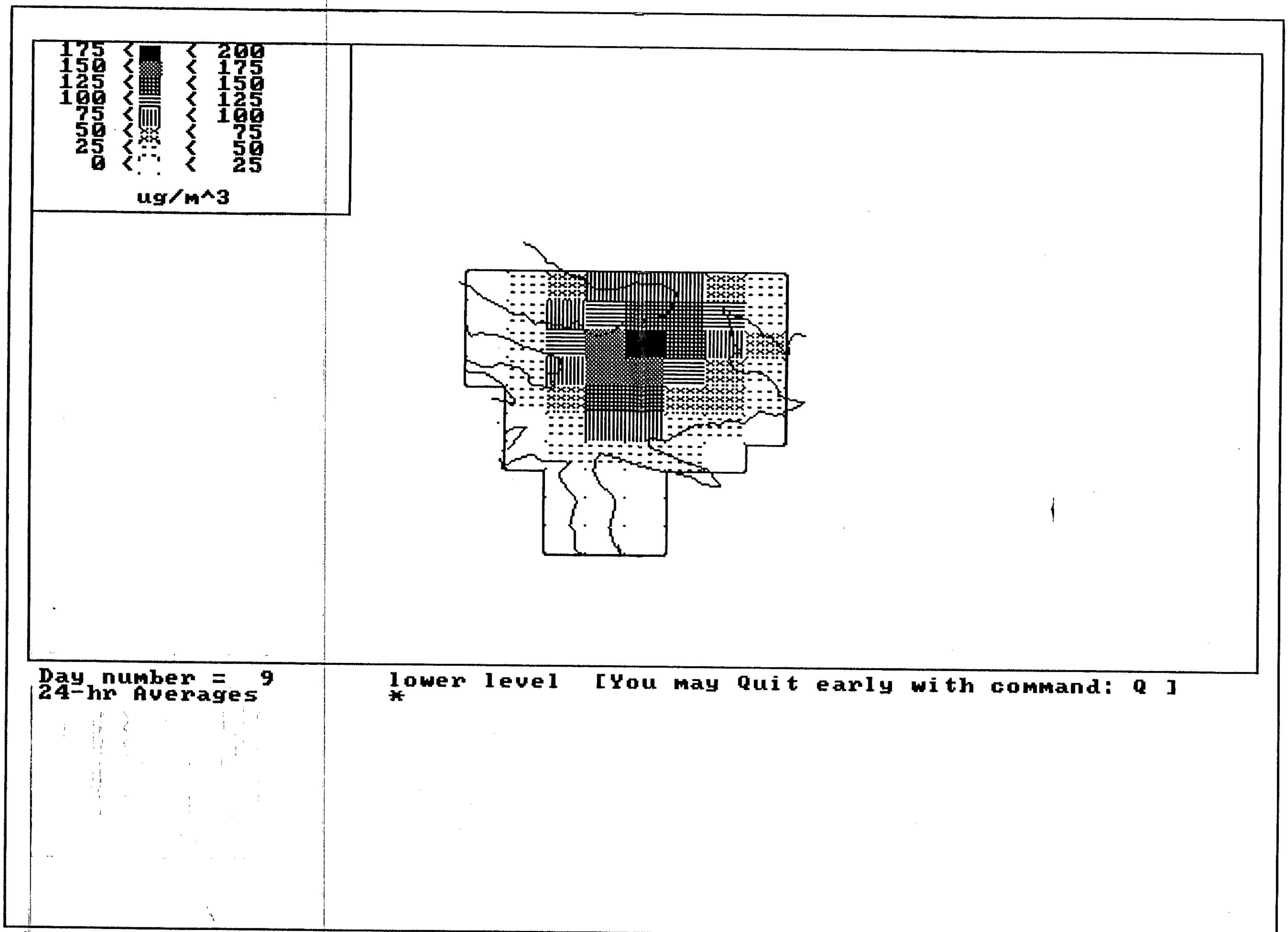

Figure 8: 1994 Model Predicted Values

II. ROLLBACK MODELING

IDAHO DEPARTMENT
OF HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

1410 North Hilton, Statehouse Mail, Boise, ID 83720-9000, (208) 334-0502

Cecil D. Andrus, Governor   Richard P. Donovan, Director

August 27, 1991

Lynn McKee
Director
EPA - Idaho Operations Office
422 W. Washington Street
Boise, ID 83702

Dear Mr. McKee:

The Idaho Air Quality Bureau requests that a modified attainment demonstration be allowed for the Silver Valley PM-10 nonattainment area. This modified demonstration would be based on rollback modeling supported by a complete emission inventory, receptor modeling and limited dispersion modeling.

The modified attainment demonstration approach proposed is allowed under current guidance and we are currently intending to use it in our Silver Valley PM-10 SIP submittal this fall.

The requested approach is provided for in the March 4, 1991 memorandum "PM-10 SIP Attainment Demonstration Policy for Initial Moderate Nonattainment Areas," from John Calcagni, and the July 5, 1990 memorandum "PM-10 SIP Demonstrations for Small Isolated Areas with Spatially Uniform Emissions" from Robert Bauman.

In order to ensure that our final SIP submittal is acceptable, we are requesting formal approval in advance to proceed with this approach. Since the approach has already been discussed informally with Region 10 PM-10 staff, I hope that it is reasonable to expect a response by September 13, 1991.

Sincerely,

Helen G. Rigg
Supervisor, Policy and Standards
Air Quality Bureau

HGR:br

cc: O. Green, IAQB
G. Lauderdale, EPA-10
D. Cole, EPA-IOO
COF 1.1

August 27, 1990

Silver Valley PM-10 SIP
Justification for Rollback Modeling Attainment Demonstration

The Silver Valley/Pinehurst PM-10 nonattainment area meets the conditions for a modified attainment demonstration based on proportional rollback modeling. This paper provides documentation in support of the recommended approach.

Background

An April 2, 1991 memo from John Calcagni to the Directors of EPA's regional offices offers information regarding PM-10 Moderate Area SIP Guidance. The content of this memo will be published in the Federal Register in the Fall 1991. Attachment 5 (attached) of this memo describes the PM-10 SIP Attainment Demonstration Policy for Initial Moderate Nonattainment Areas. The policy explains that "in those situations where time constraints, inadequate resources, inadequate data bases, lack of a model for some unique situations and other unavoidable circumstances would leave an area unable to submit an attainment demonstration within the short timeframe provided by the newly revised law, ... a modified demonstration ....may be submitted." Further, EPA's policy on PM-10 SIP Demonstrations for Small Isolated Areas With Spatially Uniform Emissions, as described in a June 4, 1990 memo from Robert Bauman and Joseph Tikvart of EPA to the EPA Regions, provides guidance on when receptor modeling, along with proportional (rollback) modeling, is adequate to identify source contributions and demonstrate attainment. This memo (attached) summarizes an option provided for in sections 4 and 6 of the PM-10 SIP Development Guideline. It describes the conditions under which dispersion (or stagnation) modeling is not necessarily required to support a SIP.

Briefly, these conditions include a determination of:

1. The spatial representativeness of the monitoring network and the spatial uniformity of emissions. The PM-10 monitoring network must represent the maximum impact from the major sources in the Emissions Inventory.

2. Temporal representativeness of the monitoring network. Sampling intervals must be frequent enough to characterize the impacts of the major sources.

3. The impact of only a few, relatively well categorized source categories. Receptor modeling can adequately characterize a limited number of sources.

The modeling effort for the Pinehurst/Silver Valley SIP falls within the above Attachment 5 guidance for a modified attainment demonstration since the available meteorological data is not representative of the entire Silver Valley. The discussion below provides technical justification for using receptor and rollback modeling in the Pinehurst/Silver Valley SIP as outlined in the EPA memo. A more detailed discussion of the rational for choosing receptor/rollback modeling will be found in the Pinehurst/Silver Valley PM-10 SIP.

Justification

1. Silver Valley Saturation Study monitoring found PM-10 concentrations are consistently below the NAAQS 24 hour standard in Smelterville, Kellogg, Silverton and Wallace. The same study showed PM-10 concentrations during a stagnation event near and/or above this 24 hour standard in Pinehurst and Osburn. These Saturation Study results support the data collected from SLAMS PM-10 monitor in Pinehurst which reported 24 hour standard exceedances of PM-10 during the same stagnation event. Pinehurst is in area within the Silver Valley where local terrain severely inhibits flow through the valley and low wind speeds predominate. Therefore, ambient PM-10 data and meteorological data from Pinehurst represent the worst case conditions in the Silver Valley.

No ambient monitoring by EPA approved methods has been done in Osburn. Osburn can not be considered nonattainment based solely on the non-approved methods used in saturation study. Because of the high PM-10 values seen during the Saturation Study, the IAQB is scheduling an installation of a SLAMS monitor in Osburn.

2. Point source emissions in the valley are relatively small. IAQB's Point Source Emissions Inventory has identified less than 10 significant point sources, some of which are located on the nearby hillsides above the valley inversion. The total of all the point source emissions are very small in comparison to the area sources. As reported in IAQB's Silver Valley Area Source Emissions Inventory, the point sources contribute only 12% of the PM-10 emissions on a 24 hour basis during the winter. The area sources are dominated by wood smoke and fugitive road dust which contribute a total of 85% of the total 24 hour PM-10 emission inventory. In addition, most of the point sources are located on the steep slopes of nearby mountains and contribute little impact during stagnation conditions.

Receptor modeling from Pinehurst supports the emissions inventory by indicating wood burning as the largest source of PM-10. Fugitive road dust is found to be the second largest source.

3. SLAMS sampling in Pinehurst occurred on an every third day basis in the winter of 1988 and an every second day basis in the winters of 1989 and 1990. Two exceedances were measured during this three year period. Considering the large influence of area sources, the sampling frequency is considered adequate to characterize the elevated ambient PM-10 concentrations caused by the major sources.

4. As discussed above, the major wintertime PM-10 sources in the Silver Valley are limited to area sources; residential wood burning and fugitive road dust. Receptor modeling has been able to characterize these two chemically distinct sources in Pinehurst without difficulty and within acceptable uncertainty limits. Wood burning is the major source of PM-10, followed by fugitive road dust. Receptor modeling also identified vehicle tailpipe emissions and secondary sulfate and nitrate as other extremely small sources influencing ambient PM-10 levels.

While the IAQB believes the Pinehurst/Silver Valley area meets the criteria for replacing dispersion/stagnation modeling with receptor and proportional rollback modeling, we are not requesting the total abandonment of the use of dispersion/stagnation modeling. We request that a limited stagnation modeling effort be acceptable along with the full emission inventory, receptor and rollback modeling in the Silver Valley.

An intense level of effort in stagnation modeling does not appear to be necessary to understand the PM-10 trends in Pinehurst. The IAQB will run stagnation model simulations for one air pollution event documented in Pinehurst/Silver Valley. The stagnation model used is the updated WYNDvalley Version 3.3. The stagnation event to be considered is the worst case situation during 1988-1990: January 28,1988. The emission value inputs for both area and point sources will be based on 1988 estimates. The IAQB Pinehurst meteorological data will be utilized. Efforts in model reconciliation and future projections will be limited. Stagnation modeling will be used to determine future projections of PM-10 concentrations in Pinehurst for 1990, 1994 and 2000. Rollback modeling will then be implemented to demonstrate the effect of curtailment programs on projected concentrations.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

5 JUL 1990

MEMORANDUM

SUBJECT: PM-10 SIP Demonstrations for Small Isolated Areas With Spatially Uniform Emissions

FROM: Robert D. Bauman, Chief
SO_2/Particulate Matter Programs Branch (MD-15)

Joseph A. Tikvart, Chief
Source Receptor Analysis Branch (MD-14)

TO: Chief, Air Branch
Regions I-X

This memorandum is in response to recent conversations between the Particulate Matter Programs Section and Regions VIII and X. The Regions have repeatedly expressed the need for flexibility in control strategy demonstration requirements when confronted with air-sheds where receptor modeling, coupled with proportional (rollback) modeling is considered to be adequate to identify source contributions and demonstrate attainment. The purpose of this memorandum is to discuss the rationale and justification for exercising this flexibility.

It is appropriate in certain situations to rely on a receptor model (RM) demonstration (i.e., use of receptor modeling, emission inventories, design value obtained by air quality monitoring, and proportional modeling) as the basis for a control strategy demonstration. This approach is an option provided for in sections 4 and 6 of the PM-10 SIP Development Guideline. While it is clear from the guideline that the use of dispersion models in combination with receptor models is the preferred approach, in certain limited situations, the use of an RM demonstration alone may be adequate to demonstrate attainment. The State must obtain approval to use the RM demonstration option prior to SIP submittal. The decision that an RM demonstration is adequate to demonstrate attainment is the responsibility of the Regional Office; however, the Region should consult the Model Clearinghouse for advice in makir- this determination. The Region must justify the determination and, in doing so, must consider all of the following:

1. The spatial representativeness of the monitoring network and the spatial uniformity of emissions. The PM-10 monitoring network must be representative of the maximum air quality impacts from the predominant (i.e., generally on the order of 90 percent) sources and source categories in the PM-10 emission inventory. Emissions from

area source categories are often distributed nearly uniformly across the area. This implies that ambient patterns would not be characterized by strong concentration gradients, thus lessening the need for an extensive monitoring network. However, areas with point sources will generally find an RM demonstration difficult to justify because the concentration pattern would be characterized by local "hot spots." In such cases, a dispersion model, along with representative meteorological data are typically required.

In a few areas, emissions of antiskid materials from a small number of road surfaces constitute the predominant PM-10 source category. These emissions should be uniformly distributed along these road surfaces. The monitoring network must be shown to be in accordance with EPA's monitoring guidance and spatially representative of the maximum air quality impact from this source category.

2. The temporal representativeness of the monitoring network. If the 24-hour NAAQS is controlling, the network must have samples collected at sufficiently frequent intervals to ensure that the impacts from the governing emission sources are adequately monitored.

3. The impact of only a few, relatively well characterized source categories. Receptor models can generally well characterize only a limited number of chemically distinguishable sources or source categories.

The above criteria imply that the area should be relatively small, characterized by uniform areawide emissions of one or two source categories, and geographically isolated from other PM-10 source areas. Examples of circumstances where RM demonstrations may be justifiable are small air-sheds where the only significant emission sources are residential wood combustion and/or road antiskid materials. It must be noted that the prerogative to use RM demonstrations should be exercised judiciously. Even when a RM is employed, consideration should be given to initiation of basic meteorological measurements as a contingency to the control program being found inadequate and predictive dispersion modeling being necessary at a later time. The use of dispersion modeling and receptor modeling in combination remains the preferred approach when both models are applicable to a particular circumstance.

cc: T. Pace
D. Stonefield
D. Wilson
Regional Modeling Contact, Regions I-X
PM-10 Contact, Regions I-X

ATTACHMENT 5

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

MAR 4 1991

MEMORANDUM

SUBJECT: PM-10 SIP Attainment Demonstration Policy for Initial Moderate Nonattainment Areas

FROM: John Calcagni, Director
Air Quality Management Division (MD-15)

William G. Laxton, Director
Technical Support Division (MD-14)

TO: Director, Air, Pesticides, and Toxics Management Division, Regions I, IV, VI
Director, Air and Waste Management Division Region II
Director, Air Management Division Regions III and IX
Director, Air and Radiation Division Region V
Director, Air and Toxics Division Regions VII, VIII, X

Overview

The purpose of this memorandum is to document EPA's attainment demonstration policy for initial moderate PM-10 nonattainment areas, i.e., those designated nonattainment upon enactment of the Clean Air Act Amendments of 1990 and, by operation of law, classified as moderate upon enactment. This policy supplements the attainment demonstration guidance set forth in the PM-10 SIP Development Guideline (June 1987), the Guideline on Air Quality Models (Revised), and the memorandum from Joseph Tikvart and Robert Bauman dated July 5, 1990. It is limited in application to those moderate PM-10 nonattainment areas designated nonattainment at enactment, all of which have a November 15, 1991 deadline for submitting attainment demonstrations and other State implementation plan (SIP) requirements. The short period in which the statute mandates the demonstration submittal for these areas has been an important factor in EPA's decision to supplement its attainment demonstration policy.

Policy

Generally, all SIP submittals for the initial moderate PM-10 nonattainment areas should follow the existing guidance on PM-10 modeling as noted above. In the situation where an area has completed or can complete its demonstration by November 15, 1991 consistent with existing guidance, an attainment demonstration based on the existing guidance should be submitted. However, in those situations where time constraints, inadequate resources, inadequate data bases, lack of a model for some unique situations, and other unavoidable circumstances would leave an area unable to submit an attainment demonstration within the short timeframe provided by the newly revised law, then a modified demonstration based on this policy statement may be submitted. Section 189(a)(1)(B) of the recently revised Clean Air Act requires that all modified demonstrations be based on some form of "air quality modeling." In addition, 40 CFR §51.112 requires that a demonstration be shown to be "adequate and appropriate." This supplemental policy is issued in accordance with these statutory and regulatory requirements.

All such modified demonstrations should be accompanied by the following:

1. Documentation of Modified Modeling Method. Documentation of the procedures or analyses used in lieu of those set forth in the previously issued guidance.

2. Rationale for Modified Demonstration. An explanation of why the alternative modeling techniques set forth in the guidance were not used.

3. Justification of Modified Demonstration. A description of how and why the SIP provides an adequate and appropriate demonstration of areawide attainment. If the design value contained in the demonstration is based on monitoring data, the justification should also:

(a) Show that the SIP is based on at least one full year of data from an approved network that meets EPA's quality assurance requirement. Also, the justification should contain a review of the monitoring data (e.g., data completeness, prescribed sampling frequency) in accordance with EPA's SIP development guidance. The justification should also include a review the network's ability to identify the point of maximum concentration and the impact of most significant sources.

(b) Based on the network and data review in (a) above, the SIP should include appropriate provisions to conduct followup monitoring (e.g., daily monitoring, saturation monitoring, expansion or modification of the monitoring network and meteorological data collection) to address those issues raised during that review. The purpose of the followup monitoring is to ensure that the monitoring network in place as of January 1, 1994 will be appropriate to evaluate attainment.

Demonstrations based on this policy will be considered on a case-by-case basis. The policy applies only to those initial moderate PM-10 nonattainment areas which have completed the technical analysis for their SIP submittal and have made a good-faith effort to submit a final SIP by their November 15, 1991 due date. Technical analyses that are being developed on a schedule which goes beyond November 15, 1991 will be expected to follow all previously established guidance for modeling and demonstrations. The SIP's for all other PM-10 nonattainment areas will be reviewed in accordance with the previously issued attainment demonstration guidance cited above. If you have any questions regarding this guidance, please contact Fred Renner at FTS 629-5556 or Joe Tikvart at 629-5562.

1990, 1994 AND 2000 HOUSEHOLD

AND

VEHICLE MILES TRAVELED FORECASTS

FOR

SILVER VALLEY, SHOSHONE COUNTY, IDAHO

Prepared By
INTERMOUNTAIN DEMOGRAPHICS
Boise, Idaho
August, 1991

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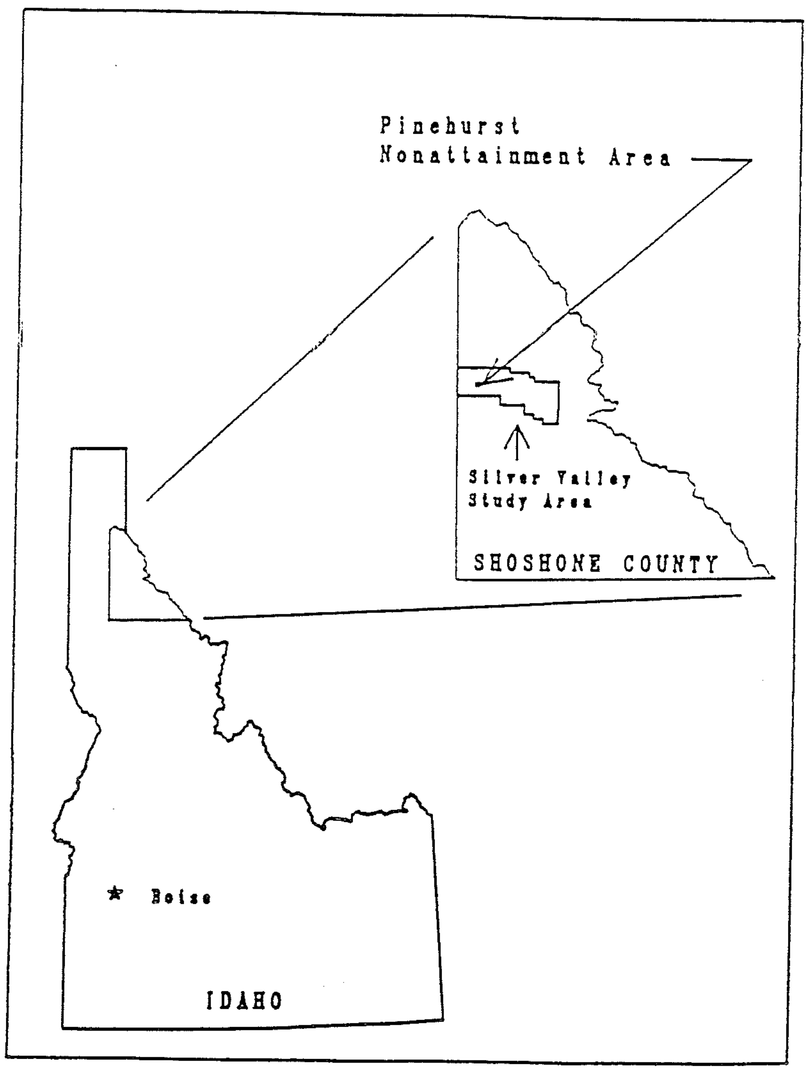
TABLE OF MAPS AND TABLES

I. INTRODUCTION

The purpose of this analysis was to prepare a database containing the number of households and Vehicle Miles Traveled (VMT) for grid cells in Silver Valley, Shoshone County, Idaho (See Map 1). Data were inventoried for 1990; forecasts were prepared for 1994 and 2000. The information will be used to forecast air quality in the Silver Valley.

The Silver Valley is located in Shoshone County in northern Idaho's panhandle. It is adjacent to Montana and is 125 miles south of the Canadian border. The nearest major city is Spokane, Washington, some 50 miles to the west.

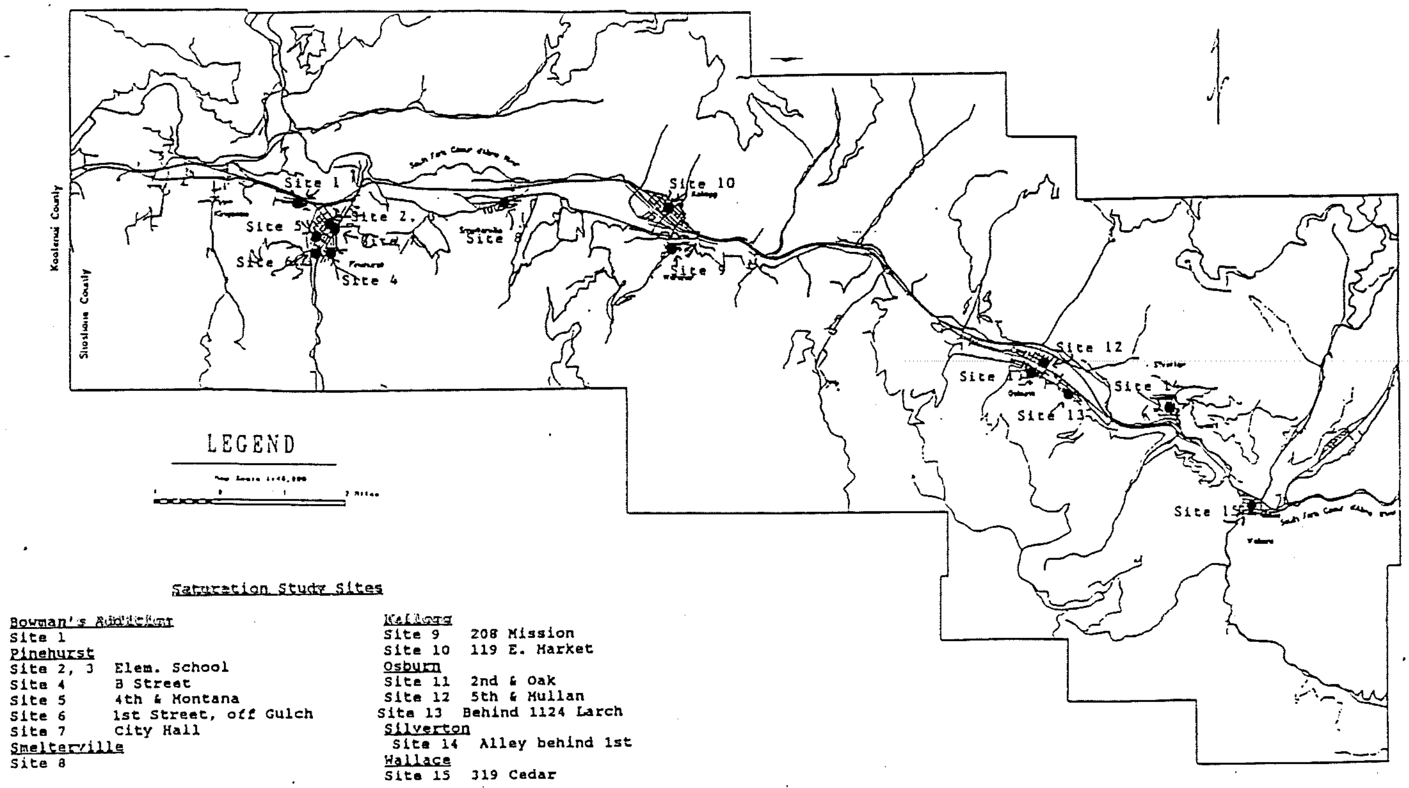
Map 1: Silver Valley Location Map



Location of Proposed Pinehurst Nonattainment Area

The study area began west of the town of Kingston and continued east through Pinehurst, Smelterville, Kellogg, Osburn, Silverton and Wallace. The eastern boundary was one mile east of Wallace (See Map 2).

Map 2: Silver Valley Study Area



The study area was divided into 220 grid cells. The cells were generally one-sixteenth square mile in the developed areas of the valley, and one-fourth square mile in the rural portion. Each grid cell contained the following information:

- -Number of housing units (residential structures),
- -Number of households (occupied housing units),
- -Vehicle Miles Traveled on the interstate (I-90),
- -Vehicle Miles Traveled on collector streets,
- -Vehicle Miles Traveled on local streets,
- -Vehicle Miles Traveled on unpaved roads.

The 1990 database is presented in Appendix D. Each grid cell record contains a description of the data quality and the methodology used to collect the data. Vehicle Miles Traveled were factored by ten to include one decimal place.

II. COMMUNITY PROFILE

Silver Valley is about 22 miles long and varies from one-tenth of a mile to slightly more than three-fourths of a mile wide. It is surrounded by rounded mountains, with two peaks reaching over 6,000 feet. Elevation in the western end of the valley is 2,200 feet and rises to 3,300 feet at the eastern end. The north fork of the Coeur d'Alene River traverses the valley. Most of the surrounding land is in the Coeur d'Alene and St. Joe National Forests.

Coeur d'Alene Indians were the first known valley inhabitants. They crossed through on their way to hunt bison in Montana. In 1842, Cataldo Mission was founded by Jesuit priests in the western end of the valley. More settlers came to the area when Lt. John Mullan had a military road built from Fort Walla Walla Washington to Fort Benton Montana. The valley population began to increase rapidly after Andrew J. Prichard discovered gold in 1881.

Recent valley history has been based primarily on the mining industry. The valley is one of the world's richest silver sites. It has the top five silver producing mines in the country, and has produced more than one billion ounces of silver. Through 1985, nearly 4.7 billion dollars worth of metal was mined, including silver, zinc, gold, copper and lead.

Portions of the valley are marked by the remnants of mining activity. Idle smokestacks, vacant buildings and rusting chain link fences are seen on the valley floor and surrounding hillsides. Dried up tailing ponds contain enough concentrations of lead and zinc to destroy vegetation. Sections of streams also are barren. Much of the flat portion of the valley is covered by slag heaps and tailings ponds. The U.S. Environmental Protection Agency designated part of the valley as a Superfund cleanup site.

Fluctuations in metal prices and the cost to extract ore have caused a "boom-and-bust" cycle in the local economy. The last "boom" occurred in the valley in the late 1970's, when the price of silver reached its historic high. A "bust" occurred in 1981, when most of the mines closed and left 2,000 people out of work. Unemployment reached 50%. By 1991, the assessed valuation of property had dropped from 1.3 billion dollars to $340 million dollars.

Efforts are being made to shift the local economy to tourism, with an emphasis on destination resort skiing. In June 1990, the Silver Mountain Resort opened. It featured a gondola, spanning 3.1 miles over 3,400 feet elevation gain, connecting Kellogg and Mountain Haus, a lodge located beneath Kellogg Peak. Tourist visits exceeded projections in the first year of operation.

Shoshone County's population has changed in response to economic conditions. In 1920, there were 14,250 persons in the county.

Population reached its peak in 1950, at 22,806. The population stabilized in the 1970s and 1980s at about 19,000 residents. By 1990, the population decreased by nearly 30% to about 14,000 residents. The 1990 Silver Valley population was estimated at 9,750 persons.

There are six incorporated cities in the study area portion of the valley, with population ranging from slightly more than 200 residents in Wardner to more than 2,000 persons in Kellogg. All six cities lost population in the 1980 to 1990 decade.

III. MAJOR FINDINGS AND ASSUMPTIONS

Major Findings. Population and the number of households in the study area were forecast to decline in 1990 and 1991, in response to employment declines in the mining industry. Beginning in 1992, population was predicted to increase by slightly more than 3% annually, according to forecasts prepared by the Idaho Department of Financial Management.

Due to the large population loss occurring in 1990 and 1991, the 1994 population would be 550 less than the 1990 total. The over 3% annual increase in 1992, 1993 and 1994 did not offset the population loss occurring in the earlier part of the 1990s. Population was predicted to reach 10,600 residents by the year 2000, using the 3.3% annual growth rate.

Households (the number of occupied housing units) would follow a similar trend. The household estimate was 4,000 in 1990. It is expected to decrease to 3,800 in 1994, and increase to 4,300 by the year 2000 (See Table 1).

Table 1: Silver Valley Database Summary

Data Category	1990	1994	2000
Population	9,750	9,200	10,600
Housing Units	4,682	4,682	4,682
Households	4,000	3,800	4,300
Interstate Mileage	22.79	22.79	22.79
Interstate VMT	219,124	258,964	318,725
Collector Mileage	29.16	29.16	29.16
Collector VMT	90,102	99,544	112,346
Local Mileage	85.98	85.98	85.98
Local VMT	25,177	23,995	27,987
Unpaved Mileage	61.13	61.13	61.13
Unpaved VMT	1,065	1,065	1,065

Source: Intermountain Demographics

The Vehicle Miles Traveled forecasts depended on the type of roadway. Vehicle Miles Traveled increased steadily on the interstate and collector systems, as seen in Table 1. These forecasts were prepared by the Idaho Transportation Department and are a continuation of past trends in traffic volume.

Total Vehicle Miles Traveled on the local street system declined from 1990 to 1994, in response to decreasing levels of population and households. Local Vehicle Miles Traveled then increased from 1994 to 2000. Unpaved mileage and Vehicle Miles Traveled were constant through the time frame of the analysis.

Major Assumptions. Two types of assumptions influenced the outcome of this analysis. They were demographic assumptions concerning population and households, and transportation assumptions regarding Vehicle Miles Traveled.

Demographic Assumptions. It was assumed that population and households would decrease as a result of declining jobs in the Silver Valley. This decrease would continue through the end of 1991. In 1992, population and households would begin to increase. Population and the number of households would continue increasing through the year 2000.

Another set of demographic assumption dealt with the location of population and household declines from 1990 to 1994. Still another set of assumptions was developed to determine which areas would increase in population from 1994 through 2000. These growth pattern assumptions were based on discussions with Silver Valley community leaders. Other assumptions such as occupancy rates and persons per household rates are discussed throughout the report.

Transportation Assumptions. Increases in Vehicle Miles Traveled on the interstate and collector roadway systems were based on forecasts prepared by the Idaho Transportation Department. A major assumption in that work is that no new interstate or collector systems would be constructed (after the current interstate construction is completed). Traffic counts on the interstate and collectors were taken in March and April of 1988 and are assumed to be acceptable for the determination of winter season travel.

It was further assumed that no new local or unpaved roads would be constructed. There was enough capacity in both systems to allow for additional residential development without constructing new facilities. Other assumptions, such as the trip rate per household and Vehicle Miles Traveled on unpaved roads, are discussed in the text.

IV. 1988 DATABASE

Initially, a database for air quality modeling was assembled for the Silver Valley in 1989. It was an inventory of 1988 households and Vehicle Miles Traveled. The 1988 database was used as the starting point for preparing the 1990 inventory and the 1994 and 2000 forecasts.

Methodology. Several data sources were used to complete the 1988 analysis. The method of gathering data for each grid cell depended on the data and resources available for that section of the study area. The following is a brief overview of data gathering procedures used in various portions of the study area:

* West of Pinehurst - Housing units were inventoried from the U.S. Geological Survey (U.S.G.S.) topographic maps. The number and location of housing units also was verified by a field inspection. Mileage to calculate Vehicle Miles Traveled was measured from Idaho Transportation Department 1 inch = 0.5 mile scale maps.

* Pinehurst through Kellogg - The number of housing units and mileage for each type of road were taken from Environmental Protection Agency maps (1 inch = 500 feet scale), prepared by the U.S. Army Corps of Engineers for the Superfund cleanup project. Housing unit counts also were field checked for accuracy.

* East of Kellogg through Wallace - 1988 aerial photographs, (1 inch = 500 feet scale), from the Idaho Transportation Department were used to determine housing counts. Portions of this section of the study area were field checked for accuracy. Mileage also was measured from maps and aerial photographs.

* East of Wallace - Housing units were counted from U.S. Geological Survey maps and verified with a site visit. Mileage was determined from Idaho Transportation Department maps (1 inch = 0.5 mile scale).

Housing Units. The first step in determining the number of households was to count the total number of housing units in each grid cell. (Housing units are residential structures such as a house, an apartment, a mobile home, a group of rooms or a single room.) That analysis was completed using the maps and photographs described in the previous paragraphs.

Several limitations may apply when determining housing unit counts from aerial photographs. Housing units located in "non-traditional" areas or structures such as warehouses, or in the second story of commercial structures may not be counted. The number of units in an apartment complex usually can not be determined. Vegetation may obscure housing units. In densely settled residential areas, structures such as garages may be inadvertently counted as housing units.

Quality control measures were undertaken to ensure the accuracy of the housing unit count. Grid cell totals for this analysis were compared to field inventories taken in the Superfund study area between Pinehurst and Kellogg. The Superfund inventories were reported for individual cities in the study area. Grid cell totals were aggregated to municipal boundaries and compared to field survey results.

Portions of the study area were verified using Shoshone County assessor's data. The assessor provided a listing of subdivision lots by section for rural portions of the study area. Grid cell totals were aggregated to sections and compared to the assessor's data.

The remaining quality control measure was to manually field check parts of the study area. The number of housing units was verified in areas where counts were taken from U.S.G.S. maps, since the maps are outdated. Housing units in other rural areas also were counted. Structures were checked to determine if they contained housing units. Apartment buildings were identified; individual units were counted.

Households. Households were defined as the number of occupied housing units. The number and location of households is a major factor when estimating vehicle trips in travel forecasting models.

The number of occupied housing units in the area was derived from a 1988 analysis done for the Superfund project. That door-to-door survey indicated that 85% of the housing units were occupied. Telephone calls were made to state and local government officials and employees to verify the accuracy of the occupancy factor for the entire study area. They indicated that the rate was acceptable for general use. The 85% occupancy factor was applied to the number of housing units in each grid cell to determine the number of households in a cell.

Vehicle Miles Traveled. Vehicle Miles Traveled were calculated for each grid cell in the study area. For Interstate-90 and collector roads, Vehicle Miles Traveled were calculated from 1988 Idaho Transportation Department traffic counts and annual growth factors. Street segment length, measured in miles, was multiplied by the most recent traffic count for that segment. Traffic counts were taken in March and April, and Vehicle Miles Traveled were calculated for that time of the year.

Vehicle Miles Traveled for local streets were calculated by multiplying the number of households in a grid cell by an average trip generation rate. That total was multiplied by length of the local street segment, in miles, to produce local Vehicle Miles Traveled for each grid cell. The same methodology was used to prepare Vehicle Miles Traveled on unpaved roads.

The average trip rate per household used in this analysis was 4.3 trips per day. This rate was based on the Institute of Transportation Engineers <u>Trip Generation Manual</u>, 1983, and discussions with officials at the Idaho Transportation Department.

The accuracy of street segment length may vary, depending on the data source. In areas covered by the 1 inch = 500 feet scale maps and aerial photographs, accuracy would be greater. In areas covered by the 1 inch = 0.5 mile scale maps, accuracy may be less.

A limitation inherent in this methodology was underestimating Vehicle Miles Traveled on unpaved roads. No traffic counts were available for unpaved roads. In addition, no housing units or corresponding households were located adjacent to unpaved roads in many of the grid cells. Many unpaved segments have length attributes, but no residential trip generators or traffic counts to determine Vehicle Miles Traveled.

Some unpaved roads led to industrial areas or utility easements. They may carry employment related traffic that could not be quantified in this analysis. This non-residential usage was not calculated, and may cause an under count of total Vehicle Miles Traveled on unpaved roads.

Each grid cell was assigned a code for the methodology to determine households and Vehicle Miles Traveled. Quality control codes also were assigned to the two variables. Appendix B contains the database for 1988. Appendix C contains the codes for methodology and quality control values assigned to each record.

V. 1990 DATABASE

For the 1990 database, the 1988 study area was expanded to include grid cells west of Pinehurst, around Kingston, and east of Wallace. One-sixteenth square mile grid cells in Smelterville and Kellogg were aggregated to one-fourth square mile cells. Grid cells from east of Osburn to Silverton were divided into high resolution (one-sixteenth square mile) cells.

Housing Units. Housing units in the 1990 database were based on 1990 census data and data collected in the 1988 analysis. Housing unit counts in the 1990 census were available for census blocks in the study area. Census blocks were generally smaller than grid cells, especially in the developed portions of the study area. Housing unit data from the census blocks were aggregated into grid cells. This methodology worked well, except in areas where a census block was larger than several grid cells. In these areas, the 1988 housing unit count was used. The 1990 database contains a code indicating the source of the housing unit count.

Field verification was undertaken for grid cells containing discrepancies between the 1988 inventory and the 1990 census information. Generally, the census count was higher, since some apartment buildings were not clearly visible in the aerial photographs and were not included in the 1988 inventory.

Population. Silver Valley's 1990 population was 9,750 people. This estimate was based on the number of housing units, the occupancy rate and an average persons per household rate.

Households. 1990 housing unit occupancy data for small geographical areas were not available from the U.S. Census Bureau in time to complete the 1990 database. The 1988 occupancy factor (85 per cent) was used to calculate households in each grid cell in the 1990 database. The 1990 countywide occupancy rate also was 85%. 1990 housing occupancy status will be verified, when census information for small areas becomes available.

Vehicle Miles Traveled. Vehicle Miles Traveled on Interstate-90 and collector streets were updated using growth factors provided by the Idaho Transportation Department. These rates varied from 0.015% to 0.05% annually, depending on the location of the interstate or collector segment. Information was aggregated when grid cells were combined. Street segment length was remeasured when one-fourth square mile grid cells were divided into one-sixteenth square mile grid cells. Vehicle Miles Traveled were calculated for the new grid cells using the Idaho Transportation Department traffic counts and growth factors.

Vehicle Miles Traveled on local streets were determined by multiplying the number of 1990 households in a grid cell by the trip rate of 4.3 trips per day. Total trips in a grid cell were multiplied by the local street segment length to calculate Vehicle Miles Traveled in each grid cell. Vehicle Miles Traveled on unpaved roads were calculated using the same methodology. Appendix D contains the 1990 database. Results of the 1990 analysis are summarized on Table 2.

Table 2: 1990 Silver Valley Database Summary

Population	9,750
Housing Units	4,682
Households	4,000
Interstate-90 Mileage	22.79
Interstate-90 Vehicle Miles Traveled	219,124
Collector Mileage	29.16
Collector Vehicle Miles Traveled	90,102
Local Mileage	85.98
Local Vehicle Miles Traveled	25,177
Unpaved Mileage	61.13
Unpaved Vehicle Miles Traveled	1,065

Source: Intermountain Demographics

Methodology codes were applied to households and Vehicle Miles Traveled variables in each record. Quality control codes also were assigned to the two variables. Appendix E contains methodology and quality control codes for the 1990 database.

VI. 1994 AND 2000 FORECASTS

The 1994 and 2000 databases were assembled to show changes in households and Vehicle Miles Traveled for each of the 220 grid cells. The first step in compiling this information was to project Shoshone County population for 2000.

Population forecasts. The original methodology to determine Silver Valley population was to forecast the 2000 population for Shoshone County, and to "step-down" that forecast to the Silver Valley. The 1994 population for Shoshone County and Silver Valley would be an extrapolation of the 1990 to 2000 forecast. A range of forecasts, with different assumptions, would be arrayed. A single forecast would be chosen, based on discussions with Silver Valley elected officials, local residents and others familiar with demographic characteristics in the valley.

Assembling past population trends in Silver Valley was undertaken to determine if a trend emerged. Shoshone County's population had fluctuated dramatically over time. The largest population was slightly more than 22,000 people in the 1950s. The lowest population was in 1990, and was a 27.5% decrease from 1980 (See Table 3).

Table 3: 1920 - 1990 Shoshone County Population

Year	Shoshone County Population
1920	14,250
1930	19,060
1940	21,230
1950	22,806
1960	20,876
1970	19,718
1980	19,226
1990	13,931

Source: U.S. Census Bureau

Four population projection alternatives were prepared for further analysis. The alternatives ranged from a high of 19,400 residents, a return to the 1980 level of population, to a low of 10,100 residents (See Table 4).

The first alternative was based on forecasts done in 1985 by Boise State University for the Idaho Department of Water Resources. Alternative II was prepared by the Idaho Division of Financial Management. Alternative III was a continuation of the 1920 through 1990 trend. The last alternative was a continuation of the 1980 to 1990 trend.

Table 4: Shoshone County Population Forecasts, 2000

Alternative	2000 Estimated Population
I	19,400
II	18,500
III	13,900
IV	10,100

Sources: Idaho Department of Water Resources
Idaho Division of Financial Management
Intermountain Demographics

Discussion with local elected officials and residents as well as subsequent research showed that there had been additional lay-offs at the mines in the Silver Valley since the 1990 census count. There also was a corresponding reduction in Silver Valley population since that time. These findings indicated a new approach to forecasting 1994 and 2000 population and households.

1994 Forecasts.

Population and Households. The 1994 Silver Valley study area population was estimated at 9,200 residents. There would be 3,800 households in the study area that same year.

The methodology to derive the population forecast was to first determine the reduction in mining and related employment, based on an economic multiplier. That reduction in employment was applied to the 1990 Shoshone County population to produce a 1991 county population estimate of 11,900. The 1991 Silver Valley population of 8,400 was determined as a ratio of Silver Valley to Shoshone County population, based on past census data.

The 1994 Silver Valley population was determined by applying the Idaho Division of Financial Management 3.3% rate of population increase to the 1991 estimate of 8,400 residents (Rural Profile of Idaho, 1990). That growth rate was assumed to apply to the Silver Valley study area, since most Shoshone County residents live in the area. The 1994 population forecast for Silver Valley was 9,200 persons. This methodology assumes that the study area population decreased from 1990 through 1991, and increased from 1992 through 1994. Even with the 3.3 percent growth rate, the 1994 population was less than the population in 1990.

The number of households was determined by dividing the 1994 Silver Valley population by a persons per household rate of 2.45, based on the 1990 census. Total households decreased from 4,000 in 1990, to 3,800 in 1994. Household reductions were made in grid cells located in Kellogg, Osburn, Pinehurst, Smelterville and Wallace based on discussions with local residents and elected officials.

Interstate and Collector Vehicle Miles Traveled. Both categories of roadway Vehicle Miles Traveled increased from 1990 to 1994. Increases were based on average annual growth factors provided by the Idaho Transportation Department. Annual growth factors ranged from 0.015% to 0.05%, depending on the location of a road segment. The growth factors are based on an extrapolation of past trends in traffic counts.

Local Vehicle Miles Traveled. The local Vehicle Miles Traveled was based on 1994 households multiplied by the average trip rate (4.3 vehicle trips per day) and multiplied by the number of miles of local road in each cell. This followed the methodology used to determine 1990 local Vehicle Miles Traveled. Since there was a decrease in the number of households, it was assumed that no new local streets would be needed between 1990 and 1994.

Unpaved Vehicle Miles Traveled. This data set remained constant from 1990 through 1994. There were no household reductions in grid cells containing unpaved roads. It also was assumed that no new unpaved roads would be constructed from 1990 to 1994.

1994 Summary. There was a net population reduction of nearly 550 in the Silver Valley from 1990 through 1994. Population decreased from 1990 to 1991, in response to mining industry lay-offs. Population was assumed to increase beginning in 1992, but the 1994 forecast fell short of the 1990 total. Households decreased by 200 in the 1990 to 1994 time period (See Table 5).

Interstate and collector Vehicle Miles Traveled increased, based on forecasts prepared by the Idaho Transportation Department. Local Vehicle Miles Traveled decreased slightly in response to the decrease in households. Unpaved Vehicle Miles Traveled remained constant.

Table 5: 1994 Silver Valley Database Summary

Population	9,200
Housing Units	4,682
Households	3,800
Interstate-90 Mileage	22.79
Interstate-90 Vehicle Miles Traveled	258,964
Collector Mileage	29.16
Collector Vehicle Miles Traveled	99,544
Local Mileage	85.98
Local Vehicle Miles Traveled	23.995
Unpaved Mileage	61.13
Unpaved Vehicle Miles Traveled	1,065

Source: Intermountain Demographics

Appendix F contains the 1994 database.

2000 Forecasts.

Population and households. The Idaho Division of Financial Management average annual population increase rate of 3.3% was applied to the 1994 Silver Valley population to yield a total of 10,600 residents in 2000. That total was divided by the persons per household rate of 2.45 to yield a total of 4,300 households in 2000. The increase in households was allocated to grid cells in Kingston, Pinehurst, Kellogg, Wallace and Osburn based on future growth patterns discussed with local residents and elected officials.

Interstate and Collector Vehicle Miles Traveled. Vehicle Miles Traveled for the interstate and collectors were forecast to 2000 using Idaho Transportation Department annual growth factors. These growth rates ranged from 0.015% to 0.5% annually, depending on the location of the road segment.

Local Vehicle Miles Traveled. Vehicle Miles Traveled on local roads was determined by multiplying the number of households by the average rate of 4.3 trips per day. That total was multiplied by the length of the local road segment for each grid cell. It was assumed that no new local roads would be built between 1994 and 2000, since the total number of housing units in 2000 did not exceed the number of housing units in 1990.

Unpaved Vehicle Miles Traveled. This data set remained constant from 1994 to 2000. No households were added to grid cells containing unpaved roads.

2000 Summary. There was a net population gain of 1,400 residents from 1994 to 2000, resulting in an increase of 500 new households in the Silver Valley.

Vehicle Miles Traveled increased on the interstate and collector system from 1994 to 2000. Since there was an increase in population and households, Vehicle Miles Traveled also increased on the local street network. Unpaved Vehicle Miles Traveled remained constant.

Table 6: 2000 Silver Valley Database Summary

Population	10,600
Housing Units	4,682
Households	4,300
Interstate Mileage	22.79
Interstate Vehicle Miles Traveled	318,725
Collector Mileage	29.16
Collector Vehicle Miles Traveled	112,346
Local Mileage	85.98
Local Vehicle Miles Traveled	27,987
Unpaved Mileage	61.13
Unpaved Vehicle Miles Traveled	1,065

Source: Intermountain Demographics

The 2000 database is shown in Appendix G.

VII. CONCLUSION

This analysis focused on population, household and travel changes in Silver Valley, Idaho. It began with a discussion of the 1988 database which was prepared in 1989. The main emphasis was preparing databases for 1990, 1994 and the year 2000. The databases included households and interstate, collector, local road and unpaved road mileage. All data were prepared for 220 grid cells in the study area.

The analysis showed that population and households would decrease from 1990 to 1994, due to lay-offs in the mining industry. As a result, local road mileage also would decrease in the same time frame. Unpaved mileage was assumed to remain constant. Interstate and collector mileage showed increases from 1990 to 1994, according to forecasts prepared by the Idaho Transportation Department.

From 1994 through 2000, population and households showed an average annual increase of 3.3%. This growth rate was developed by the Idaho Division of Financial Management and was applied to the 1994 database. The increase in households was responsible for a 16% increase in local Vehicle Miles Traveled, from 1994 to 2000. Unpaved Vehicle Miles Traveled again remained constant. Interstate and collector Vehicle Miles Traveled increased according to Idaho Transportation Department annual growth factors.

APPENDIX F

CONTROL STRATEGY

Pinehurst PM_{10}
Air Quality Improvement Plan
February 5, 1992

APPENDIX F

Control Strategy

TRENDS IN PARTICULATE LEVELS IN THE SILVER VALLEY

A REVIEW OF THE EFFECTIVENESS OF THE AIR QUALITY ADVISORY PROGRAM

THROUGH THE WINTER OF 1990-1991

Idaho Air Quality Bureau
Department of Health and Welfare
Division of Environmental Quality
450 W. State Street
Boise, Idaho 83720

This report was prepared and edited by the Meteorological staff of the Idaho Air Quality Bureau (IAQB). IAQB meteorologists provide day to day technical operation of the Air Quality Advisory program and disseminate public information. Strong support from the IAQB monitoring staff made this possible.

Special thanks go to the Pinehurst City Government, the Kellogg School District, and the staff and management at the Pinehurst Elementary School. Their cooperation with IAQB monitoring and public information programs have allowed for a better understanding of trends in air pollution levels, and for the development of programs to ensure public health.

Support from area residents and local press will remain a key to the successful operation of the AQA program. Such support has been strong and effective, and appears to be making a difference in improving air quality trends.

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1. INTRODUCTION

The Air Quality Advisory (AQA) service was initiated in the Pinehurst area in December of 1988, and has been operating each cold weather season since then (mid fall through February). Information has been provided daily on air quality levels and trends, and cooperation has been sought, when necessary, to limit the extent of pollutant accumulation. This report reviews the effectiveness of this service and assesses potential modifications and enhancements to maximize citizen use of and response to the information provided.

The AQA service consists of a 24-hour telephone line (682-3333) with an answering machine. The recorded message, which is updated by 9:00 A.M. local time on weekdays and as needed on weekends and holidays, reports on the current air quality and short term outlook as well as potential health effects. Requests for limiting wood burning are also included when pollutant trends show high impacts.

2. POLLUTANT REGULATIONS AND MONITORING

The particulate pollutant for which federal and state health standards have been promulgated has been PM_{10} since approximately 1986. PM_{10} is defined as particulate matter with an aerodynamic diameter less than or equal to 10 microns. These small particulates are considered inhalable, because they can pass through bodily filtering systems into the respiratory tract. The state and federal health standard for PM_{10} is 150 ug/m^3 for a 24 hour average and 50 ug/m^3 for an annual average.

The Environmental Protection Agency (EPA) has identified a reference method for measuring PM_{10} levels. Ambient air is drawn at a known rate through an inlet that removes larger particles which pose less of a health threat. The remaining smaller particulates are drawn through and trapped on a filter. The PM_{10} concentration is calculated from the weight of particulates on the filter. The certified method is very accurate, but requires a 24 hour sampling period. The filter must then be manually removed, transported to a laboratory, and allowed to acclimatize before the deposited particulates can be weighed. As a result, reference method PM_{10} concentration measurements are not available until well after the event.

IAQB estimates hourly particulate levels in real time using a nephelometer. This instrument infers particulate levels by drawing air into a chamber and measuring the scattering of light through the chamber. Scattering is a function of the particulate load. This method of measurement is not certified by the EPA. It has proven quite accurate though, as long as the particulates are small in size. This is very true of smoke particles, but much less so for other particulates such as dust. The nephelometer provides excellent estimates of PM_{10} concentrations when smoke predominates but is not as effective at picking up larger particles such as road dust.

IAQB has also collected meteorological data in Pinehurst since 1987. This information is important in understanding and forecasting trends in pollutant levels. Pinehurst tends to have more frequent windless winter days than Kellogg and Mullan, which could lead to elevated pollutant levels in Pinehurst. Until August of 1990, IAQB operated a small weather station at the Pinehurst Elementary School Annex Building. Since that site became unavailable, IAQB installed a state of the art meteorological tower behind the school yard in September of 1991. For the winter of 1990 - 1991, the only local weather data available was from the National Weather Service site in Mullan.

Local air quality advisory programs are operated using the nephelometer readings, and verified by reference method sampling. One reference method PM_{10} monitor is located in Pinehurst, with another site planned in Osburn. A reference method lead monitor is located in Kellogg. IAQB's nephelometer is in Pinehurst. It is about a block and a half from the Elementary School PM_{10} monitor site, having been relocated there from another site equally close in November, 1990. The near proximity of the nephelometer to the PM_{10} monitors allows the IAQB to verify and calibrate PM_{10} predictions from the continuously available nephelometer readings.

Nationwide, reference method monitoring is scheduled every sixth day, with the schedule accelerated in identified problem areas. Silver Valley sampling has occurred on the national schedule since the 1974. Historical sites located in Pinehurst, Kellogg, and Osburn appeared to indicate significantly elevated lead levels in Kellogg and particulate levels in Osburn and Pinehurst. An early 1980's loss in resources forced IAQB to drop the Osburn site. IAQB plans to reestablish monitoring in Osburn by year's end. Monitoring continues in Kellogg for lead, but not PM_{10}. This monitoring method can give an indication of particulate levels, but not PM_{10} concentrations.

Because Pinehurst's PM_{10} monitoring has historically shown wintertime exceedances of health standards, IAQB, under agreement with the EPA, has seasonally accelerated the local sampling schedule to every other day in that community since 1988.

3. GENERAL PARTICULATE PATTERNS IN THE SILVER VALLEY

The geography of the Silver Valley, and much of Idaho, at most times provides scenic vistas and enhanced recreational opportunities. This same geography can work against us during the winter. The nature and shape of the intermountain valleys can lead to stagnant weather conditions when cool, dense air settles down into the valley. This plug of cold air is cut off from the general circulation and trapped between the valley walls. Warmer air moving into the area, less dense than the cold air, rides over the top of the cool air instead of mixing down to the ground. The result is cold temperatures in town, and minimal air exchange in and out of the cold valley.

Under these stagnant conditions, residential heating emissions are high because of the cold temperatures, but the lack of air exchange severely limits dispersion of the pollutants. The result is typically a buildup in pollutant levels for the duration of the stagnation episode. Requests for voluntary burning limitations in the AQA program are designed to slow or stop this accumulation so that unhealthful conditions are avoided, as had historically occurred.

The more open portions of the Silver Valley, such as Kellogg and Smelterville Flats, are not as severely affected because winds flowing up and down the valley provide enough air movement to transport pollutants away (In warm, dry weather these same winds could lead to heavy blowing dust impacts). But where valley geographical features block the flow of air, stagnant pollutant buildup can occur. The ridges surrounding Pinehurst and those just east of Osburn appear to restrict air movement in those communities, leaving them especially prone to pollutant accumulation.

There is a distinct diurnal cycle in particulate levels even during pollutant accumulation episodes. During the midday period, after the sun has had a chance to heat the ground, the hot air rises. It is replaced by cold air from above, resulting in mixing the lower layer near the ground. Ground level pollutant concentrations usually decrease. As the sun sets, though, the air becomes colder and denser. It settles down low and limits the dilution of pollutants. Since this coincides with maximum emissions from residential heating, particulate levels increase, often significantly. Levels typically remain elevated until the following day's heating again induces mixing.

Most of the year the daytime heating and the mixing it generates causes enough vertical mixing to lift the previous night's air above the local terrain, to be carried away by the upper air weather pattern. During stagnant conditions, surface heating is not sufficient to mix pollutants out of the valley. The shorter days and lower sun angles of the winter season offer less incoming heat to drive the mixing. Fog and/or particulates can further hinder surface heating, delaying or minimizing daytime mixing. Snow cover works similarly, reflecting away the sun's heat. The dirty air may rise off the ground, but typically only drifts slightly upvalley. As the evening cooling begins, it sinks back down following the terrain.

These problem stagnation conditions are described by Wolyn and McKee as deep stable layers. They studied four intermountain cities, finding that these conditions occurred frequently in intermountain valleys. A brief description of deep stable layer theory is presented in Appendix A. This theory describes the life cycle of a stagnation event and analytically defines measurements of stagnation occurrence and severity.

4. RECENT POLLUTANT TRENDS IN THE SILVER VALLEY

Particulate trends in the Silver Valley and most of the northwest have historically shown winter season peaks, induced by the geographical factors described in Section 3. In dry years with windy falls, though, much of North Idaho can be affected by blowing dust or forest fire smoke. Technically, EPA considers these "acts of God" and exceptional events which are not in official PM_{10} records. Two such exceptional events have been observed in the Silver Valley since 1987; smoke from numerous forest fires on September 6, 1988, and a dust storm which affected all of North Idaho on September 25 and 26, 1989.

Since the initiation of the Air Quality Advisory program in 1988, the trends in particulate pollutant levels in the Silver Valley have been encouraging. As mentioned in Section 2, the only continuously operating PM_{10} monitoring site during that period is located in Pinehurst. However, a special Saturation Study was performed in February and March of 1989 with 15 monitors distributed throughout the Silver Valley from Bowman's Addition through Wallace. A very significant stagnation event occurred during the study, between February 7 and 11. Unfortunately, though, the very cold temperatures (well below zero and windy) caused some difficulty in the operation of the monitors.

In most of the seven communities in which monitors were placed, PM_{10} concentrations appeared to remain below the daily average PM_{10} health standard. This was true in Bowman's Addition, Smelterville, Kellogg, Silverton, and Wallace. PM_{10} concentrations in Pinehurst and Osburn appeared to reach unhealthful levels, although just barely so in Pinehurst. IAQB still awaits EPA's final verification of the data.

Figure 1 shows that annual average PM_{10} concentrations in Pinehurst have steadily decreased from well above the health standard of 50 ug/m^3 in 1987 (68 ug/m^3) to well below the standard in 1990 (32 ug/m^3). The maximum observed 24 hour average PM_{10} concentration also is trending downward, although an exceedance of this standard was observed on January 10, 1991.

Figure 1.

24 Hr. Standard

Annual Average Standard

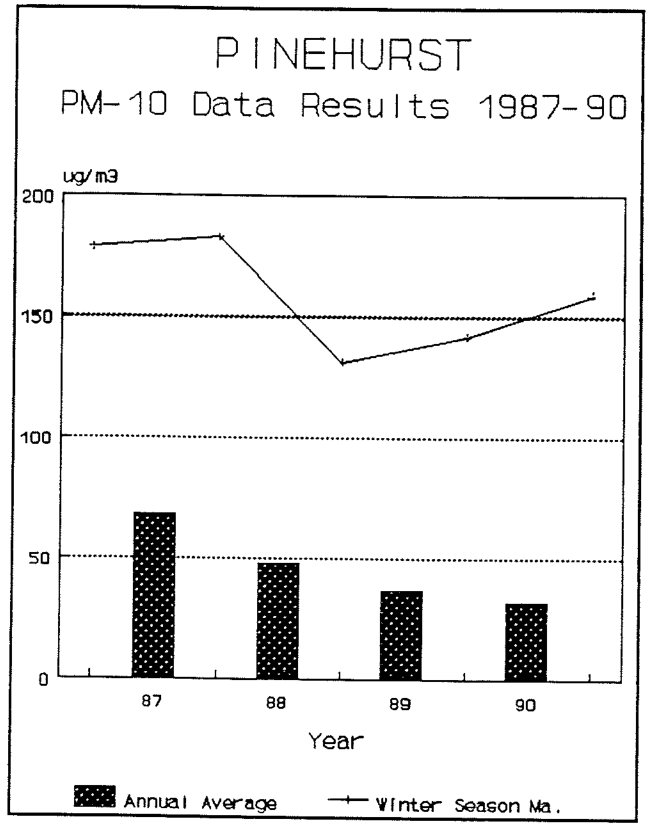


Table 1 further indicates the trend toward decreasing particulate levels in the Silver Valley. In the two winters prior to the initiation of the Air Quality Advisory program more than 11% of the winter observations reached unhealthful levels. Less than 1 per year, or less than 0.3%, is required to meet the health standard. No exceedances were observed in the first two winters of program operation. Last winter, one exceedance was measured in 91 observations. Similarly, the percentage of observations over 100 ug/m^3 decreased from over 30% in the two earlier winters to less than 10% in the last two.

Table 1.

Elevated Daily Winter Season PM_{10} Concentrations in Pinehurst

Winter	Number Samples	PM_{10} > 150	>100	% PM_{10} Obs. > 150	>100
86-87	27	3	10	11.1	37.1
87-88	42	5	14	11.9	33.3
88-89	79	-	9	0.0	11.4
89-90	89	-	4	0.0	4.5
90-91	91	1	8	1.1	8.8

Meteorological analysis of weather conditions and chemical analysis of filters from Pinehurst have clearly indicated that exceedances of PM_{10} health standards there are caused by wood burning emissions. Chemical analysis shows that wood smoke accounts for 55% to 90% of the PM_{10} on days when exceedances of the health standard were measured. Appendix C presents a case study of the January 10, 1991 event.

Figures 2 to 4 show PM_{10} trends measured in Pinehurst for each of the last three winters. These represent the first three seasons of operation for the Air Quality Advisory program. The Xs represent the PM_{10} concentrations as measured according to EPA specifications. The solid line represents the PM_{10} values inferred from the nephelometer. Since the EPA certified data takes weeks to process, the nephelometer data is the only information available in real time.

Figure 2.

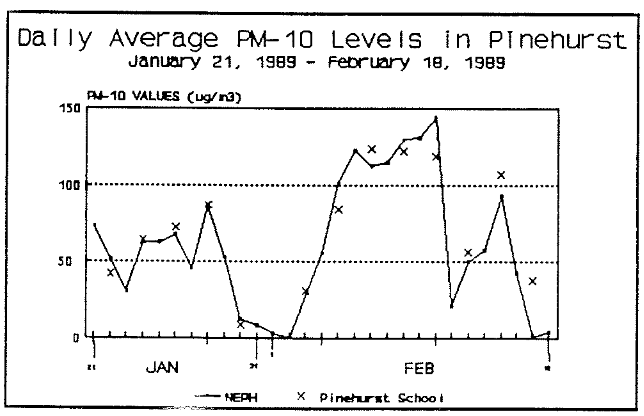


Figure 3.

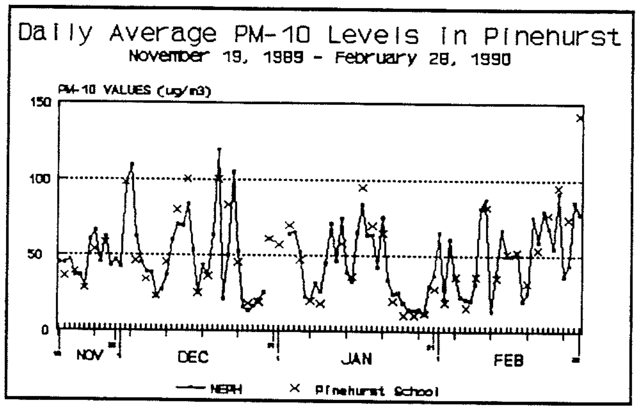
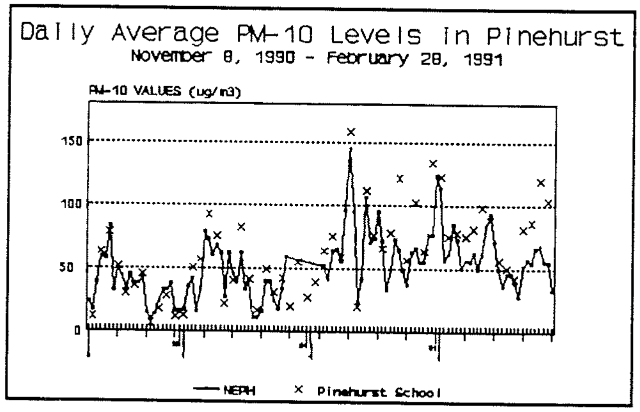


Figure 4.



The nephelometer implied PM_{10} levels verify well against measured PM_{10} concentrations. A statistical review of this accuracy follows the figures, and is addressed again in Appendix D. This is especially important when PM_{10} concentrations are high. Note that late in the season, when road dust impacts are typically most pronounced, observed PM_{10} concentrations often are above nephelometer implied values but below the health standard.

5. NEPHELOMETER bSCAT CORRELATION

Twenty-four hour PM_{10} concentrations from EPA reference method PM_{10} samplers are compared with twenty-four hour average values taken from a collocated nephelometer. The nephelometer uses a laser beam to measure the back scattering (bscat) caused by particulates. A linear regression is performed to determine the best fit line relating the two parameters. The equation of this line is then used to convert nephelometer bscat data to PM_{10} concentration.

Prior to August, 1990, when the nephelometer was located at the Pinehurst School annex, the equation for transforming bscat to PM_{10} concentration at Pinehurst was

$$PM_{10}\ (ug/m^3) = 17*bscat - 8.$$

This relationship had an R^2 correlation coefficient of 0.70. This statistical relationship is further described in Appendix D.

After November of 1990 the nephelometer was relocated and a new relationship needed to be developed. The new relationship is based on winter 1990 data and was not available during the winter 1990-1991 AQA season. The new relationship is

$$PM_{10}\ (ug/m^3) = 17.6*bscat + 2.$$

The R^2 for the new relationship improved to 0.82. It should be noted that the new equation has a positive intercept, more consistent with other observations statewide. This equation is more consistent with the relationships seen at the other IAQB sites around the state.

In general, bscat correlates well with PM_{10} concentrations. However, there are situations when the nephelometer can not reliably predict PM_{10} concentrations. The nephelometer "sees" smaller particulates well, but if the particle size distribution is skewed such that many larger particles are present the nephelometer will underestimate particulate concentrations. This situation occurs during episodes of blowing dust or resuspended dust. It can dominate particulate trends in late winter and early spring when the snow cover recedes and sanding materials are kicked up as dust. During pollution episodes in which the primary pollutant is wood smoke the use of a nephelometer is quite accurate at determining PM_{10} concentration.

6. AIR QUALITY ADVISORY EFFECTIVENESS

While it is documented above that trends in air quality are toward improvement, there remains a question of why. IAQB would like to believe the Air Quality Advisory program is responsible; however, many other factors also contribute and could have at least as important an effect. Local support in the form of public information and cooperation with IAQB programs, especially from the City of Pinehurst, is an important factor. Also important has been the increase in the use of pellet stoves. These stoves help air quality in two ways: they burn much cleaner than traditional stoves, and the market for pellets has caused the wood products industry to phase out the burning of their byproducts.

An important factor in assessing the effectiveness of any plan for limiting pollutant impact during stagnation episodes is the number and severity of stagnation events which occur. Unfortunately, no analytical measure of the severity of stagnation events during the last few winters can be provided because the necessary upper air data is not available. Generally, the winter of 1989 - 1990 seemed fairly mild, while significant stagnations were observed in February, 1988 and January, 1991. Throughout the northwest, the most severe winter for stagnant weather conditions was 1985 - 1986.

The Air Quality Advisory program is believed to have been more effective during its first two winters of operation than it was last winter. In the first two winters, press releases describing the program and information provided should have made it more visible. Last winter, because our meteorological and nephelometer monitoring stations were down when the program was slated to begin, no press release was issued. When the nephelometer was brought on line in early November, 1990, daily reporting began two weeks behind schedule.

It is clear from responses to questions in the March, 1991 residential heating survey that local awareness of the advisory service is limited. This may have been affected by the lack of a press release that fall. When local residents were asked if they had heard of the AQA phone line, 291 or 83% of the people indicated they had not. 166 people, or 47%, said they did not know where they would call to find out more about air quality in the Silver Valley. This makes it clear that this program is not the only factor in the turnaround to improved particulate levels.

IAQB found it encouraging that no exceedances of PM_{10} were observed during the two winters of full program operation, and that only one exceedance was measured during last winter's operation with limited data.

The answering machine had a call counter built in. IAQB expected to use the counter to determine the level of use of the recorded message. It was designed to count incoming messages, though, and did not meet IAQB need to count the number of times the message was listened to. As a result there is no record of how many people called the line or on which days.

The effectiveness of the AQA will be significantly improved with the reinstallation of the weather station and the benefit of a local visibility observer. It should also experience increased usage as a result of a comprehensive public awareness campaign. The assignment of local staff responsibilities may be possible as the Idaho Division of Environmental Quality reorganizes and additional resources are placed in the field offices. This would enhance the awareness and timeliness of the service, helping play a key role in the Pinehurst area's attainment program.

7. SUMMARY AND FUTURE PLANS

The effectiveness of the enhancements to the service will be measured in several ways. PM_{10} monitoring data will be used to assess improvements in ambient air quality, although it is hard to draw a direct correlation between these numbers and the programs described above. A more realistic approach to the assessment is the use of surveys. IAQB anticipates performing another survey in the spring of 1992. Many of the same questions that were asked on the 1991 survey will be repeated, and responses will be compared.

IAQB has identified funding for a new answering machine with a counter. This machine will be formatted to provide additional information on air quality programs in the Valley. The bioenergy funding will also be used to initiate development of a broad based public awareness program which will highlight the availability and importance of the advisory line.

Other steps being taken to enhance the effectiveness of the advisory line include the installation of an new meteorological station in Pinehurst. The weather station that was placed at the elementary school in December of 1988 was removed in August of 1990, along with the nephelometer. The latter was moved to the fire station, but the weather station was not reactivated until September of 1991 when state of the art equipment was put in place at the school. This new equipment has higher quality instruments, and allows the IAQB to measure additional parameters.

IAQB is also enlisting the assistance of one of the teachers at the school to report on local conditions when a pollutant buildup is possible. The teacher has received training in visual observation of air quality, which includes estimating visual range from predetermined fixed points. This allows for PM_{10} impacts to be corroborated. The teacher will be contacted when the Bureau's meteorologists suspect a stagnation event. This local perspective will prove helpful to the Boise technical staff in supplementing the data from the instruments.

IAQB has identified several long term strategies that would enhance the effectiveness of the AQA service. One is the use of a real time reference method PM_{10} monitor with telemetry. This would probably be a PM_{10} beta gauge or a TEOM, both of which cost in the range of $18,000. Another strategy would be the presence of a local (Coeur d'Alene) staff member who would be responsible for the AQA forecasting and publicity. This person would need some training in general interpretation of meteorological and air quality data. They would have the resources of the IAQB's meteorologists to call on in case any questions arise.

The local staff person would be the contact point for the media and other groups which want information on local air quality. This person would be expected to take the initiative on informing the public and the media about the program, and contacting them when a stagnation event is building up. This public awareness role is critical to the effectiveness of the AQA service and will continue to receive high priority.

REFERENCES

Boise City Wood Burning Ordinance, 1986

Bild, E. and Thorson, P., An Assessment of Regulatory and Nonregulatory Control Strategies on an Area-wide Source of Air Pollution: A Case Study in Missoula, Montana, 1986

Idaho Air Quality Bureau, Operations Manual for the Air Quality Index Program for the Boise Metropolitan Area, October 1989

Idaho Air Quality Bureau, Trends in Particulate Levels in Boise A Review of the Air Quality Index Program for the Winter of 1988-1989, August 1989

Idaho Air Quality Bureau, Trends in Particulate Levels in Boise A Review of the Air Quality Index Program for the Winter of 1989-1990, September 1990

U. S. Government, Code of Federal Register, 40 CFR, Part 50, Appendix J & K

Wolyn, P. G. and McKee, T. B., Deep Stable Layers in the Intermountain Western United States, Monthly Weather Review, pp. 461-472, March 1989

APPENDIX A

DEEP STABLE LAYER THEORY AND METHODS OF ASSESSING STAGNATION STRENGTH

During most seasons, air circulation patterns over the Pacific Northwest and the Silver Valley are characterized by a regular flow of air through the valley. As discussed in the General Particulate Patterns in Boise section, though, the valley geography and climate can often lead to stagnant weather patterns during the winter season, severely restricting the exchange of air in and out of the valley. Such conditions can potentially lead to the buildup of air pollutants in the valley.

In a technical paper published in the March, 1989 Monthly Weather Review, Paul Wolyn and Thomas McKee reported on their study of the formation and life cycle of Deep Stable Layers. Stagnant conditions, where heavy cold air is trapped near the surface and lighter warm air floats above, are very stable in a meteorological sense. Air movement is suppressed in the vertical because the heavier air is near the ground and the lighter air is above.

Another meteorological term for these conditions is inversion. The Idaho public has come to relate the term inversion to air pollution episodes. Actually, the term has no reference to air pollution in its definition, but is a weather condition conducive to the accumulation of air pollution. Technically, an inversion is a condition where air temperature increases from the ground up (the inverse of the usual condition where temperature drops as you go above the surface).

Wolyn and McKee described an analytical method of assessing the onset and severity of a stagnation event. By analyzing the rate of change of temperature in the lowest 1500 meters (approx. 5000 ft.), they defined statistical tests which could determine the onset and severity of Deep Stable Layers. They defended Deep Stable Layers as stagnation events severe enough that normal daily heating would not be sufficient to allow air to mix in from outside the local valley.

Their 25 years of climatological study was based on National Weather Service upper air reporting stations. The nearest stations to the Silver Valley are located in Spokane, Missoula, and Boise. Their study showed that Deep Stable Layers occur frequently in western valleys, with severe events lasting three or more days typically occurring at least once a year.

IAQB studies have shown that PM_{10} concentrations trend with DSL statistics. This correlation is quite damped when valley temperatures are comparatively warm, but very dramatic when valley temperatures are cold. One explanation is that heating sources dominate the local emissions patterns when temperatures drop. Technical reasons discussed in the Wolyn and McKee paper are likely to contribute to this trend. Snow cover, dense ground fog, and other factors limiting the surface heating effect of sunlight are more likely in the extremely cold deep stable layer episodes.

APPENDIX B

Samples hourly PM_{10} trends on days with Good to Moderate Air Quality

The above graphs of hourly PM_{10} concentrations in Pinehurst for November 10, 1990 and February 22, 1991 show typical winter diurnal trends in particulate levels. These values are nephelometer inferred.

Each case shows lower levels during the afternoon when solar heating generates mixing, with particulates increasing by sunset and remaining elevated through the night. Another common feature shows up well here. A secondary peak often occurs just after sunrise. The first heat of the morning starts the mixing cycle on a small scale, bringing the thickest particulate haze down to the ground, while residents awaken and restart heating and transportation activity. It is typically during this early morning impact period that Air Quality Bureau scientists prepare their analyses and forecasts.

Both examples show good to moderate conditions. Good implies a 24 hour average PM_{10} of less than 50 ug/m^3; moderate implies a 24 hour average between 50 and 150 ug/m^3. These two examples had daily average PM_{10} levels of 46 and 68 ug/m^3. Less smoke buildup occurs during warm weather, when emissions are lower, or windy weather, when pollutants blow away rather than accumulating. Problem cases would show higher overnight levels, later and less extensive afternoon relief, and very significant early evening increases as dirty air resettles.

APPENDIX C

Case studies of events with Elevated PM_{10} Concentrations

Two arctic blasts dominated Idaho's weather from mid December through mid January, with significant stagnation occurring in many mountain valleys during the second.

Temperatures approached or reached all-time lows around the Christmas holiday in 1990. Enough circulation was present to prevent stagnant conditions. Just before the new year, a second arctic blast blew in. Initially, the strong winds provided enough mixing that pollutants were quickly blown away. After a few days, though, the winds died down. High pressure dominated, and with weak winds and cold temperatures the weather pattern became stagnant and pollutant accumulation occurred.

The graphs below show hourly PM_{10} concentrations, as inferred by the Pinehurst nephelometer, for the second week of January, 1991. Notice that each night from the 6th on pollutant levels rose through the evening and that the generally stagnant weather pattern led to heavy accumulation by morning. Typical morning clearing became more delayed, until by the 10th and 11th it did not occur until after noon. The clearing on the 10th, in addition to being delayed, was not complete since PM_{10} levels only briefly dropped below 100 ug/m^3. As a result, air quality on January 10, 1991 was in the unhealthful range. The daily average of 159 ug/m^3 exceeded the primary health standard for PM_{10}.

Hourly particulate levels, January 6 - 12, 1991

January

6 7 8 9 10 11 12

APPENDIX D

Nephelometer - PM_{10} Regression and Scatter Diagram

The scatter diagram that follows represents another way of examining the accuracy of the nephelometer implied PM_{10} levels. This accuracy check is important because the AQI program is often operated with only nephelometer data available.

These plots present the same data from Figure 3 in a different format. The points on the plot represent each PM_{10} and corresponding nephelometer inferred value for the winter season. The solid line is the "best fit" regression line, which represents the most accurate linear relation between the nephelometer values and the PM_{10} concentrations. The points represent the officially verified data (not available until after the fact). The solid line, if much different from the point data, would show that the IAQB the equation for inferring PM_{10} levels from nephelometer readings was not reliable.

The closer all the points are to the regression line, the more dependable the nephelometer implied PM_{10} levels are. The graphs show no points significantly deviating from the regression line. This is especially important for the points with higher PM_{10} levels, points which could trigger control actions or affect the public well being. The R^2 correlation coefficient provides a statistical measure of the "goodness of fit" of the regression line. The R2 value of .82 shows good agreement between nephelometer trends and PM_{10} concentrations.

The IAQB interprets this scatter diagram as showing that nephelometer implied PM_{10} levels remained consistent through the winter, and were dependable in providing realistic estimates of actual PM_{10} concentrations. The few points with PM_{10} concentrations above 100 ug/m^3 occurred in late January and February when temperatures were warm, with road dust suspected as the primary source. This winter's regression is the first at the new Fire Station site. The results are encouraging because they show a better correlation between nephelometer values and PM_{10} concentrations.

The nephelometer regression will continue to be closely watched, since nephelometer implied PM_{10} concentrations are typically the only measures of particulate trends available to program operators in real time.

OPERATIONS MANUAL FOR THE AIR QUALITY ADVISORY PROGRAM IN THE SILVER VALLEY

Air Quality Bureau
Division of Environment
Idaho Department of Health and Welfare
450 West State Street
Boise, Idaho 83720
(208)334-5898

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1.0 INTRODUCTION

The 1989-1990 wintertime Air Quality Advisory (AQA) program for the Silver Valley has been developed in response to the designation of the Silver Valley as a Group I area for particulate matter with an aerodynamic diameter less than or equal to ten microns (PM10). The intent of the AQA program is to advise local residents of meteorological conditions and particulate concentrations, their potential health effects, and what they can do to help.

In 1988 the Idaho Air Quality Bureau (IAQB) began studies to determine the nature and extent of elevated particulate levels in the valley. This study is ongoing, with results beginning to trickle in. Last winter, the first for the AQA program, particulate levels were lower than the previous few years. A report on last winter's Saturation Study, which analyzed spacial particulate distributions and attempted to identify areas with pollutant levels of concern, will be available by November, 1989.

The AQA program will maintain a 24-hour telephone line (682-3333) dedicated to reporting the current air quality and short term outlook in the Pinehurst area during the cold weather season. Daily reporting will begin this year on October 15th.

When necessary, the AQA report also carries Air Stagnation Advisories issued by IAQB. Air Stagnation Advisories typically cover a wider area, and carry with them the force of state law in prohibiting open burning. These advisories indicate areawide conditions threatening pollutant buildup, and will provide coverage to surrounding communities when necessary.

Analyses figure to be quite accurate. They will be based on data collected in Pinehurst. Forecasts will consider all availble data. IAQB's planned installation of a state of the art meteorological station at the Pinehurst Elementary School will significantly enhance AQA analysts understanding of local diffusion patterns. Forecasts should improve after the installation of the new equipment, as local conditions are better understood and the effects of voluntary emissions reduction programs are noted.

Air Quality levels will be categorized, according to particulate load, using the Air Quality Index (AQI).

2.0 DESCRIPTION OF THE AQI

The AQI is a system that enables the ambient air quality to be described in terms of health-descriptor categories. It is based on the Environmental Protection Agency (EPA) Pollutant Standards Index (PSI) system, and uses identical nomenclature for the health-descriptor categories. The PSI program was developed by EPA to provide a nationally consistent program for reporting urban air quality. Table 1 lists the Health Effect Descriptor, General Health Effects, and Cautionary Statements associated with various levels of fine particulates (PM10). The "unhealthful" category corresponds to the short-term primary standard for the specific pollutant.

The short-term particulate standard is specified as a maximum 24-hour PM10 concentration of 150 micrograms per cubic meter (ug/m^3). Measurements of PM10 typically involve particles ranging from about 0.1 to 10 microns in diameter (the size of most inhalable particulates in the atmosphere).

High particulate concentrations can adversely affect human health, climate, visibility, vegetation, and personal comfort. The effects of particulates on human health and welfare are directly related to their chemical composition and size.

Inhalable particulates are of greatest concern because they enter through the nose and mouth and can penetrate the deeper regions of the lung. Major health effects are lung tissue damage, carcinogenesis, breathing and respiratory difficulty, and aggravation of existing lung and ear diseases. The people most sensitive to the effects of particulate matter are elderly individuals, children, smokers, and individuals with existing respiratory or heart diseases.

Particulate pollution in Pinehurst is measured directly by PM10 samples, and indirectly by nephelometer readings.

PM10 levels are monitored with high volume samplers, which will be run more frequently than usual in Pinehurst, every other day for twenty-four hours. High volume samplers pull ambient air from the surrounding area and collect the particulate matter 10 microns or less in diameter it carries on a filter. The filter is weighed before and after exposure in order to determine the net amount of inhalable particulates in the air for the sampled day. Dividing this quantity by the known flow volume yields an average PM10 concentration.

The integrating nephelometer measures the light scattered by particles and gases in a sample volume of air. The amount of scattering is proportional to the particulate level, so this measurement can be used to calculate visual range and estimate fine particle mass concentration.

There is a delay in data receipt from PM-10 monitors which makes their real-time use impractical. The sampling period is long, and a laboratory analysis must be performed before a sample concentration can be calculated. The nephelometer calculates an optical scattering (bscat) coefficient nearly instanteneously. These readings have been shown to vary nearly linearly with PM-10 levels. Fine particulate concentrations are estimated through functions relating historical optical scattering (bscat) and PM10 correlations. The accuracy of these regression equations is routinely checked. At present, PM10 levels are estimated to be 17 times nephelometer bscat readings minus 8. In this way, particulate levels can be continuously monitored.

The nephelometer readings are maintained on a data logger, which automatically telemeters the bscat coefficients and local weather conditions to a microcomputer system over a dedicated phone line. The AQA analyst may access the data at any time.

3.0 AQA FORECASTING PROCEDURES

The information needed to qualitatively forecast the AQI is of two types: (1) pollutant-related and (2) meteorological. The meteorological features and parameters used to forecast the AQI include:

- *The character and movement of air masses and fronts;
- *The incidence of stagnating high pressure systems; and
- *The incidence, intensity and height of temperature inversions.

The pollutant-related information includes data on:

- *source locations,
- *source characteristics and emissions, and
- *actual air quality measurements and trends.

For particulates, the foremost concern is the quantity of emissions released from residential woodburning. This will primarily be a function of the ambient temperature and the density of woodburning appliances in the area.

The AQA methodology is as follows:

A. Analyze the previous day's monitoring data

1. Nephelometer data

   a. Convert the bscat coefficients to particulate concentration estimates.

   b. Calculate the previous day's concentration estimate, and determine the appropriate health-descriptor category.

2. Missing data

   a. Expected repair time in the event of equipment failure is 24-48 hrs. If the nephelometer data becomes unavailable, the AQA forecaster will make a subjective advisory using the best available information.

B. Meteorological data

1. Note Pinehurst temperature and winds measured by the Idaho Air Quality Bureau meteorological instruments at Pinehurst Elementary School. (see Appendix A for sample telemetry report, which includes this meteorological data as well as the nephelometer bscat coefficients)

   a. IAQB plans to upgrade the meteorological monitoring station this fall. State of the art equipment will be installed.

2. Contact the Aviation forecaster at the National Weather Service to obtain current and forecast meteorological information on winds, inversions, air mass movements, precipitation probabilities, cloud cover, temperatures, etc. The information received from the National Weather Service is shown in Appendix B. It is updated hourly. Additional information, if necessary, can be gathered directly by phone from NWS forecasters.

C. Determine if stagnation conditions are likely to exist during the next 24-hours.

D. Forecast the AQI Health-Descriptor categories for the current day and the day following. For Friday, also issue a forecast for conditions on Sunday. The forecast will be based on current pollutant levels and expected meteorological conditions.

E. Record the AQA forecasts, and Air Stagnation Advisories when applicable, on the automatic telephone answering device. An example of the telephone message format is given in Figure 1 and the AQI cautionary statements and directives are shown in Figure 2.

Air Quality Advisory forecasts for the current and following day will be issued by the State of Idaho Air Quality Bureau by 9:00 a.m. each day (Monday through Friday). The forecast issued on Friday will include a forecast for Sunday, thus providing seven-day a week coverage.

FIGURE 1

TAPED TELEPHONE MESSAGE FORMAT

Hello. This is NAME, TITLE for the Idaho Air Quality Bureau, with the DAY-OF-WEEK, MONTH, DAY, Air Quality Advisory report for

the Silver Valley.

It is estimated that yesterday's Air Quality was in the HEALTH-DESCRIPTOR category.

The outlook for today is for an Air Quality Index in the HEALTH-DESCRIPTOR category.

with ADJECTIVE moderation during TIME-OF-DAY (optional)
Residents are requested to voluntarily reduce the use of wood stoves or fireplaces whenever possible to minimize the extent of smoke induced health risks
Cautionary Health Statement

(STATEMENT ON ANTICIPATED AIR QUALITY TREND over the weekend.)

This message will be updated by TIME, DAY-OF-WEEK, MONTH-DAY.

Thank you for calling.

In case of an ASA, the dashed area above will be replaced with:

_______________________________.
(Air Stagnation Advisory coverage area)

Air Stagnation Advisory statement

For the Silver Valley,

these will be included only with unhealthful forecasts

FIGURE 2

CAUTIONARY STATEMENTS AND DIRECTIVES

"UNHEALTHFUL"

Persons with existing heart or respiratory ailments should reduce physical exertion and outdoor activity.

(Under Air Stagnation Advisories, all open burning is prohibited until further notice.)

"VERY UNHEALTHFUL"

Elderly and persons with existing heart or lung disease should stay indoors and reduce physical activity.

(The use of incinerators [and all open burning] is prohibited until further notice.) Facilities utilizing coal or residual fuel oil are required to switch to natural gas or distillate oil where possible. [Residents are requested to voluntarily reduce urban area driving whenever possible.]

"HAZARDOUS (a)"

Elderly and persons with existing diseases should stay indoors and avoid physical exertion. General population should avoid outdoor activity.

(The use of incinerators [and all open burning] is prohibited until further notice.) Facilities using coal or residual fuel oil must switch to natural gas or distillate oil, or curtail the use of existing fuels. [Residents are requested to voluntarily reduce urban area driving whenever possible]

"HAZARDOUS (b)"

All persons should remain indoors, keeping windows and doors closed. All persons should minimize physical exertion and avoid traffic.

(The use of incinerators [and all open burning] is prohibited until further notice.) Because of the severity of the air pollution, additional measures have been ordered by the Governor. Information on these measures and related matters are being disseminated by the news media. Further information may be obtained by calling 334-5898.

TABLE 1

COMPARISON AMONG PM10 CONCENTRATIONS, HEALTH-DESCRIPTOR CATEGORIES GENERAL HEALTH EFFECTS, AND CAUTIONARY STATEMENTS

HEALTH EFFECT DESCRIPTOR	PM10 CONCENTRATION (24-HR. AVERAGE) UG/M3	GENERAL HEALTH EFFECTS	CAUTIONARY STATEMENTS
Good	0-50	None	
Moderate	51-150	None	None
Unhealthful	151-350	Mild aggravation of symptoms in susceptible persons and appearance of irritation symptoms in healthy population.	Persons with existing heart or respiratory ailments should reduce physical exertion and outdoor activities.
Very Unhealthful	351-420	Significant aggravation of symptoms and decreased exercise tolerance in persons with heart or lung disease, with widespread symptoms in the healthy population.	Elderly and persons with existing heart or lung disease should stay indoors and reduce physical activity.
Hazardous (a)	421-500	Accelerates the onset of certain diseases in addition to significant aggravation of symptoms and decreased exercise tolerance in healthy persons.	Elderly and persons with existing diseases should stay indoors and avoid physical exertion. General population should avoid outdoor activity.
Hazardous (b)	>500	Can cause premature death of ill and elderly. Healthy people will experience adverse symptoms that affect their normal activity.	All persons should remain indoors, windows, and doors closed. All persons should minimize physical exertion and avoid traffic.

APPENDIX A

PINEHURST TELEMETRY REPORT

LOCKED
116

UNLOCKED

T.C.S.P.D.O.R.M.E.?
T 00 RPT1 1111
337:05:00
B15 0001.3BSC
WS1 0001.7MPH
WD1 00159.DEG
TEM 0026.1^F
SIG 43.292
/

00 RPT1 1111
337:06:00
B15 0001.4BSC
WS1 0001.0MPH
WD1 00093.DEG
TEM 0025.8^F
SIG 45.775
/

T.C.S.P.D.O.R.M.E.?

UNLOCKED
116

LOCKED

APPENDIX B

NWS SUPPLIED METEOROLOGICAL DATA AND PROGNOSIS

TTAA00 KBOI 021418
SPECIAL DISPERSION STATEMENT
NATIONAL WEATHER SERVICE BOISE ID
7 AM MST THU DEC 1 1988

SYNOPSIS...THE AXIS OF A 700MB RIDGE WILL LIE OVER WESTERN MONTANA AND WESTERN WYOMING TODAY AND SATURDAY PUTTING A STRONG SOUTHWESTERLY FLOW ALOFT OVER NORTHERN AND CENTRAL IDAHO. LIGHT FLOW OVER SOUTHERN IDAHO WILL ALLOW STAGNATION.

```
WOUS00 KGEG 021200
72785 TTAA  52121 72785 99937 02906 03006 00201 ///// /////
85507 03664 22536 70067 02980 24042 50566 19161 23564 40729
28331 24573 30929 435// 24083 25049 541// 24068 20188 657//
24565 15362 609// 23561 10617 601// 27026 88176 707// 24071
77278 24088 40931 31313 110// 51515 10164 00013 10194 /////
23035=
```

```
WOUS00 KGEG 021200
72785 TTBB  5212/ 72785 00937 02906 11930 03510 22918 01309
33900 00659 44892 03662 55880 04464 66794 03470 77726 02767
88576 10780 99534 15180 11524 16162 22514 16967 33483 21557
44478 21335 55445 22723 66326 39958 77204 659// 88176 707//
99164 643// 11153 637// 22146 583// 33120 571// 44100 601//
61616 01100=
```

```
PPBB  52120 72785 90056 03006 22538 23031 90789 23033 23036
23538 91246 24547 24550 24559 9205/ 23570 24072 93025 24580
24088 24558 936// 24548 94148 24071 23561 23571 9502/ 24560
26527=
```

ID08-LEWISTON GRANGEVILLE PALOUSE AREAS
330 AM PST FRI DEC 2 1988

.TODAY...PERSISTENT AREAS OF VALLEY FOG. OTHERWISE INCREASING CLOUDS. HIGHS UPPER 30S AND 40S. WINDS EAST 5 TO 15 MPH.
.TONIGHT AND SATURDAY...CLOUDY WITH A SLIGHT CHANCE OF SNOW OR FREEZING RAIN... EXCEPT RAIN IN THE LOWEST VALLEYS. LOWS UPPER 20S AND 30S. HIGHS MID 30S TO THE MID 40S. WINDS EAST 5 TO 15 MPH.
.<
LEWISTON 48 38 45 35 GRANGEVILLE 43 28 40 MOSCOW 41 32 38

$$

ID09-IDAHO PANHANDLE
330 AM PST FRI DEC 2 1988

.TODAY...PERSISTENT AREAS OF VALLEY FOG. OTHERWISE INCREASING CLOUDS. HIGHS IN THE 30S. WINDS EAST 5 TO 15 MPH.
.TONIGHT AND SATURDAY...CLOUDY WITH A CHANCE OF SNOW OR FREEZING RAIN. LOWS 25 TO 30. HIGHS IN THE MID 30S. WINDS EAST 5 TO 15 MPH.
.<
SANDPOINT 36 27 36 10/30/30 MULLAN 38 25 36

--

130/140W TROF STECHG/SHRRG WITH N PTN BEING PUSHD INLD BY FAST MOVG S/WV RDG AHD NXT TROF LOBE IN NRN PTN SPLIT VIC 150W. PROGS AGR ON PUSHG MSTR FM STRECHG/WKNG BACLN BND OVR WA INTO NRN ID LATR TDY THEN HOLDG THIS MSTR BND OVR THE N TNGT BFR FINALLY SAGG WKND RMNS OF THE BACLN BND S AND E OVR SRN ID SAT. HIR MSTR VALUES INDCTD BY BOTH THE AVN/RGL OVR THE LFM IN ID TNGT/SAT. THESE HIR RH VALUES MAY BE OK BUT DYNAM IN THE INCOMG SHRRG TROF WIL BE WK/ESPLY IN THE S. WILL INCR POPS ONLY A LTL OVR MOS BUT KP ANY CHC PCPN IN SLT TO CHC CATEGORIES IN LN PREV FP. YANSKEY
BOI 012 PIH 001 LWS 022 SS0 022 MOSCOW 022
.ID...NONE.

IDAHO STATE WEATHER SUMMARY
NATIONAL WEATHER SERVICE BOISE IDAHO
6 AM MST FRI DEC 2 1988

SYNOPSIS...HIGH PRESSURE CONTINUED TO DOMINATE IDAHOS WEATHER OVERNIGHT WITH ONLY A FEW HIGH CLOUDS AND SOME PATCHES OF VALLEY FOG. OVERNIGHT TEMPERATURES AGAIN VARIED WIDELY OVER THE STATE. 5 AM TEMPERATURES RANGED FROM 40 AT LEWISTON DOWN TO 6 BELOW ZERO AT CHALLIS. WINDS WERE LIGHT MOST AREAS OVERNIGHT BUT THERE WERE SOME BREEZES IN THE LOWER VALLEYS OF BOTH NORTHERN AND SOUTHWESTERN IDAHO.

THE HIGH PRESSURE WHICH HAS PREVAILED OVER IDAHO FOR SEVERAL DAYS IS WEAKENING... AND IS NOW CENTERED JUST EAST OF THE STATE. THIS WEAKENING WILL ALLOW A FRONTAL SYSTEM NOW PUSHING INTO WESTERN WASHINGTON AND OREGON TO MOVE INTO THE GEM STATE TONIGHT AND SATURDAY. HOWEVER THIS FRONT WILL BE VERY WEAK AS IT REACHES IDAHO. CLOUDS WILL ACCOMPANY THE WEAKENED FRONT INTO NORTHERN IDAHO TONIGHT AND SOUTHERN IDAHO SATURDAY. THERE WILL ALSO BE A CHANCE OF RAIN OR SNOW... AND EVEN SOME LOCAL FREEZING RAIN IN THE NORTH TONIGHT AND SATURDAY. THERE WILL BE A SLIGHT CHANCE OF THESE VARIED FORMS OF PRECIPITATION IN SOUTH DURING THE DAY SATURDAY.

IDAHO EXTENDED FORECAST FOR SUNDAY THROUGH TUESDAY...

NORTHERN IDAHO
PARTLY CLOUDY SUNDAY. WIDELY SCATTERED RAIN OR SNOW SHOWERS VALLEYS AND SNOW SHOWERS MOUNTAINS MONDAY. PARTLY CLOUDY AGAIN TUESDAY. AREAS OF VALLEY FOG. HIGHS MID 30S TO MID 40S. LOWS 20S TO MID 30S.

IDAHO TEMPERATURE AND PRECIPITATION SUMMARY
NATIONAL WEATHER SERVICE BOISE ID
5 AM MST FRI DEC 2 1988

LETTER B INDICATES BELOW ZERO TEMPERATURES.

STATION...HIGH YESTERDAY...LOW UNTIL 5 AM...24 HOUR PRECIP INCL SNOW				
BOISE	37	20		
BURLEY	31	19		
CALDWELL	37	MM		
CHALLIS	15	8B		
COEUR D ALENE	35	MM		
EMMETT	42	MM		
FAIRFIELD	18	MM		
GRANGEVILLE	44	26		
HAGERMAN	MM	MM		
IDAHO FALLS	23	5		5 INCHES SNOW ON GROUND
KETCHUM/SUN VLY	32	20		
LEWISTON	49	37		
LOWELL	36	29		
MALAD	33			
MALTA	33	13		
MC CALL	20	5		
MOSCOW	41	MM		
MULLAN	39	21		10 INCHES SNOW ON GROUND
ONTARIO, OR.	30	MM		
PARMA	34	MM		
PAYETTE	38	MM		
POCATELLO	26	8	TRA	
REXBURG	20	MM		
SALMON	19	MM	TRA	
SODA SPRINGS	MM	MM		
STANLEY	16	MM		
TWIN FALLS	34	MM		
WEISER	30	MM		

BOI SA 1350 CLR 15 323/21/18/0000/039
MUO SA 1355 200 -SCT 306/20/17/1403/035=
TWF SA 1350 CLR 30 16/15/1208/033
BYI SA 1345 CLR 15 316/19/15/0610/035
IDA SA 1351 CLR 15 373/6/2/3606/039
PIH SA 1349 CLR 15 351/9/5/0605/037/SMKY E
MLD SA 1355 CLR 5F 379/5/1/0000/043/F IN VALLEY VSBY E-S2 NOSPL
U78 SA 1330 CLR 20 16/11/E1815/036/ 42898 90406 /NOSPL
S06 SA 1251 250 -SCT 7 255/23/20/0000/018/NOSPL
GEG SA 1352 W1 X 1/8F 238/25/24/0706/014/R21VR10
LWS SA 1351 AMOS 39/23/1204/M PK WND 08 000
S80 SA 1400 FINO
P69 SA 1348 RAMOS /29/26/0000/M PK WND 05 ///879 RNO
MYL SA 1352 AMOS 06/02/1500/M PK WND 00 000
U15 SA 1351 AMOS -07/-10/2901/M PK WND 02 000
27U SA 1337 W5 X 1F 400/8/5/0000/M/ /NOSPL
ALL AVAILABLE OBSERVATIONS COLLECTED

1991 SILVER VALLEY AIR QUALITY

RESIDENTIAL HEATING SURVEY RESULTS

for
The State of Idaho
Department of Health and Welfare
Division of Environmental Quality
October, 1991

ES FIELD SERVICES, *Inc.* FOR MARKETING RESEARCH

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Silver Valley Air Quality Survey

April, 1991

Survey Purpose

The purpose of the survey is to study wood burning characteristics of Silver Valley residents to determine the emissions generated by RWC (Residential Wood Combustion) devices in the Silver Valley of Idaho. Information such as the other types of heating equipment used and the attitudes and demographics of RWC device users will be analyzed to help develop appropriate control strategies.

Sampling and Sample Size

A sample size of 350 households was drawn from an estimated 4,000 households in the Silver Valley. The sample size was based upon a pre-disposed 50 percent population rate of study characteristics, a maximum difference between the true population rate and the sample rate of five percent, with a 95 percent degree of certainty. For the purpose of this survey, the boundaries of the Silver Valley extended from Pinehurst in the west, to Mullan in the east. Respondents were randomly selected from local phone books. (The communities of Elizabeth Park, Kellogg, Kingston, Mullan, Osburn, Page, Pinehurst, Silverton, Smelterville, Wallace, Wardner, and Wood Park were included in the study).

Survey Procedures

Exactly 350 households were contacted by telephone Tuesday, March 26, through Thursday, March 28, from 4 p.m. until 9:15 p.m., PST. All calls were made from the E.S. Field Services telephone research facility in Boise, Idaho. The interview was designed and executed via computer terminals.

Questionnaire Design

This survey was commissioned by what may have been viewed as a 'regulatory' agency; therefore, the possibility of respondents being resistant to answering questions was anticipated. For that reason, the specific purpose of the survey was described to respondents as a general "residential heating equipment and utility bill study." The name of the client was divulged to the respondents at the conclusion of the interview.

Survey Findings

Types of Heating Equipment Present in the Home

Respondents were asked to name the general kinds of heating equipment found in their home. (Sixty-six percent of the respondents owned more than one kind of heating equipment.) The following table shows the equipment types found in the households surveyed, and shows the equipment types listed as the main source of heat in the home.

Ownership rates of RWC devices were comparable to ownership rates for electric equipment -- 62 percent of the respondents owned RWC devices and 59 percent owned electric equipment. Forty-three percent owned natural gas heating equipment and 16 percent owned kerosene, propane or coal burning equipment.

Heating Device Used as a Main Source of Heat

For each device in the home, respondents were asked whether it was used as the main source of heat or as a back-up source. The main source of heat named most often was natural gas, which made up 38 percent (N=136) of the responses, RWC devices 30 percent (N=110), electric equipment 21 percent (N=76) and various propane, kerosene, oil and coal made up the remaining 11 percent (N=39) of the main heating sources named. The following table illustrates the heating equipment present in the homes of the respondents surveyed:

Heating Equipment Types

Equipment Type	Heating Type Owned		Main Source	
	Number	% Pop.	Number	% as Main
WOOD / PELLET	218	62.3	110	30.5
ELECTRIC	205	58.6	76	21.1
NATURAL GAS	152	43.4	136	37.7
PROPANE/KEROSENE / OIL / COAL	56	16.0	39	10.8
			361*	100.0

* 350 households were surveyed; 361 pieces of equipment were listed as main heating sources. Thus, 11 respondents listed more than one device as the main heating source.

Residential Wood Combustion

Number of RWC Devices

Sixty-two percent (N=218) of the households surveyed had some type of RWC device on their property. The average number of RWC devices was 1.37 units per household. Projecting by a base population estimate of 4,000[1] households, there were approximately **2,491 households** (± 122 households) with RWC devices and a total of **3,413 RWC devices** (± 159 devices) in the Silver Valley area (calculated by multiplying the incidence of .62 by the population of 4,000, by the average number of 1.37 RWC devices per household, then by the degree of certainty of ± 4.65 percent.

RWC Device Types Used

Wood stoves were the most popular RWC device used by residents of the Silver Valley, which made up 56 percent (N=166/299) of the RWC devices mentioned. Twenty-three percent of the RWC devices owned were fireplaces (N=71/299) followed by fireplace inserts which made up 14 percent (N=43/299). Wood furnaces and pellet stoves each made up about three percent of the RWC devices in the study.

RWC Devices

RWC Type	Total Devices	Percent	Device-Type as Main Source of Heat		% of Each RWC-Type Used as Main
WOODSTOVE	166	55.5	87	79.1	52.4
FIREPLACE	71	23.7	2	1.8	2.8
INSERT	43	14.4	10	9.1	23.3
WOOD FURNACE	9	3.0	5	4.5	55.6
PELLET STOVE	10	3.3	6	5.5	60.0
Total	299*	100.0	110	100.0	

[1] Based upon the "1990, 1994, 2000 Household and Vehicle Miles Traveled Forecast for the Silver Valley, Shoshone County, Idaho," prepared for the Idaho Air Quality Bureau, by Intermountain Demographics, August 1991, using 1990 Census Data. Previous report information was based upon a smaller demographic field study conducted in 1988 for the Air Quality Bureau.

RWC Devices Used as the Main Source of Heat

There were approximately 1,257 households in the Silver Valley area using RWC devices as the main source of heat (± 58.5 households). Of those who named RWC devices as their main source of heat, 79 percent (N=79/99), or an estimated 993 households, (± 109) used a wood stove as the main source of heat. Inserts were used by seven percent of the RWC users, while pellet stoves and wood furnaces were each used by five percent of the RWC main-source users.

Back-up Heat Sources Used by Wood Burners

Those who named RWC devices as their main source of heat were analyzed in order to discover the back-up heating sources they had in their homes. Of the 110 who listed an RWC as the main source of heat, 66 percent (N=73/110) had electric back-up heat, 17.4 percent (N=19/110) had natural gas, (six of those had both natural gas and electric back-up heat). Eight percent (N=9/110) used some other form of fossil fuel (oil, propane, kerosene or coal). Thirteen percent (N=14/110) did not have other heat sources besides an RWC device. These are illustrated in the following table:

BACK-UP SOURCES USED

RWC DEVICE AS MAIN HEAT	NO BACK-UP	ELECTRIC (NO GAS)	NAT. GAS ONLY	BOTH ELEC. & GAS	KEROSENE/ PROPANE/OIL	TOTAL
WOOD STOVE	12	53	9	5	8	**87**
INSERT	-	7	2	-	1	**10**
PELLET STOVE	-	5	1	-	-	**6**
WOOD FURNACE	2	1	2	-	-	**5**
FIREPLACE	-	2	-	-	-	**2**
TOTAL	**14**	**68**	**14**	**5**	**9**	**110**

RWC Device Installation

Those owning wood stoves, fireplace inserts, wood furnaces and "other" types of wood burning devices were asked if they had installed their device themselves (or with the help of a friend or relative) or if the installation was done by a dealer or professional.

Of the 201 respondents asked, 66 percent (N=132/201) said they installed the device themselves. Fourteen percent (N=28) said it was installed by a professional and 20 percent (N=41) did not know how their RWC device was installed. Consequently, of those who **did** know, 82.5 percent (N=132/160) installed it themselves and 17.5 percent (N=28/160) had the device installed by a professional.

EPA Certification

Those owning wood stoves, fireplace inserts and wood furnaces were asked if their device was certified by the EPA. Thirty-seven percent of wood stove owners said their device was certified by the E.P.A. Forty-one percent of inserts thought their insert was certified and 22 percent of wood furnace owners said that their device was certified. (See pink DATA section, p. 23, 26, 28 for details.)

Burning Cycles Used

Days of RWC Usage

Those with RWC devices were asked if they burned more on weekends, week days or about the same amount every day. Sixty percent (N=125) reported burning about the same amount every day. Twenty-one percent (N=44) said they burned more on weekends and three percent (N=7) said they burned more during the week. Fifteen percent were not sure.

Hours of Usage per Day

Among the 157 respondents who said they burned about the same amount each day (this figure includes those who were not sure), 45 percent (N=71) said they used their RWC device continuously.

The average RWC device in all households in the Silver Valley was used an average of 15.1 hours per day, seven days per week during the 1990-91 winter season. Among those who used their wood stove the same amount each day, the average usage was 16.8 hours per day. The hours of use per day dropped among those who used their stoves more on weekends or weekdays, to an average of 9.9 hours per day (RWC devices were used about 11.9 hours/day on weekends, and about 9.1 hours/day during the week for this group).

Usage During the Day

All groups (those who burned the same amount every day and those who burned more on weekends or weekdays) were most likely to use their RWC device during the early morning and the evening. The periods of time most likely to burn (first response) and total day parts chosen (total responses are shown on the following three charts for each group:

Group 1: (Burned about the same amount each day).

When Most Likely to Burn	First Response	Total Responses	Percentage
early morning	32	34	27 %
mid morning	4	12	9 %
noon	1	10	8 %
mid afternoon	1	13	10 %
late afternoon	7	12	9 %
evening	13	33	26 %
night	7	13	10 %
all parts equally	71	71	NA

Group 2: (Burned more on weekends).

When Most Likely to Burn	First Response	Total Responses	Percentage
early morning	14	14	19 %
mid morning	4	8	11 %
noon	0	6	8 %
mid afternoon	5	11	15 %
late afternoon	4	11	15 %
evening	10	18	25 %
night	1	4	6 %
all equally	10	10	NA

Group 3: (Burned more on week days).

When Most Likely to Burn	First Response	Total Responses	Percentage
early morning	11	11	19 %
mid morning	1	4	7 %
noon	1	3	5 %
mid afternoon	2	8	14 %
late afternoon	3	6	11 %
evening	17	22	39 %
night	0	3	5 %
all parts equally	7	7	NA

Wood Usage Characteristics

Cords Burned

An average of 4.2 cords of wood were burned in each household with a (wood burning) RWC device this past winter. The number of cords burned this winter and last winter by type of device are as follows:

	Number of Cords		Percent by Device	
Type of Device	This year	Last year	This year	Last year
wood stove	561	602	64%	59%
fireplace	125	148	14%	15%
fireplace insert	153	216	17%	21%
wood furnace	42	45	5%	4%
wood steam	1	2	0%	0%
TOTAL CORDS:	882*	1013		

* There were 13 percent fewer cords burned in the 90-91 season than previous season.

Self-Cutting vs. Delivery

When asked if they cut their own wood or bought it pre-cut, 55 percent (N=114/208) of the wood burners in the Silver Valley said that they cut their own wood. Thirty-one percent (N=64) said they bought their wood pre-cut (or had it delivered) and eight (N=16) percent said they do a combination of the two. About seven percent (N=14) did not know how they got their wood.

Splitting of Wood

Of those who burned wood, 85 percent (N=176/208) split their wood before it was used. Another four percent (N=8) said they split it most of the time or sometimes. Eleven percent (N=24) did not split their wood or did not know if it was split before it was used.

Time Between Cutting and Splitting of Wood

The wood was cut an average of nine months before it was burned, and split an average of seven months before used; therefore, the average amount of time the wood was stored after being split was about two months. The next two tables are cross-tabulations illustrating the number of months the wood was cut and split before it was used. The first table shows the number, or frequency of responses in each category, and the second table shows the percent of the total in each category.

Of the 184 wood burning residents who split their wood (always, most of the time or sometimes), 16 percent did not know how long their wood was cut and/or how long it was split before it was burned (see the right-hand column and the bottom row of the next two tables).

Seventy-one 71 percent of the wood burners cut and split their wood at about the same time (see the bold diagonal line of numbers in the next table). This however, does not necessarily mean that the split wood was stored for several months before it was used -- 19 percent of the respondents cut and split their wood within one month of the time it was burned; 23 percent within three to four months. Only 31 percent of the respondents usually used wood that had been split and stored for five months or longer before it was used.

Time Between Cutting and Splitting of Wood

Crosstabulation (count) [208 selected, 24 MD cases]

NUMBER OF MONTHS CUT BEFORE USED

NUMBER OF MONTHS SPLIT BEFORE USED	TOTAL	1-2	3-4	5-6	7-8	9-10	12-14	24-36	40-48	60-70	D.K.
	184	37	55	19	4	3	25	20	2	2	17
1-2	63	**35**	10	3	-	-	6	3	-	1	5
3-4	51	1	**43**	2	-	1	1	-	-	-	3
5-6	20	-	-	**14**	1	1	-	2	1	-	1
7-8	3	-	-	-	**3**	-	-	-	-	-	-
9-10	1	-	-	-	-	**1**	-	-	-	-	-
12-14	19	-	1	-	-	-	**18**	-	-	-	-
24-36	15	-	-	-	-	-	-	**15**	-	-	-
40-48	1	-	-	-	-	-	-	-	**1**	-	-
60-70	1	-	-	-	-	-	-	-	-	**1**	-
D.K.	10	1	1	-	-	-	-	-	-	-	**8**

Time Between Cutting and Splitting of Wood

Crosstabulation (% total) [208 selected, 24 MD cases]

NUMBER OF MONTHS CUT BEFORE USED

NUMBER OF MONTHS SPLIT BEFORE USED	TOTAL	1-2	3-4	5-6	7-8	9-10	12-14	24-36	40-48	60-70	D.K.
	184	20.	30.	10.	2.2	1.6	14.	11.	1.1	1.1	9.2
1-2	34.	19.	5.4	1.6	-	-	3.3	1.6	-	.5	2.7
3-4	28.	.5	23.	1.1	-	.5	.5	-	-	-	1.6
5-6	11.	-	-	7.6	.5	.5	-	1.1	.5	-	.5
7-8	1.6	-	-	-	1.6	-	-	-	-	-	-
9-10	.5	-	-	-	-	.5	-	-	-	-	-
12-14	10.	-	.5	-	-	-	9.8	-	-	-	-
24-36	8.2	-	-	-	-	-	-	8.2	-	-	-
40-48	.5	-	-	-	-	-	-	-	.5	-	-
60-70	.5	-	-	-	-	-	-	-	-	.5	-
D.K.	.4	.5	.5	-	-	-	-	-	-	-	4.3

Wood Storage

When asked where Silver Valley residents stored their wood, 43 percent of the wood burners said it was stored outside and covered (N=90/208); 33 percent stored it in an enclosed and unheated area; and 12 percent store their wood inside their home or heated garage. Six percent of the wood burners said they stored their wood outside and uncovered and six percent did not know where their wood was usually stored.

Species of Wood Burned

Of the people who burned wood, 63 percent (N=131) said that they burned soft wood exclusively. Only four percent (N=9) said they burned hard wood exclusively and 21 percent (N=44) said they burned both hard and soft wood.

When asked if they knew the specific names of the kinds of wood burned, 89 percent (N=184/208) said "yes." Most of them, 54 percent (N=99/184), said that they burned tamarack the most often, followed by douglas fir, 20 percent (N=36/184). (See pink DATA Section, p. 35-36 for details.)

Compressed Logs

None of the respondents in the Silver Valley said that they burned compressed logs or "Presto" logs "often" and only five percent (N=10/208) said they used compressed logs "sometimes." Of those who said they "sometimes" used compressed logs, the average number of logs used each winter was 10.6.

Trash and Newspaper Burning

When asked if they ever burned trash, newspapers or other things, 66 percent (N=137/208) said that they did not know. Another seven (N=15) percent said they did not burned trash or newspapers. About 23 percent (N=48) said they burn other things, the majority of those saying they burned newspapers.

Attitudes About Pollution

Pollution Problem

All respondents were asked if they thought there was an air pollution problem in their area. Two-thirds (N=244/350) of the respondents did not think there was much of an air pollution problem in the Silver Valley. This 67 percent was broken down as follows:

* 40 percent said "no, not really,"
* 27 percent said "definitely not,"
* 10 percent did not know.

About 30 percent thought there was a pollution problem in the area, (one third of those said "yes, definitely"; two-thirds said "yes, somewhat." See DATA section, page ___ for details.)

Cross-tabulations were run to compare the communities in the Silver Valley (Kellogg, Pinehurst, Osborne and Wallace) based upon the answers given to this question to determine if they differed in their attitudes about pollution by area. (See Blue DATA Section, p. 46-48.) Responses were as divided as follows:

* Positive = "Yes, definitely" and "Yes, somewhat"
* Negative = "No, not really," "Definitely not," "Don't Know."

Osborne residents were most likely to say there was a pollution problem in their area. Forty-two percent (N=26/62) said there was "definitely" or "somewhat" of an air pollution problem in their area.

Pollution Problem in Your Area

Community	YES, DEFINITELY YES, SOMEWHAT		NO, NOT REALLY DEFINITELY NOT DON'T KNOW	
	Number	Percent	Number	Percent
Kellogg	24	23.1	80	76.9
Pinehurst	43	37.1	73	62.9
Osborne	26	41.9	36	58.1
Wallace	13	19.1	55	80.9

Sources of Pollution

All, except those who said there was "definitely not" an air pollution problem in the area, were asked to name what they thought were the main sources of pollution in the Silver Valley area. Wood burning was named most often for the first answer, making up 63 percent, followed by factories and industry with 12 percent of the first responses. Nearly 15 percent said there were no pollution sources in the area.

Eighty-seven percent of those who said there was "definitely" or "somewhat" of an air pollution problem said that wood stoves were the main source of air pollution in their area. Eight percent of this group said factories or industries were the main sources of pollution in their area.

Air Quality Information Resources

Nearly half of those surveyed, 47 percent (N=166/350) said they did not know how to find out about the air quality in the Silver Valley if they wanted to know. Twenty-eight percent (N=99/350) said that they would call a government agency. Five percent (N=19/350) said they would call the Air Quality Advisory Hot Line, three percent (N=11/350) would watch the television news and three percent (N=10/350) would read the newspaper. The remaining responses were made up of "other" responses not specified in this survey.

Factors Thought to Determine RWC Usage

Cross-tabulations were run to determine if attitudinal and demographic differences occurred between respondents based upon the following three groups:

* Those who use RWC devices as a main source of heat.
* Those who use RWC devices as a back-up source of heat.
* Those who do not own RWC devices.

Significant differences among these three groups were found in a number of different questions: the number of members in the household, education, employment status, income and zip code. However, these results should be interpreted with caution; potentially there are a number of underlying factors involved.

When analyzing these cross-tabulations, some of the differences seem to be somewhat random in the way they occur. However, these differences seem plausible if information from the "Pocatello Air Quality RWC Device Usage" study is considered.

The Pocatello study, which was similar in nature, showed a high correlation between the type of household in which a respondent lived (whether an apartment, a condominium, a mobile home or a house) and whether or not they owned an RWC device. In the Pocatello study, none of the respondents living in apartments or condominiums owned RWC devices. Of those who owned RWC devices in Pocatello, 7 percent (N=12/370) lived in mobile homes, and 93 percent in houses.

The possibility exists that houses and mobile homes in the Silver Valley are also more likely to have RWC devices than apartments or condominiums. As income rises, the respondent is more likely to live in a house, and subsequently, more likely to own an RWC device. However, this creates an unusual dichotomy. As income rises, the respondent is less likely to use an RWC device as main source of heat (gas or electric heat being more common), but because they are more likely to own a house and an RWC, it would be used as a back-up source of heat. (Refer to yellow DATA Section, p.41-45.)

Examine the income question, for example (yellow DATA Section, p. 45). In the lowest income category (those who earn $10,000 and less annually), the number of households that use RWC devices as back-up heat sources is relatively small compared to the number who use RWC devices as a main source, or those who do not own RWC devices. When moving up to the $20,000 bracket, the majority switches to the "RWC as Main Source Group"; those in the $30,000 bracket ten toward the "RWC as Back-up Source Group".

Also consider the education table (yellow DATA Section, p. 43). The results seem feasible if the correlation between higher education and higher income, which in turn, correlates with a higher likelihood of owning a house. Those who had less than a high school education seemed to be much more likely to use RWC devices as a main source of heat, or not to own RWC devices at all, and less likely to use RWC devices as a back-up source of heat. In the group of respondents who had four years of college or more, this pattern reversed. There was a relatively higher percentage of those who used RWC devices as a back-up source, a lower percentage using them as a main source of heat, and a lower percentage of those who did **not** own RWC devices.

Also look at the employment table (yellow DATA Section, p. 44). Those who were unemployed seemed more likely to use RWC devices as a main source of heat, while those who were self-employed seemed more likely to use RWC devices as a back-up source of heat.

Whether the respondents rent or own their residences may also be a key determining factor influencing RWC ownership and usage.

DATA

SECTION

DATA

Heating Equipment Used

Before getting into specific equipment questions, I'm going to read some groups of heating fuel sources. Please tell me those that you HAVE in your home, garage or workshop (whether you use them or not). Do you own...?

Value Label	Frequency	Percent	Valid Percent	
ANY ELECTRIC EQUIPMENT	193	55.1	55.1	
GAS/PROPANE/KEROSENE	130	37.1	37.1	
WOOD BURNING EQUIPMENT	26	7.4	7.4	
PELLET/COAL BURNING	1	.3	.3	
Total	350	100.0	100.0	
Valid cases	350	Missing cases		0

(Second level heating fuel sources)

Value Label	Frequency	Percent	Valid Percent	
ANY ELECTRIC EQUIPMENT	10	2.9	2.9	
GAS/PROPANE/KEROSENE	78	22.3	22.3	
WOOD BURNING EQUIPMENT	139	39.7	39.7	
PELLET/COAL BURNING	4	1.1	1.1	
NO MORE ANSWERS	119	34.0	34.0	
Total	350	100.0	100.0	
Valid cases	350	Missing cases		0

(Third level heating fuel sources)

Value Label	Frequency	Percent	Valid Percent	
ANY ELECTRIC EQUIPMENT	2	.6	.9	
WOOD BURNING EQUIPMENT	43	12.3	18.6	
PELLET/COAL BURNING	6	1.7	2.6	
NO MORE ANSWERS	180	51.4	77.9	
	119	34.0	Missing	
Total	350	100.0	100.0	
Valid cases	231	Missing cases		119

(Fourth level heating fuel sources)

Value Label	Frequency	Percent	Valid Percent	
PELLET/COAL BURNING	2	.6	3.9	
NO MORE ANSWERS	49	14.0	96.1	
	299	85.4	Missing	
Total	350	100.0	100.0	
Valid cases	51	Missing cases		299

Electric Equipment

(ASKED OF THOSE WHO MENTIONED OWNING ELECTRICAL HEATING EQUIPMENT.) You mentioned owning some electrical heating equipment. Would that be...

Value Label	Frequency	Percent	Valid Percent
ELECTRIC FURNACE	48	13.7	23.4
ELECTRIC BASEBOARD HEATERS	102	29.1	49.8
ELECTRIC SPACE HEATERS	42	12.0	20.5
OTHER ELECTRIC	12	3.4	5.9
DON'T KNOW	1	.3	.5
	145	41.4	Missing
Total	350	100.0	100.0

Valid cases 205 Missing cases 145

* Heat pumps were included in the categories read, but there were no answers in that category.

(Second level electrical heating equipment)

Value Label	Frequency	Percent	Valid Percent
ELECTRIC FURNACE	1	.3	.5
ELECTRIC BASEBOARD HEATERS	4	1.1	2.0
ELECTRIC SPACE HEATERS	19	5.4	9.3
OTHER ELECTRIC	2	.6	1.0
NO MORE ANSWERS	178	50.9	87.3
	146	41.7	Missing
Total	350	100.0	100.0

Valid cases 204 Missing cases 146

(Third level electrical heating equipment)

Value Label	Frequency	Percent	Valid Percent
OTHER ELECTRIC	2	.6	7.7
NO MORE ANSWERS	24	6.9	92.3
	324	92.6	Missing
Total	350	100.0	100.0

Valid cases 26 Missing cases 324

("Other" electrical heating equipment -- open-end, unaided responses)

Value Label	Frequency	Percent	Valid Percent
RADIANT WALL HEATER	4	1.1	25.0
RADIANT CEILING HEATER	4	1.1	25.0
WALL AND CEILING HEATER	1	.3	6.3
ELECTRIC FIREPLACE	1	.3	6.3
FORCED AIR WALL UNIT	1	.3	6.3
ELECTRIC PANELS	3	.9	18.8
RADIANT WALL CONES	1	.3	6.3
UNSPECIFIED RADIANT	1	.3	6.3
	334	95.4	Missing
Total	350	100.0	100.0

Valid cases 16 Missing cases 334

(ASKED OF THOSE WHO OWNED AN ELECTRIC FURNACE.) Do you consider your electric furnace to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	24	6.9	49.0
BACK-UP HEAT SOURCE	25	7.1	51.0
	301	86.0	Missing
Total	350	100.0	100.0

Valid cases 49 Missing cases 301

(ASKED OF THOSE WHO OWNED A BASEBOARD HEATER.) Do you consider your baseboard heater to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	47	13.4	44.3
BACK-UP HEAT SOURCE	59	16.9	55.7
	244	69.7	Missing
Total	350	100.0	100.0

Valid cases 106 Missing cases 244

Do you have more than one baseboard heater (in your home, garage or workshop)?

Value Label	Frequency	Percent	Valid Percent
YES-MORE THAN ONE	93	26.6	87.7
NO-ONLY ONE	13	3.7	12.3
	244	69.7	Missing
Total	350	100.0	100.0

Valid cases 106 Missing cases 244

(ASKED OF THOSE WITH MORE THAN ONE BASEBOARD HEATER.) How many baseboard heaters do you have?

Value Label	Frequency	Percent	Valid Percent
TWO	14	4.0	15.1
MORE THAN TWO	79	22.6	84.9
	257	73.4	Missing
Total	350	100.0	100.0

Valid cases 93 Missing cases 257

(ASKED OF THOSE WHO OWNED SPACE HEATER/S) Do you consider your space heaters to be your main source of heating or do they work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	2	.6	3.3
BACK-UP HEAT SOURCE	58	16.6	95.1
DON'T KNOW	1	.3	1.6
	289	82.6	Missing
Total	350	100.0	100.0

Valid cases 61 Missing cases 289

(ASKED OF RESPONDENTS WHO GAVE UNAIDED RESPONSES) Do you consider your ["other" electrical heating source inserted here] to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	4	1.1	25.0
BACK-UP HEAT SOURCE	11	3.1	68.8
DON'T KNOW	1	.3	6.3
	334	95.4	Missing
Total	350	100.0	100.0

Valid cases 16 Missing cases 334

Gas, Propane, Fuel Oil or Kerosene

You mentioned owning some gas, propane, fuel oil or kerosene equipment. Would that be....

Value Label	Frequency	Percent	Valid Percent
NATURAL GAS FURNACE	151	43.1	72.6
NATURAL GAS FIREPLACE	1	.3	.5
PROPANE FURNACE	5	1.4	2.4
FUEL OIL FURNACE	34	9.7	16.3
KEROSENE HEATERS	5	1.4	2.4
STEAM HEATERS USING THE ABOVE	5	1.4	2.4
OTHER GAS/PROPANE/KEROSENE	7	2.0	3.4
	142	40.6	Missing
Total	350	100.0	100.0

Valid cases 208 Missing cases 142

(Second level use of fossil fuel equipment)

Value Label	Frequency	Percent	Valid Percent
NATURAL GAS FIREPLACE	1	.3	.5
KEROSENE HEATERS	2	.6	1.0
STEAM HEATERS USING THE ABOVE	3	.9	1.4
OTHER GAS/PROPANE/KEROSENE	4	1.1	1.9
NO MORE ANSWERS	198	56.6	95.2
	142	40.6	Missing
Total	350	100.0	100.0

Valid cases 208 Missing cases 142

Specify "other" types of gas, propane, oil or kerosene equipment used.

Value Label	Frequency	Percent	Valid Percent
ALADDIN KEROSENE	1	.3	9.1
FREE-STANDING GAS HEATER	1	.3	9.1
GAS PORTABLE HEATER	1	.3	9.1
GAS HEATER	2	.6	18.2
HEATER (UNSPECIFIED)	2	.6	18.2
OIL STOVE	2	.6	18.2
OIL FLOOR BURNER	1	.3	9.1
PROPANE SPACE HEATER	1	.3	9.1
	339	96.9	Missing
	-------	-------	-------
Total	350	100.0	100.0

Valid cases 11 Missing cases 339

Do you consider your natural gas furnace to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	135	38.6	89.4
BACK-UP HEAT SOURCE	16	4.6	10.6
	199	56.9	Missing
	-------	-------	-------
Total	350	100.0	100.0

Valid cases 151 Missing cases 199

Do you consider your gas fireplace to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	1	.3	50.0
DON'T KNOW	1	.3	50.0
	348	99.4	Missing
	-------	-------	-------
Total	350	100.0	100.0

Valid cases 2 Missing cases 348

Do you consider your propane furnace to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	2	.6	40.0
BACK-UP HEAT SOURCE	3	.9	60.0
	345	98.6	Missing
	-------	-------	-------
Total	350	100.0	100.0

Valid cases 5 Missing cases 345

Do you consider your fuel oil furnace to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	20	5.7	58.8
BACK-UP HEAT SOURCE	13	3.7	38.2
DON'T KNOW	1	.3	2.9
	316	90.3	Missing
Total	350	100.0	100.0

Valid cases 34 Missing cases 316

Do you consider your kerosene heater to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	1	.3	14.3
BACK-UP HEAT SOURCE	6	1.7	85.7
	343	98.0	Missing
Total	350	100.0	100.0

Valid cases 7 Missing cases 343

Do you consider your steam heater to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	7	2.0	87.5
BACK-UP HEAT SOURCE	1	.3	12.5
	342	97.7	Missing
Total	350	100.0	100.0

Valid cases 8 Missing cases 342

(ASKED OF RESPONDENTS WHO GAVE UNAIDED RESPONSES) Do you consider your [insert "other" gas, oil, propane or kerosene equipment here] to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	7	2.0	63.6
BACK-UP HEAT SOURCE	4	1.1	36.4
	339	96.9	Missing
Total	350	100.0	100.0

Valid cases 11 Missing cases 339

Do you consider you coal stove to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	2	.6	66.7
BACK-UP HEAT SOURCE	1	.3	33.3
	347	99.1	Missing
Total	350	100.0	100.0

Valid cases 3 Missing cases 347

Residential Wood Burning Equipment

You mentioned that you own some wood burning equipment. Would that be a wood stove?

Value Label	Frequency	Percent	Valid Percent
YES	145	41.4	69.7
NO	63	18.0	30.3
	142	40.6	Missing
Total	350	100.0	100.0

Valid cases 208 Missing cases 142

Do you own a fireplace?

Value Label	Frequency	Percent	Valid Percent
YES	59	16.9	28.4
NO	149	42.6	71.6
	142	40.6	Missing
Total	350	100.0	100.0

Valid cases 208 Missing cases 142

Do you own a fireplace insert stove?

Value Label	Frequency	Percent	Valid Percent
YES	39	11.1	18.8
NO	169	48.3	81.3
	142	40.6	Missing
Total	350	100.0	100.0

Valid cases 208 Missing cases 142

Do you own a wood furnace?

Value Label	Frequency	Percent	Valid Percent
YES	9	2.6	4.3
NO	199	56.9	95.7
	142	40.6	Missing
Total	350	100.0	100.0

Valid cases 208 Missing cases 142

Wood Stoves

Do you consider your wood stove to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	86	24.6	59.3
BACK-UP HEAT SOURCE	58	16.6	40.0
DON'T KNOW	1	.3	.7
	205	58.6	Missing
Total	350	100.0	100.0

Valid cases 145 Missing cases 205

Do you have more than one wood stove (in your home, garage or workshop)?

Value Label	Frequency	Percent	Valid Percent
YES-MORE THAN ONE	21	6.0	14.5
NO-ONLY ONE	124	35.4	85.5
	205	58.6	Missing
Total	350	100.0	100.0

Valid cases 145 Missing cases 205

How many wood stoves do you have?

Value Label	Frequency	Percent	Valid Percent
TWO WOOD STOVES	19	5.4	90.5
MORE THAN TWO WOOD S	2	.6	9.5
	329	94.0	Missing
Total	350	100.0	100.0

Valid cases 21 Missing cases 329

Was the wood stove new when you purchased it?

Value Label	Frequency	Percent	Valid Percent
YES	11	3.1	84.6
NO	2	.6	15.4
	337	96.3	Missing
Total	350	100.0	100.0

Valid cases 13 Missing cases 337

Is your existing wood stove certified by the E.P.A.?

Value Label	Frequency	Percent	Valid Percent
YES-CERTIFIED	54	15.4	37.2
NO-NOT CERTIFIED	42	12.0	29.0
NOT SURE-MAYBE YES	17	4.9	11.7
NOT SURE MAYBE NOT	10	2.9	6.9
DON'T KNOW	22	6.3	15.2
	205	58.6	Missing
Total	350	100.0	100.0

Valid cases 145 Missing cases 205

What is the brand name of your wood stove?

Value Label	Frequency	Percent	Valid Percent
DON'T KNOW	24	6.9	16.6
AIRTIGHT	1	.3	.7
AMERICAN HOME HEATER	1	.3	.7
ASHLEY	2	.6	1.4
BEN FRANKLIN	1	.3	.7
BLAZE KING	18	5.1	12.4
BUCK STOVE	1	.3	.7
COMFORT	1	.3	.7
COUNTRY	1	.3	.7
DOTI	1	.3	.7
DOWN DRAFTER	1	.3	.7
EARTH / EARTH STOVE	10	2.9	6.9
ENGLANDER	1	.3	.7
FIREVIEW	1	.3	.7
FISHER	14	4.0	9.7
GREAT NORTHERN	3	.9	2.1
HOME MADE	26	7.4	17.9
HURRICANE	10	2.9	6.9
JOHNSON	1	.3	.7
JOTUL	1	.3	.7
KENT	2	.6	1.4
LOPI	1	.3	.7
MILLER EAGLE	1	.3	.7
MONARCH	3	.9	2.1
NEWMAN	2	.6	1.4
NIGHT GUARD	2	.6	1.4
NOR'WESTER	1	.3	.7
OREGON	1	.3	.7
PIONEER	1	.3	.7
PEND O'RIELLE	3	.9	2.1
PRAIRIE	1	.3	.7
RIGHT WAY	1	.3	.7
SEARS / SEARS RANGE	3	.9	2.1
SIGNATURE	1	.3	.7
SUN RISE	1	.3	.7
WONDERWOOD	1	.3	.7
YELLOWSTONE	1	.3	.7
	205	58.6	Missing
Total	350	100.0	100.0

Valid cases 145 Missing cases 205

Who installed your wood stove?

Value Label	Frequency	Percent	Valid Percent
SELF-INSTALLED OR FRIEND	102	29.1	70.3
INSTALLED BY DEALER OR PROF	14	4.0	9.7
OTHER	9	2.6	6.2
DON'T KNOW	20	5.7	13.8
	205	58.6	Missing
Total	350	100.0	100.0

Valid cases 145 Missing cases 205

How old do you estimate your wood stove to be?

Value Label	Frequency	Percent	Valid Percent
ONE	4	1.1	2.8
TWO	9	2.6	6.2
THREE	11	3.1	7.6
FOUR	12	3.4	8.3
FIVE	8	2.3	5.5
SIX	12	3.4	8.3
SEVEN	5	1.4	3.4
EIGHT	11	3.1	7.6
NINE	2	.6	1.4
TEN	26	7.4	17.9
ELEVEN	3	.9	2.1
TWELVE	10	2.9	6.9
FOURTEEN	5	1.4	3.4
FIFTEEN	8	2.3	5.5
TWENTY	2	.6	1.4
TWENTY-FIVE	3	.9	2.1
THIRTY	1	.3	.7
FIFTY	2	.6	1.4
NINETY	1	.3	.7
NINETY-EIGHT	1	.3	.7
DON'T KNOW	9	2.6	6.2
	205	58.6	Missing
Total	350	100.0	100.0

Valid cases 145 Missing cases 205

Fireplaces

Do you consider your fireplace your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	5	1.4	8.5
BACK-UP HEAT SOURCE	47	13.4	79.7
DON'T KNOW	7	2.0	11.9
	291	83.1	Missing
Total	350	100.0	100.0

Valid cases 59 Missing cases 291

Do you have more than one fireplace?

Value Label	Frequency	Percent	Valid Percent
YES-MORE THAN ONE	13	3.7	22.0
NO-ONLY ONE	45	12.9	76.3
DON'T KNOW	1	.3	1.7
	291	83.1	Missing
Total	350	100.0	100.0

Valid cases 59 Missing cases 291

How many fireplaces do you have?

Value Label	Frequency	Percent	Valid Percent
TWO	12	3.4	92.3
MORE THAN TWO	1	.3	7.7
	337	96.3	Missing
Total	350	100.0	100.0

Valid cases 13 Missing cases 337

Fireplace Inserts

Do you consider your fireplace insert to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	12	3.4	30.8
BACK-UP HEAT SOURCE	25	7.1	64.1
DON'T KNOW	2	.6	5.1
	311	88.9	Missing
Total	350	100.0	100.0

Valid cases 39 Missing cases 311

Do you have more than one fireplace insert (in your home, garage or workshop)?

Value Label	Frequency	Percent	Valid Percent
YES	5	1.4	12.8
NO	33	9.4	84.6
DON'T KNOW	1	.3	2.6
	311	88.9	Missing
Total	350	100.0	100.0

Valid cases 39 Missing cases 311

How many fireplace inserts do you have?

Value Label	Frequency	Percent	Valid Percent
TWO	5	1.4	100.0
	345	98.6	Missing
Total	350	100.0	100.0

Valid cases 5 Missing cases 345

Is your existing fireplace insert certified by the E.P.A.?

Value Label	Frequency	Percent	Valid Percent
YES-CERTIFIED	16	4.6	41.0
NO-NOT CERTIFIED	12	3.4	30.8
NOT SURE-MAYBE YES	2	.6	5.1
NOT SURE MAYBE NOT	4	1.1	10.3
DON'T KNOW	5	1.4	12.8
	311	88.9	Missing
Total	350	100.0	100.0

Valid cases 39 Missing cases 311

Who installed your fireplace insert?

Value Label	Frequency	Percent	Valid Percent	
SELF-INSTALLED OR FRIEND	19	5.4	48.7	
INSTALLED BY DEALER OR PROF	12	3.4	30.8	
OTHER	3	.9	7.7	
DON'T KNOW	5	1.4	12.8	
	311	88.9	Missing	
	-------	-------	-------	
Total	350	100.0	100.0	
Valid cases	39	Missing cases		311

Wood Furnaces

Do you consider your wood furnace to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent	
MAIN HEAT SOURCE	6	1.7	66.7	
BACK-UP HEAT SOURCE	3	.9	33.3	
	341	97.4	Missing	
	-------	-------	-------	
Total	350	100.0	100.0	
Valid cases	9	Missing cases		341

Do you have more than one wood furnace (in your home, garage or workshop)?

Value Label	Frequency	Percent	Valid Percent	
NO-ONLY ONE	9	2.6	100.0	
	341	97.4	Missing	
	-------	-------	-------	
Total	350	100.0	100.0	
Valid cases	9	Missing cases		341

What is the brand name of your wood furnace?

Value Label	Frequency	Percent	Valid Percent	
DON'T KNOW	2	.6	22.2	
DOWN DRAFTER	1	.3	11.1	
FISHER	1	.3	11.1	
HOME MADE	2	.6	22.2	
MONARCH	1	.3	11.1	
SOUTHERN AIRE	1	.3	11.1	
STOKER	1	.3	11.1	
	341	97.4	Missing	
	-------	-------	-------	
Total	350	100.0	100.0	
Valid cases	9	Missing cases		341

Is your existing wood furnace certified by the E.P.A.?

Value Label	Frequency	Percent	Valid Percent
YES-CERTIFIED	2	.6	22.2
NO-NOT CERTIFIED	5	1.4	55.6
DON'T KNOW	2	.6	22.2
	341	97.4	Missing
Total	350	100.0	100.0

Valid cases 9 Missing cases 341

Who installed your wood furnace?

Value Label	Frequency	Percent	Valid Percent
SELF-INSTALLED OR FRIEND	6	1.7	66.7
INSTALLED BY DEALER OR PROF	1	.3	11.1
DON'T KNOW	2	.6	22.2
	341	97.4	Missing
Total	350	100.0	100.0

Valid cases 9 Missing cases 341

Burning Cycles Used

On a typical Saturday or Sunday, about how many hours do you use your wood burning equipment?

Value Label	Frequency	Percent	Valid Percent
CONTINUOUSLY	10	2.9	19.6
20-24 HRS/DAY	4	1.1	7.8
16-20 HRS/DAY	3	.9	5.9
12-16 HRS/DAY	4	1.1	7.8
8-12 HRS/DAY	6	1.7	11.8
4-8 HRS/DAY	13	3.7	25.5
LESS THAN 4 HRS/DAY	10	2.9	19.6
DON'T KNOW	1	.3	2.0
	299	85.4	Missing
Total	350	100.0	100.0

Valid cases 51 Missing cases 299

On a typical weekday, about how many hours do you usually burn wood?

Value Label	Frequency	Percent	Valid Percent
CONTINUOUSLY	7	2.0	13.7
16-20 HRS/DAY	3	.9	5.9
12-16 HRS/DAY	5	1.4	9.8
8-12 HRS/DAY	5	1.4	9.8
4-8 HRS/DAY	10	2.9	19.6
LESS THAN 4 HRS/DAY	18	5.1	35.3
DON'T KNOW	3	.9	5.9
	299	85.4	Missing
Total	350	100.0	100.0

Valid cases 51 Missing cases 299

On an average day, about how many hours do you burn wood?

Value Label	Frequency	Percent	Valid Percent
CONTINUOUSLY	71	20.3	45.2
20-24 HRS/DAY	10	2.9	6.4
16-20 HRS/DAY	5	1.4	3.2
12-16 HRS/DAY	12	3.4	7.6
8-12 HRS/DAY	8	2.3	5.1
4-8 HRS/DAY	6	1.7	3.8
LESS THAN 4 HRS/DAY	28	8.0	17.8
DON'T KNOW	17	4.9	10.8
	193	55.1	Missing
Total	350	100.0	100.0

Valid cases 157 Missing cases 193

Pellet Stoves

You mentioned that you own some coal or pellet burning equipment. Would that be ...

Value Label	Frequency	Percent	Valid Percent
PELLET	10	2.9	76.9
COAL	3	.9	23.1
	337	96.3	Missing
Total	350	100.0	100.0

Valid cases 13 Missing cases 337

Do you consider your pellet stove to be your main source of heating or does it work as a back-up source?

Value Label	Frequency	Percent	Valid Percent
MAIN HEAT SOURCE	7	2.0	70.0
BACK-UP HEAT SOURCE	3	.9	30.0
	340	97.1	Missing
Total	350	100.0	100.0

Valid cases 10 Missing cases 340

(ASKED OF THOSE WITH PELLET STOVES) Approximately how many tons of pellets did you use THIS winter?

Value Label	Frequency	Percent	Valid Percent
ONE	1	.3	10.0
TWO	2	.6	20.0
THREE	4	1.1	40.0
DON'T KNOW	3	.9	30.0
	340	97.1	Missing
Total	350	100.0	100.0

Valid cases 10 Missing cases 340

(ASKED OF RESPONDENTS WHO BURN DIFFERENT AMOUNTS ON WEEKENDS THAN THEY DO ON WEEKDAYS) On a typical Saturday or Sunday, about how many hours do you use your pellet burning equipment?

Value Label	Frequency	Percent	Valid Percent
8-12 HRS/DAY	1	.3	100.0
	349	99.7	Missing
Total	350	100.0	100.0

Valid cases 1 Missing cases 349

(ASKED OF RESPONDENTS WHO BURN DIFFERENT AMOUNTS ON WEEKENDS THAN THEY DO ON WEEKDAYS) On a typical weekday, about how many hours do you usually use your pellet burning equipment?

Value Label		Frequency	Percent	Valid Percent	
LESS THAN 4 HRS/DAY		1	.3	100.0	
		349	99.7	Missing	
		-------	-------	-------	
	Total	350	100.0	100.0	
	Valid cases	1	Missing cases		349

On an average day, about how many hours do you use your pellet burning equipment?

Value Label		Frequency	Percent	Valid Percent	
CONTINUOUSLY		5	1.4	55.6	
20-24 HRS/DAY		1	.3	11.1	
16-20 HRS/DAY		1	.3	11.1	
12-16 HRS/DAY		1	.3	11.1	
8-12 HRS/DAY		1	.3	11.1	
		341	97.4	Missing	
		-------	-------	-------	
	Total	350	100.0	100.0	
	Valid cases	9	Missing cases		341

Wood Amounts and Usage Habits

About how many cords of wood did you burn THIS winter?

Value Label	Frequency	Percent	Valid Percent
ONE	57	16.3	27.4
TWO	12	3.4	5.8
THREE	23	6.6	11.1
FOUR	31	8.9	14.9
FIVE	28	8.0	13.5
SIX	11	3.1	5.3
SEVEN	8	2.3	3.8
EIGHT	5	1.4	2.4
NINE	1	.3	.5
TEN	8	2.3	3.8
ELEVEN	1	.3	.5
FIFTEEN	1	.3	.5
DON'T KNOW	22	6.3	10.6
	142	40.6	Missing
Total	350	100.0	100.0
Valid cases	208	Missing cases	142

About how many months would you say your wood is CUT before it is used?

Value Label	Frequency	Percent	Valid Percent
ONE	14	4.0	6.7
TWO	25	7.1	12.0
THREE	34	9.7	16.3
FOUR	24	6.9	11.5
FIVE	9	2.6	4.3
SIX	11	3.1	5.3
SEVEN	2	.6	1.0
EIGHT	2	.6	1.0
NINE	1	.3	.5
TEN	2	.6	1.0
TWELVE	26	7.4	12.5
FOURTEEN	1	.3	.5
TWENTY-FOUR	13	3.7	6.3
THIRTY-SIX	8	2.3	3.8
FORTY	1	.3	.5
FORTY-EIGHT	1	.3	.5
SIXTY	1	.3	.5
SEVENTY	1	.3	.5
DON'T KNOW	32	9.1	15.4
	142	40.6	Missing
Total	350	100.0	100.0
Valid cases	208	Missing cases	142

Do you SPLIT your wood before it is used?

Value Label	Frequency	Percent	Valid Percent
YES	176	50.3	84.6
MOST OF THE TIME	2	.6	1.0
SOMETIMES / HALF THE TIME	6	1.7	2.9
NOT USUALLY	4	1.1	1.9
NO, NEVER	5	1.4	2.4
DON'T KNOW / NO ANSWER	15	4.3	7.2
	142	40.6	Missing
Total	350	100.0	100.0

Valid cases 208 Missing cases 142

About how many months is your wood SPLIT before it is used?

Value Label	Frequency	Percent	Valid Percent
ONE	41	11.7	22.3
TWO	22	6.3	12.0
THREE	28	8.0	15.2
FOUR	23	6.6	12.5
FIVE	9	2.6	4.9
SIX	11	3.1	6.0
SEVEN	2	.6	1.1
EIGHT	1	.3	.5
NINE	1	.3	.5
TWELVE	18	5.1	9.8
FOURTEEN	1	.3	.5
TWENTY-FOUR	7	2.0	3.8
THIRTY-SIX	8	2.3	4.3
FORTY-EIGHT	1	.3	.5
SEVENTY	1	.3	.5
DON'T KNOW	10	2.9	5.4
	166	47.4	Missing
Total	350	100.0	100.0

Valid cases 184 Missing cases 166

Where do you store your wood?

Value Label	Frequency	Percent	Valid Percent
INSIDE HOME/HEATED GARAGE	25	7.1	12.0
ENCLOSED UNHEATED AREA	69	19.7	33.2
OUTSIDE AND COVERED	90	25.7	43.3
OUTSIDE, NOT COVERED	12	3.4	5.8
DON'T KNOW	12	3.4	5.8
	142	40.6	Missing
Total	350	100.0	100.0

Valid cases 208 Missing cases 142

How often, if ever, do you use compressed wood logs -- like Presto logs?

Value Label	Frequency	Percent	Valid Percent
YES-SOMETIMES	10	2.9	4.8
NO-NEVER	192	54.9	92.3
DON'T KNOW	6	1.7	2.9
	142	40.6	Missing
Total	350	100.0	100.0
Valid cases	208	Missing cases	142

About how many compressed wood logs do you burn each winter?

Value Label	Frequency	Percent	Valid Percent
ONE	2	.6	20.0
TWO	1	.3	10.0
THREE	2	.6	20.0
TEN	1	.3	10.0
TWELVE	1	.3	10.0
TWENTY-FOUR	1	.3	10.0
	1	.3	10.0
	1	.3	10.0
	340	97.1	Missing
Total	350	100.0	100.0
Valid cases	10	Missing cases	340

Do you cut your own wood or do you buy it pre-cut or delivered?

Value Label	Frequency	Percent	Valid Percent
CUT OWN WOOD	114	32.6	54.8
BUY WOOD PRE-CUT	64	18.3	30.8
COMBINATION	16	4.6	7.7
DON'T KNOW	14	4.0	6.7
	142	40.6	Missing
Total	350	100.0	100.0
Valid cases	208	Missing cases	142

The next questions deal with the kind of woods you burn. Do you burn...

Value Label	Frequency	Percent	Valid Percent
SOFT WOOD, EVERGREEN	131	37.4	63.0
HARD WOOD WITH LEAVES	9	2.6	4.3
SOME OF BOTH	44	12.6	21.2
DON'T KNOW	24	6.9	11.5
	142	40.6	Missing
Total	350	100.0	100.0
Valid cases	208	Missing cases	142

Do you know the specific names of the kinds of wood you burn?

Value Label		Frequency	Percent	Valid Percent	
YES		184	52.6	88.5	
NO		24	6.9	11.5	
		142	40.6	Missing	
		-------	-------	-------	
	Total	350	100.0	100.0	
	Valid cases	208	Missing cases		142

What specific kinds of wood do you burn most often?

Value Label		Frequency	Percent	Valid Percent	
COTTONWOOD		1	.3	.5	
DOUGLAS FIR		36	10.3	19.6	
HEMLOCK		3	.9	1.6	
GRAND FIR		11	3.1	6.0	
LODGE POLE PINE		2	.6	1.1	
OTHER FIR		14	4.0	7.6	
OTHER PINE		3	.9	1.6	
TAMARACK		99	28.3	53.8	
WHITE PINE		13	3.7	7.1	
OTHER HARD WOOD		2	.6	1.1	
		166	47.4	Missing	
		-------	-------	-------	
	Total	350	100.0	100.0	
	Valid cases	184	Missing cases		166

(Second level - specific kinds of wood burned most often)

Value Label		Frequency	Percent	Valid Percent	
COTTONWOOD		2	.6	1.1	
DOUGLAS FIR		34	9.7	18.5	
HEMLOCK		2	.6	1.1	
GRAND FIR		11	3.1	6.0	
LODGE POLE PINE		1	.3	.5	
OTHER FIR		19	5.4	10.3	
OTHER PINE		8	2.3	4.3	
TAMARACK		44	12.6	23.9	
WHITE PINE		28	8.0	15.2	
DON'T KNOW		35	10.0	19.0	
		166	47.4	Missing	
		-------	-------	-------	
	Total	350	100.0	100.0	
	Valid cases	184	Missing cases		166

(Third level - specific kinds of wood burned most often)

Value Label	Frequency	Percent	Valid Percent	
COTTONWOOD	2	.6	1.3	
DOUGLAS FIR	4	1.1	2.7	
GRAND FIR	1	.3	.7	
LODGE POLE PINE	1	.3	.7	
OTHER FIR	5	1.4	3.4	
OTHER PINE	9	2.6	6.0	
TAMARACK	10	2.9	6.7	
WHITE PINE	22	6.3	14.8	
OTHER HARD WOOD	2	.6	1.3	
DON'T KNOW	83	23.7	55.7	
NO MORE	10	2.9	6.7	
	201	57.4	Missing	
Total	350	100.0	100.0	
Valid cases	149	Missing cases		201

(Fourth level - specific kinds of wood burned most often)

Value Label	Frequency	Percent	Valid Percent	
DOUGLAS FIR	1	.3	1.8	
HEMLOCK	1	.3	1.8	
OTHER FIR	1	.3	1.8	
TAMARACK	3	.9	5.4	
WHITE PINE	3	.9	5.4	
OTHER HARD WOOD	1	.3	1.8	
DON'T KNOW	42	12.0	75.0	
NO MORE	4	1.1	7.1	
	294	84.0	Missing	
Total	350	100.0	100.0	
Valid cases	56	Missing cases		294

Do you ever burn newspaper, trash or other materials such as newspaper or trash?

Value Label	Frequency	Percent	Valid Percent	
YES-NEWSPAPER	36	10.3	17.3	
YES-TRASH	11	3.1	5.3	
YES-COMBO	1	.3	.5	
NO	15	4.3	7.2	
DON'T KNOW	137	39.1	65.9	
	8	2.3	3.8	
	142	40.6	Missing	
Total	350	100.0	100.0	
Valid cases	208	Missing cases		142

Demographic Questions

What county do you live in?

Value Label	Frequency	Percent	Valid Percent
KOOTENAI	5	1.4	1.4
SHOSHONE	343	98.0	98.0
ALL OTHER ANSWERS	2	.6	.6
Total	350	100.0	100.0

Valid cases 350 Missing cases 0

Including yourself, how many people live in your household?

Value Label	Frequency	Percent	Valid Percent
ONE	70	20.0	20.0
TWO	140	40.0	40.0
THREE	56	16.0	16.0
FOUR	55	15.7	15.7
FIVE	21	6.0	6.0
SIX	6	1.7	1.7
SEVEN	2	.6	.6
Total	350	100.0	100.0

Valid cases 350 Missing cases 0

What is the highest level of formal education you have completed?

Value Label	Frequency	Percent	Valid Percent
LESS THAN HIGH SCHOOL	63	18.0	18.0
HIGH SCHOOL GRADUATE	151	43.1	43.1
SOME COLLEGE/VO-TECH	91	26.0	26.0
FOUR YEAR COLLEGE GRADUATE	30	8.6	8.6
GRAD/PROF. DEGREE	14	4.0	4.0
REFUSED	1	.3	.3
Total	350	100.0	100.0

Valid cases 350 Missing cases 0

What is your age?

Value Label	Frequency	Percent	Valid Percent
17-25	19	5.43	5.43
26-35	58	16.57	16.57
36-45	85	24.29	24.29
46-55	52	14.86	14.86
56-65	50	14.29	14.29
66-75	51	14.57	14.57
76-85	29	8.29	8.29
86-95	3	.86	.86
REFUSED	3	.86	.86
Total	350	100.0	100.0

Valid cases 350 Missing cases 0

Which category best describes your employment status?

Value Label	Frequency	Percent	Valid Percent
SELF-EMPLOYED	26	7.4	7.4
COMPANY/CORPORATION	85	24.3	24.3
GOVERNMENT	43	12.3	12.3
RETIRED	113	32.3	32.3
UNEMPLOYED/HOMEMAKER	78	22.3	22.3
OTHER/REFUSED	5	1.4	1.4
Total	350	100.0	100.0

Valid cases 350 Missing cases 0

Attitudinal Questions

Do you think there is an air pollution problem in your area?

Value Label	Frequency	Percent	Valid Percent
YES, DEFINITELY	37	10.6	10.6
YES, SOMEWHAT	69	19.7	19.7
NO, NOT REALLY	139	39.7	39.7
DEFINITELY NOT	95	27.1	27.1
DON'T KNOW	10	2.9	2.9
Total	350	100.0	100.0

Valid cases 350 Missing cases 0

(THOSE WHO SAID THERE WAS DEFINITELY NOT A POLLUTION PROBLEM WERE NOT ASKED THIS QUESTION.) What, in your opinion, are the main sources of pollution within the Silver Valley area?

Value Label	Frequency	Percent	Valid Percent
NO POLLUTION SOURCES	37	10.6	14.5
WOOD STOVES/BURNING	161	46.0	63.1
CARS/TRAFFIC	12	3.4	4.7
INDUSTRY/FACTORIES	31	8.9	12.2
OTHER	5	1.4	2.0
DON'T KNOW	9	2.6	3.5
	95	27.1	Missing
Total	350	100.0	100.0

Valid cases 255 Missing cases 95

(Second level - sources of pollution)

Value Label	Frequency	Percent	Valid Percent
WOOD STOVES/BURNING	8	2.3	3.2
CARS/TRAFFIC	19	5.4	7.7
INDUSTRY/FACTORIES	12	3.4	4.9
OTHER	5	1.4	2.0
DON'T KNOW	182	52.0	73.7
NO MORE	21	6.0	8.5
	103	29.4	Missing
Total	350	100.0	100.0

Valid cases 247 Missing cases 103

(Third level - sources of pollution)

Value Label	Frequency	Percent	Valid Percent
CARS/TRAFFIC	1	.3	2.3
INDUSTRY/FACTORIES	1	.3	2.3
OTHER	1	.3	2.3
DON'T KNOW	38	10.9	86.4
NO MORE	3	.9	6.8
	306	87.4	Missing
Total	350	100.0	100.0
Valid cases	44	Missing cases	306

If you wanted to find out about the air quality in the Silver Valley, what would you do?

Value Label	Frequency	Percent	Valid Percent
CALL AQ ADVISORY HOT LINE	19	5.4	5.4
CALL GOVT AGENCY	99	28.3	28.3
READ NEWSPAPER	10	2.9	2.9
WATCH TV NEWS	11	3.1	3.1
OTHER	44	12.6	12.6
DON'T KNOW	166	47.4	47.4
EXIT SCREEN	1	.3	.3
Total	350	100.0	100.0
Valid cases	350	Missing cases	0

(THIS QUESTION WAS NOT ASKED OF THOSE WHO MENTIONED THE HOT LINE IN THE PREVIOUS QUESTION.) Have you heard of the Air Quality Advisory telephone line available in the Silver Valley area?

Value Label	Frequency	Percent	Valid Percent
YES	36	10.3	10.9
NO	291	83.1	87.9
DON'T KNOW	4	1.1	1.2
	19	5.4	Missing
Total	350	100.0	100.0
Valid cases	331	Missing cases	19

This last question concerns income. Stop me when I read the number that comes closest to your household's total ANNUAL income.

Value Label	Frequency	Percent	Valid Percent
$10,000	100	28.6	28.6
$20,000	92	26.3	26.3
$30,000	65	18.6	18.6
$40,000	42	12.0	12.0
$50,000	18	5.1	5.1
$60,000	11	3.1	3.1
$70,000	1	.3	.3
REFUSED	21	6.0	6.0
Total	350	100.0	100.0
Valid cases	350	Missing cases	0

DATA

NUMBER OF HOUSEHOLD MEMBERS by RWC OWNERSHIP

NUMBER OF PERSONS IN HOUSEHOLD	Count Row Pct Col Pct Tot Pct	MAIN HEAT	BACK-UP HEAT	NO RWC	Row Total
	ONE	5 7.1 4.7 1.4	23 32.9 22.1 6.6	42 60.0 30.2 12.0	70 20.0
	TWO	46 32.9 43.0 13.1	41 29.3 39.4 11.7	53 37.9 38.1 15.1	140 40.0
	THREE	16 28.6 15.0 4.6	20 35.7 19.2 5.7	20 35.7 14.4 5.7	56 16.0
	FOUR	27 49.1 25.2 7.7	12 21.8 11.5 3.4	16 29.1 11.5 4.6	55 15.7
	FIVE	10 47.6 9.3 2.9	6 28.6 5.8 1.7	5 23.8 3.6 1.4	21 6.0
	SIX	3 50.0 2.8 .9		3 50.0 2.2 .9	6 1.7
	SEVEN		2 100.0 1.9 .6		2 .6
	Column Total	107 30.6	104 29.7	139 39.7	350 100.0

Chi-Square	Value	DF	Significance
Pearson	41.04569	12	.00005
Likelihood Ratio	46.72246	12	.00001
Mantel-Haenszel test for linear association	19.19560	1	.00001

Minimum Expected Frequency - .594
Cells with Expected Frequency < 5 - 6 OF 21 (28.6%)
Number of Missing Observations: 0

ZIP CODE by RWC OWNERSHIP

ZIP CODE	Count / Row Pct / Col Pct / Tot Pct	MAIN HEAT	BACK-UP HEAT	NO RWC	Row Total
	83810	3 50.0 2.8 .9	1 16.7 1.0 .3	2 33.3 1.4 .6	6 1.7
	83837	21 25.0 19.6 6.0	20 23.8 19.2 5.7	43 51.2 30.9 12.3	84 24.0
	83839	19 61.3 17.8 5.1	3 9.7 2.9 .9	9 29.0 6.5 2.6	31 8.9
	83846		1 100.0 1.0 .3		1 .3
	83849	17 34.0 15.9 4.9	18 36.0 17.3 5.1	15 30.0 10.8 4.0	50 14.3
	83850	26 32.9 24.3 7.4	30 38.0 28.8 8.6	23 29.1 16.5 6.6	79 22.6
	83867	1 8.3 .9 .3	6 50.0 5.8 1.7	5 41.7 3.6 1.4	12 3.4
	83868	5 25.0 4.7 1.4	5 25.0 4.8 1.4	10 50.0 7.2 2.9	20 5.7
	83873	15 22.4 14.0 4.3	20 29.9 19.2 5.7	32 47.8 23.0 9.1	67 19.1
	Column Total	107 30.6	104 29.7	139 39.7	350 100.0

Chi-Square	Value	DF	Significance
Pearson	47.88806	28	.01102
Likelihood Ratio	49.12610	28	.00808
Mantel-Haenszel test for linear association	1.05071	1	.30534

Minimum Expected Frequency - .297
Cells with Expected Frequency < 5 - 27 OF 45 (60.0%)
Number of Missing Observations: 0

EDUCATION by RWC OWNERSHIP

EDUCATION (Count / Row Pct / Col Pct / Tot Pct)	MAIN HEAT	BACK-UP HEAT	NO RWC	Row Total
LESS THAN HIGH SCHOOL	24 38.1 22.4 6.9	8 12.7 7.7 2.3	31 49.2 22.3 8.9	63 18.0
HIGH SCHOOL GRADUATE	48 31.8 44.9 13.7	45 29.8 43.3 12.9	58 38.4 41.7 16.6	151 43.1
SOME COLLEGE OR VO-TECH	29 31.9 27.1 8.3	28 30.8 26.9 8.0	34 37.4 24.5 9.7	91 26.0
FOUR-YEAR COLLEGE GRADUATE	4 13.3 3.7 1.1	16 53.3 15.4 4.6	10 33.3 7.2 2.9	30 8.6
GRADUATE OR PROFESSIONL DEGREE	2 14.3 1.9 .6	7 50.0 6.7 2.0	5 35.7 3.6 1.4	14 4.0
REFUSED			1 100.0 .7 .3	1 .3
Column Total	107 30.6	104 29.7	139 39.7	350 100.0

Chi-Square	Value	DF	Significance
Pearson	22.66718	10	.01204
Likelihood Ratio	24.20030	10	.00709
Mantel-Haenszel test for linear association	.45484	1	.50005

Minimum Expected Frequency - .297
Cells with Expected Frequency < 5 - 5 OF 18 (27.8%)
Number of Missing Observations: 0

EMPLOYMENT STATUS by RWC OWNERSHIP

EMPLOYMENT (Count / Row Pct / Col Pct / Tot Pct)	MAIN HEAT	BACK-UP HEAT	NO RWC	Row Total
SELF-EMPLOYED	8 30.8 7.5 2.3	12 46.2 11.5 3.4	6 23.1 4.3 1.7	26 7.4
COMPANY OR CORPORATION	26 30.6 24.3 7.4	27 31.8 26.0 7.7	32 37.6 23.0 9.1	85 24.3
GOVERNMENT	13 30.2 12.1 3.7	16 37.2 15.4 4.6	14 32.6 10.1 4.0	43 12.3
RETIRED	22 19.5 20.6 6.3	29 25.7 27.9 8.3	62 54.9 44.6 17.7	113 32.3
UNEMPLOYED	36 46.2 33.6 10.3	19 24.4 18.3 5.4	23 29.5 16.5 6.6	78 22.3
OTHER/REFUSED	2 40.0 1.9 .6	1 20.0 1.0 .3	2 40.0 1.4 .6	5 1.4
Column Total	107 30.6	104 29.7	139 39.7	350 100.0

Chi-Square	Value	DF	Significance
Pearson	26.77777	10	.00282
Likelihood Ratio	26.15725	10	.00353
Mantel-Haenszel test for linear association	.00498	1	.94371

Minimum Expected Frequency - 1.486
Cells with Expected Frequency < 5 - 3 OF 18 (16.7%)

INCOME by RWC OWNERSHIP

INCOME	Count Row Pct Col Pct Tot Pct	MAIN HEAT	BACK-UP HEAT	NO RWC	Row Total
	$10,000	30 30.0 28.0 8.6	20 20.0 19.2 5.7	50 50.0 36.0 14.3	100 28.6
	$20,000	35 38.0 32.7 10.0	27 29.3 26.0 7.7	30 32.6 21.6 8.6	92 26.3
	$30,000	14 21.5 13.1 4.0	25 38.5 24.0 7.1	26 40.0 18.7 7.4	65 18.6
	$40,000	16 38.1 15.0 4.6	11 26.2 10.6 3.1	15 35.7 10.8 4.3	42 12.0
	$50,000	4 22.2 3.7 1.1	8 44.4 7.7 2.3	6 33.3 4.3 1.7	18 5.1
	$60,000	1 9.1 .9 .3	7 63.6 6.7 2.0	3 27.3 2.2 .9	11 3.1
	$70,000	1 100.0 .9 .3			1 .3
	REFUSED	6 28.6 5.6 1.7	6 28.6 5.8 1.7	9 42.9 6.5 2.6	21 6.0
	Column Total	107 30.6	104 29.7	139 39.7	350 100.0

Chi-Square	Value	DF	Significance
Pearson	23.85483	14	.04771
Likelihood Ratio	23.64654	14	.05053
Mantel-Haenszel test for linear association	.08262	1	.77378

Minimum Expected Frequency - .297
Cells with Expected Frequency < 5 - 6 OF 24 (25.0%)

DATA

EMPLOYMENT STATUS by POLLUTION PROBLEM RECOGNITION

EMPLOYMENT	Count / Row Pct / Col Pct / Tot Pct	definitely / somewhat	not really / definitely not / don't know	Row Total
SELF-EMPLOYED	Count	8	18	26
	Row Pct	30.8	69.2	7.4
	Col Pct	7.5	7.4	
	Tot Pct	2.3	5.1	
COMPANY OR CORPORATION	Count	29	56	85
	Row Pct	34.1	65.9	24.3
	Col Pct	27.4	23.0	
	Tot Pct	8.3	16.0	
GOVERNMENT	Count	17	26	43
	Row Pct	39.5	60.5	12.3
	Col Pct	16.0	10.7	
	Tot Pct	4.9	7.4	
RETIRED	Count	29	84	113
	Row Pct	25.7	74.3	32.3
	Col Pct	27.4	34.4	
	Tot Pct	8.3	24.0	
UNEMPLOYED	Count	18	60	78
	Row Pct	23.1	76.9	22.3
	Col Pct	17.0	24.6	
	Tot Pct	5.1	17.1	
OTHER/REFUSED	Count	5		5
	Row Pct	100.0		1.4
	Col Pct	4.7		
	Tot Pct	1.4		
Column Total		106	244	350
		30.3	69.7	100.0

Chi-Square	Value	DF	Significance
Pearson	16.90889	5	.00468
Likelihood Ratio	17.38723	5	.00382
Mantel-Haenszel test for linear association	.71665	1	.39724

Minimum Expected Frequency - 1.514
Cells with Expected Frequency < 5 - 2 OF 12 (16.7%)

ZIP CODE by POLLUTION PROBLEM RECOGNITION

ZIP	Count / Row Pct / Col Pct / Tot Pct	definitely somewhat	not really definitely not don't know	Row Total
	83810	1 16.7 .9 .3	5 83.3 2.0 1.1	6 1.7
	83837	19 22.6 17.9 5.4	65 77.4 26.6 18.6	84 24.0
	83839	7 22.6 6.6 1.7	24 77.4 9.8 6.6	31 8.9
	83846	1 100.0 .9 .3		1 .3
	83849	24 48.0 22.6 6.9	26 52.0 10.7 7.4	50 14.3
	83850	35 44.3 33.0 10.0	44 55.7 18.0 12.6	79 22.6
	83867	2 16.7 1.9 .6	10 83.3 4.1 2.9	12 3.4
	83868	5 25.0 4.7 1.4	15 75.0 6.1 4.3	20 5.7
	83873	12 17.9 11.3 3.4	55 82.1 22.5 15.7	67 19.1
	Column Total	106 30.3	244 69.7	350 100.0

Chi-Square	Value	DF	Significance
Pearson	33.31012	14	.00260
Likelihood Ratio	34.58778	14	.00169
Mantel-Haenszel test for linear association	.35759	1	.54985

Minimum Expected Frequency - .303
Cells with Expected Frequency < 5 - 17 OF 30 (56.7%)

SOURCES OF POLLUTION by POLLUTION PROBLEM RECOGNITION

POLLUTION SOURCES	Count / Row Pct / Col Pct / Tot Pct	definitely somewhat	not really definitely not don't know	Row Total
	THERE ARE NO POLLUTION SOURCES	1 2.7 .9 .4	36 97.3 24.2 14.1	37 14.5
	WOOD STOVES / BURNING	92 57.1 86.8 36.1	69 42.9 46.3 27.1	161 63.1
	CARS / TRAFFIC	3 25.0 2.8 1.2	9 75.0 6.0 3.5	12 4.7
	INDUSTRY FACTORY	8 25.8 7.5 3.1	23 74.2 15.4 9.0	31 12.2
	OTHER	1 20.0 .9 .4	4 80.0 2.7 1.6	5 2.0
	DON'T KNOW	1 11.1 .9 .4	8 88.9 5.4 3.1	9 3.5
	Column Total	106 41.6	149 58.4	255 100.0

Chi-Square	Value	DF	Significance
Pearson	48.01054	5	.00000
Likelihood Ratio	56.94589	5	.00000
Mantel-Haenszel test for linear association	1.65834	1	.19783

Minimum Expected Frequency - 2.078
Cells with Expected Frequency < 5 - 4 OF 12 (33.3%)

RESOLUTION NO. 68

A RESOLUTION ADDRESSING RESIDENTIAL WOOD BURNING WHEN POOR AIR QUALITY DAYS ARE FORECAST BY THE IDAHO DIVISION OF ENVIRONMENTAL QUALITY

WHEREAS, Federal and State air quality standards for particulates (PM10) have been exceeded in the City of Pinehurst; and

WHEREAS, the health, safety and welfare of Pinehurst citizens are adversely affected by poor air quality; and

WHEREAS, the main source of these exceedences in Pinehurst is residential wood burning; and

WHEREAS, it is important for Pinehurst's citizens to take steps to improve air quality; and

WHEREAS, Pinehurst's citizens have shown that they are willing to voluntarily not burn wood on poor air quality days;

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Pinehurst that when a poor air quality day is forecast by the Idaho Division of Environmental Quality, all citizens, except those who must rely on wood burning as their only source of heat, are requested not to burn wood until the poor air quality call has ended.

PASSED by the Council and APPROVED by the Mayor this 11th day of November, 1991.

Mike Bisotti

MAYOR

ATTEST:

Sharon K Hewitt

CITY CLERK

Reasonably Available Control Measure Status

Fugitive Dust Control Measures

1. Pave, vegetate, or chemically stabilize access point where unpaved traffic surfaces adjoin paved roads.

   Not applicable, since fugitive dust emissions are primarily a wintertime problem caused by deposition and build-up of anti-skid materials.

2. Require dust control plans for construction or land clearing projects.

   See response to 1 above.

3. Require haul trucks to be covered.

   See response to 1 above.

4. Provide for traffic rerouting or rapid clean up of temporary sources of dust on paved roads.

   Not feasible for antiskid materials since there are no street sweepers in the Pinehurst area. The Idaho Transportation Department (ITD) District 1, covering the five northern Idaho counties, has only three street sweepers. These sweepers are used on major state highways and the interstate. Also not feasible because of frequency of snowfalls and ice formation which would necessitate almost constant clean up activities.

5. Prohibit permanent unpaved haul roads, and parking or staging areas at commercial, municipal, or industrial facilities.

   See response to 1 above.

6. Develop traffic reduction plans for unpaved roads.

   See response to 1 above.

7. Limit use of recreational vehicles on open land.

   See response to 1 above.

8. Require improved material specification for and reduction of usage of skid control sand or salt.

   This will be done as a joint study with ITD proceeds and when EPA financial support is obtained.

9. Require curbing and pave or stabilize shoulders of paved roads.

See response to 1 above. This measure can be effective where there is street sweeping, which there is not in Pinehurst. With an annual budget of about $80,000, the City cannot be expected to contemplate such a purchase.

10. Pave or chemically stabilize unpaved roads.

See response to 1 above.

11. Pave, vegetate, or chemically stabilize unpaved parking areas.

See response to 1 above.

12. Require dust control measures for material storage piles.

See response to 1 above.

13. Provide for storm water drainage to prevent water erosion onto paved roads.

See response to 1 above.

14. Require revegetation, chemical stabilization, or other abatement of wind erodible soil.

See response to 1 above.

15. Rely upon soil conservation requirements to reduce emissions from agricultural operations.

See response to 1 above.

<u>Residential Wood Combustion Control Measures</u>

1. Establish an episode curtailment program.

This is being done.

2. Establish a public information program.

This is being done.

3. Encourage improved performance of wood burning devices by:

identifying deficiencies in stove operation and maintenance - this is being done for the entire area through the public awareness program and community meetings.

providing voluntary dryness certification programs - this is being done with funding from the regional bioenergy program

encouraging the accelerated changeover of existing devices - this is being done by working with the natural gas supplier, the Farmers Home Administration, the Resource Conservation and Development District, the Wood Heating Alliance, and others.

4. Provide inducement that would lead to reduction in stove and fireplace population or use:

slow the growth of wood burning devices in new housing units through use of disincentives - no applicable since there are virtually no new housing units being built, and not feasible in an area where the unemployment rate is 24%.

encourage a reduction in the number of wood burning devices - this will be done where possible, as part of changeover programs.

discourage the resale of used stoves through disincentives - this is being worked on at the state legislative level and at the community ordinance level.

Discourage the availability of inexpensive firewood - not feasible in the Pinehurst area where wood is readily available on private property.

Prescribed Burning Control Measures

Not applicable as primary sources of winter PM-10 emissions are residential wood burning and fugitive road dust.

RACT Determination for Stationary Sources

Not applicable as there are no stationary sources in the Pinehurst area.

DRAFT FUNDING PROPOSAL FOR:

WOOD SWITCH SAVER

SUBMITTED TO:

WASHINGTON WATER POWER

Prepared By:
Idaho Air Quality Bureau
1410 North Hilton
Boise, ID 83706

August, 1991

FUNDING PROPOSAL TO WASHINGTON WATER POWER

The Idaho Air Quality Bureau is asking Washington Water Power to commit $100,000 as partial funding for 40 low-income families to participate in a Wood Switch Saver program in the Pinehurst area of North Idaho. This program would focus on natural gas conversions for those homes capable of being heated electrically but which use wood as their main source of heat. The elimination of 40 older, wood burning stoves would go a long way toward assuring that the Pinehurst area is able to attain and maintain the national standard for PM_{10}.

Introduction

The United State Environmental Protection Agency adopted a new National Ambient Air Quality standard for particulate matter on July 1, 1987. The standard is expressed in terms of PM_{10}, which is particulates less than 10 micrometers in aerodynamic diameter or about one-tenth of the diameter of a human hair. On August 7, 1987, EPA classified Shoshone County (Pinehurst) as a Group I PM_{10} nonattainment area. As a consequence of this nonattainment designation, the State of Idaho is required to submit a State Implementation Plan (SIP) for Shoshone County to EPA no later than November 15, 1991. The plan document must provide for attainment of the standard as expeditiously as practicable but in any case no later than December 31, 1994.

Background

The Idaho Air Quality Bureau (IAQB) has been monitoring in Pinehurst since 1974 when it set up a Total Suspended Particulate site at the elementary school. In 1985 TSP monitoring at the Pinehurst site was discontinued and replaced by a PM_{10} monitor. PM_{10} exceedences (>150 ug/m3) were measured numerous times in Pinehurst during the winters of 1985-86, 1986-87, and 1987-88.

As a result, sampling accelerated from once every six days to every other day for the winter season (October to March) starting in 1988. At the same time the IAQB initiated an Air Quality Advisory service. This service consists of a 24-hour telephone line (682-3333) dedicated to reporting the current air quality and short term outlook in the Pinehurst area. The recorded message is available from October 15 to the end of February, and it is updated on weekdays. When necessary, the recording also carries Air Stagnation Advisories. These advisories cover a wider area, and carry with them the force of state law in prohibiting open burning.

A PM_{10} saturation study was undertaken in the Silver Valley during January, February and March of 1989. The monitors recorded borderline values (max. 163ug/m3) in Pinehurst, but there were no official exceedences of the standard in that year or in 1990. However, on January 10, 1991, a reading of 159 was picked up on the monitor, and this indicates that air quality problems continue to exist in the Pinehurst area.

In order to help determine the sources of these high readings, the Bureau had twelve air monitor filters from Pinehurst analyzed for chemical composition. The presence and proportions of elemental carbon, organic carbon and soluble potassium found on these filters indicate that the major source of these particulates is residential wood combustion. As concern continues to mount over the health effects of woodstove emissions, particularly for the young, the elderly and those with respiratory problems, attention must be focused on both short term and long term measures which will reduce these emissions.

Program Need

As part of its preparation of an air quality plan for Shoshone County, the IAQB, in March 1991, contracted for a residential heating telephone survey. 350 households were interviewed, and 59%, or 208, used wood as a source of heat. Of this number, 123 or 35% of the total sample, were main source woodburners. Back up heat for this group was apportioned as follows: 54% electricity, 33% natural gas, and 13% fuel oil or liquid propane.

IAQB assumes that these percentages are applicable in the Pinehurst area, in which case there would be about 650 households using wood as their main source of heat. There would then be 351 of these households with electricity as a backup heat. Other survey data indicate a high proportion of low income households, particularly among main source woodburners. In other words, it would appear that there are a significant number of low income households which have electricity as the back up heat for their main source woodburning.

Proposed Program

The IAQB as part of its effort to assist the Pinehurst area attain and maintain healthful air, has put together a comprehensive program to reduce wood stove emissions. This will entail a coordinated effort among a number of organizations, including the North Idaho Community Action Agency, the Idaho Energy Division, Shoshone County Commissioners, Pinehurst City Council, the Farmers Home Administration, the Silver Valley Economic Development Corporation and others.

The role that Washington Water Power is being asked to play is the partial funding of the cost of converting to natural gas 40 low income households using wood as their main source of heat. WWP has experience with changeover programs through its Switch Saver project, which is focussed primarily on eliminating electrical load. The Wood Switch Saver proposal would enhance this demonstration project by also addressing the local air pollution problem caused by residential woodsmoke.

Wood Switch Saver would be similar to its namesake, except that the clients' portion of the costs would be determined on a sliding scale basis. It is clear, however, that many low income residents in the Pinehurst area would not be able to cover their portion of the conversion costs, so the IAQB is pursuing funding to cover the clients' share. Another difference would be that any household taking advantage of WWP's offer would have to surrender or disable their wood stove. That way there would be no possibility that the device could be used by the household or resold for use elsewhere in the State.

WWP could administer the program, or it could be contracted to local agencies. In either case the public information function would be incorporated into the broader woodsmoke reduction effort, with outreach being provided by a variety of groups such as the weatherization and energy assistance programs, senior services, Shoshone County Social Services, and others.

Program Benefits

WWP's support for the elimination of 40 older wood burning stoves would be a significant step in the effort to bring the Pinehurst area into attainment with the national PM_{10} standard. This support would come at a critical time in the area's struggle for economic revitalization and community renewal.

The Wood Switch Saver program could act as a pilot project for utilities across the country. This program would provide tangible evidence of the natural gas industry's commitment to clean air, and provide a model for other companies to follow. It would also demonstrate that environmental improvement and economic development can be mutually supportive.

Proposed Funding for Conversion of 40 Residential Woodburning Heating Systems

<u>Conversion Costs</u>

WWP $2000 per system		$ 80,000
Weatherization Program $ 375 per system		15,000
Other sources $1125 per system		45,000
	Sub-total	$140,000

<u>Administrative Costs</u>

WWP		20,000
	TOTAL COST	$160,000

THE WASHINGTON WATER POWER COMPANY

NOTICE OF TARRIFF CHANGE
(Electric Service Only)

Notice is hereby given that the "Sheets" listed below of Tariff I.P.U.C. No. 25, covering electric service, has been filed with the Idaho Public Utilities Commission in Boise:

Original Sheet 90
Original Sheet 90-a
Original Sheet 90-b

The Washington Water Power Company is making an application to the Idaho Public Utilities Commission for an Order approving a new tariff, Schedule 90, covering the conversion of residential customer's existing space and water heating equipment from electricity to natural gas.

Copies of the proposed tariff changes are available for inspection in the Company's offices.

December 21, 1990

Energy Factors (EF) of at least 51% - 56% depending on tank size (which went into effect January 1, 1990).

Under the Water Heat Conversion Program and Space Heat Conversion Program, the Company will require the installation of high efficiency gas equipment which meet higher efficiency standards than the federal minimums. Furnaces installed must have an Annual Fuel Use Efficiency (AFUE) of at least 90%. Water Heaters installed must have a minimum static operating efficiency of at least 85%, which is equivalent to an annual operating Energy Factor (EF) rating of at least 60%.

An additional requirement for customers wishing to participate in the Space Heat Conversion Program is that water heaters must also be installed at the time of conversion. The sole exception to this requirement is when the installation of the water heater would exceed $1,200. However, up to the $1,200 limit, the customer would be required to pay for costs which exceed the maximum funding limits.

LOW INCOME CUSTOMERS: All of the Company's customers will be eligible for the proposed program. However, the Company is currently working with state and local agencies in Idaho to develop a low income component of these programs for qualifying low income customers on assistance. The Company will seek to obtain state and federal funds to provide all or a portion of the monthly shared savings charges that would be assessed a participating low income customer. If these supplemental funds prove unavailable for qualified low income customers, the Company may propose a low income component of the conversion programs that would forego payment of some portion or potentially all of the shared savings charges.

The Company currently plans to either file a modification of this proposed tariff, or file an additional tariff at a later date specifically designed for qualified low income customers.

VIII.

TEST PROGRAM AND EVALUATION: Prior to fully implementing both programs, the Company proposes to run tests of each program March 1, 1991 through June 30, 1991. During the test period, the Company will only offer the programs to customers generally located within the city limits of Coeur d'Alene and within the 83814 zip code. The Company will target the Water Heat Conversion Program test to the estimated 2,400 customers having gas space heat but currently heating water with electricity. There are estimated to be 2,000 electric space heat customers in the test area that are potentially eligible for the Space Heat Conversion Program.

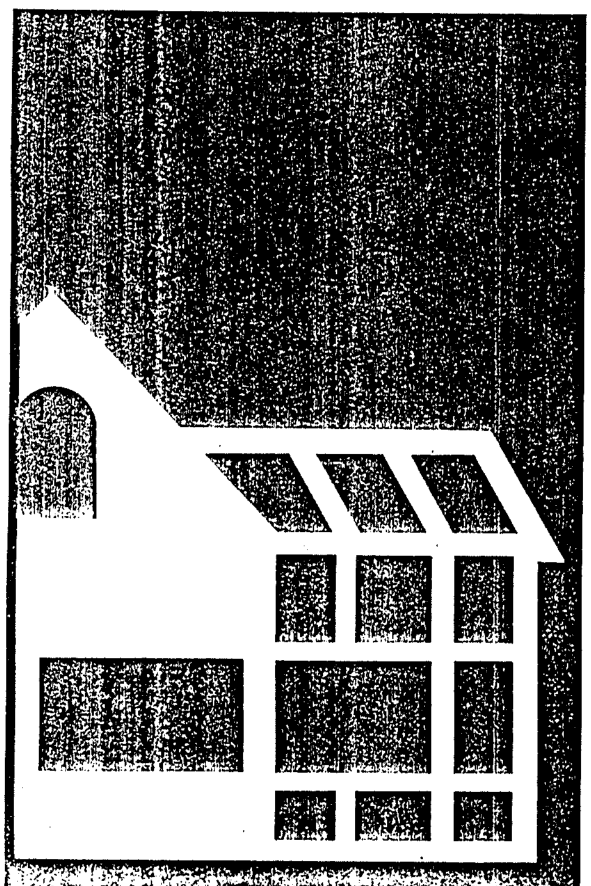
The Company will use results from the program tests to verify the cost-effectiveness of conducting such a program as an electric demand side management program. The results of the program tests from the Coeur d'Alene area will be compared with results of testing promotion-only in another limited area within the Company's service territory.

United States Department of Agriculture

Farmers Home Administration

Program Aid Number 1184

Home Improvement Loans and Repair Loans and Grants



Home Improvement Loans and Repair Loans and Grants

A rural homeowner whose house needs fixing up may be eligible for a loan and/or grant from Farmers Home Administration (FmHA).

The agency makes home improvement loans to people who may not need or cannot afford a new house, but need some work done on their present house to bring it up to minimum standards. It also makes loans as well as grants to homeowners to remove health or safety hazards from their dwellings. Grants are made only to low-income elderly homeowners, 62 years or older.

A borrower's income is the key to the type of assistance for which he or she is eligible.

If income is so low as to permit only removal of health and safety hazards, a repair loan and/or grant may be available.

For homeowners with somewhat higher income, a home improvement loan may be possible to bring the house up to minimum standards.

How Can Funds Be Used?

The ways in which repair loans and/or grants and home improvement loans can be used are very similar, and FmHA county supervisors will help borrowers determine the type of assistance that best fits their needs and for which they are eligible.

Generally, repair loans and grants may be used to remove health hazards by repairing roofs, providing a sanitary water and waste disposal system that meets local health department requirements, installing screens, windows, or insulation, or taking other steps to make the home safe.

Home improvement loans may include similar purposes, but may go further by bringing the home up to minimum standards and making changes for the convenience of the residents, such as adding a room, remodeling the kitchen, or otherwise modernizing the house.

What Are The Terms?

FmHA county supervisors will help families determine the type of assistance that is best suited to their needs and their income.

Very low-income families can receive up to $5,000 in a loan, a combination loan and grant, or a full grant to remove health hazards. Loans up to $1,500 must be repaid within 10 years, loans between $1,500 and $2,500 within 15 years, and loans over $2,500 within 20 years. The interest rate is 1 percent.

To receive a combination loan and grant, an applicant

To receive a full grant, the homeowner must be 62 years or older, and unable to pay for any repairs on the house.

Families with somewhat higher incomes can borrow up to $7,000 to improve their homes. Loans can be made for up to 25 years. Interest rates are based on each household's income and usually will be 1, 2, or 3 percent.

Other home improvement loans are repayable in 33 years. These loans are made at the regular interest rate, or with "interest credits," depending upon family size and income.

Who Can Borrow?

If you own and live in a home on a farm, in the open country, or in towns of up to 10,000 population, you may qualify for a loan and/or grant if you cannot secure credit from regular commercial lenders. The homeowner must be 62 years or older to qualify for a grant or a combination loan and grant. This assistance is also available in some towns of 10,000 to 20,000 population. Your town may be in this category. To be sure, ask the FmHA county supervisor whether this assistance is available in your town.

What Security Is Required?

A real estate mortgage is required for loans of more than $2,500, and in some instances may be required for smaller loans. If the loan is under $2,500, but income is small so that repaying the loan will be difficult, someone may co-sign the loan note with the borrower.

Homeowners who receive a grant or a combination loan and grant must agree not to sell the house on which grant funds are used for up to 3 years.

Where Do You Apply?

Go to the local county office of the Farmers Home Administration. The office address can be found in the telephone directory under "U.S. Government–Agriculture." Or write directly to the Farmers Home Administration, U.S. Department of Agriculture, Washington, D.C. 20250.

Are There Other Conditions?

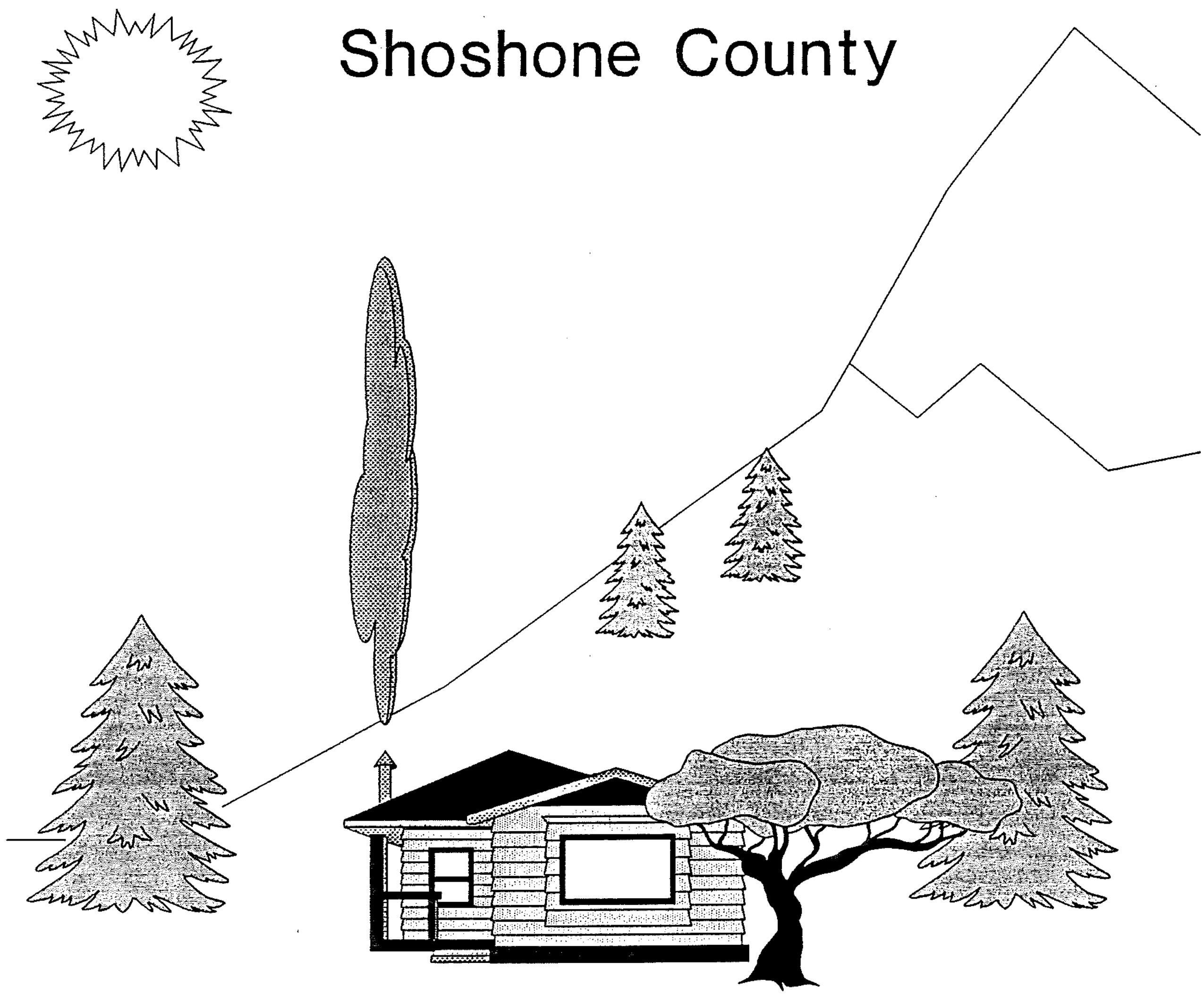
Applications from eligible veterans are given preference. Veterans and nonveterans must meet the same requirements.

Each person who applies will receive equal consideration regardless of race, color, religion, sex, age,

Idaho Community Development Block Grant Application

by

Shoshone County



November 1, 1991

Full Application

for an

Idaho Community Development Block Grant

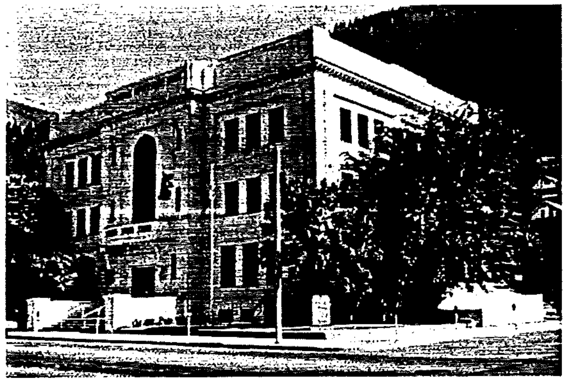
by

Shoshone County

November 1, 1991

Commissioner Don Hayman

MARCIA WINGFIELD, CLERK DISTRICT COURT AUDITOR and RECORDER
TAMARA HOUSE, TREASURER and TAX COLLECTOR
DUANE E. LITTLE, ASSESSOR
FRANK D. CRNKOVICH, SHERIFF
JOHN J. ROSE, JR., PROSECUTING ATTORNEY



COMMISSIONERS:
DON HAYMAN, CHAIRMAN
DAVID R. DOSE
W.N. (BILL) SEATON
LONNY DUCE, CORONER

County of Shoshone

WALLACE, IDAHO 83873

October 30, 1991

Mr. James v. Hawkins
Idaho Department of Commerce
700 West State
Hall of Mirrors, 2nd Floor
Boise, ID 83720

RE: Idaho Community Development Block Grant - Woodstoves

Dear Mr. Hawkins:

The County of Shoshone respectfully submits this application for an Idaho Community Development Block grant. Many of the houses in our County have old woodstoves which are inefficient, polluting and often unsafe. The $50,000 in this grant request will assist in the replacement of these stoves with safer, more efficient and cleaner heating systems, either certified woodstoves or natural gas. All of the recipients of these funds will be persons of low or moderate incomes.

We appreciate your concern and attention to our grant request.

Sincerely,

BOARD OF COUNTY COMMISSIONERS

Don Hayman

Don Hayman, Chairman

DH:cls

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D. APPLICATION INFORMATION - RULE 1.7.3d

IDAHO COMMUNITY DEVELOPMENT BLOCK GRANT

Applicant: Shoshone County Address: P.O. Box 1049, Wallace, Idaho 83873

Chief Elected Official: Don Hayman, Chairman Phone: 752-3331

Application Prepared By: Vicky McLane Phone: 334-5898

Address: 1410 N. Hilton St., Boise, Idaho 83706

Architect/Engineer/Planner: Phone:

Address:

NATIONAL OBJECTIVES: (please check)	PROJECT CATEGORY: (please check)	PROJECT FINANCING: (fill in)	
LMI X	Public Facility	ICDBG:	$ 50,000
Slum and Blight	Housing X	Local:	46,280
Imminent Threat	Senior Citizen	State:	15,000
		Federal:	
		Private:	99,520
		Other:	
	Economic Development	TOTAL:	210,800

* Note: Send 2 copies of all applications to Department of Commerce and 1 copy to your regional Economic Advisory Council member and attach Project Maps and LMI Survey Maps in Appendix.

Project Area Population: 18,997

Project Area LMI Pop.: 7,191 Project Area Enumeration District Number(s): All of Shoshone County

Total Mill Levy for Project Area: $ 2,542,180

Total Jurisdiction Budget: $ 7,905,129 Assessed Valuation: $ 378,369,977

Current Monthly Utility Rates: Water N/A Sewer N/A Effective Date N/A

DETAILED PROJECT DESCRIPTION: Housing rehabilitation project involving the replacement of non-certified woodstoves by certified woodstoves and/or natural gas. This will improve energy efficiency, health and safety for 60 low income families.

DESCRIBE PURE LOCAL MATCHING FUNDS: Families participating in the woodstove replacement project will pay a portion of the costs. For certified woodstoves, households will pay $4.60 per month for twenty years for a total of $1104.00. For gas conversions, households will pay $10.00 per month for 5 years for a total of $600.00.

APPLICATION CERTIFICATION:

The data in this application is true and correct. This document has been duly authorized by the governing body of the city or county and the city or county will comply with all required certifications, law and regulations if the application is approved and selected for funding.

Name (Typed) Don Hayman Title Chairman

Chief Elected Official

Signature Don Hayman Date 10-30-91

E. **Threshold Factors**

Eligible Applicant: Shoshone County is a general purpose unit of government in Idaho with a population of less than 50,000.

Eligible Activity: The project will principally benefit low and moderate income persons by household income qualification during the eligibility certification process - rule 1,3. This housing rehabilitation program will result in improvements to privately-owned residential buildings - rule 1,4,17,a. The improvements will consist of the replacement of principal fixtures and components of existing structures (old, wood burning stoves which are used as the main source of heat) - rule 1,4,17,c,i. The improvements will increase energy efficiency through replacement of heating equipment - rule 1,4,17,c,iii - and will involve rehabilitation services - rule 1,4,17,c,viii.

Administrative Capacity: Shoshone County is currently administering two CDBG grants. The County intends to contract for the administration of this project with the North Idaho Community Action Agency (NICAA), which is responsible for programs for the economically disadvantaged in the five counties of North Idaho. NICAA has extensive experience in both state and federal grant processes and procedures, and is applying for approval as an Idaho CDBG grant administrator.

NICAA presently administers grants from the Department of Housing and Urban Development (senior housing), Farmers Home Administration (senior housing), Department of Agriculture (commodities), Department of Energy (weatherization), Department of Health and Human Services (energy assistance and community service block grant), Department of Education (child care feeding), and ACTION (retired senior volunteers).

Public Participation: The public has been involved in developing this project through the input of several groups. These include the Silver Valley Chapter of Idaho Citizens Network (ICN), a statewide citizen action organization working to improve the quality of life for low and moderate income households (see Appendix for ICN letter of support). The Shoshone County Commissioners have also been involved, as has NICAA. NICAA's Board of Directors is made up of equal representation from the private sector, the public sector, and the low income.

Public participation will be encouraged and solicited throughout this project with the use of brochures, public service announcements, community meetings and other means. A formal Citizen Participation Plan is attached, along with a copy of the public notice and meeting minutes. Verification is also included that citizens' comments and views on the proposed application were considered prior to submittal.

Date of Public Notice 10/23/91 Date of Public Hearing 10/30/91

F. General Project Description

1. Community Description

Shoshone County is comprised of 1,670,000 acres of heavily forested land in the eastern part of Idaho's Panhandle. It is traversed by the South Fork of the Coeur d'Alene River which winds through the 22 mile long Silver Valley. Almost 75% of the land is owned by the Federal government and managed by the United States Forest Service. Elevation at the western edge of the County is 2200 feet with steep slopes rising to 3300 feet at the Montana border.

In 1842 Cataldo Mission was founded by Jesuit priests in the western part of the County, and more settlers came to the area when the Mullan military road was built. Population began to increase rapidly after gold was discovered in 1881. Recent valley history has been based primarily on the mining industry, along with retail trade and services. However, with many mine closures and cutbacks in the past few years, mining employment has lost its prominence, and the County is now developing a tourist oriented economic base.

The population was 19,226 in 1980, and dropped to 13,931 in 1990, reflecting the economic downturn. Most of the residents live in seven small communities strung out along the Silver Valley. Housing stock is old and deteriorating, with 35.5% of the homes built prior to 1939, compared to a statewide figure of 21.9% Per capita income is less than 80% of the state average, and the unemployment rate is approaching 30%.

2. Community Needs Assessment

Shoshone County has many and varied needs, ranging from public facilities to health programs to economic development projects. One of its needs which is often overlooked is decent housing for low and moderate income families. Decent housing is an absolute essential to the health of any community. This has been recognized by both the federal and state governments since it is listed as one of the major goals of their respective community development block grant programs.

An important component of decent housing is a safe, efficient and non-polluting heating system. A residential heating survey conducted in the Silver Valley in April of 1991 by the Idaho Division of Environmental Quality indicates that there are many households in Shoshone County which do not have heating systems that meet these criteria.

Most of these homes receive their heat from older woodstoves which are energy inefficient, highly polluting, and often installed in an unsafe manner. They pose a significant and well documented threat to human health due to the large number of small particles which they emit. Small particles can penetrate the deeper regions of the lung, and when they contain cancer causing or toxic materials, such as are found in wood smoke, the health effects can be acute and long term.

The problems of an inadequate woodstove heating system are particularly acute in Shoshone County where these stoves are located primarily in older homes that were not built with the benefit of modern fire and safety codes as well as weatherization requirements. Improved residential heating systems, therefore, become a high priority in assessing Shoshone County's needs.

3. Project Description

Shoshone County is requesting $50,000 of CDBG funding for a housing rehabilitation project will replace old woodstoves in sixty low and moderate income households. The CDBG funds will be used to pay all or part of the client's cost of various low and moderate income housing rehabilitation programs offered by other organizations. Agencies identified to date which offer this type of housing rehabilitation program are the Farmers Home Administration, Washington Water Power, NICAA, the federal Department of Energy, and the Idaho Division of Energy.

Many Shoshone County homeowners are not able to participate in these programs because they are unable to afford the required monthly payments, minimal though these may be. It is these low income households which will receive the benefit of the CDBG dollars. Eligibility will be restricted to those households which qualify for the Department of Energy's weatherization assistance program. That income limit is 130% of the poverty level, which is less than HUD's moderate income level. Priority will be given according to the weatherization application priority formula (see Appendix).

Eligible households will be offered the option of converting their heating systems to certified woodstoves or natural gas, where it is available. All of the homes will also be referred to free weatherization services in order to maximize the effectiveness of the heating system upgrade.

The project will cost approximately $210,800 with most of this money spent on replacement equipment and professional installation. The 40 natural gas conversions will cost about $160,000, the 20 certified woodstove replacements about $40,000, and the rest allocated to certification of families and administration.

As outlined in the project schedule, it should take four months from the date of the grant award to complete the administrative work which will allow the woodstove replacements to begin in September 1992. It will not be possible to have all 60 homes on the same schedule since it will take time to identify and qualify eligible applicants. Therefore the replacements will take place over a ten month period from September 1992 to May 1993.

A second public hearing will take place in January 1993. Final inspection of the work and acceptance by the initial group of households is projected for March 1993, with all construction completed by June 1993. Closeout will be in November 1993.

4. Benefits of the Project

This project will improve housing stock for low and moderate income citizens, and thereby meet one of the four objectives of the ICDBG program. It will help provide decent housing for sixty low and moderate income families in Shoshone County by replacing older woodstoves and providing referrals to free weatherization assistance. The project will improve energy efficiency by reducing the demand on energy resources; it will improve home safety by reducing the possibility of woodstove related fires; and it will improve the environment by reducing the amount of health related air pollution.

The improved housing stock that this project will provide is certainly a prerequisite to the economic growth that the county is working so hard to attain. The housing rehabilitation activities should contribute directly to the county's economy by providing work for and equipment purchases from county residents and businesses. In order to ensure local economic benefit, it is important that, as much as possible, purchases be made from Shoshone County businesses and local residents be employed on the project.

Eligibility for this project will be the same as for the Department of Energy's weatherization assistance program, with priority assigned according that program's formula (see Appendix). It is difficult to profile the female head of household or the minority and handicapped status of the participants, although the income guidelines will probably result in significant participation by members of these groups. It should be noted that according to the 1980 census Shoshone County has a minority population of less than three percent, female head of households of 7%, and a disabled population of 9.4%

The particular combination of funding and agencies that is represented in this project will make it a model to follow for other parts of the state which have similar problems. It is even possible that the experience gained in Shoshone County can be transferred to rural areas across the country. And the knowledge gained by everyone involved will enable them to do a better job of meeting the needs of Shoshone County's low and moderate income population.

G. Budget Form (See Rule 1, 7, 3g)

ATTACHMENT A
BUDGET
COMMUNITY DEVELOPMENT PROJECT

Applicant (or Grantee): Shoshone County Project No.: (If grant awarded)

Project: Housing Rehabilitation

LINE ITEMS:	ICDBG Grant	Other Fed	AMOUNTS: State[1]	Local[2]	Private[3]	TOTAL
Administrative Expenses*	5,000					5,000
Project Planning Design*						
Land, Structures, Rights of Way						
Individual Household Certification	5,000					5,000
Permit and Inspection Fees				1,600	6,400	8,000
Relocation Expenses						
Relocation Payments to Businesses & Individuals						
Demolition and Removal						
Housing Rehabilitation	40,000		15,000	44,680	93,120	192,800
Equipment						
Audit				4		
Total Costs**	50,000		15,000	46,280	99,520	210,800

Remarks: 1. Idaho Division of Energy Stripper Well funding 2. Participating households 3. Washington Water Power 4. Shoshone County will pick up audit costs.

* Administrative expenses & project planning design costs when totaled shall not exceed 10% of the total ICDBG amount.

** Grantees allowed to shift up to 10% of total ICDBG funds between line items without requesting budget amendment. Therefore, there is no contingency line item.

CDServer/CDBG/Forms/BudgetPageHandbookAppendix

H. Assurances - Rule 1.10.3h

In the event we, ~~the~~ Shoshone (~~City~~ ~~or~~ County), should receive a Community Development Block Grant, we certify we will comply with the requirements of the following:

National Environmental Policy Act of 1969

Civil Rights Act of 1964 Pub.L 88-352

Civil Rights Act of 1968 Pub.L 90-284

Age Discrimination Act of 1975

Rehabilitation Act of 1973, Section 504

Housing and Community Development Act of 1974, as amended Pub.L 93-383

Davis-Bacon Act (40 USC 276a - 276a-5)

Historic Preservation Act

Section 106 of the Housing and Urban Recovery Act of 1983 certifying to:

- Minimize displacement as a result of activities assisted with CDBG funds; and is following a residential antidisplacement and relocation assistance plan.
- Conduct and administer its program in conformance with Title VI and Title VIII, and affirmatively furthering fair housing;
- Provide opportunities for citizen participation comparable to the State's requirements (those described in Section 104(a) of the Act, as amended);
- Not use assessments or fees to recover the capital costs of CDBG-funded public improvements from low and moderate income owner occupants;
- Abide by all State and Federal rules and regulations related to the implementation and management of Federal grants.
- Assess and implement a Handicapped Accessibility Plan in accordance with Section 504 of the Rehabilitation Act of 1973, as amended.
- Adopt and implement an Excessive Force Policy.
- Adopt and abide by the Anti-Lobbying Certification.

Don Hayman (signature)
Signed by Chief Elected Official

10-30-91
Date

Don Hayman
Typed Name

I. Ranking Criteria (continued)

ii. National Objectives - Rule 1.8.4 (Choose either the benefit to LMI or the prevention and elimination of slum and blight)

OPTION ONE - LMI (260 possible points)

BENEFIT TO LOW AND MODERATE INCOME (Rule 1,8,4a):

(Check one) Area Benefit____ Facility for LMI persons____ Direct Benefit to LMI households X

Calculate percentage of LMI persons below:

Total # of persons = 192 Total # of LMI persons = 192 : Percentage of LMI = 100 %
(100 points)

How were LMI persons determined? By household income qualification during eligibility certification process.

Survey_____* Census Data_____ Enumeration District Numbers_____ Other XX (describe)
* Note: (Attach sample survey, description of the methodology used & survey tabulation.)

Total # of houses in project area = 5295
Total # of LMI houses in project area = 1836
Total Minority Households in project area = 150
Total Handicapped Households in project area = 550

Source of data: 1980 Census & June 27, 1988 HUD data "Updated 1980 census information"

Describe all the needs of the LMI persons: (80 points)

The needs of the low and moderate income persons in Shoshone County are similar to those of the community at large in many respects. This includes the need for a job, adequate housing, clean drinking water, decent roads, accessible health care, etc. Clearly, however, inadequate housing is much more common for low and moderate income families than for those in a higher economic status. The North Idaho Community Action Agency, in a recent grant application, referred to ". . . the many problems typical of low income housing stock that were unable to be addressed." These problems include lack of an adequate heating system, as evidenced by a residential heating survey conducted in the Silver Valley in April of 1991 by the Idaho Division of Environmental Quality. It indicated that over 50% of the households in Shoshone County are low and moderate income (making less than $20,000 per year), and that these households often do not have heating systems which meet the basic criteria of safety, efficiency and cleanliness.

Describe how the project will impact the LMI needs:(80 points)

Inadequate housing has been identified as a priority need of the low and moderate income household in Shoshone County. This project will relieve these households of the cost of rehabilitating their homes by providing a safe, efficient and clean heating system. It will upgrade and replace sub-standard wood burning devices which are used as a main source of heat, and provide referrals to free home weatherization. Thus low and moderate income families will be provided with improved housing stock.

Impact will be measured throughout the process by the number of households which successfully participate in the project. It will also be measured by follow up contact with these households to determine the direct and indirect effects of the improvements that have been made to their homes. An improved heating system and weatherization should help to meet some of the basic needs that low and moderate income families experience.

I. Ranking Criteria (continued)

ii. National Objectives (Choose either the benefit to LMI or the prevention and elimination of slum and blight)

OPTION TWO - SLUM AND BLIGHT (260 possible points)
PREVENTION OR ELIMINATION OF SLUM AND BLIGHT: NOT APPLICABLE

Provide Community Data (Rule 1,8,4(b):

Attach map of the area.
Attach official declaration by governing body.

Describe project area:____
____
____

Describe survey of conditions____
Number and kind of deteriorated structures____
Number and type of unsafe/unsanitary structures____
Number and type of deteriorating (ED) infrastructure ____

Describe the need to eliminate slum and blight (1/4 page): (130 points)

Describe how the project will impact the area and alleviate slum and blight. How will these impacts be measured? (1/4 page) (130 points)

I. PFH Rating and Ranking Criteria - Rule 1.8.3

i. Program Impact - 340 points

A. Percentage of ICDBG dollars in Total Project (60 points)
ICDBG funds divided by total project cost = % ICDBG in project

$ 50,000 ÷ $ 210,800 = 24 %

B. Percentage of Pure Local Matching Funds in Total Project (60 points)
Pure local matching funds divided by total of CDBG plus matching funds = % pure local matching funds in project.

$ 46,280 ÷ $ 96,280 = 48 %

C. ICDBG Dollars Per Person (50 points)
ICDBG dollars divided by total persons directly benefiting by the project = ICDBG dollars per person.

$ 50,000 ÷ 192 = 260 Dollars Per Person

D. Local Matching Funds Per Person (50 Points)
Local matching funds divided by total persons directly benefiting by the project = local dollars per person

$ 46,280 ÷ 192 = Local Matching Funds Per Person $241

E. Eligible Activity Point Form (100 points)

(Please complete the eligible activity point form on the following page.)

F. Distressed Communities / Downtown Projects (20 points)

County Unemployment Rate________ State Average x 1.5________

Above State Average? Yes_____ No_____

Is Project Located Downtown? Yes_____ No_____

Eligible Activities Point Form (See Rule 1,8,3e)

IDAHO COMMUNITY DEVELOPMENT BLOCK GRANT
PART OF RATING AND RANKING CRITERIA - Program Impact Item E

TOTAL ICDBG FUNDS REQUESTED $50,000.00

RULE #	ELIGIBLE ACTIVITY	ICDBG DOLLARS ALLOCATED	PERCENTAGE OF TOTAL	X POINT VALUE	TOTAL POINTS
1.4.1	Acquisition of Real Property			25	
1.4.2	Public Facilities & Improvements - Health/Safety Related - Social Service Facility			 100 50	
1.4.3	Code Enforcement			0	
1.4.4	Clearance/ Demolition			10	
1.4.5	Removal of Architectural Barriers			50	
1.4.6	Rental Income Payments			0	
1.4.7	Disposition of Property			10	
1.4.8	Public Services			0	
1.4.11	Relocation Payments			25	
1.4.12	Planning Activities			0	
1.4.13	Administrative Activities	5,000	10	100	10
1.4.15	Grants to Non-Profit Community Organizations			0	
1.4.16	Energy Planning			0	
1.4.17	Housing Rehabilitation	45,000	90	50	45
	TOTALS		100%	Total Points	55

I **Ranking Criteria (continued)**

iii. Public Facility and Housing Applications

Describe Planning (40 points)

Planning for this project started in April 1991, and consultations have taken place with NICAA, Farmers Home Administration, Washington Water Power, the Shoshone County Commissioners, Idaho Citizens Network (ICN) and other community groups. Much of the planning continues to be done by the agencies responsible for the housing rehabilitation programs.

However, it is important to note that this project is dependent on Farmers Home Administration receiving adequate funding for its home rehabilitation programs (see Appendix for description). Their funding levels will not be set until Congress passes a budget. It is also dependent on Washington Water Power going systemwide with their gas conversion program, and receiving approval from the Idaho Public Utilities Commission to include a component focusing on low income woodburners with electrical backup. WWP did include forty subsidized low income slots in their original program. Both of these agencies have indicated a strong interest in the project.

Describe Previous Actions (40 points)

Much of the planning necessary for this project has taken place, including identification of sources of funding, determination of potentially eligible households, availability of qualified contractors, and training of local building officials and fire marshals (see Appendix for workshop agenda). The community is involved in other related activities such as a wood energy education effort, funded by the regional bio-energy program, a proposed cordwood and pellet stove demonstration program, and a workshop on Farmers Home Administration programs.

Certified Gem Communities (40 points)
Certified: Yes

Detailed Cost (40 points)

Labor	$ 56,000
Piping, venting, ducting	58,000
Equipment and materials	66,000
Permits, inspections, certifications	25,800
Administration	5,000
TOTAL	$210,800

I. **Ranking Criteria (continued)**

PROJECT SCHEDULE

Grant Award	May 1992
Administrative Contract	June 1992
Advertise Program Availability for households and contractors	June 1992
Civil Rights Review	June 1992
Individual Household Certification Starts	July 1992
Civil Rights Report Completed	July 1992
Contractor Qualification & Certification	August 1992
Debarred Check	August 1992
Inspection of Eligible Homes Starts	August 1992
Initial Environmental Reviews Begin (this is a categorically excluded project)	August 1992
Initial Environmental Releases	September 1992
Initial Bid Awards	September 1992
Start of Construction	September 1992
Inspection of Work and Acceptance by Households Starts	November 1993
Second Public Hearing	January 1993
Construction Completed	May 1993
Final Inspections and Acceptance	June 1993
Monitoring Visit	July 1993
Final Report	August 1993
Closeout	November 1993
Audit Begins	January 1994

I. Ranking Criteria (continued

iv. ADVISORY COUNCIL POINTS (Rule 1.8.6): (200 points)

Describe the Community's ability to finance the project with pure local matching funds; local effort and commitment; the project's local and regional economic impact.

Shoshone County's ability to finance even the most basic of services is questionable, and therefore its ability to finance this housing rehabilitation project is out of the question. The assessed valuation of property in Shoshone County has decreased from its 1981 high of 1.3 billion dollars to $340 million in 1991. It is estimated that approximately 50% of the County's residents have incomes less than $20,000 per year and unemployment is approaching 30%.

Shoshone County is committed to improving opportunities for its residents, and it is exploring all possibilities, from traditional economic development efforts to small non-traditional projects such as this housing rehabilitation proposal. As detailed earlier, the work that is done with the households selected for this project will have direct local and regional economic benefit. To the extent possible, purchases will be made locally and Shoshone County residents will be hired to do the work. The project will also result in more decent housing, a tangible asset, for the families which are assisted. And it will act as a model for other communities to follow.

Describe any other benefits of the project, or extenuating circumstances why this project should be funded.

Shoshone County has experienced a number of circumstances which make this project particularly worthy of CDBG funding. Unemployment is approaching 30% as the result of mine closures and slowdowns, and the population has decreased 28% over the last ten years. New residential construction has almost stopped, and Shoshone County's existing housing stock is aging. 35.5% of the homes in Shoshone County were built prior to 1939, compared to a statewide figure of 21.9% Housing and infrastructure will continue to deteriorate unless outside sources of funding become available.

The Bunker Hill lead smelter operation has resulted in a portion of the County being designated as a Superfund site. This has caused serious economic, health and development problems. The flat Superfund site contains most of the land in the County which has significant economic development potential, yet its future use appears to be tied up in a legal knot. The liability issue has scared away potential buyers, and given the county a negative image.

J. **Appendix**

i. Citizen Participation Plan

ii. Verification that Citizens Comments were Considered

iii. Public Hearing Notice, Minutes and Attendance

iv. Location Map

v. Weatherization Application Priority Formula

vi. Farmers Home Administration Home Rehabilitation Programs

vii. Woodstove Inspection Workshop Agenda

viii. Letter of Support

CITIZEN PARTICIPATION PLAN FOR THE IDAHO COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM COMMUNITY OF SHOSHONE

Pursuant to the citizen participation requirements of Section 508 of the Housing and Community Development Act of 1987, as amended, the City/County of SHOSHONE will undertake the following actions to ensure compliance with said requirements as an applicant for or recipient of Idaho Community Development Block Grant Funds.

1. Conduct at least one public hearing on the ICDBG activities proposed in the ICDBG application submitted to Idaho Department of Commerce (IDC) and at least one public hearing on the status of funded activities.

   The application hearing, at minimum, must include a review of: (a) how the need for the proposed activities were developed, (b) how the proposed activities will be funded and sources of funds, (c) date application will be submitted, (d) requested amount of ICDBG funds, (e) estimated portion of the ICDBG funds requested that will benefit persons of low and moderate income, (f) where the proposed activities will be conducted, (g) plans to minimize displace of persons and businesses as a result of funded activities, (h) plans to assist persons actually displaced, and (i) the nature of the proposed activities.

   The public hearing on the status of funded activities, at minimum, must include a review of (a) a general description of accomplishments to date, (b) a summary of all expenditures to date, (c) a general description of the remaining work, and (d) a general description of changes made to the ICDBG project budget, performance targets, activity schedules, project scope, location, objectives or beneficiaries.

2. Publish notices of hearing(s) consistent with the requirements of the Idaho Code, Section 60-109.

3. Ensure the public reasonable access to all local meetings, project records and information relating to the proposed and actual use of ICDBG funds.

4. Conduct all ICDBG related public meetings or hearings in public buildings or facilities that are accessible to the handicapped.

5. Provide citizens the name and address of: (a) the persons(s) authorized to receive and respond to citizen proposals, questions and complaints concerning proposed or funded activities, (b) the person(s) that will be available and able to provide technical assistance to groups representative of persons of low and moderate income in preparing and presenting their proposals for the request and use of ICDBG funds.

6. Provide translators during or written translations after public hearings attended by non-English speaking residents upon their request whenever they represent a significant proportion of the persons benefitted by the proposed or actual project activities.

This plan shall become effective November 1, 1991

SIGNED Don Hagman

Verification that Citizens Comments Were Considered

The grant application was modified as the result of citizen comments at the public hearings. These comments stressed the potential economic importance to Shoshone County of this grant award IF purchases are made locally and local residents are hired to do the work, as much as possible. The commentor asked if that provision could be made a condition of the grant implementation and it was suggested that this issue be brought up with the County Commissioners if the County receives the grant. Two parts of the application were modified to reflect the strong concern expressed about keeping the economic benefits within the County.

6 THE NEWS-PRESS Wednesday, Oct. 23, 1991

SHOSHONE COUNTY, IDAHO
NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the Shoshone County Board of Commissioners will hold a public hearing to accept verbal and written comments on a Housing Block Grant for Shoshone County. Shoshone County is requesting $50,000 from the Idaho Department of Commerce to assist in the upgrade and replacement of non-certified woodstoves in low and moderate income households. The project will include replacing non-certified woodstoves with natural gas heating systems and with certified cordwood stoves.

THE PUBLIC HEARING WILL be held in the Shoshone County Courthouse, Wallace, Idaho, on October 30, 1991 at 11:00 a.m. in the Commissioner's Conference room. This facility is handicapped accessible and the public is welcome to attend and make their comments known.

BOARD OF COUNTY COMMISSIONERS
SHOSHONE COUNTY, IDAHO
David R. Dose, Chairman Pro-tem
Legal #SHO 320
1 x 10-23/1991

SHOSHONE COUNTY, IDAHO
BOARD OF COUNTY COMMISSIONERS

HEARING ON IDAHO COMMUNITY DEVELOPMENT BLOCK GRANT $50,000

OCTOBER 30, 1991 11:00 A.M. CONFERENCE ROOM

The public hearing on the Idaho Community Development Block Grant through the Department of Commerce in the amount of $50,000 for upgrading woodstoves was called to order at 11:00 a.m. by Chairman Don Hayman. Present were: Chris Seagraves, Secretary; Vicki McClain from the Idaho Division of Environmental Quality; Harold Van Asche, County Planner; Gerald Garvey of the North Idaho Community Action Agency; Diane Aubry of Shoshone County News-Press; Peter Piekarski; Barbara Miller and Josephine Davis of the Idaho Citizens Network.

Ms. McClain pointed out that the application and handbook are present for anyone to view. Ms. McClain noted that the State has about $2.5 million available for public facilities and housing grants with a maximum of $400,000 per request. Ms. McClain explained that Shoshone County is requesting $50,000 for a housing rehabilitation project which would replace woodstoves. Ms. McClain went on to explain the eligibility requirements for moderate to low income families.

Ms. McClain explained that this project is estimated to cost $210,000 with most of the money being spent on installation of woodstoves or conversion to natural gas. Ms. McClain also noted that it is proposed that the North Idaho Community Action Agency administer the grant.

On a question from Commissioner Hayman, Mr. Garvey explained that once the project grant is awarded, they will see a lot of people through their regular weatherization program, they will advertise the availability of the funds and contact senior centers and get the word out as much as possible.

Barbara Miller questioned the time frame involved. Ms. McClain explained that if all goes as planned, the State would make their grant award in May, 1992 and they would anticipate advertising in June and actually start on the project in about September of 1992. They would have to phase people in and the project completion date would be approximately May, 1993.

Barbara Miller asked that consideration be given to purchasing the woodstoves from local suppliers. Ms. McClain noted that it would be up to the Board of Commissioners, when they do the contract, to formalize that. Commissioner Hayman indicated that is definitely a concern of the Commissioners.

On a question from Mr. Piekarski, Mr. Garvey explained that there will be a maximum limit of about $1,600 spent on each home.

Commissioner Hayman moved to approve the application for the Idaho Community Block Grant in the amount of $50,000. (Commissioner Dose seconded the motion later in the day and it was approved).

Being no further persons wishing to be heard, the public hearing adjourned at 11:35 a.m.

Respectfully submitted:

Chris Seagraves

Chris Seagraves, Secretary

SHOSHONE COUNTY, IDAHO
ATTENDANCE ROSTER FOR Block Grant 10-30-91
PURPOSE OF MEETING: Woodstoves

****

PLEASE SIGN IN

NO.	PRINTED NAME	ADDRESS OR COMPANY REPRESENTING
1	Vicky McLane	Idaho DEQ, 1410 N. Hilton, Boise 8371
2	GERALD GARVEY	NORTH IDAHO COMMUNITY ACTION AGEN
3	Diane Aubry	Shoshone News Press
4	Peter P. Piekarski	myself.
5	Harold Van Asche	Shoshone Co Planning & Zoning
6	Barbara Miller	ICN Pinehurst, ID
7	Josephine Davies	ICN member Kellogg Idaho
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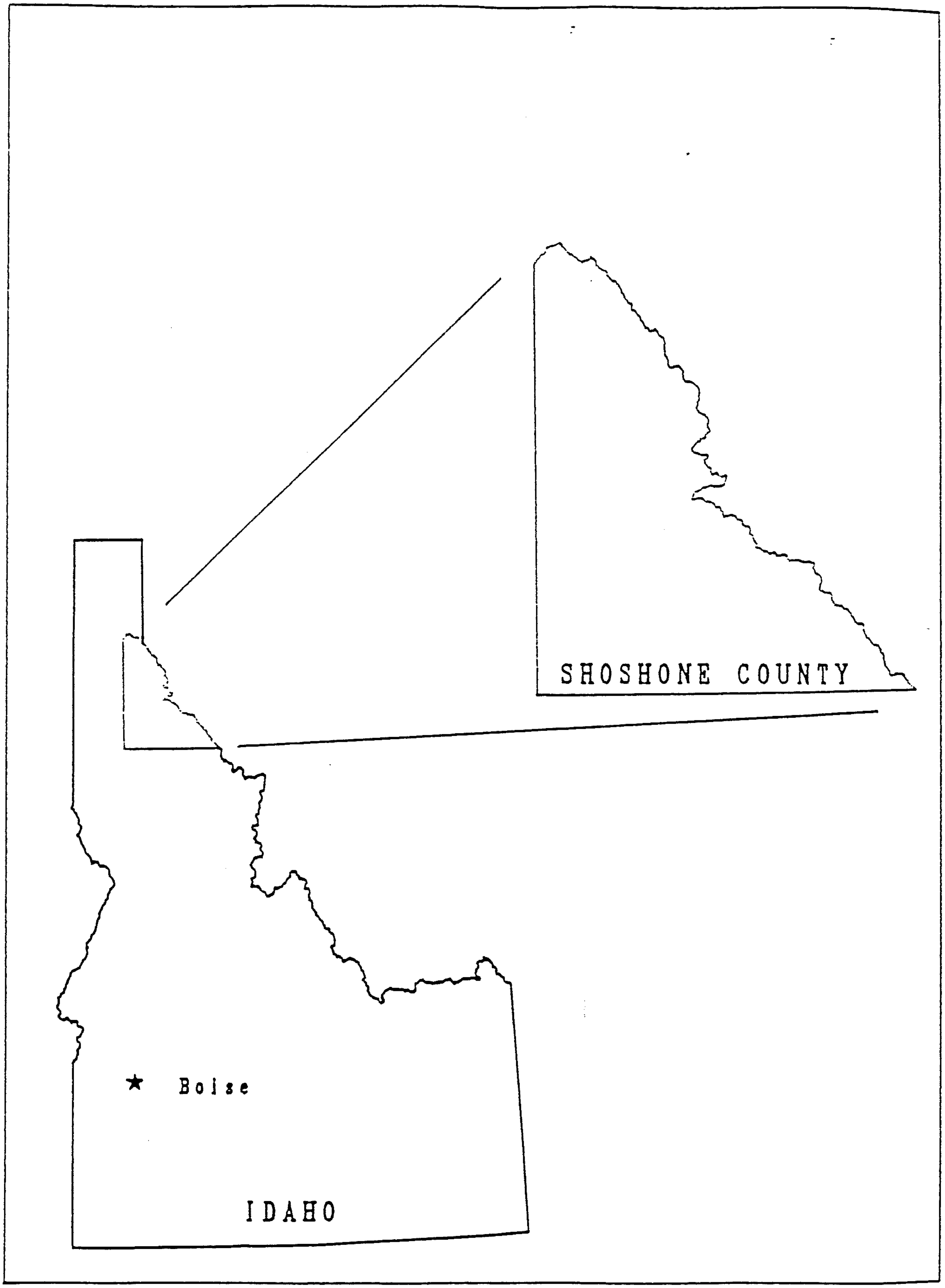


Location of Shoshone County

12/85
R 1/91

EXHIBIT V
WEATHERIZATION
APPLICATION PRIORITY FORMULA

The Priority Formula must be used to assign a priority rating to every eligible application immediately following the energy Analysis. The rating will determine the scheduling for crew assignment.

Number are to be assigned to the rating sheet according to the following formula.

AGE AND/OR INFIRMITY

None of the below..0
One or more children eighteen years or younger...................1
One or more residents either elderly or infirm...................2
one or more residents both elderly and infirm....................3

CONDITION OF HOME

Good Condition - House is structurally sound, requiring minimal or no infiltration measures and/or repairs...0

Fair Condition - House requiring minor infiltration measures and/or repair; partial window/door jam replacement; limited amount of envelope sealing; weatherstrip kits, etc..............1

Poor Condition - Definite structural deficiencies requiring considerable amount of infiltration measures and/or repairs; window/door replacements; roof leaks; water damage due to leaking pipes; extensive envelope sealing, etc..............2

Emergency - Condition of home severe; adequate indoor temperatures are not maintainable during the heating season; possible health (hypothermia) risks to occupants..........................3

ANTICIPATED BENEFIT OF WEATHERIZATION

LC/NC - Majority of energy savings is anticipated through client education; nature of possible weatherization measures and/or repair being limited, resulting in minimal reduction in energy consumption. Home will receive (low cost / no cost) weatherization.......0

- Combination of: Client education; infiltration measures..1

- Combination of: Client education; infiltration measures; one of the following measures (floor/duct wall - attic) insulation.........................2

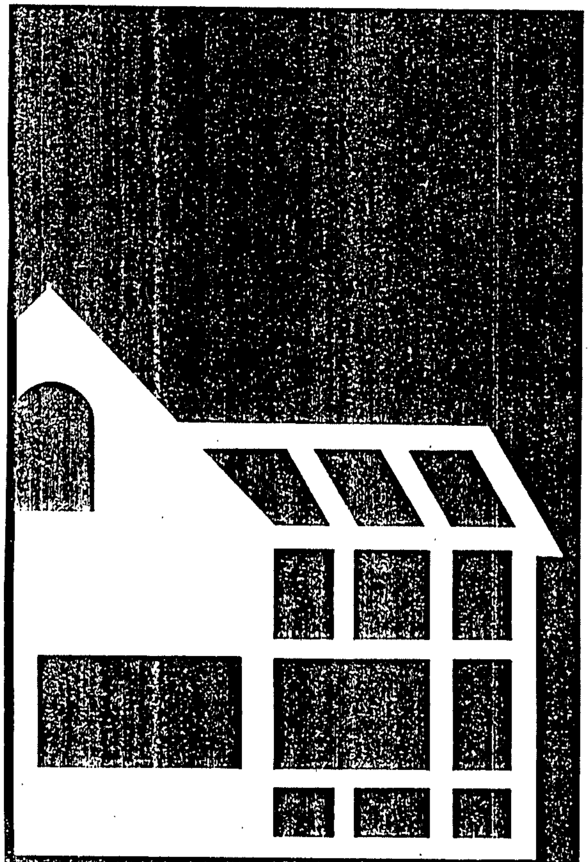
- Combination of: Client education; infiltration measures; two of the following measures (floor/duct wall - attic) insulation.........................3

United States Department of Agriculture

Farmers Home Administration

Program Aid Number 1184

Home Improvement Loans and Repair Loans and Grants



Home Improvement Loans and Repair Loans and Grants

A rural homeowner whose house needs fixing up may be eligible for a loan and/or grant from Farmers Home Administration (FmHA).

The agency makes home improvement loans to people who may not need or cannot afford a new house, but need some work done on their present house to bring it up to minimum standards. It also makes loans as well as grants to homeowners to remove health or safety hazards from their dwellings. Grants are made only to low-income elderly homeowners, 62 years or older.

A borrower's income is the key to the type of assistance for which he or she is eligible.

If income is so low as to permit only removal of health and safety hazards, a repair loan and/or grant may be available.

For homeowners with somewhat higher income, a home improvement loan may be possible to bring the house up to minimum standards.

How Can Funds Be Used?

The ways in which repair loans and/or grants and home improvement loans can be used are very similar, and FmHA county supervisors will help borrowers determine the type of assistance that best fits their needs and for which they are eligible.

Generally, repair loans and grants may be used to remove health hazards by repairing roofs, providing a sanitary water and waste disposal system that meets local health department requirements, installing screens, windows, or insulation, or taking other steps to make the home safe.

Home improvement loans may include similar purposes, but may go further by bringing the home up to minimum standards and making changes for the convenience of the residents, such as adding a room, remodeling the kitchen, or otherwise modernizing the house.

What Are The Terms?

FmHA county supervisors will help families determine the type of assistance that is best suited to their needs and their income.

Very low-income families can receive up to $5,000 in a loan, a combination loan and grant, or a full grant to remove health hazards. Loans up to $1,500 must be repaid within 10 years, loans between $1,500 and $2,500 within 15 years, and loans over $2,500 within 20 years. The interest rate is 1 percent.

To receive a full grant, the homeowner must be 62 years or older, and unable to pay for any repairs on the house.

Families with somewhat higher incomes can borrow up to $7,000 to improve their homes. Loans can be made for up to 25 years. Interest rates are based on each household's income and usually will be 1, 2, or 3 percent.

Other home improvement loans are repayable in 33 years. These loans are made at the regular interest rate, or with "interest credits," depending upon family size and income.

Who Can Borrow?

If you own and live in a home on a farm, in the open country, or in towns of up to 10,000 population, you may qualify for a loan and/or grant if you cannot secure credit from regular commercial lenders. The homeowner must be 62 years or older to qualify for a grant or a combination loan and grant. This assistance is also available in some towns of 10,000 to 20,000 population. Your town may be in this category. To be sure, ask the FmHA county supervisor whether this assistance is available in your town.

What Security Is Required?

A real estate mortgage is required for loans of more than $2,500, and in some instances may be required for smaller loans. If the loan is under $2,500, but income is small so that repaying the loan will be difficult, someone may co-sign the loan note with the borrower.

Homeowners who receive a grant or a combination loan and grant must agree not to sell the house on which grant funds are used for up to 3 years.

Where Do You Apply?

Go to the local county office of the Farmers Home Administration. The office address can be found in the telephone directory under "U.S. Government–Agriculture." Or write directly to the Farmers Home Administration, U.S. Department of Agriculture, Washington, D.C. 20250.

Are There Other Conditions?

Applications from eligible veterans are given preference. Veterans and nonveterans must meet the same requirements.

Each person who applies will receive equal

NORTH IDAHO CODE ENFORCERS

in coorperation with

DIVISION OF ENVIRONMENTAL QUALITY
Idaho Department of Health & Welfare

presents

WOODSTOVE INSPECTION WORKSHOP

Friday, October 18, 1991 9AM - Noon

Coeur d'Alene City Hall
710 Mullan

AGENDA

9:00 - 9:15	Purpose of Workshop Rick Ulveling, President, NICE Vicky McLane, Idaho DEQ
9:15 - 10:00	NFPA 211 - The Whys and Wherefores How UL Standards Relate to NFPA 211 Wes Christensen, Underwriters Laboratory
10:00 - 10:15	Q & A
10:15 - 11:00	Woodstove Installation - The How Tos A Practical Perspective, Including Training & Technical Assistance John Killen, The Log House John Crouch, Wood Heating Alliance
11:00 - 11:15	Q & A
11:15 - 12:00	Woodstove Inspection - The Process How to Develop A Simple Inspection Program Jim Fackrell, Building & Community Development Department
12:00 - ?	Q & A

Anyone who is interested in learning more about woodstove inspections is welcome to attend this free workshop.

For more information, Call Mike Jacobs, 667-9533

IDAHO DISABILITIES COALITION • COEUR d'ALENE • SILVER VALLEY • TWIN FALLS • POCATELLO • BURLEY • BOISE

SILVER VALLEY CHAPTER

IDAHO CITIZEN'S NETWORK

P.O. Box 362 • Kellogg, ID 83837 • 208-682-4387

October 25, 1991

Greetings:

The Idaho Citizens Network being a non-profit, non-partisan organization utilizing the grass roots movement to bring about resolution of social injustice issues supports the purpose of this Community Economic Block Grant.

We have become acquainted with Vicky McLane from Division of Enviornmental Quality over the past year. She has taken time to visit the Valley and understand the sensitive needs of the people who live here.

Homelessness, poor housing, the designation of being the 2nd largest Superfund site in the nation, double digit unemployment figures are all factors that qualify Shoshone County for the CEBG. Funding from this grant will improve the quality of life for 60 low to moderate income households in the Valley by providing them with the oppotunity to rehabilitate their homes with efficent, non-polluting certified wood stoves or gas heat.

Sincerely,

The Silver Valley ICN
Barbara Miller, Staff person

APPENDIX G

PUBLIC INVOLVEMENT IN THE SIP DEVELOPMENT PROCESS

Pinehurst PM_{10}
Air Quality Improvement Plan
February 5, 1992

APPENDIX G

Public Involvement in the SIP Development Process

PUBLIC INVOLVEMENT IN THE SIP DEVELOPMENT PROCESS

The notice of the comment period for the Pinehurst PM_{10} SIP was published in the Coeur d'Alene Press and the Shoshone County News-Press on December 17, 1992. The comment period ran from December 17, 1991 through January 24, 1992. There was a hearing held in Pinehurst during the comment period on January 22, 1992.

There was also an information meeting on the Pinehurst PM_{10} SIP held on December 17, 1991 in Pinehurst. The notice of the information meeting was published in the Shoshone County News-Press on December 14, 1991.

The legal notice with affidavits of publication, the advertisement for the information meeting, the hearing transcript, and the hearing officer's report with the exhibits from the hearing are included in this appendix for documentation.

NOTICE OF INTENT TO AMEND A STATE PLAN
FOR PARTICULATE MATTER (PM-10) AIR QUALITY
IMPROVEMENT IN PINEHURST

The State Department of Health and Welfare, Division of Environmental Quality (DEQ), will hold a public hearing on January 22, 1991 at 7:00 p.m. in the Pinehurst Elementary School Cafeteria, 107 S. Third, Pinehurst, Idaho, to receive public comment on an amended state plan for particulate matter (PM-10) air quality improvement in Pinehurst. The Department has also scheduled a public comment period from December 17, 1991 through January 24, 1992.

The purpose of the hearing and the comment period is to receive input from the public on revising the referenced State Plan. This plan identifies residential wood burning as the primary contributor to Pinehurst's exceedances of state and federal PM-10 ambient air quality standards. The plan describes a wood burning emission control package for the area as the key air quality improvement measure. This package focuses on providing funding assistance to residents to voluntarily replace old wood burning equipment with low polluting and more efficient heating devices. The plan demonstrates that implementation of this package will result in the standard being met in the Pinehurst area by December 31, 1994, and maintained until at least the year 2000.

Verbal testimony will be limited to five (5) minutes per speaker. Written comments will be received by the Department until 5:00 p.m. MST on January 24, 1992 at the following address:

Gary Reinbold
Department of Health and Welfare
Division of Environmental Quality
1410 N. Hilton
Boise, ID 83706-1253
(208) 334-5898

Copies of the proposed amendments are available at the above address, Pinehurst City Hall, the Pinehurst Kingston Public Library, and at the DEQ regional office in Coeur d'Alene, 2110 Ironwood Parkway. If you have any questions, please call Terry Christianson at the DEQ Coeur d'Alene office, 667-3524.

AFFIDAVIT OF PUBLICATION

STATE OF IDAHO,
County of Kootenai, } ss.

Julie Jacobs being first duly sworn upon oath deposes and says:

1. I am now and at all times hereinafter mentioned was a citizen of the United States, resident of the State of Idaho, over the age of twenty-one years and not a party of the above entitled action.

2. I am now and at all times hereinafter mentioned was the printer (principal clerk) of the "Coeur d'Alene Press," a newspaper printed and published daily except Sunday in Coeur d'Alene, Kootenai County, Idaho, and having a general circulation in said county.

3. The Legal Notices

of which the annexed is a printed copy, was published in the regular Tues issue of said newspaper for 1 consecutive day, commencing on the 17th day of December, 1991, and ending on the 17th day of December, 1991, and such publication was made as often during said period as said Daily newspaper was regularly issued.

4. That said newspaper has been continuously and uninterruptedly published in said Kootenai County, during a period of more than seventy-eight consecutive weeks immediately prior to the first publication of said notice.

Julie Jacobs

Subscribed and sworn to before me this 17th day of December, 1991.

Roberta Manley
Notary Public for the State of Idaho, residing at Coeur d'Alene, Idaho.

ROBERTA MANLEY
My commission expires 2-3-93

NOTICE OF [illegible] AMENDED STATE PLAN FOR PARTICULATE MATTER (PM-10) AIR QUALITY IMPROVEMENT IN PINEHURST

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Legal 796
Dec. 17, 1991

RECEIVED

DEC 19 1991

Div. of Environmental Qu.
Permits & Enforcement

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Legal #SHO 377
1 x 12-17/1991.

PROOF OF PUBLICATION

) Department of Environmental Quality
) 1410 North Hilton
) Statehouse Mall
Boise, Idaho 83720

I, R. N. "Bud" Budvarson, being first duty sworn deposes and says: SHOSHONE COUNTY NEWS-PRESS, a daily newspaper of general circulation in said county, published in the City of Kellogg, in the County of Shoshone and the State of Idaho, and which has been published continuously in said county for a period of 78 weeks immediately prior to the publication of this notice hereinafter described, and that the

Legal Notice

of which the annexed is a true copy, was published in each regular weekly/daily issue of said newspaper, and not in supplement thereto, for a period of (1)one consecutive weeks/days, the first publication thereof being in its issue dated 12/17/91 and the last publication thereof being in the issue dated

[signature]

COUNTY OF

On this 18th day of December in the year of 1991, before me, a Notary Public, personally appeared R. N. "Bud" Budvarson, known or identified to me to be the person whose name subscribed to the within instrument and being by me first duly sworn, declared that the statements therein are true, and acknowledged to me that he executed the same.

[signature]
Notary Public for Idaho
Residing at Kellogg, Idaho
My commission expires: 10/17/94

	Initial	Date
Project Officer	[initials]	12-30-91
Manager		
Bureau Chief		
Check for appropriate codes		

LEARN TO BURN BETTER

and help reduce wintertime air pollution!

The Idaho Division of Environmental Quality (DEQ) invites you to a public meeting to discuss a plan to reduce particulate pollution in the Pinehurst area.

Tuesday, December 17, 1991

7 p.m.

Cafeteria of the

Pinehurst Elementary School.

For more information about the meeting, call Sharon Hewitt at Pinehurst City Hall 682-3721, or Terry Christianson at the DEQ Regional office in Coeur d'Alene at 667-3524.

To find out more about daily air quality and to obtain woodburning advice, call the DEQ air quality hotline at 682-3333.

Idaho Department of Health and Welfare

Division of Environmental Quality

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Idaho Department of Health and Welfare
Division of Environmental Quality

BEFORE THE DEPARTMENT OF HEALTH AND WELFARE
STATE OF IDAHO

CONCERNING PINEHURST AIR QUALITY)
IMPROVEMENT PLAN FOR PARTICULATE PM-10)
)

ORIGINAL

Taken at the Pinehurst Elementary School Cafeteria
107 South Third
Pinehurst, Idaho
Wednesday, January 22, 1992 - 7:10 p.m.

PUBLIC HEARING

CLEAR WATER REPORTING

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INDEX

Reported by SHELLY JAN BUTTZ, CSR, Freelance Court Reporter and Notary Public, States of Idaho, Washington and Oregon, residing in Lewiston, Idaho.

A P P E A R A N C E S

PURSUANT TO NOTICE, there appeared before Shelly Jan Buttz, CSR, a Notary Public, at the Pinehurst Elementary School Cafeteria, 107 South Third, Pinehurst, Idaho, at the hour of 7:10 p.m., Wednesday, January 22, 1992, in a public hearing of Pinehurst Air Quality Improvement Plan For Particulate (PM-10)

Mr. Louis Garbrecht, Hearing Officer, appears on behalf of the Department of Health and Welfare.

The public hearing was reported in stenograph by the Notary Public, Shelly Jan Buttz, CSR, for the firm of Clearwater Reporting, 631 Main Street, Lewiston, Idaho, and by her later transcribed.

WEDNESDAY, JANUARY 22, 1992

MR. GARBRECHT: Let the record show that I am Louis Garbrecht the designated Hearing Officer for the Department of Health and Welfare, Divison of Environmental Quality. The hearing is being recorded by Clearwater Reporting service. It is now about 7:10 p.m. on the 22nd day of January, 1992. We are in the cafeteria, even though it looks more like a library to me, at the Pinehurst Elementary School, Pinehurst, Idaho. This is the time and place set to receive oral comments in the revision to the state implementation plan. The revision we'll be dealing with is a new chapter on the Pinehurst Air Quality plans for -- for particulate PM-10.

For the audiences' information, the state implementation plan is a plan required by Federal law to be developed and implemented by a state to meet the national ambient air quality standards. The purpose of this proceeding is to gather the facts, views or arguments for all interested persons relative to the revisions so that they may receive consideration by the Department.

I will accept written statements or documents at the hearing this evening, if relevant and signed by the persons presenting them. The materials will be included as exhibits in the record, which I will transmit to the Division of Environmental Quality following the close of the public comment period.

Let the record show the affidavits are on file regarding publication of the legal notice of the opportunities for public comment at least 30 days prior to the close of the scheduled comment period as required in Title 40, Code of Federal Regulations, Section 51.102 (d). Such publication was made in the Coeur d'Alene Press and the Shoshone News-Press on December 17th, 1991. Such publication included the notice of this public hearing. This publication was timely made, and other necessary notice requirements have been met.

Now, as an informal proceeding, there is no right to cross-examine a person offering a comment, nor is there a right to counsel or subpoena powers. No objections or procedures of a technically legal nature will be received. And as a Hearing Officer, I am the sole regulator of the course of the presentations, including, but not limited to, a determination that the comments are outside the scope of the rules, or that comments are unduly repetitious. I'm not here to answer questions or to explain any part of the proposed plan, although, I, myself, might ask questions to further explore or amplify the information presented.

All those interested persons attending the hearing are asked to sign in on the roster by the entrance, indicating a desire, if any, to make an oral presentation. I ask that you try to limit your comments to five minutes, but I would like to note that if we have enough time and we feel like there's more that you would like to offer, we'll consider extending it beyond five minutes.

After a brief statement by the Department representative, which will summarize the information upon which the action is based, each person will be given an opportunity to speak at least once prior to any person being heard a second time. I will remind you that this hearing is on the proposed Pinehurst PM-10 SIP revision and that only comments concerning that topic may be considered.

At this time, the Department's statement will now be read into the record followed by the oral presentations.

And I understand that Vicky McLane of the Division of Environmental Quality will make the opening statement on behalf of the Department.

Thank you.

MS. MCLANE: Mr. Hearing Officer, ladies and gentlemen, my name is Vicky McLane. I'm a Program Development Specialist with the Idaho Division of Environmental Quality. I would like to provide you with some background on the proposed Pinehurst -- Pinehurst Particulate (PM-10) Air Quality Improvement Plan that is before you tonight. The plan outlines air quality problems in the Pinehurst area and proposes ways in which the problems can be effectively addressed.

In July of 1987 the Environmental Protection Agency adpoted standards for small airborne particles less than or equal to 10 microns in size, known as PM-10. The State of Idaho adopted these safe standards in April of 1990. The standard that we are concerned with tonight is the 24 hour value of 150 micrograms per cubic meter. This standard was set to protect human health and provide a margin for safety.

State monitoring data indicates that Pinehurst had exceeded the standard 4 times in 1986 and 6 times in 1987. As a result, Pinehurst was designated a nonattainment area for PM-10. When an area is identified as nonattainment for national ambient air quality standard, the Clean Air Act requires that states adopt and submit the Environmental Protection Agency a plan called a state implementation plan, or

SIP. The plan must show that the standard will be met no later than December 31st, 1994, and that the standard will be maintained until the year 2000.

The Division of Environmental Quality has done several studies which indicate the major source of PM-10 pollution in the Pinehurst area is residental wood burning, with the next largest source being road dust. Therefore, the plan identifies a wood stove emission control package as the key air quality improvement measure. This package focuses on providing funding assistance to residents to voluntarily replace old wood burning equipment with low polluting and more efficient heating devices.

The plan also calls for a voluntary ban on wood burning when a high pollution day is forecast. This ban would mean that all citizens, except for those who must rely on wood burning as their only source of heat, are requested not to burn wood until the poor air quality call has ended.

The State supports this plan as a reasonable way to move quickly toward attaining the PM-10 national ambient air quality standard in Pinehurst.

The Division of Environment Quality is very interested in receiving comments on the plan. No one should feel that they must have detailed technical knowledge of the plan in order to provide useful comments. However, only comments relevant to the air quality plan may be considered by the Division.

Oral comments at this hearing or written comments mailed to the Division are welcome. You are encouraged to fill out the last page of the material you were given when you came in and leave it with the Hearing Officer tonight or mail it to the indicated address by the closing date. Following this hearing, and after receiving the Hearing Officer's report and any public comments, the State will review these comments, make appropriate revisions and prepare a final document that will be included for inclusion in the state air quality implementation plan. This plan will then be submitted to the Environmental Protection Agency for its consideration.

MR. GARBRECHT: Thank you.

Has everybody had a chance to sign up? If not, I'll just leave one here and....

I'm just going to go through in order. And, apparently, at this point, there's only two people that have marked on the sheets that they would like to -- to go ahead and testify.

And it looks like the first people that have indicated a wish to testify would be Mike and Viola

Heglund.

Okay. Why don't you come up here to the podium, sir. It might be easier for the court reporter to record your statements.

MR. HEGLUND: Might be easier for me to speak sitting here.

HEARING OFFICER GERBRECHT: I know, and I apologize. I feel the same way.

MR. HEGLUND: No. That's okay.

I just want to state that I just want to, not caution the city or the county or anybody else, but I would just like to make certain that monies, State monies, our tax dollars and our personal money isn't going to be spent on something that's not going to alleviate the problem. In other words, to exchange one pollution source for another.

Let's make sure that we're getting what we're paying for. That's all I have.

HEARING OFFICER GARBRECHT: Okay. Thank you very much.

And the next person that indicated a wish to make a statement is Darrell Johnson.

MR. JOHNSON: Well, I don't really know how pertinent my comments will be because I'm not even a resident of Pinehurst. But when I heard of this meeting -- I have attended others, because I happen to be a -- in the -- in the business of selling fireplace equipment, and I've also been in the wood stove industry for about 14 years.

And, interestingly, I came in anti-wood stove. I have been anti-airtight wood stove for many, many years.

Wood has received a lot of bad publicity -- wood burning has received a lot of bad publicity because of the airtight wood stove. The idea of a single wood load being able to last for many, many hours, simply doesn't fit in with the laws of physics or the laws of nature. But that's the way wood has been burned for the last 20 years in the modern wood stove. And the proliferation of wood stoves has lead to a -- a lot of air pollution. There's no question about that. But there's a danger of throwing out the baby with the bath water.

The reason I'm commenting here is because a number of years ago, we took a unit that we -- that we manufactured here in Idaho, we took it to an EPA accredited laboratory to have it certified, which we felt would be quite easy because our unit was advertised as a clean-burning unit since 1981, when it first came on the market. And we advertised that it was the cleanest burning one you could buy, money-back guarantee. So we felt that it fit right in with the new standards.

Well, I guess we were a little naive, because we found that in order to get that unit certified, we would have to make some major changes. In fact, we would have to change the draft system in order to slow the burn time down in order to get it certified to the EPA standard.

And I'd like to ask a question: how many people here have read the Federal register that sets out the standards for testing and certifying wood stoves? I don't see any hands. And I'll have to admit, before I went to the test laboratory, I hadn't read it either. But when the engineer said that we -- that our unit burned wood too fast to get it certified, I said, Well, what difference should that make, because if we're burning clean, we should be able to get it certified. He said, No. In order to meet the EPA standards, a wood stove cannot burn more than one kilogram of dry wood per hour.

So, in other words, in order to get a wood stove certified to the EPA standard, the wood -- the burn rate has to be slowed down to one kilogram of dry wood per hour. This is why if you go look at wood stoves today they either -- they either have a very tiny fire box or they have to put a catalytic combustor on them to attain the emissions limits that also are mandated by the standard.

The point of this is that the EPA has developed a standard that will never address the real problem of pollution from woods stoves, and that is the long, drawn out burn time.

Certified stoves do work better than the old airtight, no question about that. But they still fall far short of what we really need if we're going to clean up the air and burn wood at the same time. I believe that wood is a very viable source of domestic heat energy. And it's plentiful. It's plentiful, and it's cheap. And therein lies another problem because there's some that don't want us to have cheap fuel. But it also has to be used responsibly.

Anyone who wants to burn wood has to realize that they have the potential for messing up somebody else's air. And, you know, we're all neighbors. We all live here together. And if we have control of anything, whether it's our automobile, our heating units or even cigarettes -- I'm not a smoker, but many are -- people are getting more and more conscious of the fact that if we're polluting someone else's air, then we're going to be held accountable for it.

We all need warm homes, and the alternatives to burning wood also present pressures on our environment. We're talking about air pollution; and, of course, the wood stoves, it's easily identified, the type of pollution, because of its distinctive smell. No mistaking the smell from a wood stove. And some studies have shown that many of the particulates that are taken, the samples, have been, because of the pervasive nature of wood smoke, it has a tendency to contaminate other particulates.

It's my personal opinion that sometimes I think wood stoves are getting blamed for more damage in the contaminants, as far as the air quality is concerned. But be that as it may, there's no question that wood stoves do produce a tremendous amount of pollution.

The solution, the way I see it, is for each individual that wants to burn wood to recognize the fact that there's work involved. It's not an automatic thing. I grew up with wood stoves. I remember back in the 40s a little town where I grew up in Idaho, everybody burned wood. Most people had at least two stoves. You had a cook stove and you had a heating stove. And the air was breathable.

How many -- how many here remember those days when everybody burned with wood? And the air was breathable. It was different than it is today. If you walk downtown, in some areas -- you can even smell it here in Pinehurst. You can smell the smoke in the air. I can smell a little bit tonight.

Something changed from the 1940s to the 1980s and 1990s. And, basically, it was the advent of the airtight wood stove, because people like the convenience of being able to load the stove and have that single wood load go all the way through the night and maybe all day. Many people brag that they only have to load their stove twice a day. And there isn't anything, no type of technology, no laboratory testing, catalytic combustors or anything else, that is going to allow anyone to burn a single wood load all day and have clean air. It just won't happen. And the reason is is because of the basis of the wood itself.

Wood is unique as a fuel. First of all, we consider it a solid fuel; but, actually, wood consists of two separate distinct elements of fuel. The charcoal, which is the solid portion that burns, and then the condensable organic hydrocarbons that evaporate out of the wood as it heats up.

The wood stoves are designed to deal with the charcoal, but most of the heat value in wood is in the condensable organic matter that evaporates out of the wood. That is what goes into the air. Not only is it a pollution, but it's also a wasted fuel. And it's dangerous because it can -- it can condense inside chimneys and form creosote, and a lot of wood burners have experience chimney fires as a result of the creosote build up in their chimney.

The solution to burning wood and heating a home with it is to provide an environment that will burn not only the charcoal but burn those organic vapors as they come out of wood. And the airtight wood stove, those are all lost into the atmosphere, most of them are lost into the atmosphere. Because they are in a complex molecular form, these particulates are very small in size, they remain suspended in the air. This is the PM-10 we're talking about, a very tiny particulate. You can't even see that. That remains suspended in the air; and, consequently, we can breathe them down into our lungs.

The environment necessary for burning these vapors, since they're very illusive, they require high temperatures and a lot of oxygen to burn. Open fireplaces, for instance, don't -- do not put out the pollution that an airtight wood stove does, because an open fireplace has plenty of air.

Temperatures in excess of 1100 degrees are necessary to burn the vapors from wood, plus oxygen. If you provide that, the high temperature and the air, not only do you burn these vapors, you get a lot more heat out of the wood. But the particulates that are released into the atmosphere are not the PM-10. They're -- most of the elements involved -- wood is organic. Consists primarily of carbon and hydrogen, carbon, hydrogen and oxygen, which is the primary elements in all organic matter.

So most of the gases that come out are carbon dioxide, a free carbon, and carbon monoxide and a host of other hydrocarbons, but they're in -- the ratio is quite small from a hot burning fire. And because it is a hot burning fire, there are ions produced, and lot of free carbon which will -- this will settle out of the air. In fact, it has a tendency to take these other particulates with it. It could be beneficial -- actually, a hot burning fire could be beneficial to the atmosphere by filtering out other contaminants.

Most plans for improving the air quality, in various places where I've -- where we've worked and where I've been, focus on sometimes the wrong things: changing stoves or changing heating devices, rather than changing burning habits. And I feel that the single most important part of improving the air from wood burning is for those who are burning wood, to learn how to burn it properly, to learn what it takes to burn wood. And if your old stove won't do it, get a new one.

I'm not in favor so much of the certified wood stoves for the very reasons I pointed out earlier, because they have kind of a catch 22 a -- a factor involved. In fact, in order to stay legal, we had to get our product exempted, or change it. We didn't change it because I'm more of an environmentalist than I am a capitalist for sure. And we stuck with our guns and stuck with our design, and we finally got our unit exempted. But it does -- it functions different. It functions on the principles that I was talking about.

But it's something that, you know, we -- we don't want to lose our freedoms. Those who have grown used to heating their homes with wood are never totally happy heating their homes in any other way, many people. And that desire to hang on to that is very strong.

But I would urge each one to be cognizant of the fact that we are in control of something that can pollute -- pollute the air and affects other people.

And curtailment during bad air quality is a good idea. I don't think switching to certified stoves is the answer.

That's the biggest comment that I have.

HEARING OFFICER GARBRECHT: Thank you. I appreciate it.

Does anybody else have a statement they'd like to to make tonight?

Yes, sir. Why don't you gentlemen there in front, why don't you come on up.

And, again, I apologize to have to request that you use the podium.

MR. HODGE: No problem.

MEMBER OF THE AUDIENCE: You're used to that.

HEARING OFFICER GARBRECHT: And since you're not on the roster, could you state and spell your name, please.

MR. HODGE: My name is Jim Hodge, J-I-M, H-O-D-G-E.

I have one quick comment that I'd like in the records. The SIP plan addresses Pinehurst, and people seem to look at Pinehurst as Pinehurst city limits. We could implement the plan -- and I'm not so sure that that would rectify the problem -- as the outlying areas outside the city are so closely oriented and that the prevailing winds will bring in the wood smoke from the Mullan-Mission area, Wier Gulch and from the Pinebrooke area, and continue the problem. I think what needs to be -- an area-wide plan needs to be developed, and not so much particularly at Pinehurst city limits. And I know Vicky's well aware of that situation.

But as this plan is presented to the EP (sic), I would like that noted in there for the fact that we might not be able to still continue to meet the PM-10 standards, although the people in Pinehurst are voluntarily shuting off their wood stoves at -- in opportune times and whatever.

And I'd just like that entered into the record.

HEARING OFFICER GARBRECHT: Thank you very much.

Maybe I could ask Ms. McLane, do you have any indication as to how much might be from the outlying areas as opposed to the city limits, or is that done in any of the studies?

MS. MCLANE: The answer is, no, we really don't. And we are -- we are constraint at this point because Environmental Protection Agency has specifically used the city limits of Pinehurst for their designation of the nonattainment area.

I think, however, the State's view of this is probably reflected pretty clearly. We have some maps in the back labled "Proposed Pinehurst Nonattainment Area." And we, too, believe, along with Jim Hodge, that it does encompass a broader area. And it would be very hard for us, I think, to -- to distinguish what's coming up Pinecreek and what's coming from -- from different areas.

So we haven't done that yet, but we believe it's an area-wide problem, not a city limits problem.

HEARING OFFICER GARBRECHT: I also assume that any kind of education programs would obviously expand beyond this --

MS. MCLANE: Yes. For example, the brochures that you have in front of you have been distributed, courtesy of the Boy Scouts, to the whole area. It wasn't just to Pinehurst. It was to all the areas that Jim Hodge mentioned. And we plan to continue that emphasis as an area-wide problem.

HEARING OFFICER GARBRECHT: All right. Thank you. There was another gentleman back by Mr. Hodge.

Why don't you step up to the podium if you you could.

Again, if you could state and spell your name for the record, please.

MR. SCHLAEFER: J-O-H-N S-C-H-L-A-E-F-E-R.

And I'm just concerend with how the study has been carried out. I realize there are three samplers on top of the school here that all seem to be, like, within 20 or 30 feet of each other. And I'm not aware of any other samplers in the city limits of Pinehurst, sampling air.

Fairway Heights is within the city limits of Pinehurst, and I think there should be a sampler up there and samplers spread out around the city, in average, taken for the entire city within the city limits.

It doesn't seem like a very rigorous or scientific study to have all samplers within a very limited area and base the results for the entire city on that one area.

That's all I have to say.

HEARING OFFICER GARBRECHT: All right. Thank you.

Ms. McLane, I hate to bother you again, but maybe you could shed some light on why those particular samplers were chosen.

MS. MCLANE: If it's okay with you, I would like to address this question to Terry Christianson from our Coeur d'Alene office who is -- that's what he does is work with those monitors.

HEARING OFFICER GARBRECHT: Sure. Would you have any problems with, maybe, answering that question?

MR. CHRISTIANSON: Can I just sit here?

HEARING OFFICER GARBRECHT: That's fine. Why don't you spell your name for us and then --

MR. CHRISTIANSON: C-H-R-I-S-T-I-A-N-S-O-N. Terry, T-E-R-R-Y.

Two years ago, we did a saturation study in the area that went all the way from Wallace, Kellogg, Pinehurst, I think even over at Cataldo and -- trying to define a boundary. And's that something that we need to do again, there's no doubt about it.

I agree that when we come back to look at the boundaries a little closer, I think we're going to have to go out from Pinehurst City. And the only way to do that is to then bring saturation samplers and get a better definition. But we have done it before. But, like Vicky said earlier, EPA designated Pinehurst. And the State really feels that this goes beyond Pinehurst.

HEARING OFFICER GARBRECHT: Thank you for answering that.

Yes, sir, Mr. Hegland.

MR. HEGLAND: I just want to ask you a question. The saturation sampling, how many -- what?

-- all over the town here, Fairview Heights, taking samples?

MR. CHRISTIANSON: Yes. Boy, I think we had somewhere between 15 and 20 small saturation monitors that were run every other day for -- I believe it was a six-week period.

MR. HEGLAND: For six weeks. In what? January?

MR. CHRISTIANSON: January, February, that time of year, yes. But that's something that needs to be ongoing. You just don't do it once. It's something we need to look at doing again.

MR. HEGLAND: Now, can I ask you another question?

HEARING OFFICER GARBRECHT: Sure. Go ahead.

MR. HEGLAND: It was my understanding that, from speaking to people in the council and staff here, that in the last three years there was one day that Pinehurst exceeded the level. Now is that correct? One day out of three years and that --

MR. CHRISTIANSON: January of '91 we had -- this past January.

MR. HEGLAND: One day in the city limits?

MS. MCLANE: One in -- one in '89.

MR. CHRISTIANSON: '89, '90.

MR. HEGLAND: It's a little hard for such a small community to have all this happening.

MR. CHRISTIANSON: Well, the problem you get into when you're dealing with air quality is you might have a mild winter, like we're having now. And so really, we haven't seen any diversions, so you haven't any high levels of particulate.

Next year, we could go through a winter where we have sixty days of hard diversions and all kinds of diversions coming up. It's -- it's -- it's a hard thing to do. You don't -- you don't see the same thing year in and year out.

MR. HEGLAND: But isn't the Federal guidelines, do they state that --

MR. CHRISTIANSON: All you need --

MR. HEGLAND: -- a three-year period is when the study is conducted? Over a three-year period?

MR. CHRISTIANSON: I don't follow what you're asking.

MR. HEGLAND: That you -- do you remember what we did?

MR. HODGE: Yeah. I believe we go through a three-year period without any violations and you could be --

MR. CHRISTIANSON: Okay. You're talking

about -- I believe it's eight quarters of what we do being a wintertime study. And, yeah, if you go through, I think it's eight quarters with no violation, then you can re-petition EPA to designate the area attainment.

MR. HEGLAND: So one day in three --

MR. CHRISTIANSON: One day -- one day is going to do it. All it's takes is one day. If we have another one in '92, that's all it takes. The Clean Air Act is very specific on that.

MR. HEGLAND: Okay.

HEARING OFFICER GARBRECHT: Yes, sir. Could you -- could you state your name, please, if you could.

MR. PRESTON: My name is Ken Preston.

HEARING OFFICER GARBRECHT: Could you spell that for us, please?

MR. PRESTON: P-R-E-S-T-O-N.

HEARING OFFICER GARBRECHT: Thank you, sir.

MR. PRESTON: I'd like to ask a question of the gentleman that had some interesting information about certified stoves. How large a home would a stove serve that burned a kilogram of wood for an hour? That's not very much.

MR. JOHNSON: That's two point two pounds.

MR. PRESTON: Two point two pounds, yeah.

MR. JOHNSON: They're basically just room heaters, you know. That's one of the problems.

MR. PRESTON: I mean, I can't imagine a stove that burns two point two pounds per hour and a certifeid stove that would heat a very large area.

MR. JOHNSON: No, they won't. But, of course, you have to remember, too, that the test sample, the wood that they burn in the test laboratory is different than what you're going to be burning in a stove. It's milled lumber with spacers, you know. They have to be consistent in the test results, so they have to use a consistent fuel.

MR. PRESTON: Heating different wood.

MR. JOHNSON: But the result has been that there are very few wood stoves available on the market any more. Mostly -- most of the wood stove companies are now selling pellet stoves, you know. Because, then, with the pellet stove, you can -- it kind of takes up the slack from -- because of the small fire box necessary to meet the burn rate requirement.

MR. PRESTON: Well, basically, you're saying that for a stove -- a wood stove that burns a kilogram per hour, you have to have a stove for every room in the house.

MR. JOHNSON: Really. Or maybe a couple.

Yeah. Yeah. They don't work out good, and people are finding that out.

This is a sad thing really that -- the other alternative is to put a catalytic combustor on the stove. They have surface and an afterburner to reduce the -- the catalyst enables the vapors to be burned at a lower temperature.

MR. PRESTON: Yeah. So then you'd have to have, say, just one stove for two rooms.

MR. JOHNSON: Well, you still build a pretty big fire box. But I'm -- there have been a lot of problems with those, too. See, they're complicated and subject to wearing out. And my experience has been that many people that have those end up taking the catalytics -- the catalysts -- the catalytic elements out so that they can use the stove like they're -- they're used to. And then, of course, that defeats the whole purpose of it.

MR. PRESTON: Well, thank you.

HEARING OFFICER GARBRECHT: Yes, sir.

MR. YERGLER: I'd like to -- my name is Larry Yergler -- Y-E-R-G-L-E-R.

I have a catalytic stove, and I believe I can put 25 pounds of wood in it and burn it for ten hours and heat my whole house from it, so that turns out to be two point five kilograms -- or two kilograms per hour -- or one kilogram per hour. With a catalytic converter it's somewhere in that range.

My question is, I burn wood as my sole source of heat because I can't afford to pay the electricity for the electric heating. If we have the certified wood stove, will we be allowed to burn all the time, or will we have to quit burning them during the certain days? And if we have to do that to go -- and have to go to some other type of energy, will there be some Federal grant money to put in some type of cheaper energy source?

HEARING OFFICER GARBRECHT: Well, let me refer that, if I could, to Ms. McLane.

MS. MCLANE: We would anticipate certified wood stoves being allowed to burn. That's usually when we have an equality wood burning ban, certified wood stoves or pellet stoves, or what we call certified or exempt stoves and pellet, some of the pellet stoves, are allowed to burn, to answer the first part of your question.

And the second part would be, yes, we're working to -- the State is working now, on a variety of sources of Federal grants. Whether or not you want to burn another source of heat, we're trying to make it available to upgrade for cleaner wood stoves or if you change to another source of fuel.

And I think you may be aware, Washington Water Power is -- is doing some of this type of work in its service area. And we're working with them on this.

HEARING OFFICER GARBRECHT: Thank you.

Does anybody else have any comments they'd like to make orally tonight? And, again, I would remind you that you can certainly complete written comments on the back, and either turn them in here tonight, or you can mail them to Boise, Idaho. And I would be glad to provide the address to anybody that -- well, I think it's on the back there. So you -- you can certainly either turn it in tonight or mail it to me.

And if there's no other comments, I've got a closing statement I've got to make.

This hearing having been called and commenced at about 7:10 p.m. and the time now being about 7:45, the hearing is now closed. This record together with the exhibits will be transmitted by me to the Division of Environmental Quality. The oral comments presented at the hearing and the written comments received by the deadline for submittal of comments will be reviewed and considered by this Hearing Officer and by the Division of Environmental Quality.

And, again, I would remind you that the deadline, my understanding, is the 24th. So you don't have a whole lot of time to get that in, especially with the mail time to Boise.

Its statement of final action will then be made available to the public. This hearing is now adjourned and thank you all for coming.

(Hearing adjourned at 7:45 p.m.)

CERTIFICATE

STATE OF IDAHO)
: ss.
County of Nez Perce)

I, Shelly Jan Buttz, CSR, being a principle of Clearwater Reporting, and Notary Public for the States of Idaho, Oregon and Washington, residing in Lewiston, Idaho, do hereby certify:

That Shelly Jan Buttz, CSR, was duly authorized to and did report the public hearing in the above-entitled cause;

That the foregoing pages of this public hearing constitute a true and accurate transcription of the stenotype notes of the proceedings.

I further certify I, Shelly Jan Buttz, am not an attorney nor counsel of any of the parties; nor a relative or employee of any attorney or counsel connected with the action, nor financially interested in the action.

IN WITNESS WHEREOF, I have hereunto set my hand and seal on this 24th day of January, 1992.

Shelly Jan Buttz

Shelly Jan Buttz, CSR
Freelance Court Reporter
Notary Public, States of Idaho and Washington and Oregon
Residing in Lewiston, Idaho
My Commission expires: 4-29-97

LOUIS GARBRECHT
Attorney at Law
P.O. Box 974
Coeur d' Alene, Idaho 83814-0974
(208) 666-2445

RECEIVED
JAN 31 1992
DIV. OF ENVIRONMENTAL QUALITY
PERMITS & ENFORCEMENTS

January 28, 1992

GARY REINBOLD
PROGRAM DEV SPECIALIST DEQ
DEPT OF HEALTH & WELFARE
1410 N HILTON STATEHOUSE MAIL
BOISE ID 83720-9000

Re: Pinehurst Air Quality Improvement Plan

Dear Mr. Reinbold:

Please find enclosed the Hearing Officer Report, the Sign In Roster, a transcript of the hearing, the State Implementation Plan, the Learn to Burn Better pamphlet, the summary of the Air Quality Improvement Plan, and the statement from Bryce Campbell.

I have also enclosed an itemization of my time, and a request for reimbursement of services. I left the amount of mileage reimbursement blank because I was unsure what rate of mileage would be appropriate.

Thank you very much for the opportunity to serve as a Hearing Officer. Please do not hesitate to contact me if you need anything further.

Very truly yours,

Louis Garbrecht
Attorney at Law

LG/ad

LOUIS GARBRECHT
Attorney at Law
202 Anton Ave Ste 205
P.O. Box 974
Coeur d'Alene, ID 83814
(208) 666-2445

Designated Hearing Officer.

BEFORE THE STATE OF IDAHO
DEPARTMENT OF HEALTH AND WELFARE
DIVISION OF ENVIRONMENTAL QUALITY

IN RE:	)	
	)	HEARING OFFICER REPORT ON
PINEHURST AIR QUALITY	)	PROMULGATION OF STATE
STATE IMPLEMENTATION PLAN	)	IMPLEMENTATION PLAN
FOR (PM-10),	)	
	)	

I. INTRODUCTION

The State of Idaho, Idaho Department of Health and Welfare, Division of Environmental Quality, has proposed an air quality improvement Plan for Pinehurst, Idaho, designed to bring the Pinehurst Idaho area into compliance with the national ambient air quality standards for particulate matter as adopted by the United States Environmental Protection Agency. The Pinehurst, Idaho, area has not met the respective ambient air quality standards, and is not expected to meet those standards in the future absent a State implementation plan to bring the air quality within acceptable limits.

Pursuant to Idaho Code §67-5203(a), the Idaho Administrative Procedure Act, the Department is required to provide an opportunity for all interested persons to submit data, views, or arguments, either orally or in writing.

In addition to holding several informational meetings, the Department published legal notice which complies with the provisions of Idaho Code §67-5203(a)(1).

Pursuant to that notice, a public hearing was held on January 22, 1992, in Pinehurst, Idaho, to provide an opportunity for interested persons to submit their data, views, and arguments. At that hearing, no written documents were received. Several persons did offer oral statements, and these were transcribed and accompany this decision. A sign-in roster was provided, as well as an informational pamphlet entitled, "Learn to Burn Better!" and a summary of the air quality improvement Plan with a form to submit written comments. These documents, as well as the actual Plan itself, and one other written statement constitute the record in this matter.

Pursuant to Idaho Code §67-5203(a)(3), the Department is required to fully consider all written and oral submissions respecting the proposed rule, and issue a concise statement of the principal reasons for and against its adoption, incorporating reasons for overruling the considerations urged against its adoption. It was not clear from the record that the Idaho Department of Health and Welfare was required to comply with that provision which requires a petition with signatures of not less than 25 persons. Nonetheless, this report is being submitted.

II. STATEMENT OF PRINCIPAL REASONS IN FAVOR OF ADOPTION OF THE STATE IMPLEMENTATION PLAN

The Plan clearly confirms that the Pinehurst area has not attained the EPA standard for PM-10 emissions. There are two areas which must be met. First, within a 24 hour period, the standard must be less than 150 ug/m^3. The secondary standard is 50 ug/m^3 as an annual average arithmetic mean. As set forth in the Plan, the 24 hour standard has clearly been exceeded, even when factoring out exceptional events. With respect to the secondary standard, the annual arithmetic mean, it appears that while Pinehurst exceeded the standard in 1986 and 1987, it has not exceeded that standard since that time.

As set forth in §3 of the Plan the problem with attaining the 24 hour standard occurs primarily in wintertime due to temperature inversions, and the problem is primarily due to residential wood combustion. While fugitive road dust does play a part, the primary reason for non-attainment is residential wood burning. Thus the Plan directs efforts primarily in restricting use of wood stoves.

With respect to the fugitive road dust, the plan provides for the IAQB to work with the Idaho Department of Transportation to analyze sanding material on Interstate 90. IAQB is also going to work with the City of Pinehurst and the County of Shoshone to determine appropriate types of road material to minimize road dust.

With respect to the wood stove program, it must be recognized that the unemployment rate in Shoshone County exceeds 20% and that the economic base is shrinking and that 20% of the residents have income below the official poverty level. A mandatory program would eliminate the only source of heat for some households and would not be feasible in the present economic situation.

In order to control the problem, a large part of the Plan is the public awareness program as exemplified by the "Learn to Burn Better!" pamphlet. The Plan sets forth various strategies to educate the public about wood burning habits and the problems that are created by poor wood-burning practices. A second proposal is to explore methods of weatherization, primarily through the North Idaho Community Action Agency to assist the residents in obtaining help and improving weatherization. Through the public awareness program the Plan also proposes to educate residents about better storage and treatment of wood to be burned. The program also proposes restrictions and working with local governments to adopt ordinances limiting installation of wood stoves that do not meet EPA standards. Because of the lack of new residential construction, permit requirements for new installations are not feasible.

In addition, the Department proposes a program to reduce the use of wood burning devices. These are focused upon educating residents as to other heat sources and the means to pay for them. Finally, the IAQB also plans to work with local governments toward adopting ordinances prohibiting advertising and sale of any wood stove not meeting the EPA standards.

Finally, a very important part of the program is curtailing wood burning stoves during the times of highest pollution. A 24-hour hotline is in place offering the air quality report and advice on whether or not to burn wood. The plan also provides for extensive publicity to alert the public as to how to curtail wood burning during times of high pollution.

At the hearing Darrell Johnson spoke in favor of portions of the plan, particularly in support of education in how to burn wood properly and purchasing new stoves if older stoves cannot be properly converted. He was in favor of curtailing burning during periods of poor air quality.

In addition, a written statement was received from Bryce Campbell stating that he was in favor of improving the air quality in the Silver Valley. He also indicated that in his opinion inappropriate material may be used in some wood stoves in the area and indicated that he had a gas furnace. His heat and electric bill was only $28.00 per month on a yearly payment plan. He also stated that fines should be levied if wood smoke is not properly curtailed.

III. STATEMENTS AGAINST ADOPTING THE STATE IMPLEMENTATION PLAN

Very few negative comments were received. At the hearing, Mike Heglund stated that he wanted to make sure additional expenditures of tax dollars would be spent on a plan that would alleviate the problem.

Darrell Johnson stated that the EPA standard for wood stoves may not be an appropriate solution because the standard did not address the real problem of pollution from wood stoves resulting from a long burn time.

Jim Hodge stated that while the State Implementation Plan addressed only Pinehurst, some pollution came in from outside the Pinehurst Area and would therefore not be subject to the State Implementation Plan. However, since the Environmental Protection Agency has only designated the Pinehurst area, that is the area that is addressed by the Plan. It should be noted that the Plan contemplates education and ordinances beyond the city limits of Pinehurst. This was also confirmed by Terry Christianson, of the Coeur d'Alene office of the Air Quality Bureau.

IV. CONCLUSION

As indicated in the transcript at page 24 it appears that on only one day for each of the years 1989, 1990, and 1991, had the EPA standard been exceeded. This may in part be due to a lack of adverse weather conditions. Given the economic condition of the area, it appears that the State Implementation Plan is appropriate to meet the EPA standards in the least onerous manner. By relying upon public education, local ordinances, and curtailment during periods of peak pollution, the State Implementation Plan sets forth the mechanism by which the Pinehurst area can solve the problem on an almost voluntary basis without intervention by State or Federal authorities.

Respectfully submitted this 28th day of January, 1992.

LOUIS GARBRECHT
HEARING OFFICER

SIGN-IN ROSTER
PUBLIC HEARING ON A REVISION TO THE STATE IMPLEMENTATION PROGRAM

LOCATION: Pinehurst Elementary School DATE: January 22, 1992

PROJECT: Pinehurst Air Quality Improvement Plan for Particulate (PM-10)

NAME (PLEASE PRINT)	MAILING ADDRESS	ORGANIZATION REPRESENTED (IF ANY)	DO YOU WISH TO TESTIFY?
Larry Wier	Box 219 Pinehurst		
Lawanna Watts	Box 150 Pinehurst		
Bob Launhardt	Box 1206 Pinehurst		
Becky Nelson	Bx 186 Smelterville	NICAA Consumer Education	
Bernard King	Pinehurst		
James B[illegible]	Pinehurst Box 158		
[illegible]	W699 Cameron Kellogg Idaho		
Nedra Pollock	Pinehurst		
De Pollock	Box 1014 Pinehurst		
MIKE & VILLA HELLUND	Box 75 Pinehurst		√
DARREL JOHNSON	320 11th St LEWISTON 83501	ALPHA ENERGY	√

SIGN-IN ROSTER
P[illegible]BLIC HEARING ON A REVISION [illegible]O THE STATE IMPLEMENTATION PROGRAM

LOCATION: Pinehurst Elementary School DATE: January 22, 1992

PROJECT: Pinehurst Air Quality Improvement Plan for Particulate (PM-10)

NAME (PLEASE PRINT)	MAILING ADDRESS	ORGANIZATION REPRESENTED (IF ANY)	DO YOU WISH TO TESTIFY?
Jennifer Weeks	PO Box 186 Smelterville Id	Mother / AICAH	
Carl Schroeder	HC-1 Box 15A Pinehurst	—	—
Aharon Hewitt	Box 743 Pinehurst	City	no
[illegible] Howard	Box 888 Pinehurst		—
[illegible]	Box 195 Pinehurst	city	no
[illegible]	[illegible]		
David Randel	PO Box 1283 PINEHURST 83850		NO
Larry Yergler	Box 1126 PINEHURST	City P&Z	NO
John Schlaefer	Box 1324 Pinehurst	city	NO
Ken Preston	Box 1211 Pinehurst	—	—
C.C. Preston	✓ ✓ ✓ ✓		
Marna [illegible]	Box [illegible] Pinehurst	City	No

RECEIVED

JAN 21 1992

IDHW- DIV. OF
ENVIRONMENTAL QUALITY

Dear Gary

I'm Glad Someone is going To do Something about the air Quality in The Silver Valley - But what about about Kellogg? The Air Here is so polluted with wood Smoke - with these big mts on each side of the Valley theres no place for the smoke to go - as we don't get That much wind to Blow it out. - Im Supposed To walk for my Health - Im 59 & unable to work - I don't Know if you doing more Harm Than Good when I walk & I think its terrible that The Law allows this - Some people Have 2 Stoves & I don't Know what these people burn but it Sure makes ugly Smoke - I don't buy the Story that most people are too poor To get better Stoves

(

or go to gas. - I live on 350.00
a month & I Have a gas furnace
& my Heat & Electric Bill is
28.00 a month on a yearly Basis.
Its true my House is small & I'm
only one person - I think people
in town should clean up there
act or be fined - just as Speeders
are on the Hyway - only this
is much more important
wood Smoke effects every ones
Health especially the Elderly
& the young Kids walking to
School & playing outside.

Thank you

Bryce Campbell

313 W. Riverside
Kellogg Id. 83837

SPOKANE, WA 992
PM
18 JAN
1992

Department of Health
Division of Environmental Quality
1410 N. Hilton
Boise Id. 83706-1253

ATTN. Gary Reinbold

Silver Valley Residents

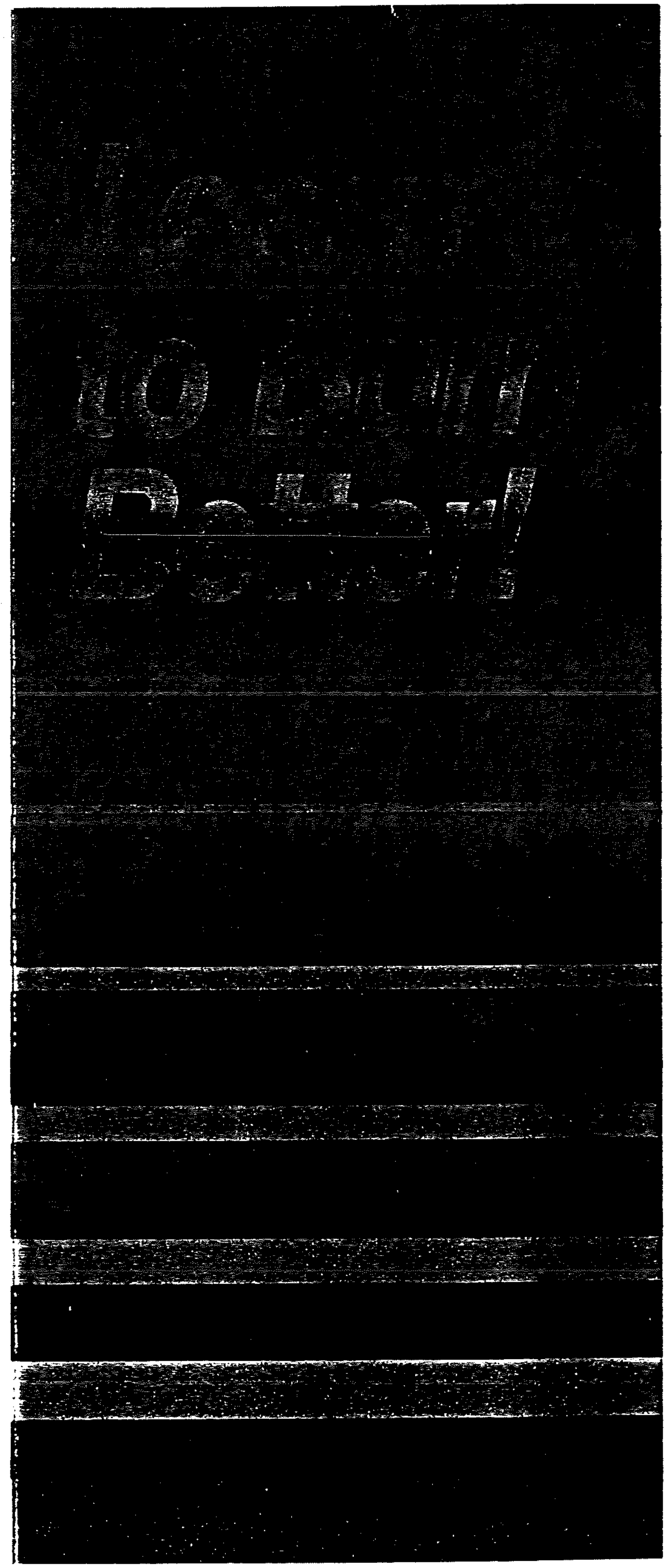
Wood stove smoke can be an air quality problem in the Valley during the winter. Please follow the simple guidelines in this brochure so that we can breathe healthier air.

From November through February, the Idaho Division of Environmental Quality with support from the City of Pinehurst, has a recorded air quality advisory. This telephone message reports current air quality conditions and advises whether or not it is a good day to burn wood.

For More Information

For More Information

Air Quality Advisory **682-3333**
Idaho Division of
Environmental Quality **667-3524**



IDAHO DEPARTMENT OF
HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

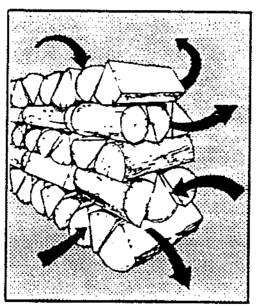
Help Reduce the Threat of Unhealthy Air...

When you're using your wood stove or fireplace this winter, follow these simple guidelines to burning better.

1. *Take a Load Off at Night*
   Banking your wood stove (loading it with enough wood to burn all night) is the biggest cause of wood smoke pollution.

   Only load your wood stove for 1/4 to 1/2 of its capacity at night; leave air inlets open and allow the fire to burn out.

   Or, bury coals in 2 to 3 inches of ash before going to bed, and the fire will relight easily in the morning.

2. *Dry-out a Little More*
   
   Wood with moisture content of less than 25% produces more usable BTUs and less smoke and creosote than green wood.

   Freshly cut wood should be split, stacked, covered and allowed to dry at least six months before it's burned.

3. *If Only You Wood*
   Wood is the only appropriate fuel for a wood stove or fireplace. Don't burn railroad ties, trash, plastic or colored paper.

4. *Blow Your Stack More Often*
   Have your chimney cleaned at least once a month during the wood burning season.

5. *Don't Get Burned*
   Buy a new, high-efficiency wood stove, and you'll get a lot more heat for your money. Be sure to buy the right size for your home, install it properly and have it inspected for clean burning safety. Read your owners manual before using your wood stove. And be sure to keep it handy for easy reference. Be a wise consumer.

Look Before You Light...

In winter months, do not use your wood stove or other wood heating appliance during high pressure periods (clear, calm, cold days).

It is at these times that our air is most susceptible to a cold air inversion, which keeps wood smoke particulates from dissipating and creates a dark cloud of unhealthy conditions for breathing.

Weatherize Your Home

The cheapest, most cost effective way to reduce your heating bills is to weatherize your home.

Before installing your wood stove, be sure to check your insulation and weatherstrip doors and windows.

Look for the Good Housewarming Seal

"High-efficiency" wood stoves are wood heating appliances which have been certified by the Environmental Protection Agency (EPA) as Phase II clean burning stoves. Look for the EPA label on the stove you buy.

Low Interest Loan

You may qualify for a low interest loan to replace your old inefficient wood stove with a new, high-efficiency one. Just call the Energy Information Hotline at 1-800-334-7283 to find out more.

PINEHURST PARTICULATE (PM-10)
AIR QUALITY IMPROVEMENT PLAN

December 17, 1991

IDAHO DIVISION OF ENVIRONMENTAL QUALITY
DEQ Air Quality Hotline - 682-3333
DEQ Information Line - 667-3524

PINEHURST PM_{10}
AIR QUALITY IMPROVEMENT PLAN

TABLE OF CONTENTS

SUMMARY

In 1987 the City of Pinehurst, Idaho, was designated as an area that does not meet the 24-hour national ambient air quality standard for small particulates, known as PM_{10}. In response to this designation, the Air Quality Bureau (IAQB) of the Idaho Department of Health and Welfare has developed this State Implementation Plan (SIP), which provides for attainment of the standard by December 31, 1994.

The first chapter provides background on the plan, information on health effects, a description of the area, and a section on community involvement. Chapter II focuses on air quality status, including monitoring and meteorological data. Chapter III is an analysis of the problem and includes the emission inventory and results of the modeling efforts. Chapter IV evaluates alternative control strategies and describes how they will be used to meet attainment. It also details an implementation schedule and describes a contingency plan.

Pinehurst, population 1722, is located in the Silver Valley, an historic mining area along the south fork of the Coeur d'Alene River in Idaho's Panhandle. The City, which was founded in the late 1920s, is situated in an enclosed bowl at the western end of the valley. The physical setting results in the frequent occurrence of stagnant weather conditions in the winter. These conditions, combined with emissions from various sources, can contribute to a buildup of particulate pollutants which sometimes exceeds the PM_{10} national health standard.

The IAQB has been measuring air quality in Pinehurst since 1974 when it installed a monitor which measures all sizes of particulate matter at the Pinehurst Elementary School. In 1985, in anticipation of a new particulate standard, expressed in terms of PM_{10}, a monitor which measures these small particulates was placed at the school. In the years following, exceedances of the PM_{10} standard were experienced, and sampling was accelerated from every sixth day to every other day for the winter season starting in October 1988.

At the same time the IAQB initiated an Air Quality Advisory telephone service. This recorded message, which is updated on weekdays and as needed on weekends, reports on the current air quality and short term outlook as well as the potential health effects of various pollution levels. Advice on whether or not to burn wood is also included.

An inventory of sources of small particles, known as an emission inventory, was developed for the Pinehurst area, and it shows that the primary cause of the high PM_{10} levels is residential wood burning at 60%, with dust from roads the second largest category at 37% of the total. There are no industrial sources in the

immediate area. Evaluation of the level of PM_{10} emissions from various source categories and analysis of actual air quality samples confirm woodstoves and road dust as the major sources.

Projections of PM_{10} levels were developed for 1994 and 2000, using mathematical models. The results indicate that without further actions the Pinehurst area will continue to experience exceedances of the PM_{10} air quality standard in 1994. Particulate emissions will need to be reduced by 19% to achieve air quality standards by the December 31, 1994 deadline. The IAQB has reviewed numerous strategies to improve air quality with local officials. The ones that have been initially selected focus on a comprehensive public awareness program combined with woodstove replacements, weatherization, and voluntary wood burning reductions. Continued implementation of these programs should ensure maintenance of the standard until at least the year 2000.

YOUR COMMENTS ON THE PINEHURST AIR QUALITY IMPROVEMENT PLAN

The DEQ would like to solicit your comments on this air quality improvement plan. Please mail any comments to:

Gary Reinbold
Division of Environmental Quality
1410 N. Hilton
Boise, ID 83706-1253

All comments must be received by January 24, 1992, 5:00 p.m. MST. If you would like the DEQ to respond to your comments please include your complete mailing address in the boxes provided. Thank you, your comments are important.

Name	Mailing Address

Your Comments:

Use the back if needed.