PM10 REDESIGNATION REQUEST

AND MAINTENANCE PLAN FOR THE

PAGOSA SPRINGS AREA

ADOPTED BY THE COLORADO
AIR QUALITY CONTROL COMMISSION
MARCH 16, 2000

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SECTION 1. INTRODUCTION

The Town of Pagosa Springs, Archuleta County, and the State of Colorado request redesignation to an "attainment" status for the Pagosa Springs PM10 nonattainment area. The Pagosa Springs area has been designated as nonattainment for the National Ambient Air Quality Standards (NAAQS) for particulate matter with an aerodynamic diameter of ten microns or less (PM10) since 1990, and the area is presently demonstrating attainment with the PM10 NAAQS. The Maintenance Plan section of this document will demonstrate that the area will be able to maintain the NAAQS through the year 2012. The benefits of redesignation to attainment status include:

1. Areas redesignated to attainment lose the stigma associated with nonattainment of the NAAQS.

2. Areas redesignated to attainment do not become "serious" nonattainment areas even if a violation of the NAAQS occurs. This means that specific control measures can be applied to address a violation without going through a rigorous federal process, where serious areas must implement mandatory control measures and be subject to numerous administrative activities.

3. Prevention of Significant Deterioration (PSD) permitting requirements replace New Source Review (NSR) permitting requirements for new and modified major stationary sources. These permitting requirements are important for large industrial facilities that are not currently located, nor likely to locate, in the Pagosa Springs area.

This Redesignation Request and Maintenance Plan is designed to document and ensure continuing attainment of the NAAQS for PM10 in the Pagosa Springs area. This document is intended to comply with requirements of the federal Clean Air Act (CAA), and with relevant procedures and policies of the United States Environmental Protection Agency (EPA).

A. BACKGROUND

1. PM10 National Ambient Air Quality Standard

In 1971, the EPA set NAAQS for several air pollutants, including total suspended particulates (TSP), defined as particles with an aerodynamic diameter of less than 40 microns. In 1987, the EPA changed the TSP standard to the PM10 NAAQS. The current PM10 NAAQS allow for a maximum annual

average of 50 micrograms per cubic meter (ug/m^3) and a 24-hour average of 150 ug/m^3. The 24-hour PM10 NAAQS may not be exceeded more than three times over any three year period.

There are both primary and secondary air quality standards. The primary standards are set to protect human health, with a margin of safety to protect the more sensitive persons in the population, such as the very young, elderly and the ill. Secondary standards are set to protect property, materials, aesthetic values and general welfare. For PM10, the national primary and secondary standards are the same. The numerical levels of the standards are subject to change, based on new scientific evidence summarized in air quality criteria documents. Although the criteria and the standards are under review by EPA at this time, the particulate matter standard has not changed since 1987.

As stated in the Code of Federal Regulations (40 CFR Part 50.6),

The standards are attained when the expected number of days per calendar year with a 24-hour average concentration above 150 ug/m^3 is equal to or less than one (based on 3-year average), and the annual arithmetic mean concentration is less than or equal to 50 ug/m^3 (based on 3-year average), as determined by Appendix K.

In general, demonstrating attainment requires collecting representative air monitoring data and using approved measuring instruments and procedures, with adequate quality assurance and quality control. The three most recent years are examined, during which the average annual number of exceedances must be less than or equal to one. The standard allows for a maximum annual average of 50 ug/m^3 and a 24-hour average of 150 ug/m^3. The 24-hour standard may not be exceeded more than three times over any three year period. Air quality measurements in the Pagosa Springs area satisfy this requirement, as shown in Section 2. "Attainment of the PM_{10} Standard."

2. Health and Welfare Effects of PM10

Particulate matter is the term given to tiny particles of solid or semi-solid material suspended in the atmosphere, and PM10 is inhaleable particulate matter 10 micrometers in diameter and smaller. In the Pagosa Springs area, PM10 is created from re-entrained road dust, carbon black (from automobile and diesel engines) and soot (from fireplaces, woodstoves, and coal stoves). PM10 from these combustion sources contains a large percentage of elemental and organic carbon, which contributes to atmospheric haze and to health problems.

Epidemiological studies and laboratory studies of humans and animals indicate that fine particles can be inhaled deeply into the respiratory system, resulting in aggravation of existing respiratory and heart diseases, damage to lung tissue, impairment of breathing and respiratory functions, alterations to the body's physical and immune system defenses, and even premature death. Many fine particles are also composed of compounds that are known or suspected human carcinogens. People most sensitive to particulate matter are the elderly, children, and those with chronic lung disease, cardiovascular disease, influenza, and asthma.

The welfare effects of particulate air pollution are wide-spread. Because of the potential for extremely long-range transport of fine particles it is thought that no place on earth is free of particulate pollution generated by urban and rural sources. Chemical and photo-chemical reactions involving the particles may occur in the air, or once they have been deposited on environmental media or structures. Such soiling and acid deposition cause visibility degradation, climate changes, and damage to crops, natural vegetation, water bodies, and aquatic life. In addition, sculpture and architecture may be damaged or destroyed by particulate soiling and acid deposition--both of which have been detected in the most remote areas of the world.

3. Pagosa Springs Nonattainment Area Classification History

Because of observed problems with air particles, monitoring of total suspended particulates (TSP) began in 1975, and continued through 1987. In 1987, based on relatively high TSP levels, the Pagosa Springs area was designated as a "Group I" area for PM10. Pagosa Springs was then designated a "moderate" nonattainment area in 1990 pursuant to section 107(d)(4)(B) of the CAA.

4. Pagosa Springs Attainment/Maintenance Area Boundaries

The boundary for the Pagosa Springs PM10 attainment/maintenance area is defined as follows:

Township 35 North & Range 2 West

Sections 13, 14, 15

Section 23 NE, N ½ SE

Section 24 all except SWSW

Section 25 N ½ NE, NENW

Township 35 North & Range 1 West

Section 18 W ½

This area essentially includes the Town of Pagosa Springs, some additional area along the San Juan River, some areas along U.S. Highway 160 outside of the Town's limits. A map illustrating the area boundary is shown in Figure 1.

B. ORGANIZATIONS INVOLVED IN PREPARING AND APPROVING PLAN

Preparation of this PM10 Redesignation Request/Maintenance Plan was a cooperative effort of the Town of Pagosa Springs, Archuleta County, and the Air Pollution Control APCD (APCD) of the Colorado Department of Public Health and Environment. The document was approved by the Pagosa Springs Town Council in February 2000, and the Colorado Air Quality Control Commission (AQCC) on March 16, 2000. The EPA, through its regional office in Denver, provided policy advice and technical assistance, and is responsible for final approval of this redesignation request and maintenance plan.

C. REQUIREMENTS FOR REDESIGNATION

Section 107(d)(3)(D) and (E) of the CAA defines the five required components of a redesignation request and maintenance plan. These components and their descriptions follow:

- Attainment of the Standard

  The State must show that the area is attaining the PM10 NAAQS. This demonstration must be based on monitoring data representative of the location of the expected maximum concentrations of PM10 in the nonattainment area.

- State Implementation Plan (SIP) Approval

  The State must demonstrate that it has a fully approved State Implementation Plan (SIP) Element for Pagosa Springs under Section 110(k) of the CAA.

Figure 1.

Map of the Pagosa Springs Attainment/Maintenance Area

- Permanent and Enforceable Improvement in Air Quality

The State must demonstrate that the improvement in air quality leading to redesignation is due to permanent and federally enforceable emissions reductions.

- Section 110 and Part D Requirements

The State must meet all requirements of Section 110 and Part D of the CAA. Section 110 describes general requirements of SIPs, while Part D pertains to requirements applicable to nonattainment areas.

- Maintenance Plan

The State must have a fully approved maintenance plan that meets the requirements of Section 175A of the CAA. This plan must provide for the maintenance of the NAAQS for at least 10 years following redesignation, and the plan must contain a contingency plan that describes potential control measures that could be implemented to ensure continued maintenance of the PM10 NAAQS.

SECTION 2. ATTAINMENT OF THE PM10 STANDARD

The State of Colorado requests that the EPA redesignate the Pagosa Springs nonattainment area to attainment status with respect to the NAAQS for PM10. The following information demonstrates, as required by Section 107(d)(3)(E) of the CAA, that the Pagosa Springs area has attained the PM10 NAAQS. This is based on quality assured monitoring data representative of the location of expected maximum concentrations of PM10 in the area.

A. PAGOSA SPRINGS HISTORICAL PERSPECTIVE

Monitoring for total suspended particulates (TSP) in Pagosa Springs began in August 1975 at the Pagosa Springs High School and continued through September 1987. TSP monitoring was also conducted at the Town Hall from March 1987 through September 1987. Concentrations at both of these monitoring locations exceeded the 24-hour NAAQS of 260 ug/m^3 and the annual NAAQS of 75 ug/m^3. The historic TSP levels were the basis for Pagosa Springs being designated as a "Group I" area for the new PM_{10} standards, which were promulgated by the EPA in 1987. Group I locations were those areas estimated to have a greater than 95 percent probability of exceeding the new PM10 standards.

Monitoring for PM_{10} began in August 1985 at the High School and an additional PM10 monitor was established at Town Hall in December 1990. The High School location was classified as a middle-scale site, which is designed to represent an area of a size ranging from 100 meters to 0.5 kilometers. Every day sampling began May 11, 1985, using three Sierra Anderson (SA) 321-a monitors; three monitors were needed to ensure that sampling could occur on an every day schedule. In June 1986, after a year of every day monitoring, two of the samplers were removed for use in other locations around the State. The remaining monitor operated on an every sixth day schedule. In March 1987 the SA 321-a sampler was changed to a SA 321-b. The modification of the 321-b was designed to eliminate problems of sampling of particles over 10 microns in diameter. This sampler was designated a Federal Reference method. The Town Hall location was also classified as a middle-scale site. It began operation as a PM10 monitor in December 1990 with one SA 321-b sampler operating on an every sixth day schedule. In September of 1991, additional samplers were added to the site and the sampling schedule was changed to every other day. In March 1992, with the addition of more samplers the schedule was increased to every day sampling. The site has remained on an every day sampling schedule since March 1992.

The following table shows the quarterly data completeness for the Town Hall monitor for the period from 1989 through 1998. Monitoring from 1988 through September 1991 was plagued with operator problems and then moved from the High School to the Town Hall location. Therefore, the data recovery suffered. Those problems have been resolved as seen in data recovery for the period from 1992 through 1998. Data recovery is calculated by calendar quarter, and the table shows the number of actual samples days divided by the number of scheduled samples days, with the resulting data recovery. Valid quarters must have at least 75 percent data recovery.

Year	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Overall
90	n/a	n/a	n/a	4	n/a
91	5/16 (33%)	0/16 (00%)	6/15 (40%)	36/46 (78%)	48/91 (51%)
92	55/55 (100%)	91/91 (100%)	91/92 (99%)	92/91 (100%)	329/329 (100%)
93	87/90 (97%)	76/91 (84%)	91/92 (99%)	89/92 (97%)	339/365 (93%)
94	87/90 (97%)	86/91 (95%)	85/92 (92%)	88/92 (96%)	346/365 (95%)
95	81/90 (90%)	86/91(95%)	90/92 (98%)	78/92 (85%)	335/365 (92%)
96	86/91 (95%)	89/91 (98%)	88/92 (96%)	88/92 (96%)	351/366 (96%)
97	81/90 (90%)	89/91 (98%)	88/92 (96%)	81/92 (88%)	339/365 (93%)
98	66/90 (73%)	91/91 (100%)	90/92 (98%)	88/92 (96%)	335/365 (92%)

As shown in the table, 27 of the last 28 quarters have been valid at the Town Hall location.

The next table lists the yearly maximum, second maximum, estimated exceedances and annual average for the Town Hall monitor for the period from 1992 through 1998. The only year that either the 24-hour or annual NAAQS for PM10 were exceeded was 1994. Exceedances of the 24-hour PM10 NAAQS were recorded on December 21 and again on December 29, 1994 and the values were 258 ug/m^3 and 262 ug/m^3, respectively. These two exceedances were the first recorded at either location since the monitors were converted to reference level samplers in 1987. The Air Pollution Control Division believes that these values are anomalies because the exceedances were the result of malfunctioning/ poorly operated street sweeping equipment done under contract. However, even with these two exceedances in a single year, the estimated 3-year average of exceedances remained below 1.0., which is not a violation of the NAAQS. Additionally, the 1994 data is outside of the three-year period used to support the redesignation request.

Pagosa Springs PM10 Monitoring Record

Year	Maximum Concentration (ug/m^3)	2nd Maximum Concentration (ug/m3)	Yearly Estimated Exceedances	3-yr Average Estimated Exceedances	Annual Average Concentration (ug/m^3)
92	129	111	0.00	n/a	45.1
93	126	125	0.00	n/a	43.5
94	262	258	2.09	0.66	41.1
95	98	97	0.00	0.66	31.7
96	85	85	0.00	0.66	32.0
97	120	96	0.00	0.00	29
98	66	66	0.00	0.00	27

B. MAXIMUM CONCENTRATION MONITORING

As illustrated in Section 6.B.1. of this document, some of the highest levels of PM10 emissions occur in the central Pagosa Springs - grids 8, 9, and 13. This is where the majority of residential, commercial, and pedestrian activities occur, and it is the area where the dispersion of pollutants is likely to be the most problematic due to temperature inversions and valley-bottom topography. The APCD's monitoring site is located in the center of this high emission and concentration area in grid 8, and it is believed to be representative of maximum PM10 concentrations.

C. PAGOSA SPRINGS DESIGN VALUE

The "design value" is the critical air quality value from which the maintenance plan is based. The design value, and the conditions that occurring on the day which it was measured, are utilized to develop emission inventories and serve as a baseline for modeling ambient concentrations into the future. PM_{10} values are discussed in terms of the 24-hour PM_{10} NAAQS, rather than the annual NAAQS, because the 24-hour NAAQS is the standard of concern and the annual NAAQS has never been exceeded. The selection of this design value utilized EPA's table look-up method from EPA's "PM10 SIP Development Guideline" document. Based on the number of samples collected during the 1996 - 1998 period (1,025), the third highest concentration is the design value, according to this guidance. The three highest concentrations measured during the period 1996-98 are:

120 ug/m^3 - 11/12/97

96 ug/m^3 - 4/9/97

89 ug/m^3- 3/3/97

Therefore, the design value for this redesignation request and maintenance plan is 89 ug/m^3.

SECTION 3. STATE IMPLEMENTATION PLAN APPROVAL

The following presents a brief summary of the development and the approval of the Pagosa Springs PM10 nonattainment SIP Element.

A. 1988 SIP ELEMENT

The first PM10 SIP Element was adopted by the Colorado AQCC in July 1988, and the emission controls consisted of paving unpaved roads. EPA Region VIII intended to approve the SIP Element, though it eventually was rejected once the Clean Air Act was amended in 1990 and new, more stringent requirements were in place.

B. 1992 and 1993 SIP ELEMENTS

A new Pagosa Springs SIP Element was adopted by the AQCC in November 1992 and supplemented in November 1993. The control measures included the paving of local roads adopted for the 1988 SIP Element and street sanding requirements on the State highways. New street sweeping requirements were adopted as contingency measures. EPA approved the SIP Element on May 19, 1994 (59 FR 26126).

C. 1994 SIP ELEMENT REVISION

The Pagosa Springs SIP Element was revised by the AQCC in November 1994. This revision consisted of updating the technical and administrative information. EPA had previously approved these technical and administrative revisions in the May 1994 action because they were submitted directly to EPA by the APCD in December 1993.

SECTION 4. PERMANENT AND ENFORCEABLE IMPROVEMENT IN AIR QUALITY

The State must demonstrate, based on Section 107(d)(3)(E) of the CAA, that the improvement in air quality leading to attainment of the NAAQS and the redesignation request is based on permanent and enforceable measures, and that the reductions are not the result of temporary reductions in emissions or unusually favorable meteorology.

A. OVERVIEW

It is reasonable to attribute the attainment of the PM10 NAAQS in the Pagosa Springs nonattainment area to emission reductions that are permanent and enforceable. These emission reductions are the result of local, State, and federal actions, not economic factors or unusual meteorology.

Economic conditions are clearly not responsible for improved ambient levels in the Pagosa Springs nonattainment area. It is assumed that growth in population and sales tax revenue are indicators of increased activities that cause increased PM10 emissions and the potential for elevated PM10 concentrations. Information obtained for the Town of Pagosa Springs shows that the period 1990 through 1996, population increased by 8.5 percent, while and sales tax revenues increased 43 percent for the period 1993 through 1996. During this period of growth, attainment of the PM_{10} NAAQS was demonstrated, and very few concentrations above 100 ug/m^3 were measured.

Favorable meteorology is also an unlikely reason why the area's PM10 concentrations are below the NAAQS. Although winter and spring meteorological conditions are highly variable in mountain settings, there is no evidence to suggest that meteorological conditions experienced in the 1990's have not been “typical” (though it is difficult to make concrete conclusions based on short-term meteorological records). Because there has not been a violation of the PM10 NAAQS in Pagosa Springs since the NAAQS was promulgated in 1987, and because there have only been two concentrations since 1987 that have exceeded the 24-hour PM10 NAAQS (258 ug/m^3 and 262 ug/m^3 are thought to be due to malfunctioning or poorly operated street sweeping equipment), the APCD concludes that the good air quality in the Pagosa Springs area is the result of the implementation of emission reduction measures, not meteorological fluctuations.

B. CONTROL MEASURES

The following control measures resulted in the area's attainment of the PM10 NAAQS, and these measures should ensure continued maintenance of the PM10 NAAQS through the year 2012, which is the duration of the maintenance period.

1. Control of Emissions through Road Paving

The Town of Pagosa Springs paved 6.5 miles of unpaved roads during 1992, 1993, and 1994 in order to reduce PM10 emissions. This strategy was adopted locally in 1991 and included in State regulation in 1992 (Section I.B. of the "State Implementation Plan-Specific Regulations for Nonattainment - Attainment/Maintenance Areas (Local Elements)). The rule was approved by EPA in 1994, then removed from Colorado regulation in 2000 as the paving requirements had been completed.

2. Street Sanding Controls

There is a requirement that any user that applies street sanding material on Highway 160 and Highway 84 in the Pagosa Springs attainment/maintenance area must use materials containing less than one percent fines. Users of street sand on these highways must also use 15 percent less sand than an established base sanding amount. These strategies were adopted in 1992 and approved by EPA in 1994, and they are defined in detail in Sections II.B. and C., respectively, of the "State Implementation Plan-Specific Regulations for Nonattainment - Attainment/Maintenance Areas (Local Elements).

3. Control of Emissions from Stationary Sources

Although there are no stationary sources located in the Pagosa Springs attainment/maintenance area, the State's comprehensive permit rules will limit emissions from any new source that may, in the future, locate in the area. These rules include: 1) Regulation No. 3, "Air Pollution Emission Notices, Construction Permits and Fees, Operating Permits, and Including the Prevention of Significant Deterioration," 2) the "Common Provisions" regulation, and 3) Regulation No. 6, "Standards of Performance for New Stationary Sources."

The Common Provisions, and Parts A and B of Regulation No. 3, are already included in the approved SIP. Regulation No. 6 implements the federal standards of performance for new stationary

sources. The maintenance plan makes no changes to these regulations. This reference to Regulation No. 6 shall not be construed to mean that this regulation is included in the SIP.

As indicated above, emissions from new or modified major stationary sources emissions of PM10 are controlled under Regulation No. 3's nonattainment-area new source review (NSR) permitting requirements. The NSR provisions require all new and modified major stationary sources to apply emission control equipment that achieves the "lowest achievable emission rate" (LAER) and to obtain emission offsets from other stationary sources of PM10. Once this redesignation request and maintenance plan has been approved by the EPA, the prevention of significant deterioration (PSD) permitting requirements become effective. The PSD requirements are a relaxation from the NSR requirements, as LAER becomes the less stringent "best available control technology" (BACT), and offsets are not required. The application of these provisions is possible, but not foreseen, in the Pagosa Springs area.

4. Federal Motor Vehicle Emission Control Program

The FMVECP has reduced PM10 emissions through a continuing process of requiring diesel engine manufacturers to produce new vehicles that meet tighter and tighter emission standards. As older, higher emitting diesel vehicles are replaced with newer vehicles, PM10 emissions in the Pagosa Springs area will be reduced.

5. Voluntary and State-Only Measures

In addition to the mandatory control measures discussed above, there are other activities that result in the reduction of PM10 emissions that are not classified as “federally enforceable control measures.” Some notable examples include:

- The Town of Pagosa Springs has historically cleaned Highway 160 in town throughout the winter and spring using regenerative air vacuum sweepers. The frequency of this voluntary sweeping/cleaning has been about once after each street sanding deployment. For the future, the Town of Pagosa Springs has committed to regularly vacuum sweep/clean Highway 160 within four days of the roadway becoming free and clear of snow and ice following each street sanding deployment, as weather, temperature, and street conditions permit, between the intersections of Highway 84 to the east and 14th street to the west.

- The Town of Pagosa Springs requires that all new developments have paved streets.

- The Town of Pagosa Springs encourages private businesses to properly clean/sweep private parking lots on a regular basis.

- Archuleta County commits to pave the unpaved portion of Hot Springs Boulevard from the existing pavement to the boundary of the airshed.

- Any owner or operator responsible for the construction or maintenance of any existing or new unpaved roadway which has vehicle traffic exceeding 200 vehicles per day in the attainment/maintenance area and surrounding areas must stabilize the roadway in order to minimize fugitive dust emissions. These State-wide requirements are defined in detail in Section III.D.2.a.(I) of the AQCC's Regulation No. 1.

These strategies are considered to be voluntary local initiatives and State-only requirements, and are intended to reduce PM10 emissions. These strategies are not intended to be federally enforceable.

SECTION 5. CLEAN AIR ACT SECTION 110 AND PART D REQUIREMENTS

For the purposes of redesignation, all of the requirements of CAA Section 110 and Part D applicable to the area must first be met. The requirements of Section 110 and Part D applicable to the Pagosa Springs area are already included in the SIP for Colorado and have already been approved by EPA. In particular, see EPA's full approval of the Pagosa Springs SIP Element (59 FR 26126).

SECTION 6. MAINTENANCE PLAN

A. REQUIREMENTS

Section 107(d)(3)(E) of the CAA provides that for an area to be redesignated to an attainment classification, EPA must fully approve a maintenance plan which meets the requirements of CAA Section 175A. The maintenance plan will constitute a SIP revision and must provide for maintenance of the relevant NAAQS in the area for at least ten years after redesignation. Since the requirement is for ten years after redesignation, some lead time for the EPA approval process (up to 18 months per CAA Section 107(d)(3)(D)) should be considered in establishing the maintenance year, which the State determines to be 2012. An additional requirement (Section 175A(d)) is the submittal of a SIP revision eight years after the original redesignation request/maintenance plan is approved that provides for maintenance of the NAAQS for an additional ten years following the first ten-year period. The State of Colorado commits to submit such a revised maintenance plan as required by the CAA and EPA requirements.

Section 175A further states that the plan shall contain such additional control measures as necessary to ensure maintenance. All current nonattainment area control measures shall remain in place, except for the most stringent NSR stationary source permitting requirements (see Section 4.B.3.). The maintenance plan shall contain a contingency plan to ensure the prompt correction of any unforeseen violation of the PM10 NAAQS. Failure to maintain the NAAQS and triggering of the contingency plan will not necessitate a revision of the SIP Element, unless required by the EPA Administrator, as stated in CAA Section 175A(d).

The provisions that are addressed in this maintenance plan include emission inventories (for a base year and a future year), a maintenance demonstration, an emission budget, an approved monitoring network, verification of continued attainment, and a contingency plan.

B. EMISSION INVENTORIES

The following presents emission inventories for the 1997 attainment year and the 2012 maintenance year. These inventories reflect the base and projected conditions in the Pagosa Springs area, and take credit for the emission control measures that have been adopted as part of this redesignation request and maintenance plan.

1. 1997 Emission Inventory

The 1997 emission inventory for the Pagosa Springs attainment/maintenance area is presented below. This inventory incorporates the emission estimates for woodburning (fireplaces and wood stoves) and coal burning that are contained in the latest version of the nonattainment area SIP Element adopted November 17, 1994; these emission were rolled-forward to 1997. There were, and continue to be, no stationary sources of emissions in the area, and restaurant emissions were not determined for the area. EPA Region VIII has approved of utilizing these previously-approved inventories as long as the major emission source categories - mobile sources - were revised. Therefore, the mobile sources inventories have been updated to reflect 1) the latest traffic estimates, 2) revised emission factors and methods for determining paved road emissions (including the accounting of street sand controls), 3) the road paving that has occurred in the area, and 4) revised exhaust emissions.

All emission estimates were prepared by using EPA-approved methods and assigned to geographic grids. The 20 grids (one square kilometer each) from the 1994 SIP element were preserved to present wood and coal burning emissions, and four additional grids were added to reflected emissions from mobile sources (U.S. Highway 160, paved and unpaved roads, and exhaust that were not included in the 1994 SIP Element). The following map illustrates these grids.

The following table presents the 1997 daily emission estimates for each source category in pounds per winter day. Detailed explanations of the methods used to determine these emissions may be found in the Technical Support Document of this document (the November 12, 1994 SIP Element for wood and coal burning, and the technical papers for the revised paved road, unpaved road, and exhaust emissions).

Pagosa Springs PM10 Emission Inventory Grid System

1997 PM10 Emission Inventory (lbs./day) for the Pagosa Springs Attainment/Maintenance Area

Grid	High-ways	Paved Roads	Gravel Roads	Dirt Road	Road Dust Total	Vehicle Ex-haust	Coal Burn-ing	Wood Stoves	Fire-Places	Total
1	25.66	0.00	67.46	65.29	158.45	0.21	0.00	11.63	0.00	170.29
2	0.00	0.00	457.20	135.90	593.09	0.41	1.08	5.81	0.00	600.39
3	0.00	3.25	60.53	0.00	63.76	0.07	0.00	5.81	0.00	69.65
4	0.00	6.82	0.00	0.00	6.81	0.04	0.00	0.00	0.00	6.85
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	115.65	0.00	44.51	0.00	160.18	0.66	0.00	5.81	0.00	166.65
7	166.44	18.84	25.66	0.00	210.97	1.03	0.00	20.83	2.34	235.17
8	351.40	134.38	156.47	286.90	929.34	3.03	1.98	37.79	3.32	975.45
9	377.39	127.99	48.51	0.00	553.96	3.01	1.98	48.44	3.32	610.70
10	211.59	0.97	0.00	0.00	212.54	1.15	0.00	0.00	0.00	213.69
11	0.00	0.00	60.32	59.12	119.42	0.06	0.00	0.00	0.00	119.48
12	0.00	1.52	7.58	63.34	72.47	0.02	0.00	5.81	0.00	78.30
13	0.00	181.81	120.09	727.00	1029.00	1.25	1.98	27.13	2.15	1061.51
14	0.00	28.81	34.00	0.00	62.80	0.19	0.00	5.33	0.00	68.31
15	110.34	0.00	0.00	0.00	110.39	0.60	0.00	11.63	2.34	124.96
16	0.00	0.00	10.94	113.90	124.84	0.03	0.00	2.90	0.00	127.77
17	0.00	3.14	6.61	0.00	9.74	0.02	0.00	5.81	1.18	16.75
18	0.00	0.00	0.00	30.97	30.99	0.00	0.00	0.00	0.00	30.99
19	0.00	0.11	20.36	0.00	20.42	0.02	0.00	2.90	0.00	23.35
20	113.16	0.32	0.00	0.00	113.53	0.61	0.00	8.72	0.00	122.86
21*	0.00	0.00	67.25	0.00	67.29	0.06	0.00	0.00	0.00	67.35
22*	136.55	0.00	53.82	0.00	190.42	0.79	0.00	0.00	0.00	191.21
23*	0.00	0.00	39.20	116.60	155.91	0.05	0.00	0.00	0.00	155.96
24*	0.00	0.00	0.00	23.39	23.44	0.00	0.00	0.00	0.00	23.44
Total	**1608.20**	**507.96**	**1280.50**	**1622.40**	**5020.28**	**13.31**	**7.02**	**206.35**	**14.64**	**5261.61**

* Emissions for these grids were determined for mobile sources only; other sources of emissions could be located in these grids, but they were not researched nor were emissions estimated.

2. 2012 Emission Inventory

The following table presents the 2012 daily emission estimates for each source category in pounds per winter day.

The wood and coal burning emissions were increased by an annual compounded rate of 1.32 percent per year, which is the lowest Colorado Department of Transportation (CDOT) projected traffic growth rates for State highways in the Pagosa Springs area (a 30% increase between 1995 and 2015). This traffic growth rate was used because there is no long-term forecast of population growth for the area, and the State highway traffic includes a large amount of through traffic that is not characteristic of local growth. Thus, the higher growth rates would be inappropriate. The 1997 emissions are multiplied by 1.2174 (21.74%), which is the 1.32 percent growth rate compounded for 15 years (1.0132^{15}) to 2012. Detailed information on the growth rate may be found in the Technical Support Document.

The mobile source re-entrained dust 1997 emissions for all road categories were increased by an annual, compounded rate of 2.69 percent to 2012 (1.0269^{15} or 48.91%). This growth rate was based on CDOTs highest projected traffic growth rates for different segments of the State highways in the Pagosa Springs area (70% increase between 1995 and 2015).

The road paving that the Town and the County plan on completing is not assumed in the 2012 inventory as the paving is considered voluntary and not enforceable by the State. Mobile exhaust emissions were modeled by the Air Pollution Control Division using EPA's particulate model. Detailed information on the growth rates may be found in the Technical Support Document.

Because 1997 PM10 emissions for all source categories remain flat or grow at a constant rate to 2012 levels, no interim year emissions were included in this maintenance plan. Projected emissions for the year 2012 are higher than for any year prior to 2012. Therefore, the demonstration of maintenance of the PM10 NAAQS for 2012 is adequate to demonstrate maintenance for all years before 2012.

2012 PM10 Emission Inventory (lbs./day) for the Pagosa Springs Attainment/Maintenance Area

Grid	High-ways	Paved Roads	Gravel Roads	Dirt Roads	Road Dust Total	Vehicle Ex-haust	Coal Burning	Wood Stoves	Fire-Places	Total
1	38.21	0.00	100.45	97.22	235.88	0.20	0.00	14.15	0.00	250.23
2	0.00	0.00	680.82	202.37	883.19	0.37	1.31	7.07	0.00	891.94
3	0.00	4.84	90.14	0.00	94.98	0.06	0.00	7.07	0.00	102.11
4	0.00	10.16	0.00	0.00	10.16	0.03	0.00	0.00	0.00	10.19
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	172.21	0.00	66.28	0.00	238.49	0.65	0.00	7.07	0.00	246.21
7	247.85	28.05	38.21	0.00	314.11	1.01	0.00	25.36	2.85	343.33
8	523.27	200.11	233.00	427.22	1383.60	2.73	3.92	46.01	4.04	1440.30
9	561.97	190.59	72.24	0.00	824.80	2.68	3.92	58.99	4.04	894.43
10	314.95	1.44	0.00	0.00	316.39	0.95	0.00	0.00	0.00	317.34
11	0.00	0.00	89.82	88.04	177.86	0.05	0.00	0.00	0.00	177.91
12	0.00	2.26	11.29	94.31	107.86	0.02	0.00	7.07	0.00	114.95
13	0.00	270.73	178.83	1082.58	1532.14	1.12	3.92	33.03	2.62	1572.83
14	0.00	42.90	50.63	0.00	93.53	0.17	0.00	6.49	0.00	100.19
15	164.31	0.00	0.00	0.00	164.31	0.54	0.00	14.16	2.85	181.86
16	0.00	0.00	16.29	169.61	185.90	0.02	0.00	3.53	0.00	189.45
17	0.00	4.68	9.84	0.00	14.52	0.02	0.00	7.07	1.44	23.05
18	0.00	0.00	0.00	46.12	46.12	0.00	0.00	0.00	0.00	46.12
19	0.00	0.16	30.32	0.00	30.48	0.02	0.00	3.53	0.00	34.03
20	168.51	0.48	0.00	0.00	168.99	0.55	0.00	10.62	0.00	180.16
21*	0.00	0.00	100.14	0.00	100.14	0.05	0.00	0.00	0.00	100.19
22*	203.34	0.00	80.14	0.00	283.48	0.77	0.00	0.00	0.00	284.25
23*	0.00	0.00	58.37	173.63	232.00	0.05	0.00	0.00	0.00	232.05
24*	0.00	0.00	0.00	34.83	34.83	0.00	0.00	0.00	0.00	34.83
Total	**2394.62**	**756.40**	**1906.81**	**2415.93**	**7473.76**	**12.06**	**13.07**	**251.22**	**17.84**	**7767.95**

* Emissions for these grids were determined for mobile sources only; other sources of emissions could be located in these grids, but they were not researched nor were emissions estimated.

C. MAINTENANCE DEMONSTRATION

In order for this redesignation request to be complete and approvable, the CAA requires that the maintenance plan provide for maintenance of the PM10 NAAQS for at least 10 years following EPA's approval of the plan. As stated earlier in this document, attainment of the 24-hour and annual PM10 NAAQS has been demonstrated in the Pagosa Spring area, and this maintenance demonstration will demonstrate continued attainment, or maintenance, of the 24-hour NAAQS through the year 2012. Because there have never been exceedances of the annual standard in Pagosa Springs, an analysis for maintenance of the annual standard was not prepared. Protection of the 24-hour standard should be sufficient to protect the annual standard since the 24-hour standard has always been the standard of concern.

Data presented throughout this document are utilized to demonstrate maintenance of the PM10 NAAQS for the Pagosa Springs area. Chemical Mass Balance (CMB) data are used to generally identify the sources of emissions that influence ambient PM_{10} concentrations. The 1997 emission inventory is used to further refine this CMB-source identification. This information is then used to apportion the design day concentration (see Section 2.C.), which becomes the basis for the "roll forward" modeling. The apportioned design day concentration is then projected, or rolled forward, into the future based on the changes that occur in the emissions inventory from 1997 to 2012. If this 2012 projection is below the 24-hour PM10 NAAQS of 150 ug/m^3, then maintenance is demonstrated. As demonstrated below, the 2012 maintenance concentration for the Pagosa Springs attainment/maintenance area is **121 ug/m^3**.

The following presents CMB roll-forward methodology that was used to calculate the 2012 maintenance concentration. First, CMB data for concentrations above 100 ug/m^3 that occurred in 1994, 1995, and 1996 are presented below. The source apportionments from each of these days were averaged to develop a design day apportionment for use in the roll-forward modeling. Concentrations that occurred prior to 1994 underwent CMB analyses, but the results are not utilized here because the control measures adopted as part of the nonattainment SIP Element had not been fully implemented. Also, the CMB data from the two highest values measured in 1994, 262 ug/m^3 and 258 ug/m^3, are not included because they would heavily bias the CMB results (geologic emissions were greatly elevated on these days due to malfunctioning or poorly operated street cleaning equipment, and these emissions are not representative of typical conditions that occur in the winter months). Finally, no values collected during 1995 and 1996 exceeded 100 ug/m^3, so the following samples from 1994 are representative of the most recent high

concentration episodes in the area. Second, the roll-forward modeling, which utilized the CMB and emissions data (which account for growth as well as controls) contained in this section, is presented.

1. CMB Source Apportionments of High Concentrations

Town Hall Monitoring Site								
Date	PM10 (ug/m^3)	Geological (%)	Vegetative Burning (%)	Ammonium Nitrate (%)	Ammonium Sulfate (%)	Mobile Source (%)	Unknown (%)	Valid CMB?
02/16/94	101	74	14	1	1	0	11	Y
03/03/94	105	71	9	0	1	0	19	Y
05/05/94	109	87	0	1	2	0	10	Y
Average	**105**	**77%**	**8%**	**1%**	**1%**	**0%**	**13%**	**100%**

Geological = Sources rich in crustal elements (street sand, soil, road dust).
Vegetative Burning = Carbon-rich sources such as woodburning and coal burning.
Ammonium Nitrate = NH_4NO_3 formed in the atmosphere from NO_x and NH_3.
Ammonium Sulfate = $(NH_4)_2SO_4$ formed in the atmosphere from SO_2 and NH_3.
Mobile Source = Auto and truck exhaust.

* Details regarding these CMB results can be found in the Technical Support Document.

2. Roll-forward Analysis

Subtract the Background Concentration from the Design Value Concentration:

The background concentration is subtracted from the design day concentration of 89 ug/m^3 (see Section 2.C.) because the background concentration would remain if all emissions in the emissions inventory were reduced to zero. A background PM10 concentration of 8 ug/m^3 is assumed to occur on any given day in the area, as described in the November 1994 SIP Element.

Design Day Concentration:	89 ug/m^3
Background Concentration:	- 8 ug/m^3
	81 ug/m^3

Apportion the Design Day Concentration with the CMB Apportionments:

Geologic:	81 x 0.77 =	62.37 ug/m^3
Vegetative Burning:	81 x 0.08 =	6.48 ug/m^3
Ammonium Nitrate:	81 x 0.01 =	0.81 ug/m^3
Ammonium Sulfate:	81 x 0.01 =	0.81 ug/m^3
Unknown:	81 x 0.13 =	10.53 ug/m^3
		81 ug/m^3

Percent Changes in Emissions between 1997 and 2012 (these percents will be used to roll-forward the CMB apportionments to the year 2012)

Highways, Paved Roads, and Unpaved Roads: emissions increased by 2453.48 lbs./day, or **48.9%**

Coal/Woodburning: emissions increased by 41.10 lbs./day, or **17.6%**

Roll-forward Apportionments to 2012 by the Percent Changes in Emissions from 1997 to 2012

Geologic: Re-entrained fugitive dust from highways, paved roads, and unpaved roads are assumed to contribute all geologic emissions that resulted in 62.37 ug/m^3 of PM10. This concentration will change by the percent change in emissions from these sources.

62.37 ug/m^3 x 1.489 = **92.87 ug/m^3**

Vegetative Burning: Woodburning and coal burning activities are assumed to contribute all vegetative burning emissions that resulted in 6.48 ug/m^3 of PM10. This concentration will change by the percent change in emissions from these sources.

6.48 ug/m^3 x 1.176 = **7.62 ug/m^3**

Ammonium Nitrate: Unknown sources contributed emissions that resulted in 0.81 ug/m^3 of secondary PM10. It is assumed that this concentration remains constant because no emissions can be assigned to this category.

0.81 ug/m^3 x 1.000 = **0.81 ug/m^3**

Ammonium Sulfate: Unknown sources contributed emissions that resulted in 0.81 ug/m^3 of secondary PM10. It is assumed that this concentration remains constant because no emissions can be assigned to these category.

0.81 ug/m^3 x 1.000 = **0.81 ug/m^3**

Unknown: Unknown sources contributed emissions that resulted in 10.53 ug/m^3 of PM10. It is assumed that this concentration remains constant because no emissions can be assigned to these category. (Mobile exhaust emissions could be assigned to this category, but mobile emissions go down slightly from 1997 to 2012; leaving this concentration constant is a conservative approach.)

10.53 ug/m^3 x 1.000 = **10.53 ug/m^3**

Total of Apportionments in 2012 Plus the Background Concentration Results in the Maintenance Demonstration

92.87+ 7.62 + 0.81 + 0.81 + 10.53 + 8= **120.64**

D. EMISSION BUDGET

Federal “transportation conformity” regulations provide for the use of mobile source emission budgets in making conformity determinations in the area. The emission budget serves as a ceiling on mobile source emissions that federally funded or approved transportation projects must comply or “conform” with.

This maintenance plan establishes an emission budget for the area of 7,486 lbs./day for 2012 and beyond for the modeling area. This budget is the total of the 2012 mobile source PM10 emissions presented in B.2. above, which includes emissions from vehicle exhaust, highways, paved roads, gravel roads, and dirt roads. This budget has been adopted in the AQCC’s "Ambient Air Quality Standards for the State of Colorado" regulation.

E. MONITORING NETWORK/VERIFICATION OF CONTINUED ATTAINMENT

The APCD has monitored ambient PM10 concentrations in the Pagosa Springs area since 1986. The APCD has operated, and will continue to operate, the Pagosa Springs PM10 monitoring network in full accordance with the federal provisions of 40 CFR Part 58 and the EPA-approved Colorado Monitoring SIP Element. The APCD will also analyze the monitoring data to verify continued attainment of the PM_{10} NAAQS. This information will provide the necessary information to determine whether the Pagosa Springs area continues to attain the PM10 NAAQS. Detailed information regarding the State's monitoring efforts and historical monitoring data can be found in Section 2. of this document.

F. CONTINGENCY PLAN

Section 175(A)(d) of the CAA requires that the maintenance plan contain contingency provisions to assure that the State will promptly correct any violation of the PM10 NAAQS that may occur after the redesignation of the area to attainment. EPA’s redesignation guidance notes that the State is not required to have fully adopted contingency measures that will take effect without further action by the State. However, the contingency plan should ensure that contingency measures are adopted expediently once the need is triggered. The primary elements of the contingency plan involve the tracking and triggering

mechanisms to determine when contingency measures would be needed and a process for implementing appropriate control measures.

1. Tracking

The tracking plan for the Pagosa Springs area will consist of monitoring and analyzing PM10 concentrations. In accordance with 40 CFR Part 58, Colorado will continue to operate and maintain the Pagosa Springs PM10 monitoring network.

2. Trigger and Response

Triggering of the contingency plan does not automatically require a revision of the SIP nor is the area necessarily redesignated once again to nonattainment. Instead, the State will normally have an appropriate time-frame to correct the violation with implementation of one or more adopted contingency measures. In the event that violations continue to occur, additional contingency measures will be adopted until the violations are corrected.

Upon notification of a PM10 NAAQS exceedance, the APCD and local government staff in the Pagosa Springs area will develop appropriate contingency measure(s) intended to prevent or correct a violation of the PM10 standard. Information about historical exceedances of the standard, the meteorological conditions related to the recent exceedance(s), and the most recent estimates of growth and emissions will be reviewed. The possibility that an exceptional event occurred will also be evaluated. (Notification to EPA, and to the local governments in the Pagosa Springs area, of any exceedance will generally occur within 30 days, but no later than 45 days.) This process will be completed within six months of the exceedance notification. If a violation of the PM10 NAAQS has occurred, a public hearing process at the State and local level will begin. If the AQCC agrees that the implementation of local measures will prevent further exceedances or violations, the AQCC may endorse or approve of the local measures without adopting State requirements. If, however, the AQCC finds locally adopted contingency measures to be inadequate, the AQCC will adopt State enforceable measures as deemed necessary to prevent additional exceedances or violations. Contingency measures will be adopted and fully implemented within one year of a PM10 NAAQS violation. Any State-enforceable measures will become part of the next revised maintenance plan, submitted to the Colorado Legislature and EPA for approval.

3. Potential Contingency Measures

The APCD and local government staff may choose one or more of the following contingency measures to recommend to local officials and the AQCC for consideration. Contingency measures will be selected that quickly bring the area back into compliance with the PM10 NAAQS and that specifically meet the needs of the Pagosa Springs area. It is likely that no federal or State monies will be available to fund the implementation of the selected contingency measure(s). Most, if not all, of the costs will be borne by local citizens and governments, local industries, and State government agencies.

- Increased street sweeping requirements
- Additional road paving requirements
- More stringent street sand specifications
- Voluntary or mandatory coal and/or woodburning curtailment
- Bans on all coal and/or woodburning
- Expanded use of alternative de-icers
- Re-establishing new source review permitting requirements for stationary sources
- Transportation control measures designed to reduce vehicle miles traveled
- Other emission control measures appropriate for the area based on the consideration of cost-effectiveness, PM10 emission reduction potential, economic and social considerations, or other factors that the State deems appropriate.

G. SUBSEQUENT MAINTENANCE PLAN REVISIONS

As stated above, it is required that a maintenance plan revision be submitted to the EPA eight years after the original redesignation request/maintenance plan is approved. This revision is to provide for maintenance of the NAAQS for an additional ten years following the first ten-year period. A maintenance plan revision will be submitted to EPA no later than December 31, 2008. This implies that staff work and all public hearings will be completed by November 1, 2007, and Colorado Legislative review and approval is completed by June 1, 2008.