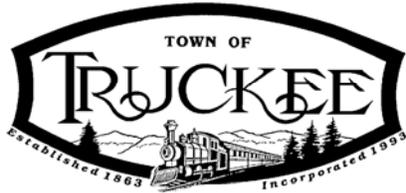


Town of Truckee



PARTICULATE MATTER

AIR QUALITY MANAGEMENT PLAN

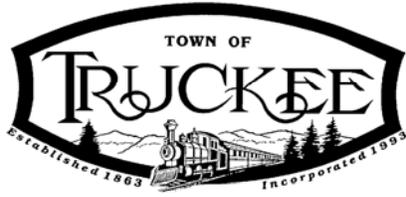
As Adopted by the Truckee Town Council

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Council Resolution No. 99-39

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Acknowledgements

AQMP Advisory Committee

This air quality management plan was prepared with the assistance of a citizen's advisory committee appointed by the Town Council. The following members of the Air Quality Management Plan Advisory Committee contributed substantial time and effort in the preparation of this plan.

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Northern Sierra Air Quality Management District

This plan is a result of a collaborative effort between the Town of Truckee and the Northern Sierra Air Quality Management District to improve air quality in Truckee. The following staff members of the Northern Sierra Air Quality Management District provided invaluable assistance and expertise to the preparation of this plan.

Rod Hill, Air Pollution Control Officer
Greg Gilbert, Air Pollution Control Specialist
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CHAPTER 1 INTRODUCTION

A. Purpose and Intent

Recognizing the severity of particulate matter pollution in the Town of Truckee and its environs and the urgency for reducing particulate matter emissions, the Town of Truckee Town Council initiated a planning effort to analyze particulate matter pollution and take steps to control particulate matter emissions. This air quality management plan is the first step in analyzing the severity of the problem, identifying measures to control future particulate matter emissions, and reducing particulate matter pollution in the Truckee air basin through the implementation of control measures. The air quality management plan and the subsequent ordinances, regulations, and programs to implement it are the key tools in achieving the particulate matter air quality goals of the General Plan and implementing its air quality policies.

This plan is not a comprehensive air quality management plan for the Truckee air basin. First, the plan only addresses particulate matter pollutants; other pollutants such as ozone and carbon monoxide are not addressed in the plan. At this time PM₁₀ and PM_{2.5} are the “problem” pollutants for Truckee. The Truckee air basin has routinely exceeded State PM₁₀ ambient air quality standards and occasionally even Federal standards and may not meet Federal PM_{2.5} ambient air quality standards because of the high level of emissions from woodheaters. The Town Council determined in late 1994 that PM₁₀ pollution was an urgent issue that needed to be addressed. The urgency of this issue was based on the past exceedances of State and Federal standards, the possibility of being designated a Federal non-attainment area for PM₁₀ by the Environmental Protection Agency (EPA) in the near future, and continuing growth which adds to the cumulative PM₁₀ emissions. As stated in the 1997 Annual Air Quality Monitoring Report for the Northern Sierra Air Quality Management District, “The threat of Federal non-attainment is real.”

(NSAQMD, p. 5) Other pollutants such as carbon monoxide and ozone were not identified as air quality problems that were serious enough at that time to warrant action prior to adoption of the General Plan and the Development Code. The study and monitoring of these other pollutants are identified as an implementation program of the General Plan, and further action in the form of air quality programs and regulations will be initiated for these pollutants if and when warranted.

Purpose of Air Quality Management Plan

- 1. To quantify and analyze the extent of particulate matter pollution in the Truckee air basin.*
- 2. To establish an attainment goal for the control of particulate matter pollution.*
- 3. To identify short-term and long-term implementation measures and programs to reduce particulate matter pollution to achieve the stated attainment goal.*
- 4. To establish guidelines for a monitoring program which will measure the effectiveness of adopted control measures and their level of success in achieving the stated attainment goal.*
- 5. To provide evidence and documentation to initiate and support a cooperative effort by the Town of Truckee Town Council, Nevada County Board of Supervisors, Placer County Board of Supervisors, and the California Department of Transportation to address particulate matter air quality issues in the Truckee basin.*

Second, the Town of Truckee is only one of three jurisdictions that regulate land uses in the Truckee air basin. Nevada County is the land use jurisdiction for property north, east, and west of the Town and for the Truckee-Tahoe Airport. Property to the south of the Town including Martis Valley and Northstar is under the land use jurisdiction of Placer County. This situation is further complicated by the fact that the property in Placer County is under the jurisdiction of a different air quality district – the Placer County Air Pollution Control District. However, an important goal of this plan is to initiate a cooperative effort between the Town of Truckee, Nevada County, and Placer County to address particulate matter emissions in the Truckee air basin and encourage Nevada County and Placer County to adopt control measures of similar effect as those adopted by the Town of Truckee.

Land use jurisdiction in the Truckee air basin is shared by the Town of Truckee, Nevada County, and Placer County

This air quality management plan is not mandated by State or Federal law. Although Federal PM₁₀ air quality standards have been exceeded at least once each year in the 1990's except 1996 and 1998 (based on daily TEOM monitoring), the Town of Truckee and its environs have not been designated as a Federal non-attainment area for PM₁₀ by the EPA and have not been identified or discussed by the CARB or EPA as a potential non-attainment area. Because particulate matter emissions could increase with new development and increased traffic, the Town Council wishes to avoid further exceedances which may lead to designation as a non-attainment area under the Federal Clean Air Act and the mandated sanctions that accompany such a designation. The Town Council, as expressed in the General Plan, also wishes to improve the quality of air in the Truckee area and lower public health risks. This plan, in addition to its other stated purposes and intents, is intended to demonstrate the Town's pro-active actions and commitment in reducing regulated PM emissions, improving air quality, and complying with National ambient air quality standards.

By preparing and implementing an air quality management plan at this time, the Town retains local control and authority over the adoption of the plan and the implementation of its control strategies. This local control and authority results in decisions affecting the citizens of Truckee being made by locally-elected government representatives and allows greater flexibility and innovation in addressing the air quality problem. If the area is designated a non-attainment area by the Environmental Protection Agency, responsibility for ensuring compliance with the Federal ambient air quality standards falls to the State of California and the Northern Sierra Air Quality Management District acting as an agent of the State subject to approval by the EPA. Control strategies are identified and implemented through a State Implementation Plan (SIP) which must meet stringent standards and has set time limits. Further, the SIP is approved through rulemaking action by the EPA and thereby becomes Federal rules that are incorporated into the Code of Federal Regulations.

One of the disadvantages of the Town's pro-active stance is a substantially reduced level of assistance from the EPA and the California Air Resources Board (CARB) including funding assistance. This places a greater burden upon the Town Council in preparing the plan.

B. History and Background of Plan

Particulate matter pollution has been a critical Truckee air quality issue even before Town incorporation. An article in the Sacramento Bee in 1991, part of a series about problems facing the Sierra Nevada region, highlighted the poor particulate matter air quality in the Truckee area and the negative effects associated with particulate matter pollution. Recognizing the seriousness of particulate matter pollution, the Town Council hosted an air quality and planning workshop in

September 1993 which was attended by the NSAQMD Air Pollution Control Officer. One of the results of this workshop was an offer from the District to assist the Town in its efforts to develop a locally tailored program to reduce particulate matter pollution. The Town's General Plan efforts demanded most of the Planning Commission's and Town Council's attention at this time, however the Planning Commission in June 1994 requested that the Community Development Department meet with the District to address air quality issues, especially for discretionary development projects. Subsequent discussions by the Commission in July 1994 led the Commission to recommend to the Town Council that the Council make a formal request to the NSAQMD to prepare an air quality management plan for particulate matter. The Council discussed this recommendation on October 6, 1994 and acted to formally request the NSAQMD to prepare the plan. The Council also supported the idea of creating a citizen's advisory committee to work with Town and District staff in the preparation and review of the plan.

While the District began work on the plan, the Community Development Department put together a review process for the draft plan once it was completed. The Town Council considered this review process in February 1995 and acted to create a nine-member citizens advisory committee to encourage public participation. The citizens advisory committee members were appointed by the Council in March 1995. The committee's role was to act as the initial reviewing body of the plan and to make recommendations to the Planning Commission and Town Council.

Unfortunately, because of District staff constraints, the air quality management plan took longer to complete than anticipated. The Community Development Department assisted the District where possible, and a working review draft of the plan was completed in January 1996 for the advisory committee. The committee began reviewing the plan on February 8th, meeting twice monthly, and completed its preliminary review of the plan in December 1996. The Community Development Department then prepared a public review draft of the plan that reflected the discussion and recommendations of the committee. Because of other Town priorities and commitments, it took over two years to complete the public review draft. The public review draft was reviewed by the Committee and approved by the Committee on March 16, 1999. The draft plan was forwarded to the Town Council, and the Town Council released the plan for public review and comment in May.

As part of the public review process, the Planning Commission considered the draft plan at a public hearing on June 9th. The Commission forwarded a recommendation to the Town Council recommending adoption of the Air Quality Management Plan with an additional control strategy requiring the removal of non-certified woodstoves and fireplace inserts from homes prior to the sale of the home. The Town Council held a public hearing on the draft plan on July 1st, and on July 15th adopted the Particulate Matter Air Quality Management Plan with two additional control strategies: the removal of non-certified woodstoves and fireplace inserts from homes prior to the sale of the home as recommended by the Planning Commission, and the removal of all non-certified

AQMP Timeline

- September '93 Air quality workshop held*
- October '94 Plan efforts begin*
- March '95 Advisory committee formed*
- January '96 Draft plan prepared by NSAQMD*
- December '96 Advisory committee completes review*
- April '99 Public draft completed*
- July '99 Plan adopted*

woodstoves and fireplace inserts from homes and businesses within seven years of the adoption of the plan.

C. Plan Participants

The Air Quality Management Plan is a joint, cooperative effort between the Northern Sierra Air Quality Management District (NSAQMD) and the Town of Truckee. The NSAQMD, with air quality regulatory jurisdiction over the Truckee air basin in Nevada County, protects public health by administering and enforcing a wide range of State, federal, and local air quality laws. The NSAQMD prepared a draft plan upon a request from the Town, and this draft plan was the starting point for the development of a comprehensive plan which will be used by the Town as supporting evidence to implement measures to address particulate matter emissions. Although the NSAQMD is involved, the Town is the lead agency for purposes of adopting the plan, implementing the plan through ordinances and policies, and making the necessary environmental determination as required by the California Environmental Quality Act. The NSAQMD, however, may adopt policies and regulations under their authority as an air pollution control district in order to implement components of the air quality management plan under their jurisdiction.

The role of the Air Quality Management Plan Advisory Committee (AQMPAC) went beyond that of a reviewing body as the committee was called upon to assist in the completion of the public review draft of the plan. The committee reviewed this working plan at a series of twice-monthly public meetings at which public input at this early stage was encouraged. The committee discussed the various aspects of the plan and the control strategies and accomplished the following tasks:

1. Determined the validity of the plan's assumptions;
2. Determined the attainment goal and objectives for the plan;
3. Determined consistency of the air quality management plan with the General Plan;
4. Recommended specific control strategies necessary to achieve the plan's attainment goal.
5. Provided commentary on each of the control strategies, including the pros and cons of the strategy, private and public costs to implement the strategy, enforcement challenges, and the effectiveness of the strategy;
6. Established guidelines for a monitoring program that will measure the effectiveness of recommended control strategies and their level of success in achieving the stated attainment goal.

Upon the culmination of their review process, the committee produced this public review draft of the air quality management plan providing recommendations to the Planning Commission and Town Council.

D. Plan Content Overview

The plan attempts to provide a comprehensive overview of particulate matter pollution, its impacts on Truckee, and ways to address the problem. In order to familiarize the public and decision-makers on particulate matter pollution, the plan includes general information on particulate matter pollution: what is particulate matter, how is it measured, associated public health effects, and Federal and State ambient air quality standards (*Chapters 2 and 3*). In addition, despite limitations on both funding and available information, the plan was patterned after the content requirements for State Implementation Plans (SIP). A SIP is the air quality plan that must be prepared by the State

and local air pollution control districts for areas that are designated non-attainment by the Environmental Protection Agency. Consequently, this plan analyzes air quality monitoring data for the last ten years and attempts to estimate the amount and sources of particulate matter emissions and project possible emission levels under several scenarios (*Chapters 4 and 5*).

Because Federal or State regulations do not mandate this plan, there are no mandatory air quality standards or requirements that must be met by the implementation of the plan. Nonetheless, in Chapter 6 the goal and objectives of the plan are identified – targets that the plan will try to achieve to reduce particulate matter pollution and to maintain consistency with the General Plan. The goal and objectives are important as they set the criteria by which the control strategies were considered. Chapter 7 of the plan includes a list of recommended control strategies that are believed to be necessary to achieve the plan's goal and objectives. Discussion is provided for each control strategy as to their pros and cons, costs to both the general public and private individuals, enforcement challenges, and potential benefits.

To properly evaluate the effectiveness of the plan in reducing particulate matter emissions and concentrations, emission targets are discussed in Chapter 8. Methods for monitoring emission reductions and contingency measures that could be implemented if emission targets are not met are also discussed in Chapters 8 and 9. Separate chapters on General Plan consistency (*Chapter 10*) and compliance with the California Environmental Quality Act (*Chapter 11*) are included to assist the Town Council in making State-mandated findings if the plan is adopted.

E. Plan Limitations

With little assistance from the EPA and the CARB, the Town and NSAQMD staff did not have resources and information to prepare this plan that are generally available to jurisdictions preparing SIPs. Financial costs were the main deterrent in obtaining these resources and information.

During the initial preparation of the plan, two significant variables arose which influenced the Committee's review of the plan. The first was the extension of natural gas to the Town of Truckee and the availability of natural gas to homes beginning in the summer of 1996. It is assumed that the availability of this cost-competitive heating fuel will reduce particulate matter emissions from existing residential wood combustion devices. The other variable was the impending new Federal standards on particulate matter that consists of particles less than 2.5 microns in size. These standards focus on fine particulate matter and became effective in September 1997.

F. Future Actions after Adoption of Plan

This plan is only the first step in addressing particulate matter air quality issues in the Truckee air basin. Upon adoption of the plan, the Town Council will initiate actions to implement the control strategies identified in Chapter 7. These strategies may be implemented in a variety of ways: regulations established by ordinance; policies administered through discretionary project review; programs (e.g. monitoring of particulate matter, public education and information) approved by the Town Council and performed by Town and District staff; fees applied to implement ordinances, policies, and programs; and funds set forth in the Town budget for administration of programs. Once the plan is adopted, the Town will be able to initiate discussions with Nevada County and Placer County regarding particulate matter emissions in the Truckee air basin under their respective jurisdictions and foster cooperation between the three local jurisdictions in addressing particulate matter and other pollutants within the total air basin and not just individual jurisdictions.

CHAPTER 2

THE PARTICULARS ON PARTICULATE MATTER

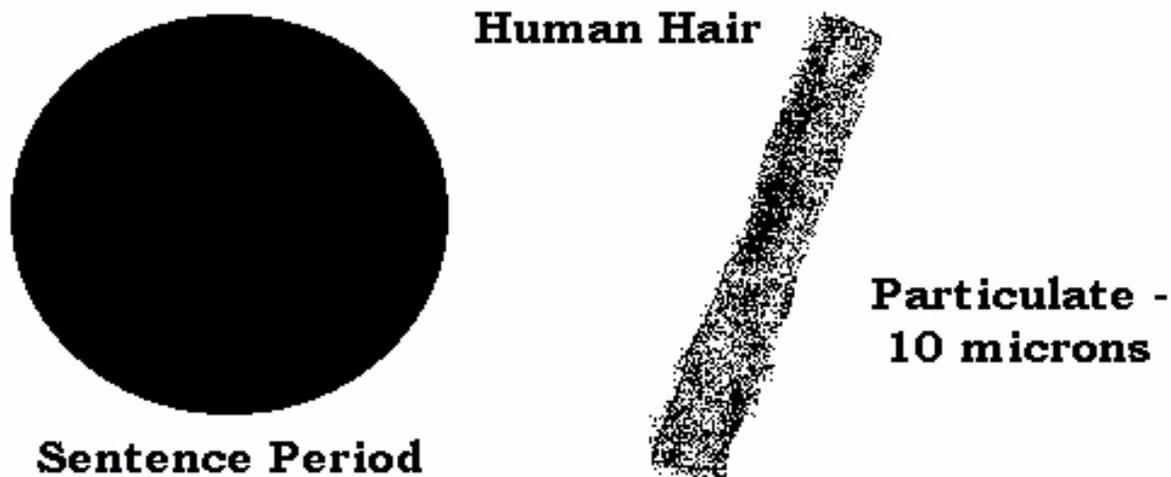
A. What is Particulate Matter?

“Particulate matter” is a generic term for a broad class of chemically and physically diverse substances that exist as discrete particles in the air (microscopic solid particles or minute liquid droplets) over a wide range of sizes. Particles are produced from a wide variety of sources, both natural and human-caused, and may be classified by several characteristics: mode of generation; size; composition; and source. The characteristics of particulate matter vary greatly from area to area, and it is important to understand these characteristics to identify from where and how particulate matter is generated.

Mode of Generation: Particulate matter may be created in two manners. Some particles may be released or emitted directly into the air from the source. These types of particles are called primary particulates or direct emissions. Examples include soil blown by the wind into the air and woodsmoke emitted by woodheaters. Secondary particulates or emissions are formed from physical and chemical reactions mainly involving gases emitted into the air. For example, locomotives and vehicles emit sulphur dioxide, nitrogen oxide, and hydrocarbon gases directly into the air. However, these gases undergo chemical reactions and transformations in the air and are transformed respectively into nitrates, sulphates, and organic carbon compounds that are solid particles and liquid droplets.

Size: Particles can vary greatly in size, ranging from greater than 10 microns or micrometers in diameter to less than 0.1 microns. They are about the same size of bacteria and invisible to the naked eye. Figure 1 shows the relative size of particulate matter to a sentence period and a strand of human hair:

Figure 1
Size of PM₁₀



- A micron is one-millionth of a meter.
- A period at the end of this sentence is about 500 microns in diameter.
- A particulate 10 microns in diameter is one-fiftieth (1/50) of the size of this period.
- A particulate 10 microns in diameter is roughly one-eighth (1/8) the thickness of a human hair.

The size of the particle affects its movement in the air and its ability to be inhaled into the human respiratory system.

Because of their weight, particles larger than 10 microns settle to the ground quickly and do not stay in the air for extended periods of time. Also, when these large particles are inhaled, they tend to collect in the mouth, throat, and nose and are eliminated from the body by sneezing, coughing, nose blowing or through the digestive system. Smaller particles (between 2.5 and 10 microns) stay in the air for longer periods of time and are able to enter the respiratory system. They are known as inhalable particles. Coarse particles 2.5 to 10 microns in diameter settle to the ground generally within a matter of minutes to hours and may be transported by wind currents for distances of less than one mile to more than 10 miles before they settle to the ground. These particles are able to enter the upper respiratory system but they do not travel far into the lungs.

In contrast, fine particles which are less than 2.5 microns in diameter can remain in the air for days to weeks and are easily transported by wind currents for distances of over 100 miles. They can penetrate deeply into the lungs, collecting in the tiny air sacs called alveoli where oxygen enters the bloodstream.

How are PM Concentrations Measured?

Particulate matter concentrations are determined by measuring the amount of particulate matter (in micrograms – μg) in a cubic meter (m^3) of air. These measured concentrations are then formulated into 24-hour concentrations and annual concentrations. The 24-hour concentration is the average concentration of particulate matter throughout the 24-hour monitoring period. The annual concentration is the arithmetic mean calculated from the 24-hour concentrations.

Composition: Particulate matter may be composed of a number of substances and elements: these include but are not limited to carbon, sulfates, aluminum, nitrates, potassium, silica, calcium, and iron. These substances and elements reflect the composition of particulate sources as they breakdown or undergo chemical reactions that transform them into particulate matter. The combustion of firewood in a woodstove or fireplace will breakdown the wood into large solids (ashes leftover in the woodstove) and smoke which consists of small solid particles of the wood and gases (e.g. carbon monoxide). The smoke consists of particulate matter that is comprised of carbon, potassium, and other substances. Another example is road sand that is broken down by vehicles into smaller and smaller particles of silica. Chemical analysis may be done on particulate matter air samples to identify the elemental composition of the particulate matter. The identification of the elements and their proportions furnishes important information on the sources of the particulate matter. Particulate matter for example with high proportions of carbon and potassium would indicate burning of organic material, woodheaters, and prescribed burning as major particulate sources while particulate matter with high proportion of silicon would be indicative of road sand and fugitive dust as major sources.

Source: Particulate matter may emanate from both natural conditions and man-made (anthropogenic) situations. Windblown dust and salts from undisturbed environments are a major natural source of particulate matter in areas with little vegetative cover (e.g. deserts). However, most particulate matter is generated as a result of human activities. Human activities that directly emit emissions into the air include the burning of wood in woodstoves and fireplaces, prescribed

burnings of natural vegetation, and re-entrained road dust kicked-up into the air by vehicles. Human activity may also result in indirect emissions of particulate matter into the air. Grading associated with development or road construction is an excellent example of an indirect anthropogenic source. Grading will remove the vegetative cover of the soil and expose the soil to wind erosion, and strong winds will transport the exposed soil into the air. Particulate matter resulting from human activities may also be classified as stationary or mobile sources.

B. Seasonality

Particulate matter characteristics, including sources, can vary greatly at different times of the year, especially in areas with pronounced seasons. In areas of strong winters with snow, particulate matter emissions from construction/demolition, fugitive dust, unpaved road dust, and mining processes are sharply reduced because of snow cover and lack of ground disturbance. In the Truckee area the Lahontan Regional Water Quality Control Board prohibits substantial grading from October 15th to May 1st and the Teichert and Sha-Neva mining and ground disturbance operations are curtailed when there is significant snow cover on the ground.

Conversely, emissions from residential wood combustion (RWC) devices and paved road re-entrained road dust are most pronounced in the winter. RWC devices are mostly used for heating purposes during the colder temperatures of late fall, winter, and early spring. They are seldom used during the summer. Substantial amounts of road sand and salt are applied to Town roads and State highways for traction control during winter storm periods. The sand and salt are “kicked-up” into the air by vehicles when the storm period ends and the roads (and the sand and salt) begin to dry out. The amount of dust and dirt on the roads during the non-winter months is substantially less than the winter months and generally is comprised of fugitive dust blown onto the road and dirt and mud tracked onto the road by vehicles coming from construction sites and unpaved roads.

“Emissions from RWC devices and re-entrained road dust are most pronounced in winter”

C. Health Effects

Particulate matter is a source of pollution that is of great concern because particulates can be readily inhaled and deposited into the human respiratory system. Air is breathed in through the nose or mouth, moves through the pharynx, enters the trachea that divides into the two bronchi, and enters the two lungs. Within the lungs, the bronchi divide into smaller and smaller airways, and eventually divide into tiny chambers called alveoli where oxygen is transported into the bloodstream and carbon dioxide is removed. The human respiratory system has elaborate defense mechanisms throughout the system to remove particles from inhaled air with particle size being the most critical factor in determining how deep the particle penetrates the respiratory system. For air breathed in by the nose, nasal hairs and mucous membranes in the nasal cavity trap particles larger than 10 microns which are they expelled by sneezing. The trachea further removes these large particles and small particles less than 10 microns through coughing and swallowing. Particles smaller than 5 microns can enter the bronchial tubes at the entrance to the lungs where the cilia which line the bronchial walls may trap and wash out some particles from the respiratory system. The particles less than 2 microns are able to penetrate the lungs into the alveoli. Some insoluble particles may be ingested by special cells called macrophages and carried out the lungs. However, the insoluble particles that remain can be retained in the deep tissues of the lung for years, while soluble particles that may

contain toxic components may be absorbed into the bloodstream and carried to other parts of the body.

Since the last review of the PM criteria and standards, a greatly expanded body of community epidemiological studies provides strong evidence that serious health effects are associated with exposures to ambient levels of PM in U.S. cities, even at concentrations below current PM standards. Health effects associated with PM include:

- Premature mortality.
- Increased hospital admissions, emergency rooms visits, work loss days, restricted activity days (primarily among the elderly and individuals with cardiopulmonary disease).
- Increased respiratory symptoms and disease (among children and individuals with cardiopulmonary disease such as asthma).
- Decreased lung function (particularly in children and individuals with asthma).
- Alterations in lung tissue and structure and in respiratory tract defense mechanisms.

(US EPA [1996a], Section II.A.1)

Sensitive populations are more at risk to particulate matter than the general population. Children, the elderly, and those with respiratory ailments begin to exhibit symptoms at much lower PM concentrations and experience greater complications than the general population. The health risks for these sensitive populations are:

- Individuals with respiratory disease and cardiovascular disease – Greater risk of premature mortality and hospitalization.
- Individuals with infectious respiratory disease (e.g. pneumonia) – Greater risk of premature mortality and morbidity.
- Elderly individuals – Greater risk of premature mortality and hospitalization for cardiopulmonary causes.
- Children – Increased respiratory symptoms and decreased lung function.
- Asthmatic children and adults – Exacerbation of symptoms associated with asthma and increased need for medical attention.

(US EPA [1996c], pp. v-31 to 36)

Health risks posed by inhaled particles are influenced both by the penetration and deposition of particles in the various regions of the respiratory tract and by the biological responses to these deposited materials. As discussed above, fine particles are more prone to be inhaled and deposited into the deep regions of the lungs including the alveoli sacs than coarse particles. Fine particles pose a greater health risk than coarse particles because of this ability to penetrate deeper into the respiratory system. Community epidemiological studies and other medical studies find that fine particles are more closely linked to mortality and morbidity effects while coarse particles are linked to effects such as aggravation of asthma and increased upper respiratory illnesses.

In regards to premature mortality, the Natural Resource Defense Council (NRDC) performed an in-depth analysis of community epidemiological studies to estimate the extent of premature mortality attributable to particulate matter air pollution in metropolitan study areas (MSA). The community epidemiological studies found that people who live in more polluted areas suffer increased risk of death and shortened life spans, and the NRDC's estimates indicate that more people may be dying from causes attributable to particulate air pollution each year than are killed in car accidents. In

relating this analysis to the Truckee area for the years 1990 to 1994, Truckee would rank 27th, out of 239 MSAs analyzed, for highest annual PM₁₀ concentrations (33.2 µg/m³) (Sphrentz, p. 78). Reno

“More people may be dying from causes attributable to particulate air pollution each year than are killed in car accidents”

ranked 9th with an average annual concentration of 38.5 µg/m³. For MSAs with comparable PM₁₀ concentrations to Truckee (30 to 35 µg/m³ annual), the NRDC estimated that cardiopulmonary deaths attributable to particulate matter air pollution varied from 28 to 72 annual premature deaths per 100,000 population (Sphrentz, pp. 58-72).

Based on the strong evidence provided by the community epidemiological studies, the EPA concluded that this recent information supported their 1987 decision to establish the cut-off point for particles capable of penetrating to the thoracic regions at 10 microns and provides no basis for changing this standard. The EPA identified that there are fundamental physical and chemical differences between coarse and fine particles, which supported considering fine and coarse particles separately and establishing separate standards for these two fractions. This is further supported by the EPA's conclusion that fine particles are a better surrogate for those components of PM that are linked to mortality and morbidity effects at levels below the current standards.

The simple conclusion of the community epidemiological studies and the EPA analysis is that reducing particulate matter concentrations, especially fine particulates, will result in the improved health of the population, particularly sensitive populations. Also, reducing PM concentrations will reduce the number of deaths attributable to particulate matter pollution and save lives. In the Town of Truckee for example, a 9% reduction (120 annual tons) in PM₁₀ emissions in the Truckee air basin will prevent eight premature deaths over a 10-year period while a 16% reduction (215 annual tons) will prevent 15 premature deaths over a 10-year period.

With this said, the EPA recognizes, “There is greater uncertainty about estimated excess mortality (and other effects) associated with particulate matter exposures as one considers increasingly lower concentrations approaching background levels.” (US EPA [1996a], p. 85) Although reduced health effects at annual concentrations lower than the adopted standards are possible, the EPA states that evidence for effects at such levels is highly uncertain and the likelihood of significant health risk becomes smaller at concentrations well below the adopted standards and approaching background levels.

D. Environmental Effects

Particulate matter pollution also has substantial effects that are not health-based. These are termed welfare-based or environmental effects. Particulate matter can contain dust, smoke, ashes, and soot and is the main source of pollution that reduces visibility. Fine particulates are especially well suited for interfering with light because particles 0.1 to 1.0 microns in diameter are around the same size as the wavelength of visible light. Soot is good at absorbing light while smaller, secondary particulates such as sulphates and nitrates are good at scattering light. This is especially true under conditions of higher humidity when scattering ability is enhanced by water vapor in the air. Forest fires during the late summer and clear weather reveal this strong trait of particulates in filtering out light from the sun and reducing visibility. Also, particulates can dirty and discolor structures and other property, including clothes, furniture and buildings.

CHAPTER 3

NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS

A. History of National Ambient Air Quality Standards

Particulate matter has long been recognized as a harmful pollutant. When the United States Congress addressed the quality of the air by the adoption of the Clean Air Act of 1970 (CAA), the Federal Government established specific regulations for the control of particulate matter. The Environmental Protection Agency (EPA) pursuant to the CAA enacted in 1971 National Ambient Air Quality Standards (NAAQS) for Total Suspended Particulates (TSP). These standards addressed all particulate matter regardless of its size. The original standards were an annual geometric mean of $75 \mu\text{g}/\text{m}^3$ (micrograms per cubic meter) and a 24-hour concentration of $260 \mu\text{g}/\text{m}^3$.

History of Air Quality Standards

1970 Clean Air Act enacted

1971 National standards for TSP's adopted

1983 State standards for PM_{10} adopted

1987 National standards for PM_{10} adopted

1990 Clean Air Act amended

1997 National standards for particulate matter amended: new standards for $\text{PM}_{2.5}$

The Clean Air Act requires periodic review and, if appropriate, revision of the ambient air quality standards and the air quality criteria on which they are based. The EPA recognized after the TSP standards were established that larger particles were not as significant as a health risk as smaller particles and smaller particles were more responsible for human health effects. This is because smaller particles have a greater ability to penetrate into the upper respiratory system and lungs and the larger particles settle to the ground quickly and can be filtered and expelled by the body when inhaled. The EPA focused its attention and efforts on particulate matter smaller than 10 microns in diameter. The EPA's purpose in reassessing the particulate matter standard was to develop a standard that was founded more on health risks and protection than the previous TSP standard. The EPA in 1987 announced new annual and 24-hour standards for particulate matter based on the PM_{10} standard: annual mean concentration of $50 \mu\text{g}/\text{m}^3$ and 24-hour concentration of $150 \mu\text{g}/\text{m}^3$.

Congress amended the Clean Air Act in 1990. The 1990 Clean Air Act establishes a permit program for larger pollution sources, gives the EPA important new enforcement powers, sets more realistic deadlines for complying with the Act, and encourages flexible market-based programs.

B. Recent Changes to NAAQS

As part of their periodic review of the air quality standards, the EPA initiated a review of the air quality criteria for particulate matter in April 1994. The EPA accelerated its review schedule in response to a Federal court order and was required to determine whether or not a revision to the standards was necessary by November 1996 and to issue a final decision by July 1997.

Their first step in the review process was to prepare a criteria document. A criteria document is a compilation and scientific assessment of all the health and environmental effects information available on particulate matter pollution. This document was reviewed by the Federal Clean Air Scientific Advisory Committee in late 1995 and was completed in April 1996. The EPA in mid-1996

prepared a staff paper that interpreted the most relevant information in the criteria document to be used in making policy decisions. The staff paper recommended major revisions to the particulate matter air quality standards, stating the revisions were necessary to protect the public health and welfare, and in November 1996 the EPA administrator proposed new standards and rules for particulate matter including standards for fine particulate matter ($< 2.5 \mu\text{g}/\text{m}^3$). The public review and comment period followed and ended in March 1997, and on July 16, 1997 the EPA administrator adopted the new standards with two significant changes to the proposed standards – changes to the $\text{PM}_{2.5}$ 24-hour standard and to the method for determining compliance with the PM_{10} 24-hour standard. The new standards became effective on September 16, 1997.

In summary the EPA took the following actions on the particulate matter standards:

- Revised the current primary (health-based) standards by adding a new annual $\text{PM}_{2.5}$ standard set at $15 \mu\text{g}/\text{m}^3$ and a new 24-hour $\text{PM}_{2.5}$ standard set at $65 \mu\text{g}/\text{m}^3$.
- Retained the current annual PM_{10} standard of $50 \mu\text{g}/\text{m}^3$ and 24-hour standard of $150 \mu\text{g}/\text{m}^3$, but revised the method and form for determining compliance with the standard.
- Revised the current secondary (welfare-based) standards by making them identical to the primary standards.
- Issued new rules related to PM monitoring requirements under the new standards.

Figure 2

NAAQS for Particulate Matter

	<i>PM₁₀</i>	<i>PM_{2.5}</i>
<i>24-hour Concentration</i>	<i>150 $\mu\text{g}/\text{m}^3$</i>	<i>65 $\mu\text{g}/\text{m}^3$</i>
<i>Annual Concentration</i>	<i>50 $\mu\text{g}/\text{m}^3$</i>	<i>15 $\mu\text{g}/\text{m}^3$</i>

A ruling in May 1999 by the United States Circuit Court of Appeals for the District of Columbia has cast a cloud over the legal status of the 1997 EPA standards. The ruling by the three judge panel overturned the new standards and their implementation, bringing into question the constitutional authority of the Environmental Protection Agency to establish air quality standards under the Clean air Act. In late June the Department of Justice, on behalf of the EPA, submitted a petition for rehearing of the matter before the full Court of Appeals. The legal status of the new standards will probably remain uncertain for some time since any such decision by the Court of Appeals may be appealed to the United States Supreme Court.

C. EPA Findings

Technology and scientific study of particulate matter pollution has made great strides since the 1980's. Consequently, the EPA's findings were based on new scientific data and conclusions on health and other effects of particulate matter pollution. The EPA reviewed over 100 particulate matter related human-health studies in reviewing the particulate matter air quality standards and

made several conclusions and findings in support of their actions to revise the particulate matter standards. The EPA estimates that the new standards will reduce premature deaths by 40,000 per year and reduce serious respiratory problems in children by 250,000 cases per year in the United States (US EPA [1996a], p. 79).

“The new standards will reduce premature deaths by 40,000 per year and reduce serious respiratory problems in children by 250,000 cases per year.”

For PM₁₀ the EPA found that the original quantitative basis for the level of the current 24-hour PM₁₀ standard was no longer appropriate. However, new health studies and information on coarse particles did not provide a basis for a lower standard level, and the EPA retained the annual and 24-hour PM₁₀ standards. The EPA also found there are welfare effects from particles for which the PM₁₀ secondary standards did not provide adequate protection. Chief among these welfare effects is visibility impairment. Particles in the fine range are primarily responsible for visibility impairment because of their ability to scatter and absorb light effectively. The EPA adopted secondary (welfare-based) standards identical to the primary (health-based) standards and believes that the new standards, combined with the Clean Air Act required regional haze program, will provide protection against the major PM-related welfare effects, including soiling and materials damage and visibility impairment.

A large number of important community epidemiological studies have been published since 1987 on the health effects of particulate matter. These studies found that adverse public health effects, such as premature mortality, hospital admissions, and other respiratory illness, are associated with exposure to particulates at levels well below the National PM₁₀ standards for both short-term (one to five days) and long-term (from generally a year to several years) periods. In reviewing the NAAQS for particulate matter in 1997, the EPA concurred with this finding that the previous standards did not adequately protect the public from the adverse health effects of particulates. In addition, the EPA also found that there are welfare effects from particulates for which the previous PM₁₀ secondary standards did not provide adequate protection. Chief among these welfare effects is visibility impairment – particulates in the fine range (less than 2.5 microns) are primarily responsible for visibility impairment because of their ability to scatter and absorb light effectively. The EPA stated that the new particulate matter standards were necessary to protect the public health and the environment.

“The previous standards did not adequately protect the public from the adverse health effects of particulates.”

The EPA concluded that fine particles are the most likely components of PM linked to mortality and morbidity effects at levels below the PM₁₀ standard while recognizing that coarse fraction particles are linked to effects such as aggravation of asthma at higher concentrations. These conclusions led to the EPA’s adoption of new standards for PM_{2.5} while retaining PM₁₀ standards as an indicator for coarse fraction particles. Further, the EPA considered the *combined* effect of annual and 24-hour standards rather than considering the short- and long-term standards independently. They concluded that much of the total annual risk associated with short-term exposures likely results from days when the levels are in the low- to mid-range, below the 24-hour peaks (US EPA [1996a], p. 81).

In other words, the peak 24-hour concentrations appeared to contribute a relatively small amount to

the total health risk compared to the risks associated with the low to mid-range concentrations. Lowering a wide range of PM_{2.5} concentrations through an annual standard, versus focusing on controlling peak 24-hour concentrations, was determined by the EPA as the best way to reduce total PM_{2.5} risk. The EPA also believed that the 24-hour standard was necessary, as it would provide additional protection for days with high PM_{2.5} concentrations, from localized “hot spots”, and from risks arising from seasonal emissions such as woodsmoke in the winter.

The EPA adopted the annual PM_{2.5} standard to protect the public health with an adequate margin of safety. The margin of safety requirement was intended to address uncertainties associated with inconclusive scientific and technical information as well as to provide a reasonable degree of protection against hazards that research had not yet identified. The EPA was seeking not only to prevent pollution levels that have been demonstrated to be harmful but also to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Although reduced health effects at lower annual concentrations are possible, the EPA stated that evidence for effects at such levels is highly uncertain and the likelihood of significant health risk becomes smaller at concentrations well below the adopted standards. The 24-hour concentration standard, in the EPA’s belief, would provide an appropriate supplement to the annual standard and reasonably reflect the peak levels observed in communities where health effects have been associated with daily levels of fine particles.

D. NAAQS Compliance

The National Ambient Air Quality Standards are designed to address both long-term and short-term air quality impacts from particulate matter. The annual concentration standard’s focus is on long-term exposure to significant particulate matter concentrations while the 24-hour standard focuses on daily concentrations that are exceedingly dangerous from a health standpoint. With two different standards, the methods for determining compliance with each standard are also different.

Compliance with the annual concentration standard is based on the “not to be exceeded” form. An area complies with the annual standard when the three-year average of the annual arithmetic mean concentrations, from single or multiple community-oriented monitors, is less than or equal to the annual standard. The annual standard for PM₁₀ is 50 µg/m³ and for PM_{2.5} is 15 µg/m³.

For the 24-hour concentration standard, the method for determining criteria is the “percentile” form. PM₁₀ concentrations are based on the 99th percentile value while PM_{2.5} concentrations are based on the 98th percentile. The percentile value is the daily value out of a year of monitoring data that the percentage of all values in the group falls below. For example, the percentile value for PM₁₀ is the daily value for the year in which 99% of all daily values fall

Changes to Compliance Criteria for the 24-hour Standard

Before July 1997 the EPA used the “one-expected exceedance” criteria for determining compliance with the 24-hour concentration standard. Compliance with the standard under this criteria is attained when the expected number of days per year (averaged over three years) on which the 24-hour concentration standard was exceeded is equal to or less than one day per year. The EPA recognized that local agencies with monitoring efforts greater than the minimum required by the EPA could possibly be penalized under this criterion. There was a greater chance for exceedances of the 24-hour standard if monitoring was done more frequently than the once-every-six-days cycle of the Hi-Vol monitoring station. To correct this dilemma, the EPA adopted the “percentile” criteria in July 1997 for determining compliance with the 24-hour standards for both PM₁₀ and PM_{2.5}.

below. To determine compliance, the percentile value of 24-hour concentrations in a year (averaged over three years at the population-oriented monitoring site with the highest measured values in the area) is calculated, and this percentile value must equal or be less than the 24-hour concentration standard. The 24-hour concentration standard for PM₁₀ is 150 µg/m³ and for PM_{2.5} is 65 µg/m³.

Non-compliance with the NAAQS will result in an area being designated as a non-attainment area by the EPA. An area may be designated as moderate or a severe non-attainment area based on the extent of non-compliance. The non-attainment designation sets into motion a string of actions for bringing the area into compliance with the NAAQS within the time frames established by the EPA. The State is required to develop and implement a State Implementation Plan (SIP) that explains how the State will do its job under the Clean Air Act to bring the area into compliance and includes a collection of regulations and controls that will be implemented to reduce particulate matter concentrations in the affected area. The SIP must also demonstrate how these actions will reduce PM₁₀ and/or PM_{2.5} concentrations and result in compliance with the NAAQS. The State, through the local air pollution control district, adopts the SIP, but the EPA must approve the SIP. The regulations and controls of the SIP are implemented by the State through the local air pollution control district and by the local governments of the affected areas. In protecting the health and welfare of the public, these regulations and controls may immensely affect private businesses and the public as they may influence how a business is conducted or operated and the lifestyle choices of a citizen.

E. State Ambient Air Quality Standards

In accordance with the California Clean Air Act, the California Air Resources Board (CARB) and the California Department of Health Services (CDHS) in 1983 adopted PM₁₀ standards more stringent than the NAAQS. In fact, the NAAQS did not have standards for PM₁₀ in 1983 but rather had a standard for Total Suspended Particles (TSP's). In assessing health-based data to establish the State ambient air quality standards for PM₁₀, CARB and CDHS determined based on their evaluations that the national standards were not protective enough of human health and serious health effects were found to occur at PM₁₀ levels well below the national 24-hour TSP standard. The health-based SAAQS were developed with the intention of preventing excess deaths from short-term exposures and exacerbation of symptoms in sensitive persons with respiratory disease. In establishing a PM₁₀ standard, it was believed that reductions in morbidity and mortality would result and also offer extra protection for the elderly, children, and those individuals with existing respiratory diseases. The State has yet to adopt a separate standard for PM_{2.5}. The current SAAQS for PM₁₀ are 50 µg/m³ for 24-hour concentration and 30 µg/m³ for annual concentration. Unlike the NAAQS, there do not appear to be any penalties or significant consequences that may result from non-compliance with the SAAQS. The SAAQS are so stringent that all counties in the State except one have one or more areas that do not comply with the standards.

G. Other EPA Measures Addressing PM₁₀

The Environmental Protection Agency addresses particulate matter pollution in other ways beyond the establishment of ambient air quality standards. Guidelines and regulations have been adopted to reduce emissions from point sources such as vehicles and woodheaters. These guidelines and regulations directly and indirectly reduce particulate matter emissions into the air. Examples include:

- Pursuant to the 1990 amendments of the Clean Air Act, the EPA issued guidelines for reducing pollution from home woodburning. These guidelines, which are not requirements,

include design criteria for less polluting stoves and fireplaces. These guidelines have resulted in the testing and certification of low-emission factor woodheaters and other residential wood combustion devices. These devices, commonly referred to as Phase II stoves, allow local governments to easily regulate the type of woodheaters which are installed and to prohibit gross-polluting stoves.

- Federal regulations have required refinements in fuels and automobiles to reduce NO_x (a secondary particulate) and other pollutants in fuel and reduce tailpipe emissions from automobiles.
- Engines for new diesel trucks, 1994 models and later, must be built to reduce particulate matter emissions by 90% (US EPA [1996d]). Buses must reduce particulate matter emissions even more than trucks. These requirements will be significant because heavy-duty diesel vehicles, although they comprise just two percent of the total vehicle population in California, contribute as much as 75 percent of the on-road PM₁₀ emissions (CARB).
- The Environmental Protection Agency recently adopted the first air quality standards for pollutant emissions from diesel locomotives. The standards will take effect in 2000, and upon their full implementation, locomotives will be required to reduce nitrogen oxide emissions by 60% and hydrocarbon and particulate matter emissions by 46% by the year 2040 (US EPA [1997], p. 3). Emission reductions within the next 20 years will be substantial with nitrogen oxide emissions decreasing by 46% and particulate matter emissions by 19% (US EPA [1997], pp. 2-3).

CHAPTER 4

PARTICULATE MATTER IN TRUCKEE

A. Truckee Air Basin and Meteorology

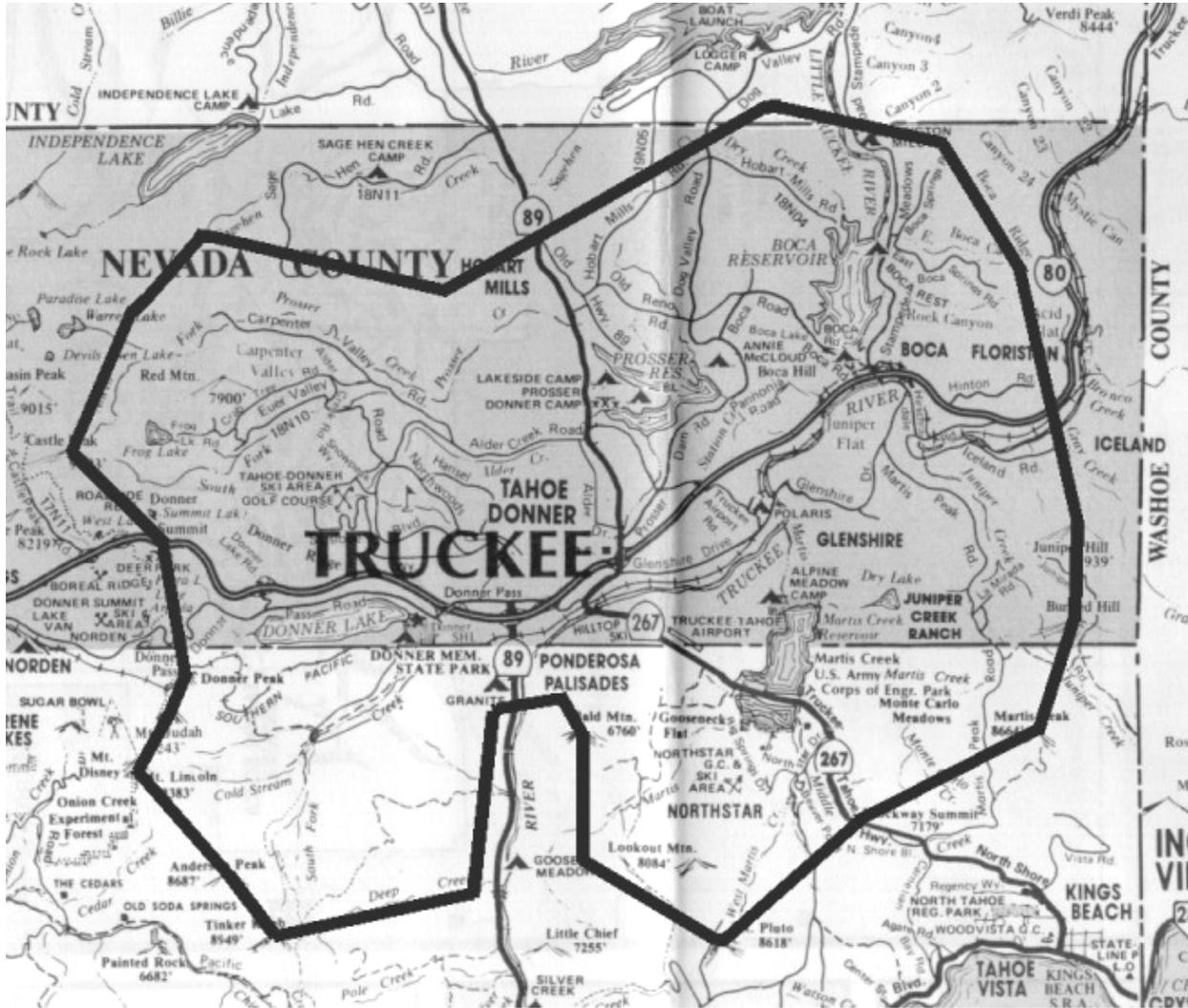
Particulate matter can travel hundreds of miles, not respecting political boundaries. Air pollutants that are generated within the Town of Truckee are easily transported across the Town limits into Nevada County and Placer County and adversely affect residents outside the Town. The reverse is also true – pollutants generated in Placer County and Nevada County outside the Town limits are transported into the Town and affect Town residents. Generally, terrain and meteorology are the most substantial influences in the transport of air pollutants. Mountainous terrain in combination with strong temperature inversion layers can restrict the movement of particulate matter and trap these pollutants in a confined region.

Truckee, like other mountain communities, is an excellent example of regions where particulate matter can be trapped and concentrated in a defined air basin. Being in a Mediterranean climate type, Truckee experiences pronounced summer and winter seasons with precipitation and temperatures following this pronounced seasonal pattern. Temperatures vary widely – extreme lows in the winter can reach from -15 to -30 °F with maximums in the summer in the 90 to 100 °F range. Truckee experiences cold nighttime temperatures in the late fall and early winter. The frost-free season in Truckee averages only 30 days. Although summer thunderstorms are common, most precipitation falls from late October through early May with winter precipitation usually taking the form of snow. The cold temperatures and snow cover on the ground are conducive to the creation of temperature inversion layers.

Mountainous terrain surrounds the Truckee area and is most pronounced in the west and the south. This area surrounded by mountainous terrain can be described as an air basin for the Truckee region in which air freely circulates within the basin but can be prevented or curtailed from leaving the basin by the higher elevations. Pollutants can rise above these higher elevations, but they can be prevented from escaping the basin by temperature inversions.

A temperature inversion is created when a stable mass of warmer air lies or sits atop a mass of colder air. This prevents the cold air from rising and mixing with the warmer air. Mountains surrounding a valley or basin act as a rim, much like the sides of a cup or bowl, and prevent the cold air from moving laterally. The lack of air movement and turbulence resulting from the inversion layer (acting as a lid) and the mountains (acting as the bowl) curbs the dispersal of pollutants. Particulates cannot rise above the inversion layer, and instead of dispersing and thinning out in a larger air volume, the particulates are trapped within a smaller, confined air space. This increases particulate matter concentrations because more and more particulate matter is concentrated in a smaller volume of air that cannot expand to accommodate the increased particulate matter emissions.

Figure 3
Truckee Air Basin



Temperature inversions in the Truckee region are generally created in two ways: nocturnal inversions and subsidence inversions. A nocturnal inversion is formed on clear, calm nights from late fall to spring. The ground cools much more rapidly during clear, calm nights than the air above it. The layer of air touching the ground also cools more rapidly than the air above it because the lower air is touching a cooler surface. This cooling effect is enhanced when there is snow on the ground. As the night wears on, this process creates a layer of air where the coolest temperatures are found closest to the surface and the air temperature increases with height. Because the air near the ground often cools to its dewpoint temperature, water vapor in the air condenses into liquid droplets and radiation fog is formed.

The other type of Truckee temperature inversion, subsidence inversion, is formed at higher elevations in the atmosphere. The downward vertical motion of air is created when large domes of high pressure air sit over the region. This causes a thick layer of air to compress into a thinner layer that warms the air. A strong cap on the atmosphere is created by this warmer air lying atop cooler air, resulting in little if any vertical mixing of air. High pressure dominates California's atmosphere from the spring to fall seasons, although high pressure systems may still occur in the winter season between storm systems.

These two inversion processes usually work together to create strong inversions in Truckee during the winter season. Strong inversions can also be created in late fall and early spring after storm systems have passed through the region and strong high pressure quickly establishes itself over the region.

Weather and Poor Air Quality

- *Cold Temperatures – Increase woodheater usage; contribute to formation of inversion layers.*
- *Low Wind Speeds – Inhibit air turbulence, mixing of cold and warm air masses, and the transport of PM by air currents.*
- *High Wind Speeds (> 25mph) – Carry road dust and other PM emission sources into air.*
- *Precipitation – Has a cleansing effect on the air as particulates append to snowflakes and water molecules and are transported to the ground.*
- *Snow Cover – Obstructs the ground from absorbing heat from the sun and contributes to heat loss near the surface during the night cycle. This results in cold air masses near the surface that can lead to the formation of inversion layers.*

B. Monitoring Efforts

The Northern Sierra Air Quality Management District (NSAQMD) has monitored particulate matter air quality in the Truckee area since 1987. The District in December 1987 installed a High Volume (Hi-Vol) PM₁₀ sampler on the roof of the downtown Truckee Fire Station (referred to as the Truckee monitoring station) to quantitatively determine the severity of local air pollution due to particulate matter. The District expanded its monitoring efforts in the Fall of 1991 by installing a continuous, real-time Tapered Element Oscillating Microbalance (TEOM) PM₁₀ sampler at the downtown Truckee fire station and a Hi-Vol PM₁₀ sampler at the fire station in the Glenshire subdivision (referred to as the Glenshire monitoring station). The monitoring stations were located and installed in accordance in Environmental Protection Agency and California Air Resource Board guidelines and criteria. The Truckee monitoring data is not skewed by its proximity to major road intersections or the Union Pacific rail lines. Also, the sampler does not have to be located at ground level to give accurate measurements of particulate matter concentrations as they may affect people. In other words, a sampler located 20 feet above the ground will give measurements comparable to a sampler at ground-level.

The size selective inlet high volume (Hi-Vol) sampler collects airborne particles with diameters less than 10 microns. The PM₁₀ samples are collected on a carbon fiber filter over a 24-hour period, and the filters are weighed and analyzed by the NSAQMD. This data provides the concentration of the particulate matter averaged over the 24-hour period. The sampler collects PM₁₀ every sixth day, and the number of samples for a given year is approximately 60 if data is complete. Known as a real-time sampler because it can provide data on up-to-the minute PM pollutant concentrations, the TEOM sampler continuously monitors air quality by collecting samples every few seconds and taking readings on those samples. The sampler is always active and provides data on hourly and daily concentrations when it is in operation. It provides more information and data on PM concentrations and gives a more accurate view of PM air quality than the once-every-six-days Hi-Vol sampler.

Located with the monitoring sampling stations are meteorological apparatus that measure air temperature and wind speed and direction. The meteorological data is not tabulated on a regular and continuous basis and as such cannot be correlated with sampling data on particulate matter concentrations. Also, precipitation and barometric pressure are not measured at these stations.

Beginning in July 1992 the District in conjunction with the California Air Resources Board conducted a special one-year study to qualitatively determine the sources of PM₁₀ emissions by analyzing the dichotomous filters of the Truckee Hi-Vol sampler. CARB analyzed the filters by X-Ray Fluorescence (XRF) testing which speciates elements trapped on the filters and indicates their relative masses. The XRF testing provides data on the size of the particulate matter (fine and coarse mass) and the elements constituting the particulate matter (e.g. silicon, potassium, iron). Because the filters are composed of carbon, XRF testing does not analyze carbon from the combustion of hydrocarbons. To analyze carbon emissions and distinguish “old” carbon-containing materials (petroleum products) from “new” carbon-containing materials (wood), chemical mass balance (CMB) analysis must be conducted. XRF testing is a subset of CMB analysis, and CMB analysis is more expensive and costs may exceed \$100,000.

CMB analysis is beneficial because it provides accurate quantities on particulate matter sizes and sources. Unfortunately, the Town and the District did not have the funds necessary to conduct CMB analysis. The Advisory Committee determined the results that could be obtained from CMB analysis did not justify the expenditure of such a large amount of funds. CMB analysis is not needed to support the conclusions of this plan that wood smoke and re-entrained road dust are the two major sources of particulate matter pollution. These conclusions are sufficiently supported by the methods and analysis discussed in Chapter 5.

Because of the new PM_{2.5} standards, the EPA recently revised the monitoring requirements for particulate matter. These revisions are necessary because an extensive ambient air quality monitoring network for PM_{2.5} does not exist and PM_{2.5} monitoring data is essential in determining which areas meet or do not meet PM_{2.5} standards. The new monitoring regulations became effective in January 1998, and the network of required monitors will be phased in over a three-year period. Because of the potential high concentrations in a populated area, a PM_{2.5} monitor has been deployed at the Truckee Fire Station and has been operating since January 1999. The monitor samples air quality once every three days and has the potential to provide chemically speciated data. This data will be used to perform source attribution analyses, evaluate emission inventories and air quality models, and support health related research studies.

C. Monitoring Data

The monitoring stations supply raw results of one-hour (TEOM) and 24-hour (Hi-Vol) concentrations. The one-hour concentrations of the TEOM station are averaged over a 24-hour period (12 midnight to midnight) to give an average 24-hour concentration. The Hi-Vol data after analysis of the filter is already converted into a 24-hour concentration. It should be remembered these 24-hour concentrations are averages and the PM₁₀ concentration at any one time during the 24-hour period may be substantially higher or lower than the 24-hour concentration. Data from the special 1992-93 dichotomous filter study is arranged in the same manner as the Hi-Vol data except data is provided for both PM₁₀ and PM_{2.5}.

The 24-hour concentrations may be calculated into monthly and annual averages by averaging 24-hour concentrations for all sampling periods during the time span. The 24-hour concentrations and the annual averages are compared to the national and state ambient air quality standards to determine compliance. The EPA and the CARB calculate annual averages by two different methods. The EPA uses a simple arithmetic mean to determine an annual average: the sum total of the 24-hour concentrations divided by the number of sample concentrations. The CARB on the other hand bases their annual average concentration on a geometric mean.

D. Compliance with Ambient Air Quality Standards

The Technical Data Appendix includes the monitoring data for the three monitoring stations from their installation to December 1998. One-hour, 24-hour, monthly average, and annual average concentrations are provided by the TEOM station while the Hi-Vol stations provide data on 24-hour, monthly average, and annual average concentrations. The monitoring data for the three monitoring stations was compiled and calculated to determine compliance with the national and state ambient air quality standards. Appendix 7 provides yearly summaries of the monitoring data for the three monitoring stations. The summary table in Figure 4 shows three-year averages of PM₁₀ data for each station and an average of all stations since 1992, identifying the average annual concentrations (both arithmetic and geometric means), the 99th percentile value for 24-hour concentrations, and the number of exceedances of the 24-hour SAAQS. Because the number of sampling days vary from the station to station and from year to year, the number of SAAQS exceedances are converted to expected exceedances per 365 days to allow better comparison of data between stations and years.

There is no current monitoring data for fine particulate matter that would allow the Town and District to ascertain whether air quality in the Truckee air basin will comply with the NAAQS for PM_{2.5}. The only data available is the 1992-93 dichotomous filter data that measured both fine and coarse particulate matter. In analyzing the 1992-93 monitoring data, the average annual concentration of fine particulate matter was 14.1 $\mu\text{g}/\text{m}^3$ which is below the annual NAAQS of 15 $\mu\text{g}/\text{m}^3$. The highest 24-hour concentrations were 54.0 $\mu\text{g}/\text{m}^3$ and 49.9 $\mu\text{g}/\text{m}^3$, both below the 24-hour NAAQS of 65 $\mu\text{g}/\text{m}^3$.

The following conclusions may be made from the monitoring data:

- Particulate matter concentrations have decreased approximately 21.5% over the past five years from a high point in 1993-94. However, monitoring data is only available for the past ten years, and there is no concrete monitoring data or other information available to correlate this reduction in PM concentrations to human activities, traffic patterns, and/or

weather events, or to identify a trend in decreasing emission levels.

- The data from the Glenshire Hi-Vol monitoring station parallels the data from the Truckee Hi-Vol station. Air quality as measured by annual concentrations in the Glenshire area is not substantially different from central Truckee, being only 10% lower than central Truckee. The lower particulate matter concentrations for Glenshire can be accounted for by the isolated location (over five miles) of Glenshire from other developed areas in the Truckee air basin.
- The dichotomous filter data from 1992-93 shows that fine particulate matter (< 2.5 microns) constitutes approximately 39% of annual PM₁₀ emissions. The proportion of fine particulate matter to total PM₁₀ varies substantially on days which exceed the SAAQS (50 µg/m³). On these days the percentage of fine particulate matter of the total PM₁₀ can range from 14% to 81%. Coarse particulate matter (between 2.5 and 10 microns) is the main component of PM₁₀ on poor air quality days (> 100 µg/m³), and fine particulate matter comprises less than 15% of the total PM₁₀ on poor air quality days.

In applying the monitoring data to the NAAQS and the SAAQS, the following conclusions can be made regarding compliance of air quality of the Truckee air basin with the current Federal and State standards:

1. **Truckee complies with the Federal PM₁₀ annual concentration standards.** All three stations show annual PM₁₀ concentrations substantially below the annual NAAQS of 50 µg/m³.
2. **Truckee complies with the Federal PM₁₀ 24-hour concentration standards.** The Truckee and Glenshire Hi-Vol stations have not exceeded the 24-hour PM₁₀ NAAQS (150 µg/m³) since monitoring efforts began. Three exceedances of the 24-hour NAAQS have been measured in the last three years at the Truckee TEOM station with the most recent exceedance in April 1999. During Truckee's poorest air quality period in the early 1990's, five exceedances were measured in the two-year period from 1993 to 1994. The highest annual 99th percentile 24-hour value for the past three years for any station is 136.44 µg/m³ which is below the NAAQS of 150 µg/m³. It should be noted that the new percentile form for determining compliance with the NAAQS aids Truckee immensely over the one expected-exceedance form since the percentile form results in a lower concentration value being used to determine compliance.
3. **Truckee complies with the State PM₁₀ annual concentration standards.** However, Truckee is close to exceeding the annual concentration standard of 30 µg/m³ and has exceeded the standard in past years. The Truckee TEOM station

Annual PM ₁₀ NAAQS	YES
24-Hour PM ₁₀ NAAQS (99 th %)	YES
24-Hour PM ₁₀ NAAQS (One-expected exceedance)	?
Annual PM _{2.5} NAAQS	?
24-Hour PM _{2.5} NAAQS	?
Annual PM ₁₀ SAAQS	YES
24-Hour PM ₁₀ SAAQS	NO

shows an annual geometric mean concentration of 29.00 $\mu\text{g}/\text{m}^3$ for the past three years. The Truckee Hi-Vol and Glenshire Hi-Vol stations have annual concentrations of 24.08 $\mu\text{g}/\text{m}^3$ and 24.35 $\mu\text{g}/\text{m}^3$ and do not exceed the SAAQS. Previous to 1996 the Truckee and Glenshire Hi-Vol stations exceeded the annual concentration SAAQS.

4. ***Truckee routinely does not comply with the State PM_{10} 24-hour concentration standards.*** All three stations measure exceedances of the 24-hour SAAQS (50 $\mu\text{g}/\text{m}^3$) on a regular basis. Extrapolated to a 365 sampling day period, air quality in Truckee exceeds the 24-hour SAAQS approximately 40 to 60 days per year.
5. ***It cannot be determined if Truckee complies with the Federal $\text{PM}_{2.5}$ annual and 24-hour concentration standards.*** Fine particulate matter was monitored at the Truckee Hi-Vol station from mid-1992 to mid-1993. The annual concentration of fine particulate matter was 14.05 $\mu\text{g}/\text{m}^3$ and the 98th percentile of the 24-hour concentration was 49.90 $\mu\text{g}/\text{m}^3$. These are close to exceeding the current $\text{PM}_{2.5}$ NAAQS of 65 $\mu\text{g}/\text{m}^3$ (24-hour) and 15 $\mu\text{g}/\text{m}^3$ (annual). It is impossible to estimate with any accuracy if $\text{PM}_{2.5}$ emissions have risen, fallen, or remained steady since 1993. If the proportion of fine to coarse particulate matter has remained the same since 1993, annual $\text{PM}_{2.5}$ concentrations have probably decreased. Total PM_{10} concentrations have decreased approximately 20% since 1993. However, annual PM_{10} concentrations fluctuated over 30% in the past six years and they are currently at their lowest levels since monitoring began in 1988. It is not known if these lower concentrations are due to decreased PM_{10} emission levels or fortuitous weather patterns.

E. Air Quality Trends

The particulate matter monitoring data demonstrates that there is notable variability in air quality. Several trends detected from the monitoring data provide clues that illustrate when Truckee is more likely to experience poor air quality periods. It is important to understand these trends in order to determine where air quality efforts should be focused and to improve efforts in foretelling poor air quality periods.

Seasonal – A strong correlation exists between air quality and the summer-winter seasons. The TEOM monitoring data clearly shows that poor air quality periods are more prevalent in the winter months of December to March with May having the best air quality. Figure 6 illustrates this trend with particulate matter concentrations increasing substantially in December, remaining high until March, and decreasing beginning in April. Twenty-four hour concentrations in summer months remain fairly level at concentrations equivalent to approximately 60% of those in winter months. This trend is amplified when we look at exceedances of the 24-hour SAAQS of 50 $\mu\text{g}/\text{m}^3$. In December, January, February, and March, there is an average of 13 exceedances of the SAAQS per month. Exceedances drop to six per month in April and do not exceed four per month during any other part of the year. In reinforcing the fact that air quality is best in May, there was not one exceedance of the SAAQS in the month of May from 1992 to 1998. The Hi-Vol sampler monitoring data also supports this seasonal trend of air quality.

Figure 4

**Summary Table of PM-10 Monitoring Data
Three Year Averages**

	'88-90	'89-91	'90-92	'91-93	'92-'94	'93-'95	'94-'96	'95-'97	'96-'98
Glenshire Hi-Vol									
Annual Concentration (Mean) (ug/m3)					38.52	37.16	33.66	30.82	27.93
Annual Concentration (Geometric) (ug/m3)					34.15	32.62	29.32	27.15	24.35
99th Percentile 24-Hour (ug/m3)					106.75	97.74	84.31	74.65	83.01
24-Hour SAAQS Expected									
Exceedances Per Year					66	55	52	47	37
Truckee Hi-Vol									
Annual Concentration (Mean) (ug/m3)	37.50	37.30	38.92	39.78	39.86	37.93	33.33	31.41	28.52
Annual Concentration (Geometric) (ug/m3)	31.45	31.38	32.26	33.89	33.42	32.64	28.23	26.87	24.08
99th Percentile 24-Hour (ug/m3)	100.00	104.41	120.21	131.08	133.84	119.25	97.85	103.82	95.99
24-Hour SAAQS Expected									
Exceedances Per Year	79	76	78	69	59	60	56	60	48
Truckee TEOM									
Annual Concentration (Mean) (ug/m3)					37.50	39.12	38.89	36.98	34.36
Annual Concentration (Geometric) (ug/m3)					31.28	32.30	33.61	31.79	29.00
99th Percentile 24-Hour (ug/m3)					135.94	138.46	115.04	112.67	105.72
24-Hour SAAQS Expected									
Exceedances Per Year					74	80	75	67	60
24-Hour NAAQS Expected									
Exceedances Per Year					2.2	1.7	0.7	1.1	0.7
Town Average									
Annual Concentration (Mean) (ug/m3)					38.63	38.07	35.29	33.07	30.27
Annual Concentration (Geometric) (ug/m3)					32.95	32.52	30.39	28.60	25.81
99th Percentile 24-Hour (ug/m3)					125.51	118.49	99.07	97.05	94.91
24-Hour SAAQS Expected									
Exceedances Per Year					66	65	61	58	48

Daily – There does not appear to be any trend from a day-to-day perspective, not even between weekdays and weekends. It was suspected that air quality could be worse on weekends during the winter because of increased traffic and increased wood stove usage (from weekend/second residence visitors). The monitoring data does not support this conclusion. Poor air quality can occur on any day of the week, and no day of the week is more likely to experience poor air quality episodes. In analyzing TEOM data from January 1995 to December 1996, particulate matter concentrations and frequency of SAAQS exceedance days is less than 10% higher for weekdays (Monday to Thursday) than weekends (Friday to Sunday including holidays).

Figure 5

Weekday and Weekend PM₁₀ Air Quality

	<i>Weekday</i>		<i>Weekend</i>	
	<i>Avg. Concentration</i>	<i>% of SAAQS Exceedance Days</i>	<i>Avg. Concentration</i>	<i>% of SAAQS Exceedance Days</i>
<i>1/95 to 12/95</i>	<i>41.32 µg/m³</i>	<i>25.3%</i>	<i>37.94 µg/m³</i>	<i>18.4%</i>
<i>1/96 to 12/96</i>	<i>34.86 µg/m³</i>	<i>13.9%</i>	<i>32.82 µg/m³</i>	<i>15.9%</i>
<i>Total</i>	<i>38.09 µg/m³</i>	<i>19.6%</i>	<i>35.38 µg/m³</i>	<i>17.2%</i>

Hourly – Hourly PM concentrations correlate closely with human activities that generate particulate matter. Hourly concentrations from the TEOM monitoring station were calculated for the period January 1996 to December 1996 to derive average concentrations for each hour of the day. These average concentrations show that PM concentrations rise sharply after 6 a.m. and reach their peak at around 10 a.m. This morning increase and peak is slightly more pronounced in summer than winter. The concentrations slightly decrease and level out in the afternoon and rise again after 5 p.m. after which they began to fall dramatically. The increases after 5 p.m. are much more pronounced in winter than summer, and except for 9 a.m. and 10 a.m., hourly concentrations are noticeably greater in the winter than summer.

Variability – The previous discussions on air quality trends utilize average concentrations compiled over several years. The use of averages hides the wide variability that may occur in PM concentrations within a measuring period by smoothing out the bumps created by measurements higher and lower than the average. For example, hourly concentrations within a single day may range from 1 µg/m³ to 248 µg/m³. More importantly, 24-hour concentrations may vary substantially from one day to the next. This was clearly illustrated in February 1993. The 24-hour PM₁₀ concentration on February 11th was 30.36 µg/m³. The next day the 24-hour concentration shot up to 129.43 µg/m³ and PM₁₀ concentrations ranged from 102.67 µg/m³ to 160.11 µg/m³ for the next three days. On February 16th the 24-hour concentration dropped substantially to 14.43 µg/m³ and reached a low of 5.95 µg/m³ on February 19th. This demonstrates that high PM concentrations may occur suddenly, and conversely they may drop just as suddenly, showing the influence of weather patterns and meteorological events on PM concentrations.

Figure 6
Monthly Air Quality

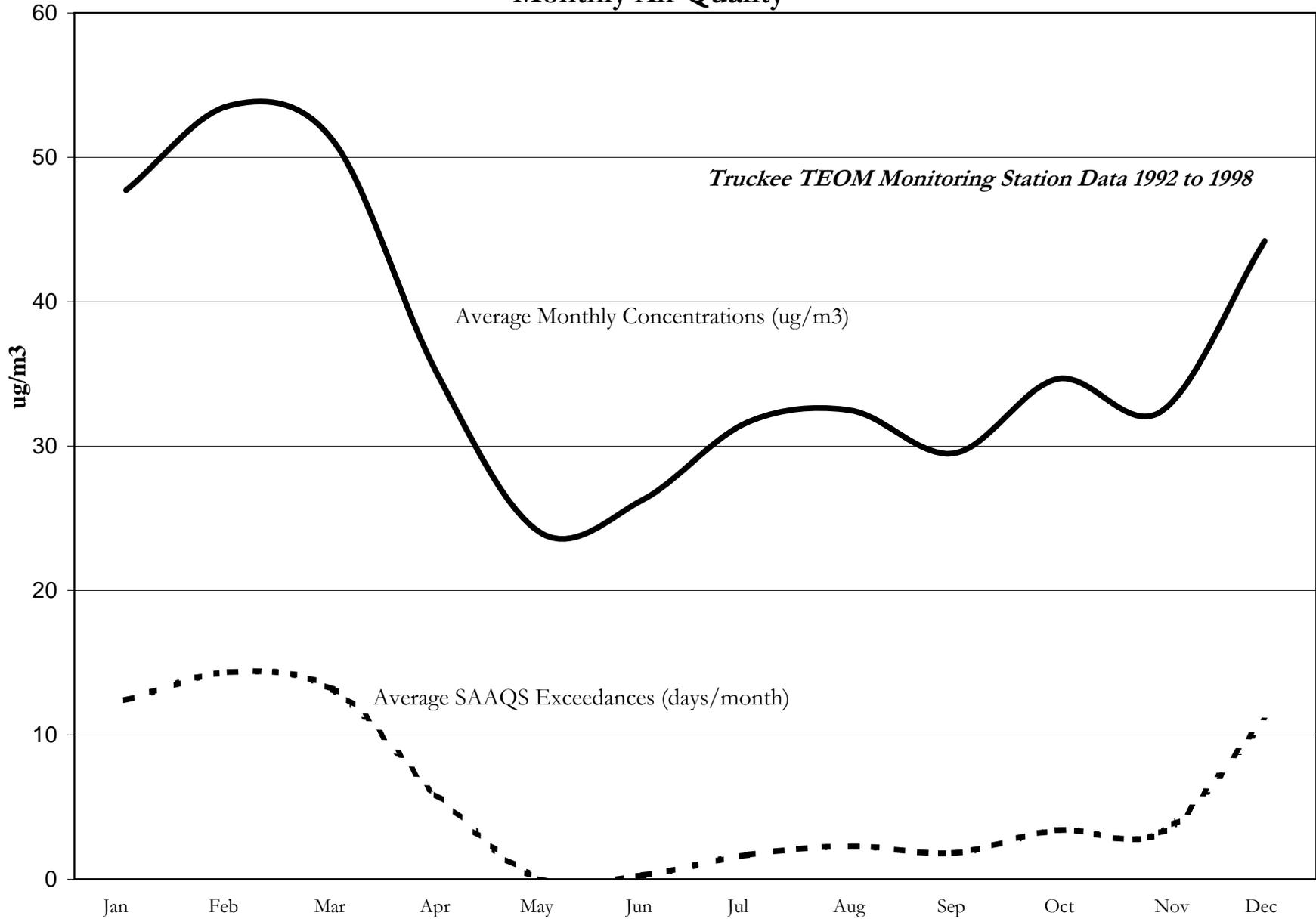
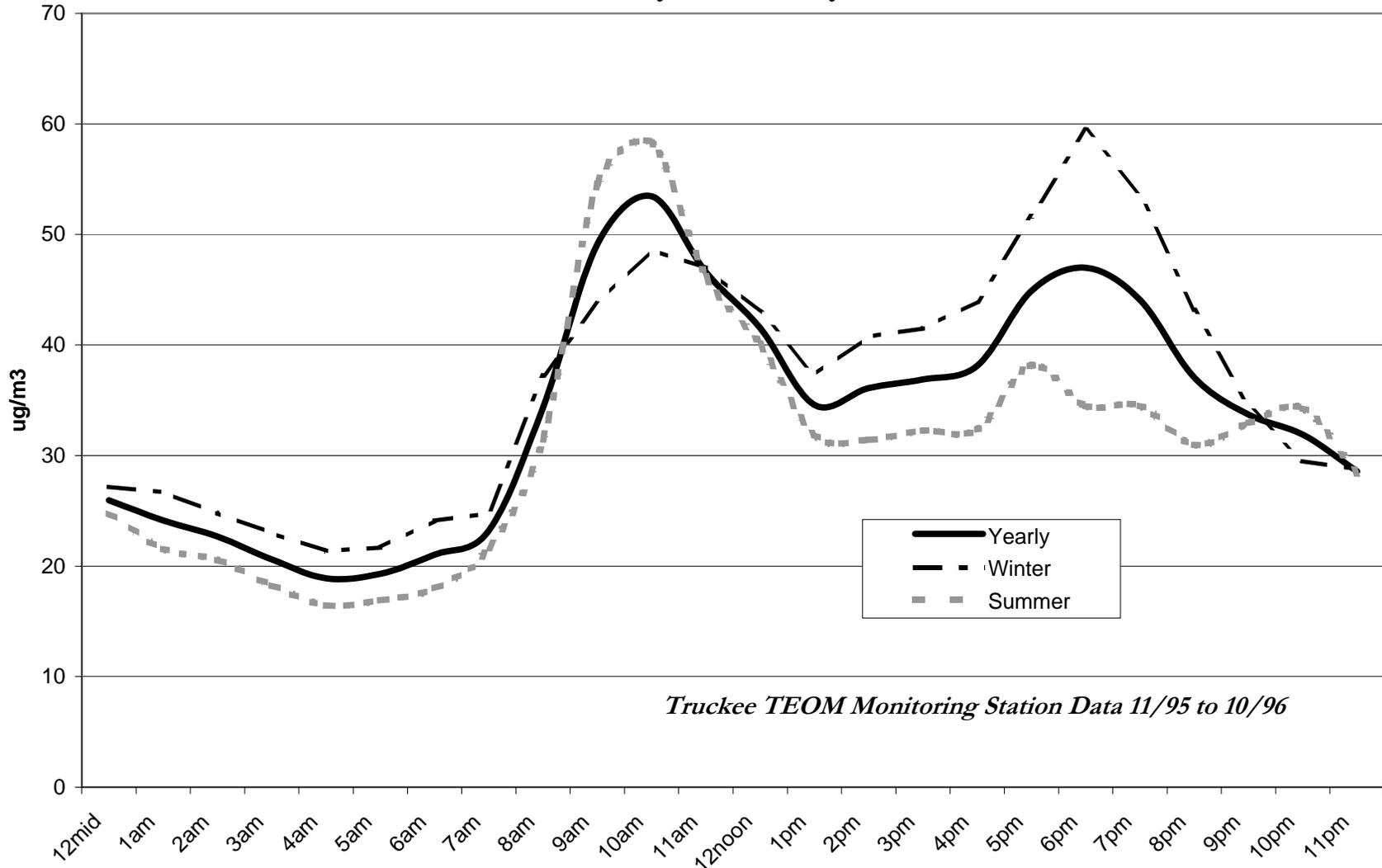
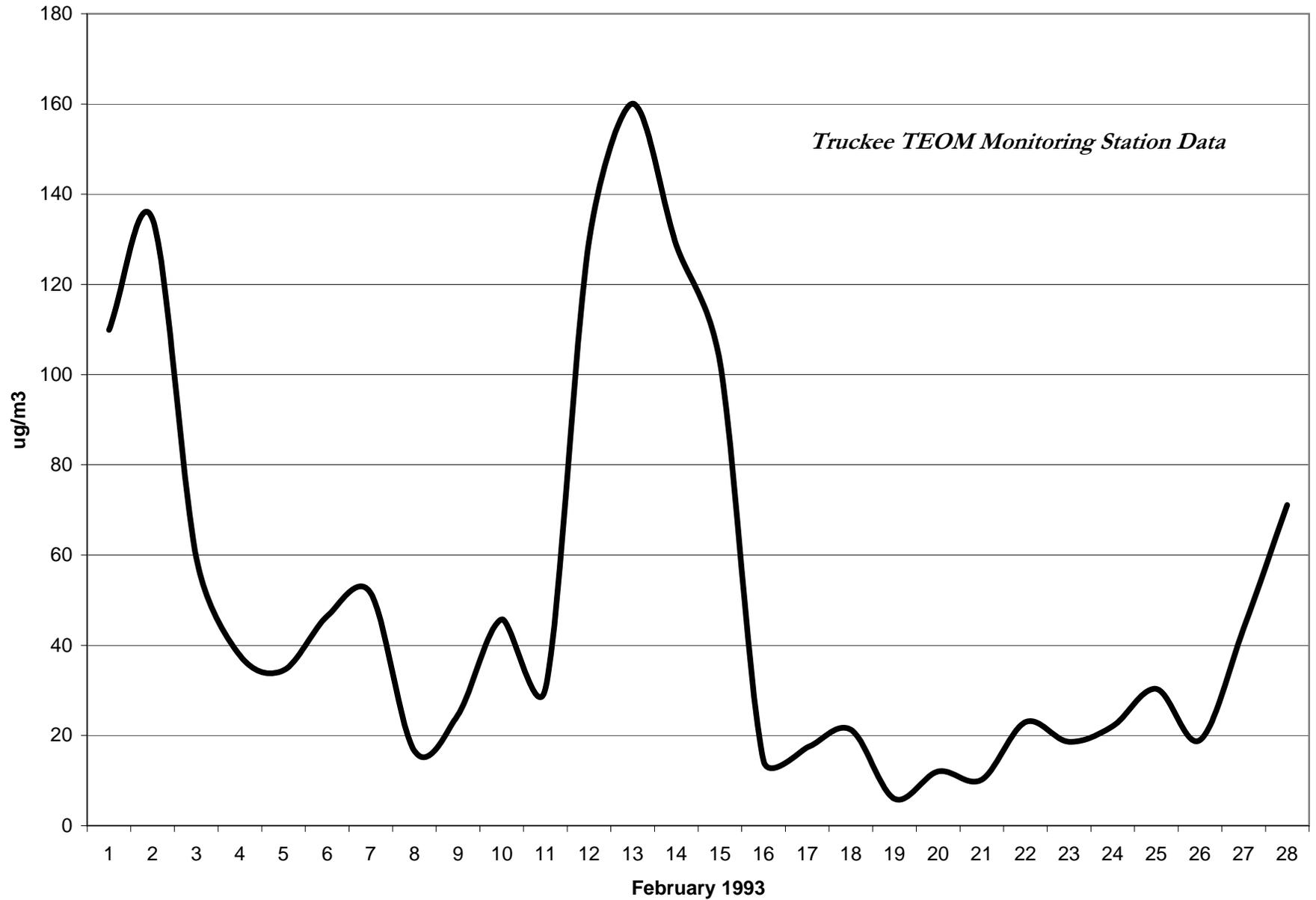


Figure 7
Hourly Air Quality



Truckee TEOM Monitoring Station Data 11/95 to 10/96

Figure 8
Daily PM10 Concentrations for February 1993



F. Current Town Implementation Measures

Town Ordinance No. 93-35 regulates the installation and operation of wood stoves and other residential wood combustion devices and has been in effect since January 1, 1994. The ordinance, as amended by Ordinance No. 98-05, contains the following restrictions:

- All solid fuel burning appliances installed on or after January 1, 1994 must be certified as meeting the emission requirements of the U.S. EPA for Phase II certification or the Oregon Department of Environmental Quality.
- Exceptions are provided for pellet fueled wood heaters, fireplaces supplied with gas and fitted with artificial logs, and one fireplace located in a hotel/motel lobby or similar common area lobby or in the common area of a condominium project.
- Exceptions are also provided for certain models of zero clearance fireplaces with low emission factors.
- The selling, offering for sale, supplying, installing, or transferring of a used wood heater after January 1, 1994 is prohibited unless it has been rendered permanently inoperable or it is EPA certified (Phase I and II), Oregon certified, or a pellet fueled wood heater.
- The burning of certain materials (e.g. garbage, plastic, rubber) in a solid fuel burning device is prohibited.
- Solid fuel appliances are prohibited from being the primary form of heat in any new construction.

CHAPTER 5

EMISSION CHARACTERISTICS

A. Introduction

To effectively address particulate matter pollution in the Truckee air basin, the major sources of particulate matter must be identified. By knowing the major particulate matter sources, the plan's efforts as described in Chapters 6 and 7 can focus on those sources, and control measures and implementation programs can be tailored toward these major sources. Despite not having the resources to conduct chemical mass balance analysis, the Town and District estimated annual emissions from various sources utilizing information and data which was available. The emissions and sources of particulate matter during Truckee's poor air quality periods unfortunately cannot be estimated or determined with any quantitative accuracy. By understanding the characteristics of particulate matter sources, however, it can be surmised with a high degree of confidence which sources are more likely to contribute to particulate matter pollution during poor air quality periods. The purpose of this chapter is to identify the major sources of particulate matter that contribute to poor air quality and possible future emission levels from these sources.

B. Annual Emissions

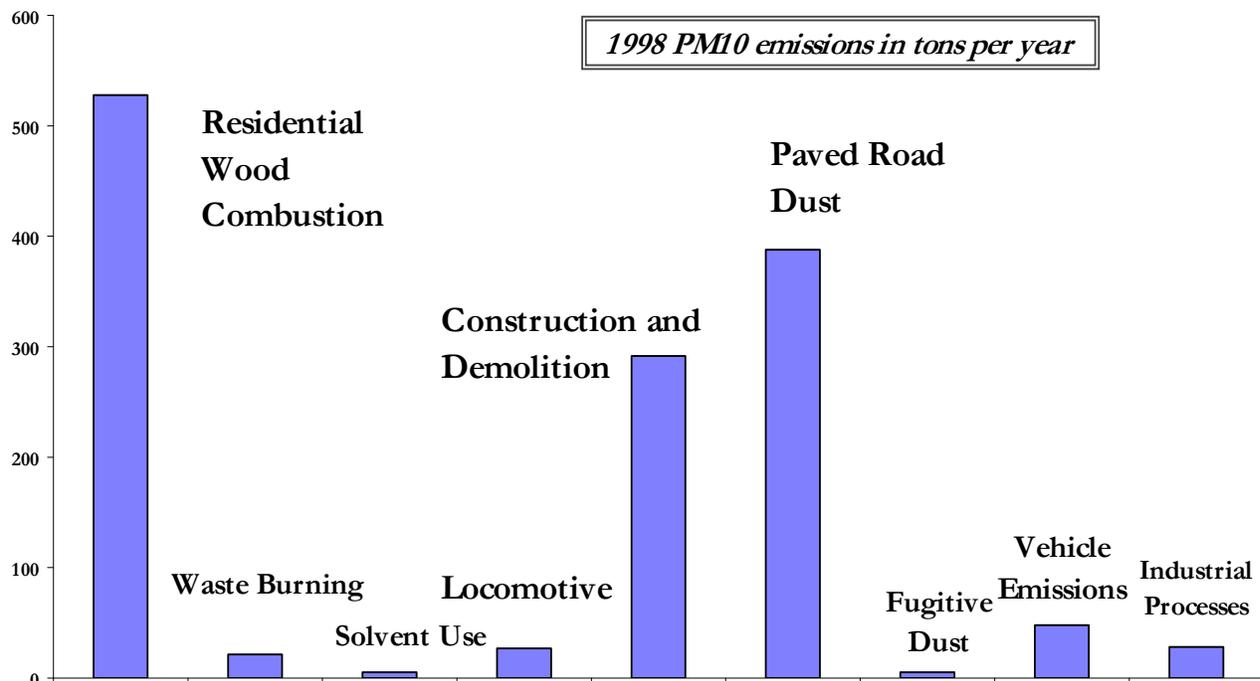
Total annual PM₁₀ emissions in the Truckee air basin in 1998 was estimated at 1,343 tons per year. The three major sources of annual emissions as shown in Figure 9 were residential wood combustion (528 tons – 39%), paved road re-entrained dust (388 tons – 29%), and construction and demolition processes (292 tons – 22%). No other source contributed more than 4% to the total annual emissions. Appendices 1 to 6 describe how the emission levels were estimated for each source with discussion on assumptions, data, and formulas in calculating the estimates.

C. Characteristics of Major Sources

Particulate matter is generated in different manners by each of the three major sources. It is important to understand the manner in which particulate matter is generated for each source in order to distinguish the different time periods and seasons during which the source contributes to particulate matter emissions.

Residential Wood Combustion: Particulate matter is generated by the combustion of firewood in woodheaters and fireplaces. It is estimated that nearly 90% of all single family homes in the Truckee air basin have at least one solid fuel burning device (excluding pellet stoves). There are approximately 9,700 solid fuel burning devices in the Truckee air basin with most homes relying on solid fuel burning devices as a primary or secondary heating source. Over half of these devices are in homes used on a seasonal or weekend basis, and over 45% of the solid fuel burning devices do not meet EPA Phase I or II emission limits. Since woodheaters and fireplaces are usually used for heating or ambience purposes during periods of cold temperatures, emissions from residential wood combustion occur more frequently during the colder months of the year, especially from November to March. Emissions will increase as temperatures drop. Also, emissions from woodheaters and fireplaces will be augmented by increased occupancy of second or vacation homes on weekends and holiday periods. Although data on particle size of woodsmoke is scarce, 80% to 95% of woodsmoke particulate matter is less than 2.5 microns in size (Raus and Huntzicker).

Figure 9

Annual PM₁₀ Emissions by Source

Paved Road Re-entrained Dust: Vehicles within the Town of Truckee travel over 171 million miles annually on Interstate 80, State highways, and Town arterial streets. A significant portion of these vehicle miles traveled (VMTs) are generated by vehicles with origins *and* destinations outside the Truckee air basin. Particulate matter is generated by the “kicking up” of dirt and sand by the movement of these vehicles, and this re-entrained dust is generated throughout the year. From the late spring to early fall, fugitive dust and mud and dirt from construction sites are deposited on roadways. However, emissions during this period from these sources are relatively small because of the small amount of dust and mud deposited on the roadways. Conversely, substantial amounts of road sand are applied to Town streets and State highways for traction control during the winter. From October 1994 to June 1995 CalTrans applied approximately 32,000 tons of road sand to State highways within the air basin while the Town applied 2,500 tons during the same time period. Most of this road sand is applied during and immediately after winter storms, further defining those time periods during which substantial road sand may be re-entrained by vehicles. Studies by air pollution agencies analyzing re-entrained road dust conclude that the vast majority of re-entrained road dust emissions occur within the first four days after the road sand is applied as the roads begin to dry out. Substantial re-entrained road dust emissions also occur during sweeping operations. Re-entrained road dust is primarily coarse in size (> 2.5 microns).

Construction and Demolition Processes: Particulate matter from construction and demolition processes is primarily generated by grading and ground disturbance operations. Ground disturbance removes vegetation and the upper layer of the soil that anchors the soil and prevents wind erosion. With the removal of this protective layer and the moving of dirt by heavy construction equipment, substantial amounts of particulate matter from the dirt can be transported into the air. Most

particulate matter from construction and demolition processes is generated from late spring to early fall. Both snow cover on the ground and Lahontan Regional Water Quality Control Board restrictions on grading from October 15th to May 1st precludes substantial ground disturbance from late fall to early spring. The size of the particulate matter can range from fine (< 2.5 microns) to over 10 microns in size. Air quality impacts from construction and demolition processes can be localized and have significant impacts on surrounding properties.

D. Emissions During Poor Air Quality Periods

In trying to determine the major sources of particulate matter emissions during poor air quality periods, monitoring data was analyzed to identify key characteristics of poor air quality periods. These characteristics that help distinguish the major sources of particulate matter in Truckee during poor air quality periods are:

- Over 90% of exceedances of the 24-hour SAAQS occurred from November to March.
- All exceedances of the 24-hour NAAQS occurred from January to April.
- Average monthly concentrations showed sharp increases from December to March. February had the highest average concentration with May having the lowest.
- Daily average 24-hour concentrations of fine particulate matter in 1992-93 did not exceed 55 $\mu\text{g}/\text{m}^3$. Daily average concentrations from April to October did not exceed 20 $\mu\text{g}/\text{m}^3$.
- Daily average 24-hour concentrations of coarse particulate matter in 1992-93 showed wide variability ranging from 2.0 $\mu\text{g}/\text{m}^3$ to 122.7 $\mu\text{g}/\text{m}^3$. The highest concentrations (> 50 $\mu\text{g}/\text{m}^3$) were found in January, February, and March.

From this information and the estimated annual emissions, the following conclusions are made:

1. Paved road re-entrained road dust and residential wood combustion are the two major sources that contribute to poor air quality and exceedances of the SAAQS and NAAQS. Emissions from these two sources are most pronounced from late Fall to early Spring when monthly concentrations are the highest and most exceedances of the 24-hour SAAQS and NAAQS occur. Although construction and demolition processes generate substantial particulate matter, emissions from this source occur primarily from late spring to early fall when monthly concentrations are at their lowest levels and exceedances of the 24-hour SAAQS are infrequent.
2. Paved road re-entrained road dust is the most substantial contributor of particulate matter on poor air quality days when PM_{10} concentrations exceed 100 $\mu\text{g}/\text{m}^3$. The dichotomous filter data of 1992-93 shows that coarse matter comprises over 80% of particulate matter on days on which the PM concentration exceeds 70 $\mu\text{g}/\text{m}^3$. The only significant source of coarse matter during these periods that would explain the high concentrations is re-entrained road dust. The paved road emission factors do not assume any seasonal variation in emissions; the emission factor is an average for the entire year. Clearly, silt loading factors, and consequently particulate matter emissions from re-entrained road dust, vary throughout the year with higher levels in winter when vehicle traction sand is applied to streets and lower levels in summer when streets are relatively free of road dust. Also, the Northern Sierra Air Quality Management District compiled preliminary data that demonstrates a strong correlation between CalTrans winter road sanding and sweeping operations and high PM_{10} concentrations.

3. Residential wood combustion is the major source of fine particulate matter during the winter months. As indicated by the 1992-93 dichotomous filter data, there are notable increases in fine particulate matter from November to March as compared to the rest of the year. Other significant sources of fine particulate matter during the winter months are vehicle emissions, locomotive emissions, and waste burning. However, these sources emit particulate matter throughout the year or are relatively small amounts and would not account for the striking increases in fine particulate matter emission levels that begin in November.

E. Future Emissions

The General Plan projects that population and housing units in the Town of Truckee will grow at a rate of 2.19% per year. The projected population for 2005 is 14,417 and for 2015 is 17,253. A change in the proportion of permanent/seasonal homes is not anticipated during this period. Most residential growth in the next five years will occur on undeveloped lots in existing subdivisions. There are over 2,000 existing lots that can be developed with single family residences. As the supply of these vacant lots dwindles, new residential growth will also be directed to new developments such as Planned Community 2 and subdivisions of undeveloped properties adjacent to existing subdivisions.

Unfortunately, emission levels and concentrations cannot be projected with any certainty. The Town and District do not have sufficient data and information to perform comprehensive modeling of future emissions. In order to project future emissions, it must be known how future development will affect particulate matter sources. The conversion of homes to natural gas may have a drastic effect on residential wood combustion, but the extent of the effect will be unknown until a survey is conducted of homeowners. These efforts are also hampered by the limitations of estimating current emissions. Consequently, it cannot be conclusively determined at this time whether emissions and concentrations will increase or decrease (and to what extent) in the future *if no actions are taken by the Town to address particulate matter pollution*. Reductions from current levels may occur from the removal or replacement of existing residential wood combustion devices, however increases are anticipated from re-entrained road dust, locomotive emissions, and new wood combustion devices. A discussion of the anticipated increases or decreases for each source follows. *Please note these general projections are based on the Town not taking any new actions on particulate matter pollution and continuing the implementation of current policies and regulations.*

Residential Wood Combustion – Emissions from residential wood combustion will probably decrease under current Town policies and regulations. New single family residential development on existing subdivision lots (over 2,000 buildable vacant lots may still exist) will result in increased emissions from new woodheaters installed in those residences. However, net increases in emissions are not anticipated from other types of new development (residential subdivisions, multi-family residential projects, and commercial businesses) because the General Plan presently requires discretionary development to mitigate 100% of their particulate matter emissions. Reductions are expected from the availability of natural gas in the Truckee area as an alternative heating source and from the natural changeout of older, gross polluting stoves to more efficient models. Conversion of homes to natural gas and more efficient woodheaters will lead to the change-out or removal of both non-certified and certified woodheaters and also to a decrease in the amount of wood used as fuel in remaining woodheaters and fireplaces. How much of a reduction that may occur cannot be

Future Emissions



Decrease

determined with accuracy until a survey is conducted measuring the effect of natural gas availability on the use of residential wood combustion and the future plans of Southwest Natural Gas on extending natural gas to unserved parts of the Town are solidified. It is estimated that annual emissions from residential wood combustion in the next ten years will decrease 15% (80 annual tons) under current Town policies and regulations, 23% (120 annual tons) with a mitigation offset program for new single family residences on existing lots, 41% (215 annual tons) with a mandatory changeout program for non-certified solid fuel burning devices, and 52% (255 annual tons) with a mandatory changeout program of all non-certified devices within seven years. These estimates do not take into consideration emission reductions that may result from a successful financial incentive/assistance program for the changeout of non-certified solid fuel burning devices.

Future Emissions



Increase

Re-entrained Road Dust – Emissions will probably increase from increased traffic projected for both State highways and Town streets. The Truckee General Plan traffic model projects that traffic (as measured by vehicle miles traveled) within the Town of Truckee on Interstate 80, Highways 267 and 89, and the Town arterials will increase approximately 46% by the year 2015. This increase in traffic will result in an increase in re-entrained dust emissions. However, these emissions should not increase at the same rate as increases in traffic. Additional road sand will not be applied at the same rate as the increases in traffic, and additional traffic will crush and entrain dust into the air to a point where the additional traffic will not result in greater dust emissions. Also, future improvements in road sanding operations and equipment may reduce emissions somewhat, but not to a great extent.

Figure 10

**Daily Vehicle Miles Traveled
Town of Truckee**

	<u>1998</u>	<u>2015</u>
Interstate 80	312,148	412,688
State Highways 267 and 89	77,923	90,783
Town Arterial Streets	78,581	125,266
<i>Total</i>	<i>468,652</i>	<i>628,737</i>

Locomotive Emissions – Locomotive emissions will increase substantially as Union Pacific railroad operations increase as anticipated. Rail trips through the Truckee air basin should increase from 20 to 36 daily trips, and the average length of a train should also increase. It is estimated that annual emissions from locomotives will increase from 28 tons (before the Union Pacific/Southern Pacific merger) to 69 tons. Approximately 370 non-certified woodheaters in permanent residents would need to be removed to offset the 41 ton annual increase in locomotive emissions. Particulate matter emissions will decrease as EPA emission standards are implemented for locomotives. Under the new emission standards, locomotives must begin

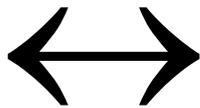
Future Emissions



Increase

cutting emissions in 2000. The EPA believes secondary PM₁₀ emissions (NO_x) will be reduced by 38% by 2010 and 46% by 2020 while direct PM₁₀ emissions will be reduced approximately 7% by 2010 and 19% by 2020 (USEPA 1997, pp. 2-3). By 2020 with the anticipated rail traffic of 36 rail daily trips remaining the same, locomotive emissions will increase approximately 50% over 1998 (pre-merger) levels.

Future Emissions



Variable

Construction/Demolition Processes – These emissions will fluctuate based on the amount of development occurring in the Truckee air basin. Emissions greater than current levels can be expected if development occurs at a faster rate than presently, while lower emissions would be expected if growth is slower. Some minor reductions can be expected from better project design and implementation of General Plan policies at the project level.

Industrial Processes (Mining) – If mining activity remains at or near the current level, future emissions can be expected to remain where they are today. An increase or decrease in mining activity will result in a parallel increase or decrease in particulate matter emissions.

Fugitive Dust – No increase in fugitive dust emissions is anticipated.

Waste Burning – It cannot be ascertain if emissions will increase or decrease from waste burning. Emissions may increase if there is an increase in prescribed fires in the area or the burning of vegetative waste created by development grading.

Solvent Use – A small increase in solvent use emissions is anticipated from additional commercial and industrial development in the Truckee air basin.

On-Road Vehicles – Emissions from vehicle tailpipes and tire wear will be substantially higher from the increase in traffic. It is projected that traffic within the Town of Truckee will nearly double by 2015. Federal regulations on fuel and automobiles will decrease tailpipe emissions that lead to particulate matter. Particulate matter emissions from new models of diesel trucks and buses will be reduced by 90% (US EPA [1996d]).

CHAPTER 6 GOAL AND OBJECTIVES

A. Introduction

The goal and objectives lay out the direction of the plan and provide the foundation for the control strategies contained within it. They are an extension of the goals and policies of the General Plan relating to air quality and attempt to achieve the aspirations set by the General Plan goals and policies. The plan's goal and objectives are important as the control strategies must be consistent with the goal and objectives; if a control strategy is not consistent, it is not furthering the intent and purpose of the plan and may conflict with the plan. Also, the goal and objectives set the threshold for emission levels and concentrations that are to be achieved by the control strategies.

B. Air Quality Management Plan Goal

The goal of this air quality management plan is as follows:

“The Town shall achieve and maintain compliance with National Ambient Air Quality Standards for PM₁₀ and PM_{2.5} as established by the United States Environmental Protection Agency. The Town shall strive to achieve compliance with State Ambient Air Quality Standards for PM₁₀ as established by State law and shall make reasonable progress toward achieving State particulate matter standards.”

The Town Council in the General Plan clearly identifies the goal of the Town regarding air quality: “Achieve and maintain air quality standards established the U.S. Environmental Protection Agency and California Air Resources Board.” (Conservation and Open Space Goal 11). Achieving and maintaining the Federal standards is the short-term goal of the plan since it is feasible to reach this goal with immediate measures and programs. It is critical to avoid Federal non-attainment status because of the constraints that may be imposed on the Town and its residents, property owners, and guests. Achieving and maintaining State standards is also important because of the health risks associated with particulate matter and the public health benefits that will result with reduced particulate matter concentrations. However, State standards are one-third of the Federal standards, and it would be difficult to achieve the State standard in a short time period without taking extreme measures. An incremental approach in achieving the State standards is recommended, as this approach is more feasible in the long run, will result in immediate reductions in particulate matter emissions and concentrations, and is consistent with the intent of the General Plan goals and policies.

C. Air Quality Management Plan Strategy

This air quality management plan and the recommended control strategies can be considered the first phase in the Town's strategy in addressing its particulate matter air pollution problem. The effectiveness of the first phase will be monitored to determine if additional steps or phases will be necessary to meet the plan's goal and objectives. The emission targets strived for in this first phase are discussed in Chapter 8. Possible control strategies that may considered for a second phase effort are identified in Chapter 9.

The plan's objectives mark both existing particulate matter sources and future sources (from new

development) for attention. This two-prong approach recognizes that Truckee air quality cannot be improved unless:

- New growth and development does not contribute to current emission levels and concentrations; and
- Current emission levels and concentrations are lessened by reducing emissions from existing sources.

The plan's objectives also focus on those emission sources that contribute significantly to the particulate matter air pollution problem: wood combustion and re-entrained road dust. The emissions from other sources either are minor (e.g. vehicle emissions from tires, tailpipes, etc.) or occur during those periods when air quality is not a significant problem (e.g. construction and demolition process during the summer). Locomotive emissions that may contribute significant PM_{2.5} during the winter were addressed in the Union Pacific/Southern Pacific merger analysis and the \$300,000 air quality mitigation funds contributed by Union Pacific to offset the increased locomotive emissions.

Lastly, the plan recognizes that the Town of Truckee is only one player among several in addressing air quality issues in the Truckee air basin. Nonetheless, the Town represents the majority of citizens and property owners and accommodates most guests in the Truckee air basin and must accept the leadership role in improving Truckee's air quality. The Town will call upon Placer County, Nevada County, and the California Department of Transportation to join with the Town in improving the quality of air in the Truckee area. However, the failure of any these agencies to contribute to the Town's efforts will not weaken the Town's resolve to improve Truckee's air quality.

D. Air Quality Management Plan Objectives

Objective 1

“New development will mitigate to the maximum extent feasible its particulate matter emissions from solid fuel burning devices and re-entrained road dust.”

Current particulate matter emissions from existing development and sources produce PM₁₀ concentrations that routinely exceed State standards and near Federal standards. It is recognized that emission levels from existing development and sources must be lowered in order to achieve the plan's goal. New development including single family residences on existing lots should not cumulatively add emissions to current emission levels since emissions from new development would negate any progress made in the reduction of emissions from existing development. “Maximum extent feasible” requires emissions from a project be mitigated or offset 100% or as much as possible (by a reduction of emissions elsewhere in the air basin) if particulate matter emissions can be reasonably measured and there are feasible measures to reduce emissions. Emissions from solid fuel burning devices can be easily measured for a new single family residence on a lot but measuring re-entrained road dust emissions from traffic generated by that residence would not be because of the high costs in preparing traffic studies. The costs of preparing the traffic study would be greater than the costs of offsetting the re-entrained road dust emissions. However, for a large residential development, mixed use project (e.g. Planned Community 2), or commercial project, both solid fuel burning device and re-entrained road dust emissions could be measured and mitigated. (Re-entrained road dust emissions can be estimated from the

formulas utilized in this plan, traffic studies conducted for the project, and by taking into account new roads constructed for the project.)

Objective 2

“Particulate matter emissions from solid fuel burning devices and re-entrained road dust represent the Town’s greatest opportunity to reduce emission levels since emission savings (i.e. a reduction of emissions below current levels) can only occur with a reduction of emissions from existing sources. Emissions from these sources will be reduced to the extent necessary to meet the attainment goal of this plan. Control strategies in the near-term should focus on these sources, and all feasible control strategies should be utilized.”

Emphasizing the point that emission levels from existing development must be lowered in order to achieve the plan’s goal, this objective asserts that control strategies will not focus solely on new development and strategies will also target existing development and sources in the near-term to reduce emission levels.

Objective 3

“The Town will request and encourage CalTrans to optimize their equipment and operational measures for winter road sanding that will reduce re-entrained road dust emissions below current emission levels. The Town will optimize its equipment and operational measures for winter road sanding to reduce re-entrained road dust emissions to the maximum extent feasible.”

Re-entrained road dust emissions originating from the State highways and Interstate 80 significantly contribute to particulate matter emissions. Further, there is a preliminary correlation between CalTrans road sanding operations and poor air quality days in the Truckee air basin (Appendix 8). Town streets that are sanded during the winter also contribute to re-entrained road dust emissions. Actions may be taken to significantly reduce re-entrained road dust emissions without jeopardizing traffic safety. Studies have found that anti-skid materials are frequently applied at loadings well above recommended levels because of public perception that effectiveness is proportional to the visible amount of surface loading, and silt loadings associated with anti-skid materials are excessive because of overapplication and noncompliance with recommended fines and durability specifications for anti-skid abrasives. As part of the cooperative effort the Town wishes to instill as part of this plan, the Town needs to make CalTrans aware of the air quality impacts resulting from winter sanding, possible EPA actions which may affect CalTrans operations if the area is designated non-attainment, and the Town’s desires to assist CalTrans in optimizing their operations to reduce emissions. The Town must be a leader in undertaking efforts to reduce re-entrained road dust emissions by optimizing Town sanding practices and equipment to minimize re-entrained road dust emissions from winter sanding.

Objective 4

“Financial incentives, public education, and other non-regulatory strategies will be encouraged when feasible. Control strategies that are cost-effective and reduce financial burdens as much as possible will be encouraged. Cost-effective strategies provide higher emission savings at lower financial expenditures to the public sector and private individuals.”

Areas designated as non-attainment by the EPA are under strict time lines and guidelines to implement control strategies to reduce emissions. Unfortunately, most of these strategies are regulatory measures that impose additional burdens on private homeowners. Because

Truckee is pro-active in addressing particulate matter and its impacts on air quality, the Town has greater opportunities and discretion than other jurisdictions in developing strategies to reduce emissions. The Town will take advantage of these opportunities by promoting programs that are voluntary and do not impose additional regulations. Also, cost-effective strategies will be promoted with the aim of minimizing costs upon both private individuals and the general public (e.g. Town government costs for implementing strategies that are funded by general fund monies).

Objective 5

“Innovative technologies for heating and building energy conservation practices will be encouraged to reduce reliance on solid fuel burning devices and other heating devices which generate particulate matter emissions.”

Emissions from solid fuel burning devices are one of the two major sources of particulate matter in the Truckee air basin, especially during winter when most exceedances occur. By encouraging heating and building practices which conserve energy and reduce heating demands, homeowners will rely less on solid fuel burning devices for heating purposes thereby reducing emissions from those devices.

Objective 6

“The Town Council will coordinate with and encourage the Nevada County and Placer County Board of Supervisors to implement PM control strategies in the Truckee air basin.”

The Truckee air basin encompasses large areas outside the Town of Truckee. However, particulate matter emitted in one jurisdiction will affect residents and visitors in other jurisdictions within the air basin. As such, a coordinated effort is necessary between the Town, Placer County, and Nevada County to comprehensively address particulate matter air pollution in eastern Nevada County and the Martis Valley. The Town hopes that this air quality management plan will provide the impetus and support for Placer County, the Placer County Air Pollution Control District, and Nevada County to implement similar control strategies for lands under their jurisdiction. This objective also ties in with Objective 3 that encourages participation by CalTrans, a State agency, in reducing particulate matter emissions in the Truckee air basin.

Objective 7

“Control strategies for regulated PM will be coordinated with strategies addressing other air pollutants and air quality issues.”

Control strategies for one type of pollutant will usually result in benefits to the reduction of other types of pollutants. For example, control strategies to reduce carbon monoxide emissions from vehicles may reduce particulate matter emissions at the same time. This objective encourages the Town Council to identify and consider other air quality benefits which may arise from particulate matter control strategies and to consider particulate matter emission benefits that may be realized if and when other air quality pollutants and strategies are studied by the Town Council.

Objective 8

“Air quality monitoring efforts will be maintained to ensure adequate monitoring of PM levels and will be coordinated with the monitoring of meteorological data.”

The NSAQMD maintains four monitoring stations in the Truckee air basin, providing excellent monitoring of particulate matter pollution. A monitoring station for PM_{2.5} has recently been installed. The Town Council, as stated in this objective, will support the continued monitoring at these current levels. Further, the Town will work with the NSAQMD and other public agencies in the placement of meteorological sensors, specifically wind speed and direction, temperature, relative humidity, precipitation, and barometric pressure, with a Truckee monitoring station. These sensors will assist the Town and NSAQMD in correlating particulate matter concentrations with meteorological events that will improve the implementation of control strategies.

Objective 9

“Within two years of the adoption of this plan and every year thereafter, the Planning Division will submit to the Town Council a report that analyzes air quality monitoring data for particulate matter including emission levels and concentrations and compliance with National and State ambient air quality standards. The Town Council will review the report to determine the success of the plan’s control strategies in achieving the attainment goal of the plan, and if necessary take the appropriate steps to ensure consistency with the plan’s goal and objectives.”

For a plan to be effective, its strategies must be implemented and achieve their purposes as planned. It is critical to gauge the effectiveness of the control strategies to ensure the goal and objectives of the plan are being met. The Town must continue to monitor particulate matter air quality and associate any changes to particulate matter emission levels and concentrations to the control strategies and to factors that are beyond the Town’s control. If emissions and concentrations increase, remain as they are, or do not decrease to the levels anticipated, this may signal that the control strategies are not succeeding and a change in the Town’s efforts may be needed. This objective provides the mechanism for the Town Council to review the effectiveness of the control strategies on an annual basis and determine if they are succeeding. It is presumed that if the control strategies are not succeeding that the Town Council will take appropriate action based on the findings of the report.

CHAPTER 7

CONTROL STRATEGIES

A. Introduction

This chapter identifies control strategies to address particulate matter emissions and concentrations. The control strategies can be categorized as:

- Programs that specify limits on total emissions, measured either as a unit of production or a reduction in emissions relative to a baseline. These include emission limits for solid fuel burning devices and mandatory curtailment programs.
- Programs that provide incentives or impose disincentives to limit emissions rather than to mandate reductions. These include financial assistance programs to encourage changeout of non-certified solid fuel burning devices and mitigation offset programs.
- Programs that do not yield quantifiable emission reductions, but still contribute to an area's overall attainment with air quality standards. These include public education and information programs.

These strategies comprehensively address particulate matter pollution by establishing regulatory mechanisms, offering financial incentives and assistance, and providing education and information. The recommended control strategies for Truckee utilize a mix of all three strategy types, focusing on market response programs and directionally sound programs.

B. Control Strategies

For each control strategy, information is provided on:

Description: A narrative of the strategy describing what the strategy will accomplish in achieving its purpose and how it will be accomplished.

Target: The particulate matter sources, type of development, and emission goals which the strategy is intended to address.

Advantages: Various factors that support the strategy.

Disadvantages: Various factors that weigh against the strategy.

Costs to Private Citizens: The potential costs of the strategy that will be directly passed onto the private citizen to implement the strategy.

Costs to Public Sector: The potential costs to the Town government and other public agencies to implement the strategy. These costs may be considered indirect costs to the Town citizens.

Emission Savings: Reductions from current levels of emissions and emission concentrations anticipated upon implementation of the strategy.

Enforcement: A discussion on how the strategy will be enforced to ensure compliance.

Implementation Guidelines: Guidelines on how the strategy should be implemented. These guidelines will be addressed and incorporated into the programs and regulations implementing the strategy to ensure that the strategy is effectively implemented.

The following control strategies implement this air quality management plan. They are arranged alphabetically and not in order of importance.

1. Air Quality Monitoring
2. Construction / Grading Regulations
3. Large Project Emissions Offset
4. Open Burning
5. Public Education and Information
6. Road Surfacing
7. Solid Fuel Burning Device, Conversion and Removal Incentives
8. Solid Fuel Burning Device, Emission Limits
9. Solid Fuel Burning Device, Emissions Offset
10. Solid Fuel Burning Device, Removal of Non-Certified Devices
11. Street Sanding Guidelines
12. Sweeping Restrictions
13. Voluntary Episodic Curtailment

1. Air Quality Monitoring

Description: The NSAQMD maintains four particulate matter monitoring stations. These monitoring stations provide data to measure particulate matter concentrations at hourly and daily levels and determine compliance with National and State ambient air quality standards. One deficiency identified by the NSAQMD is the lack of a full array of meteorological sensors linked with the monitoring stations. The Town will encourage and assist the NSAQMD in co-locating a full complement of meteorological sensors, specifically wind speed and direction, temperature, relative humidity, precipitation, and barometric pressure, with the Truckee monitoring stations.

Targets: This strategy is for the collection and analysis of air quality data to determine consistency with the plan's goals and objectives. It is not targeted towards any specific particulate matter source or type of development.

Advantages:

- (1) The meteorological data will allow the Town and NSAQMD to recognize correlations between particulate matter levels, precipitation, and other meteorological events. Analysis of this data will provide important information on the role atmospheric stability (i.e. temperature inversions) and winter storm events play in pollution concentrations, and this information will be used by the Town in assessing the effectiveness of the recommended control strategies.
- (2) The meteorological data and correlations identified by the Town and NSAQMD will assist the Town in predicting poor air quality days and calling for voluntary curtailments of particulate matter emissions.
- (3) The NSAQMD will be the lead agency in the implementation of this strategy.

Disadvantages:

- (1) The control strategy will not result in any direct or indirect reductions in emissions. Funds for this control strategy will siphon air quality funds away from other control strategies that will result in direct reductions in emissions.
- (2) On-going maintenance and operation demands on NSAQMD and Town staff will be increased. Staff will need to maintain and monitor the equipment, keep records on the meteorological information, and analyze the information to identify correlations between weather and air quality.

Costs to Private Citizens: No direct costs to private citizens.

Costs to Public Sector: There will be one-time public costs associated with the purchase of the meteorological equipment and on-going public costs for maintenance and record-keeping. It is anticipated that most of these costs will be borne by the NSAQMD, however, the Town may contribute funds as necessary to assist the NSAQMD in the implementation of this strategy. These Town costs cannot be determined until the NSAQMD is ready to proceed, and discussions between the NSAQMD and the Town on the Town's role and assistance are held. Because these costs should not be funded by the Union Pacific air quality mitigation fund and there are no other air quality fund mechanisms at this point, such costs will probably need to be funded from the Town

General Fund.

Emission Savings: No emission savings. The meteorological information and analysis may assist in the implementation of other control strategies and result in increase emission reductions from these strategies.

Enforcement: No enforcement provisions are necessary.

Implementation Guidelines:

- (1) The Town Council will consider this control strategy as part of the fiscal year budget program.
- (2) This control strategy will be a joint effort between the NSAMD and the Town. The Town's role and assistance should be secondary to that of the NSAQMD.

2. Construction / Grading Regulations

Description: The disturbance of topsoil from grading and construction results in short-term particulate matter emissions that cumulatively contribute to area-wide particulate matter concentrations and may have significant “localized” impacts on surrounding uses. Currently there are no Town development regulations in place that address dust and particulate matter emissions from grading and construction, and such emissions are addressed by the Town and NSAQMD for discretionary projects on a project-by-project basis. Development regulations are necessary to apply consistent measures to grading and construction to reduce particulate matter emissions and to ensure that grading and construction does not result in significant impacts on surrounding uses. The Town will adopt specific regulations to control dust and particulate matter emissions during construction and grading.

Targets: This strategy addresses both PM_{2.5} and PM₁₀ emissions generated by grading and construction activities. Because such activities generally do not occur during poor air quality periods, the goal of the strategy is to reduce cumulative contributions to annual particulate matter concentrations and to prevent “localized” concentrations that may be unhealthy and a nuisance on surrounding uses.

Advantages:

- (1) The regulations can be implemented within a short time period as they can be incorporated into the Town Development Code Update currently under preparation.
- (2) The regulations will result in the consistent application of regulations and mitigation measures. This will reduce uncertainty, costs, and processing time for applicants in preparing building plans and applying for building permits and will reduce Town and NSAQMD staff time in reviewing projects for particulate matter emissions and impacts.
- (3) Town staff will be able to apply clear and concise regulations to development projects, thereby substantially improving the monitoring and enforcement of air quality regulations and ensuring projects will not result in significant particulate matter impacts.

Disadvantages:

- (1) Town procedures for the inspection of grading activities will need to be upgraded to properly implement the development regulations.
- (2) Because grading does not occur during the winter or early spring seasons, this control strategy will not substantially contribute to a reduction of particulate matter emissions during the Town’s poorest air quality periods.
- (3) Because particulate matter mitigation measures are not currently applied to all projects nor properly enforced during grading, developers may need to implement additional development regulations that they currently do not routinely practice.

Costs to Private Citizens: The control strategy will result in additional grading costs to reduce particulate matter emissions. Such costs include providing water trucks, sweeping of dust from public roadways, and halting grading activities during high wind speed periods. Some of these costs are already incurred by projects, especially larger projects.

Costs to Public Sector: The development regulations will not result in direct costs to the public sector. The development regulations are being prepared as part of the Development Code Update and are covered by the funds earmarked for the Development Code Update. Town staff costs for reviewing building plans and inspecting grading to ensure a project complies with the development regulations are recovered by the building plan review and inspection fees applied to the building permit and charged to the developer.

Emission Savings: The development regulations, especially with improved implementation and enforcement, will reduce the amount of dust and particulate matter entrained into the air during grading activities. Substantial emission savings can be expected from “Construction and Demolition Processes”, the third largest source of particulate matter emissions in Truckee. However, it is beyond the scope of this plan to quantify such savings.

Enforcement: The development regulations will be implemented by ordinance in the Development Code. The Planning Division will verify compliance with the development regulations at the building permit review stage, and the Building Division will inspect grading activities to verify compliance during grading. Violations will be enforced by the Building Inspector and the Code Enforcement Officer through the enforcement provisions of the Town Building Code and Development Code.

Implementation Guidelines:

- (1) Best Available Control Measures (BACM) will be used in implementing development regulations. Because broom or mechanical sweeping does not control particulate matter emissions but rather entrains dust into the air, broom or mechanical sweeping is not considered a BACM without other measures to control dust during sweeping.
- (2) Paved access points or aprons onto Town streets should be installed at the beginning of construction of large projects. The aprons should be flushed and swept at least once daily.
- (3) Grading Ordinance provisions should be adopted to identify temporary and permanent erosion control measures and require on-going monitoring of project grading. Project site inspections should be required before grading is initiated to ensure all necessary control measures, including proper staking and tree protection measures, are in place.
- (4) A dust suppression plan should be required with grading plans for larger projects. Regular watering and other dust-preventive measures (e.g. hydroseeding, revegetation) should occur on a frequent basis during project construction.
- (5) For larger projects, securities or bonds may be required to ensure that dust control measures are properly implemented during grading.

3. Large Project Emissions Offset

Description: Large residential and commercial/industrial projects may generate substantial particulate matter emissions. Because of their scale and complexity, these projects require more extensive study and review than smaller projects, and through this extended study and review, more specific information on particulate matter emissions and concentrations can be documented. Particulate matter emissions from large residential and commercial/industrial projects that can be reasonably measured shall be estimated as part of the project study, and all feasible measures to reduce these emissions shall be implemented as part of the project so there is “no net increase” in particulate emissions from the project site.

Targets: This strategy addresses both PM_{2.5} and PM₁₀ emissions that may be generated by a development project. It is targeted towards all particulate matter sources for the project that can be measured in order to achieve “no net increase” in emissions so the project will not contribute to annual and 24-hour particulate matter concentrations.

Advantages:

- (1) The control strategy will reduce particulate matter emissions from large development projects to a less than significant level.
- (2) The control strategy will prevent substantial increases in particulate matter emissions and concentrations that may result from sudden and fast growth accommodated by large development projects such as Planned Community 2.
- (3) The control strategy is consistent with General Plan Conservation and Open Space Policy 11.2 and continues requiring 100% offset of particulate matter emissions for large development projects.

Disadvantages:

- (1) A greater burden is placed on large development projects than on smaller projects to mitigate particulate matter emissions. Cumulative emissions from smaller projects that are not directly covered by other control strategies are not addressed (e.g. re-entrained road dust emissions from increased traffic).
- (2) The measurement and study of particulate matter emissions will increase the costs for developers for the preparation and review of development proposals. The offset mitigation measures will increase the costs of construction and development.

Costs to Private Citizens: The additional costs described above will be borne by the developers of large residential and commercial/industrial projects. These additional costs will be passed through, at least partly, to small business owners and homeowners of the development.

Costs to Public Sector: Except for costs to prepare and adopt the development regulations, the control strategy will not result in direct costs to the public sector. Town costs for the review and study of the particulate matter emissions and mitigation measures will be recovered through application review fees, and the mitigation measures will be implemented by and paid for by the development.

Emission Savings: No emission savings. The objective of the control strategy is to prevent increased emissions from a site upon its development.

Enforcement: Enforcement procedures and mechanisms will be developed for each development project as part of the project's development standards and conditions of approval.

Implementation Guidelines:

- (1) A large development project will be considered a project that results in 100 or more single family residential lots, 200 or more multi-family residential units, 40,000 square feet or more of office, commercial, and/or industrial floor space, or any equivalent combination thereof.
- (2) Guidelines and methodologies will be developed by Town staff with the assistance of the Northern Sierra Air Quality Management District to calculate particulate matter emissions and identify feasible mitigation measures. The guidelines will identify those emission sources for which emissions must be estimated (e.g. wood combustion devices, vehicle emissions, re-entrained road dust both on- and off-site) and list feasible mitigation measures that may be implemented to offset emissions.
- (3) Emissions generated by the project shall be offset by 100% upon implementation of the mitigation measures. The offset should be proportional to fine and coarse particulate matter emissions generated by the project. For example, if 40% of the project's particulate matter emissions are fine, then 40% of the offset should be directed to reducing fine particulate matter emissions.
- (4) If there are not sufficient measures that can be implemented to offset project emissions, a mitigation fee (\$ per annual ton) may be paid in-lieu of other mitigation measures. The amount of the mitigation fee will be determined as part of the guidelines and methodology to be developed as part of this control strategy. The mitigation fees will be used as part of the Town's air quality mitigation funds to study and reduce particulate matter pollution and to implement other control strategies.

4. Open Burning

Description: The open burning of vegetation and other waste materials is a small contributor to annual particulate matter emissions. However, open burning during poor air quality periods may unnecessarily add to unhealthy air levels. Open burning of vegetation and other waste materials will not be allowed during yellow and red (poor air quality) periods as determined through the episodic curtailment program.

Targets: This strategy addresses PM_{2.5} emissions generated by open burning including residential burning. The goal of the strategy is to eliminate particulate emissions from open burning during the poorest air quality periods. The control strategy will target these emissions only during poor air quality periods and will reduce 24-hour concentrations of PM_{2.5} and PM₁₀ when air quality is poorest.

Advantages:

- (1) Because poor air quality periods generally occur from November to early April for short periods of time, the control strategy will not unduly interfere with homeowners and developers from burning vegetation and other materials.
- (2) The control strategy will help reduce 24-hour particulate concentrations during those periods that the Town is most likely to exceed National Ambient Air Quality Standards.
- (3) Town costs and efforts to implement the control strategy will be low.

Disadvantages:

- (1) The control strategy will be a regulatory measure. To be effective, it will require public education to make the public aware of the measure and strict enforcement to ensure the control strategy is properly implemented.

Costs to Private Citizens: There should be no additional costs to private citizens. Homeowners and developers may need to postpone open burning for several days, but this should not increase costs to burn vegetation or other materials.

Costs to Public Sector: In addition to the costs for administering and operating the voluntary curtailment program, the Town will need to support enforcement staff. Enforcement can probably be accomplished by current enforcement staffing levels, however such enforcement will reduce other enforcement efforts and may require funding for overtime.

Emission Savings: It is not known how much open burning occurs during poor air quality periods, and emissions during these periods cannot be estimated. However, the control strategy will ensure that open burning does not contribute to particulate emission concentrations during poor air quality periods.

Enforcement: The development regulations will be implemented by ordinance in the Municipal Code. The Code Enforcement Officer during poor air quality periods will conduct drive-around inspections and identify those that are burning vegetation and other materials in violation of the Municipal Code. Violators will be requested to stop burning until the poor air quality period has

ended. The Code Enforcement Officer will abate continued violations through the enforcement provisions of the Town Development Code.

Implementation Guidelines:

- (1) In cooperation with Placer County Air Pollution Control District and the Northern Sierra Air Quality Management District, the Town will explore creating a community chipping program to provide an alternative to open burning for homeowners and developers.
- (2) All new multi-family residential, commercial, industrial, and public development should be required to chip or remove residual fuels and removed vegetation created by site clearing by methods other than burning.
- (3) The Town will request that the Placer County Air Pollution Control District and the Tahoe Truckee Sierra Disposal Company not allow open burning at the Eastern County landfill during poor air quality periods.
- (4) The Town Manager will initiate discussions with Nevada County and Placer County on implementing this control strategy in areas within the Truckee air basin under their jurisdiction. The objective is to have Nevada County and Placer County adopt development regulations identical or of similar effect to those adopted by the Town.

5. Public Education and Information

Description: Woodsmoke from solid fuel burning devices is one of the two major sources of particulate matter emissions in Truckee. Unfortunately, most homeowners do not know how to properly operate a woodstove thereby resulting in reduced efficiency and increased particulate emissions. To reduce particulate emissions from improper operation of woodstoves, the Town in cooperation with the Northern Sierra Air Quality Management District, the Placer County Air Pollution Control District, the Truckee Donner Public Utility District, and local retailers needs to inform and educate homeowners in the proper operation and maintenance of woodstoves and other solid fuel burning devices and of other ways to reduce dependence on woodstoves. The homeowners also need to be informed about the particulate matter pollution problem in Truckee and the health risks associated with high particulate matter concentrations to show the importance of proper operation and maintenance of woodstoves. (Note: Other control strategies will require public education and information to properly implement those strategies. These is discussed in the applicable control strategy.)

Targets: This control strategy is targeted towards PM_{2.5} emissions from solid fuel burning devices. Its goal is to decrease particulate emissions from the improper operation and maintenance of these devices.

Advantages:

- (1) The control strategy is a non-regulatory program with low costs to implement.
- (2) Public education and information on the Truckee particulate matter pollution problem and health risks will improve compliance and participation in other control strategies as the public becomes more aware of the severity of the problem.
- (3) The Placer County Air Pollution Control District and Northern Sierra Air Quality Management District already have public education and information programs that can be complemented and improved upon by this control strategy.

Disadvantages:

- (1) The control strategy will result in low emission savings that can be estimated or calculated.
- (2) The control strategy can only be successful if the public is willing to participate.

Costs to Private Citizens: There will be no costs to an individual or business to participate in any public education or information program.

Costs to Public Sector: The public education and information programs will be funded by the Town. The costs for such programs cannot be estimated until the scope of the programs are defined. Information on costs and funding will be provided to the Council before any programs are approved and implemented.

Emission Savings: Any emission savings from solid fuel burning devices as a result of public education and information programs will be low. Further, any emission savings will not be able to be correlated to public education and information programs.

Enforcement: No enforcement provisions are necessary.

Implementation Guidelines:

- (1) The Town will cooperate with the Truckee Donner Public Utility District to develop and implement educational and informational programs to encourage energy conservation, house weatherization, solar energy use, and other alternative energy sources.
- (2) The Planning Division will conduct a formal survey to gather information on homeowner's use of solid fuel burning devices. The survey will include but not be limited to questions on the type of device, annual amount of fuel wood expended, typical times the device is used, and the effect of natural gas availability on wood combustion device usage.
- (3) The Town will purchase wood moisture meters and loan these meters to homeowners and residents. This will enable homeowners and residents to measure wood moisture and make informed decisions on the purchase of wood. Information will be provided with the meters describing the advantages of dry wood over green wood.
- (4) The Town in cooperation with the Placer County Air Pollution Control District, Northern Sierra Air Quality Management District, and local retailers will conduct educational classes on the proper operation and maintenance of solid fuel burning devices. A building permit fee waiver for the installation of solid fuel burning devices will be offered to homeowners who agree to attend these classes as part of their building permit.
- (5) Public education and information programs will be coordinated with Control Strategy #7 (Solid Fuel Burning Device Conversion Incentives) to encourage the removal of non-certified solid fuel burning devices. The public education and information programs should emphasize the community benefits of removing solid fuel burning devices or reducing use of solid fuel burning devices. Community benefits include improved air quality and reduced community health risks. Information should also be provided on the relative capital and operational costs of solid fuel burning devices versus gas-service stoves.
- (6) The public education and information program will publicize all control strategies upon their implementation. The goal is to inform residents and property owners of the Town's programs and regulations for particulate matter air quality in order to improve participation in voluntary programs and to increase compliance with mandatory regulations.

6. Road Surfacing

Description: Re-entrained road dust is generated by traffic on non-paved roads (i.e. dirt or graveled roads). This re-entrained road dust is considered a significant source in the General Plan, and Conservation and Open Space Policy 11.4 states that paving requirements for new roadways will be established to prevent generation of airborne dust. This control strategy will require non-paved roads to be paved upon the approval of new development (excluding single family residences and secondary residential units on existing lots) that will increase traffic on the road. Also, new non-paved roads will not be allowed for non-residential development projects and for subdivision roads that provide access to five or more parcels.

Targets: The control strategy addresses PM₁₀ emissions from re-entrained road dust generated by traffic on dirt and gravel roads. Because these roadways are sufficiently wet during most poor air quality periods (from rain and snow precipitation), re-entrained road dust from dirt/gravel roads do not substantially contribute to 24-hour particulate concentrations during poor air quality periods. However, road dust substantially contributes to annual particulate concentrations during the spring, summer, and fall.

Advantages:

- (1) The control strategy directly implements Conservation and Open Space Policy 11.4.
- (2) The control strategy reduces emissions from the second largest annual source of emissions: re-entrained road dust.
- (3) The paving of roadway surfaces will improve access, including emergency access, to rural subdivision parcels.

Disadvantages:

- (1) The control strategy does not address particulate emissions during poor air quality periods.
- (2) The paving of roadways will add to the improvement costs for subdivisions and may make some minor subdivisions economically infeasible.

Costs to Private Citizens: Private developers and subdividers will bear the entire cost of implementing this control strategy. Road surfaces for rural subdivisions are presently required to have only two inches of aggregate base; costs to subdivide rural subdivisions will be increased by the paving of road surfaces. Costs will vary based on the number of parcels served by the road, the number of parcels to be created by the subdivision, and the length of road.

Costs to Public Sector: No costs to the public sector except to prepare and adopt the development regulations to implement the control strategy. Any determination to require paving for a development project or subdivision will be made through the project review process, and public sector costs will be recovered through the project application fee.

Emission Savings: The strategy will not result in any emission savings. The strategy will offset increased emissions from new development and traffic utilizing dirt/gravel roads.

Enforcement: The development regulations will be implemented by ordinance in the

Development Code and applied to individual projects through the project review process. The paving requirement will be made a condition of approval for the project or subdivision and must be complied with before a project may be completed and operated and before a subdivision map may be recorded. Violations will be enforced by the Code Enforcement Officer through the enforcement provisions of the Development Code.

Implementation Guidelines:

- (1) Projects and subdivisions will be required to offset (by paving of roadways) 100% of their emissions generated by new traffic on non-paved roadways. Exemptions will be provided for single family residences, duplexes, and secondary residential units constructed on existing lots and for subdivision roads that provide access to four or less parcels.
- (2) Paving specifications (e.g. road base, thickness, width, etc.) will be defined in the Public Improvement and Engineering Standards. The Town Engineer will consider the use of recycled asphalt paving and other surfacing alternatives to reduce improvement costs associated with paving.
- (3) The Town Manager will initiate discussions with Nevada County and Placer County on implementing this control strategy in areas within the Truckee air basin under their jurisdiction. The objective is to have Nevada County and Placer County adopt development regulations identical or of similar effect to those adopted by the Town.

7. Solid Fuel Burning Device, Conversion and Removal Incentives

Description: This control strategy is a key component of the plan's approach to emphasize voluntary, financial measures and programs instead of regulatory measures. The Town currently has an air quality mitigation fund of over \$300,000 and will receive additional funds upon implementation of other control strategies (e.g. solid fuel burning device emissions offset). This control strategy will identify and implement financial incentives for homeowners, residents, and business owners to reduce dependence on solid fuel burning devices for heating and to encourage the removal of solid fuel burning devices or the conversion of solid fuel burning devices to cleaner burning devices. Programs will be coordinated with the Placer County Air Pollution Control District which controls air quality mitigation funds from residential projects in the Martis Valley.

Targets: This strategy addresses PM_{2.5} emissions generated by the burning of wood in solid fuel burning devices. Solid fuel burning devices are the largest source of annual particulate matter emissions in the Truckee air basin and one of the two largest sources of emissions during poor air quality periods. This strategy will substantially reduce cumulative contributions to both PM₁₀ and PM_{2.5} annual emissions and also substantially reduce PM₁₀ and PM_{2.5} emissions that contribute to high 24-hour concentrations during poor air quality periods.

Advantages:

- (1) The control strategy will directly reduce emissions from the largest source of particulate emissions in the Truckee air basin.
- (2) Fine particulate matter (PM_{2.5}) emissions will be substantially reduced. This will allow the Town to get a headstart in reducing PM_{2.5} annual and 24-hour concentrations in order to comply with the new National Ambient Air Quality Standards.
- (3) The control strategy will establish voluntary financial assistance programs. If successful, this control strategy will allow the Town to avoid further regulatory measures including prohibitions on the installation of new EPA Phase II woodstoves and mandatory no-burn days.

Disadvantages:

- (1) The financial assistance programs are voluntary. The programs will need significant participation from the public to be successful.
- (2) The Town will need to commit substantial staff resources to develop the financial assistance programs and to administer the programs once they are established. This will require additional staff, or staff productivity in other Town programs and projects will be adversely affected.

Costs to Private Citizens: The financial assistance programs will be voluntary. There will be no costs to private citizens to participate in these programs. It should be noted that the programs will provide public assistance to cover only a portion of the costs to convert or remove a solid fuel burning device. The remaining costs will need to be paid by the participant.

Costs to Public Sector: The Town will incur substantial costs to develop the financial assistance programs and to administer the programs once they are established. These costs cannot be estimated at this time and will vary depending on the types of programs created. These costs can be

recovered from the air quality mitigation fund, and no funds from the Town General Fund will be needed to implement this control strategy.

Emission Savings: Substantial emission savings are anticipated with the removal or conversion of solid fuel burning devices with cleaner burning devices. The replacement of a non-certified woodstove with an EPA Phase II woodstove will result in annual emission savings of 74 pounds per unit and replacement with a gas-fired stove will result in annual emission savings of 146 pounds per unit.

Enforcement: Although the programs will be voluntary, enforcement provisions will need to be developed as part of the programs to ensure that participants comply with all conditions and requirements of the program. Like other financial agreements, a contract between the Town and the program participant will be the most likely mechanism for regulating and enforcing the financial assistance/incentive program.

Implementation Guidelines:

- (1) A financial and marketing study will be conducted to determine the most cost-effective assistance and incentive programs. The study should identify the costs of each program – on a per-ton emission savings – and which types of programs are more likely to be utilized. The financial assistance or incentive should be proportional to the amount of emission savings.
- (2) Initially, 50% of the available air quality mitigation funds for the conversion of solid fuel burning devices will be dedicated to low- or no-interest loans with the remaining 50% of the funds dedicated to grants. The proportions of funds dedicated to loans and grants may be modified once the programs are in place and the effectiveness of the programs are analyzed.
- (3) The Town's financial assistance/incentive programs will be coordinated with other local agency programs and with private manufacturer/retailer incentives (e.g. The Great Stove Changeout) to maximize assistance and incentives to homeowners.
- (4) The Town will identify other public and private programs that homeowners may use to improve home energy efficiency or to remove non-certified woodstoves. Such programs may include programs offered by local banks to meet their obligations under the Community Reinvestment Act and Farmers Home Administration no-interest loans and grants for low-income senior citizens for home construction and repair.
- (5) For homeowner's participating in a financial assistance/incentive program, the Town will waive any building permit fees for the installation of new stoves and other work approved under the program. The Building Division enterprise refund will be reimbursed by the air quality mitigation funds.
- (6) The financial assistance/incentive programs will be coordinated with the Public Education and Information control strategy to advertise the availability of financial assistance and incentives. All feasible resources including the Town Newsletter and other mailers should be used to make all property owners and residents aware of the financial assistance/incentive programs and benefits of other programs offered by the Town. A program will be developed to identify gross particulate matter polluters and encourage them to participate in the programs.

- (7) Air quality mitigation funds may be used for ground source heat pumps, solar energy systems, weatherization programs (e.g. home audits, insulation, weather stripping, window replacement), conversion to natural gas, and other similar types of programs if it is determined that particulate matter emissions will be reduced. Conditions such as removal of any non-certified solid fuel burning device may be attached to any financial assistance or incentive to ensure that particulate matter emissions will be reduced.
- (8) Financial assistance and incentives will be scaled back as time progresses to encourage early participation in the financial assistance and incentive programs. The purpose of this guideline is to maximize participation at the beginning of the programs and to decrease emission levels and concentrations as quickly as possible.
- (9) The Town Manager will initiate discussions with Placer County on coordinating the Town's financial assistance/incentive program with any program administered by Placer County in the Martis Valley area. The objective of the discussions will be to coordinate administrative procedures to streamline the administrative process and reduce costs in both Placer County and the Town of Truckee. Town air quality funds may be used for the removal of solid fuel burning devices in the Martis Valley area of Placer County through cooperative agreements between the Town and Placer County.
- 10) Financial incentives and assistance will be proportional to the anticipated emission savings. For example, incentives and assistance should be greater for a changeout of a non-certified solid fuel burning device to a gas-service stove and less for a changeout to a EPA Phase II or equivalent device. Incentives and assistance will focus on permanent residents since emissions from permanent residents are greater than seasonal residents.

Implementation Example: In cooperation with woodstove retailers and manufacturers and the Northern Sierra Air Quality Management District, the Town for the past two years has participated in The Great Stove Changeout. The Great Stove Changeout is a program organized by the Northern California Nevada Hearth Products Association to offer financial incentives and assistance to homeowners to changeout their non-certified woodstoves and fireplaces and replace it with a new EPA Phase II or equivalent stove or a gas-serviced stove. During this program that runs for six weeks early in the year, the Town offers a rebate of \$100 for a new EPA Phase II or equivalent stove and \$200 for a new gas-serviced stove and also waives the building permit for installation of the stove (approximately \$70). In the two years this program has been offered, 71 non-certified woodstoves and fireplaces have been removed and replaced with 25 EPA Phase II or equivalent woodstoves and 46 gas-service stoves, resulting in an annual reduction of six tons of PM₁₀ being emitted into Truckee's air. The Town's cost for the two-year program was approximately \$19,000.

8. Solid Fuel Burning Device, Emission Limits

Description: This control strategy continues existing development regulations that limit emissions from solid fuel burning devices and total emissions from a residential unit. Emission limits from devices cannot exceed the emission requirements for an EPA-certified Phase II woodstove and total emissions from a residential unit cannot exceed 7.5 grams per hour of particulate matter.

Targets: PM_{2.5} emissions generated from solid fuel burning devices are targeted by this control strategy. The strategy's goal is to limit emissions from a solid fuel burning device and from a residence. Although the strategy will not directly reduce particulate emissions, it will prevent the installation (or re-installation) of gross polluting devices.

Advantages:

- (1) The development regulations to implement the control strategy are already in place and will require no change in current practices.
- (2) The control strategy supports Environmental Protection Agency regulations for Phase II certification of solid fuel burning devices.

Disadvantages:

- (1) Homeowners will be prevented from having free-burning fireplaces.

Costs to Private Citizens: Because the regulations are already in place, the control strategy will result in no additional costs to private citizens.

Costs to Public Sector: Public costs to implement and enforce these regulations are recovered through building permit and inspection fees.

Emissions Savings: No emissions savings.

Enforcement: The development regulations will be implemented by ordinance in the Building Code. The Building Division will verify compliance with the development regulations at the building permit review and building inspection stages. Violations will be enforced by the Building Inspector and Code Enforcement Officer through the enforcement provisions of the Town Building Code and Development Code.

Implementation Guidelines:

- (1) No changes to the current regulations are proposed. Modifications will be made to clarify any ambiguous language and to ensure consistency with other particulate matter development regulations.

9. Solid Fuel Burning Device, Emissions Offset

Description: The installation of woodstoves, fireplaces, and other solid fuel burning devices will be prohibited unless particulate matter emissions from such devices are offset or mitigated 100% thereby resulting in no net increase of emissions into the air. This strategy will apply to all new installations including all new commercial, industrial, and public buildings; new multi-family residential buildings and dwellings; new single family residential dwellings including those on existing subdivision lots; and the installation of solid fuel burning devices in existing buildings and dwellings. An exemption will be provided for the replacement of a non-certified, EPA Phase I, or EPA Phase II solid fuel burning device with a Town-certified device in the same building or dwelling. The control strategy will be implemented by imposition of a mitigation fee which will be deposited into the Town air quality mitigation fund.

Targets: This strategy is targeted towards fine particulate emissions from solid fuel burning devices in new development including new single family dwellings on existing subdivision lots and the installation of new devices in existing buildings and dwellings. Its goal is to prohibit net increases in particulate emissions from new solid fuel burning devices. The strategy will prevent increases in PM_{2.5} and PM₁₀ annual emissions and 24-hour concentrations that may occur as a result of new development.

Advantages

- (1) The strategy is not mandatory – it is a voluntary program with the homeowner making the choice. The homeowner elects whether to install a solid fuel burning device and pay the mitigation fee or to not install a solid fuel burning device and use other sources for heating. The mitigation fee would only be applicable if the homeowner wishes to install a solid fuel burning device; they would not have to pay the mitigation fee if they do not install a solid fuel burning device. The strategy acts as an economic disincentive to installing a solid fuel burning device and will encourage homeowners to seek other alternative sources of heating.
- (2) The strategy would not affect households that currently rely on woodstoves as their primary heating source. An exemption would be provided for the replacement of woodstoves in the same building or residence.
- (3) With the implementation of this strategy, new development would not cumulatively add to current emissions from solid fuel burning devices, and emission levels and concentrations from solid fuel burning devices should not increase above current levels.
- (4) A separate financial program to utilize the mitigation fees generated by this program will not have to be established. The mitigation fees can be assimilated into the air quality mitigation funds from Union Pacific Railroad and any financial program established for the air quality mitigation funds.

Disadvantages

- (1) The strategy will only remain effective if there is a sufficient number of non-certified solid fuel burning devices that can be removed through the financial assistance/incentive program.

- (2) The strategy may hinder the efforts of the financial assistance/incentive programs (through the Union Pacific air quality mitigation fund) to reduce emissions below current levels by lowering the finite number of non-certified devices that are available to be removed under the programs. Non-certified devices removed to offset new devices result in no net increase in emissions, while non-certified devices removed as part of the financial assistance/incentive programs result in substantial emission savings.

Costs to Private Citizens: The amount of the mitigation fee cannot be determined until a fee study is conducted. A rough estimate of the fee amount is from \$500 to \$1,500 for an EPA Phase II or equivalent woodstove.

Costs to Public Sector: There will be public costs associated with the preparation of the mitigation fee study and the administration of the financial incentive/assistance program. However, because the study and program are directly associated with implementation of the mitigation fee, they may be funded by the mitigation fees. No monies from the Town General Fund are anticipated to be used for this strategy.

Emission Savings: No emission savings. The objective of the strategy is to mitigate or offset new emissions. Any increase in wood combustion emissions from new development will be offset by reductions in emissions from existing development. Particulate matter emission levels and concentrations from solid fuel burning devices will not increase from new development.

Enforcement: Installation of a solid fuel burning device, including replacements, require the issuance of a building permit. The mitigation fee program will be implemented by ordinance in the Development Code. Compliance with the mitigation fee and credit program will be checked at the building permit review stage, and mitigation fees will be assessed and collected with other building permit and development impact fees. Violations will be enforced by the Code Enforcement Officer through the enforcement provisions of the Development Code.

Implementation Guidelines

- (1) In addition to solid fuel burning devices, the mitigation fees may be applied by the Town to the reduction of emissions from other sources provided such application of the fees will result in comparable reductions in PM₁₀ and/or PM_{2.5} emission levels and concentrations.
- (2) The Town Manager will initiate discussions with Nevada County and Placer County on implementing this control strategy in areas within the Truckee air basin under their jurisdiction. The objective is to have Nevada County and Placer County adopt development regulations identical or of similar effect to those adopted by the Town. Town mitigation fees may be used for the removal of non-certified solid fuel burning devices in the Martis Valley area of Placer County and that portion of Nevada County within the air basin through cooperative agreements between the Town and Placer County and Nevada County.

- (3) A credit program may be considered to allow developers and property owners to remove solid fuel burning devices from existing buildings and dwellings and receive a credit to install solid fuel burning devices in new buildings and dwellings. A credit program, if adopted, will include specific regulations that will require the “taking” and “receiving” buildings and dwellings to be under same ownership and require credits to be used within one year after the device has been removed from the “taking” building or dwelling. Credits cannot be transferred.
- (4) The mitigation fees will be proportional to the anticipated emissions of the solid fuel burning device. For example, fees for a device with emissions of 7.0g/kg should be double that of the fees for a device with emissions of 3.5 g/kg.
- (5) An exemption will be provided for the replacement or conversion of a non-certified, EPA Phase I, or EPA Phase II solid fuel burning device with a Town-certified device.

10. Solid Fuel Burning Device, Removal of Non-Certified Devices

Description: To facilitate the removal or replacement of non-certified woodstoves and fireplace inserts, this control strategy will require a property owner to remove non-certified woodstoves or fireplace inserts in a residence or commercial business prior to sale or transfer of the property or within five to ten years of adoption of this plan, whichever occurs first. The non-certified device may be replaced with a Town-certified device.

Targets: This strategy is targeted towards fine particulate emissions from non-certified woodstoves and fireplace inserts in existing buildings and structures. Its goal is to reduce or eliminate particulate matter emissions from these non-certified devices by removing non-certified devices in existing buildings within five to ten years. This strategy will substantially reduce cumulative contributions to both PM₁₀ and PM_{2.5} annual emissions and also substantially reduce PM₁₀ and PM_{2.5} emissions that contribute to high 24-hour concentrations during poor air quality periods.

Advantages:

- (1) The control strategy will directly reduce particulate emissions from the largest source of emissions in the Truckee air basin.
- (2) The control strategy will quicken the removal of non-certified devices in the Town of Truckee. Fine particulate matter (PM_{2.5}) emissions will be substantially reduced, and this will allow the Town to get a headstart in reducing PM_{2.5} annual and 24-hour concentrations in order to comply with the new National Ambient Air Quality Standards.
- (3) The control strategy will create both short-term and long-term reductions of emission levels. The removal of non-certified devices prior to the sale of a home will result in immediate reductions and these reductions will continue to increase until all non-certified devices are removed by the end of the seven-year period. After the seven-year deadline, the Town will enjoy substantial long-term reductions in emissions from existing development.
- (4) The non-certified devices will be removed or replaced prior to the sale of a house, and the costs for removal or replacement may be handled through the home sale transaction which may be a more favorable time for the property owner to remove or replace the device.

Disadvantages:

- (1) The control strategy will be a regulatory measure. It will be an additional item that a seller must address as part of a home sale transaction.
- (2) The Town will have to undertake an extensive enforcement program at the end of the seven-year deadline as up to 750 homes may still have a non-certified device and be in violation of the ordinance.
- (3) There will be substantial costs (\$1,500 +) to homeowners that rely on woodstoves as their primary heating source as these homeowners must replace the non-certified device with an EPA Phase II stove or install and utilize another type of heating source.

Costs to Private Citizens: Homeowners will be responsible for the costs of removing the non-certified woodstove or fireplace insert from the home and disposing it at an approved site. Costs for

removal and disposal will be several hundred dollars, although Town assistance may be available to cover some of these costs. If a homeowner wishes to replace the non-certified device with an EPA Phase II stove, pellet stove, or gas-service stove, or if a woodstove is the primary heating source for the home, it may cost the homeowner from \$1,500 to \$2,000 to purchase and install a new stove. There will also be minor costs for removing the non-certified device including inspections (\$50 to \$75) and Town processing of the required notices (\$50 to \$100).

Costs to Public Sector: The Town will incur public costs to administer and enforce the ordinance. The public costs for the removal of non-certified devices prior to home sale should be recovered through Town processing and enforcement fees that are passed through to the seller and buyer. The processing and enforcement costs for the removal of other non-certified devices could be recovered through Town registration fees that are passed through the homeowner and/or funded by other Town revenues (e.g. General Fund, Air Quality Mitigation Fund).

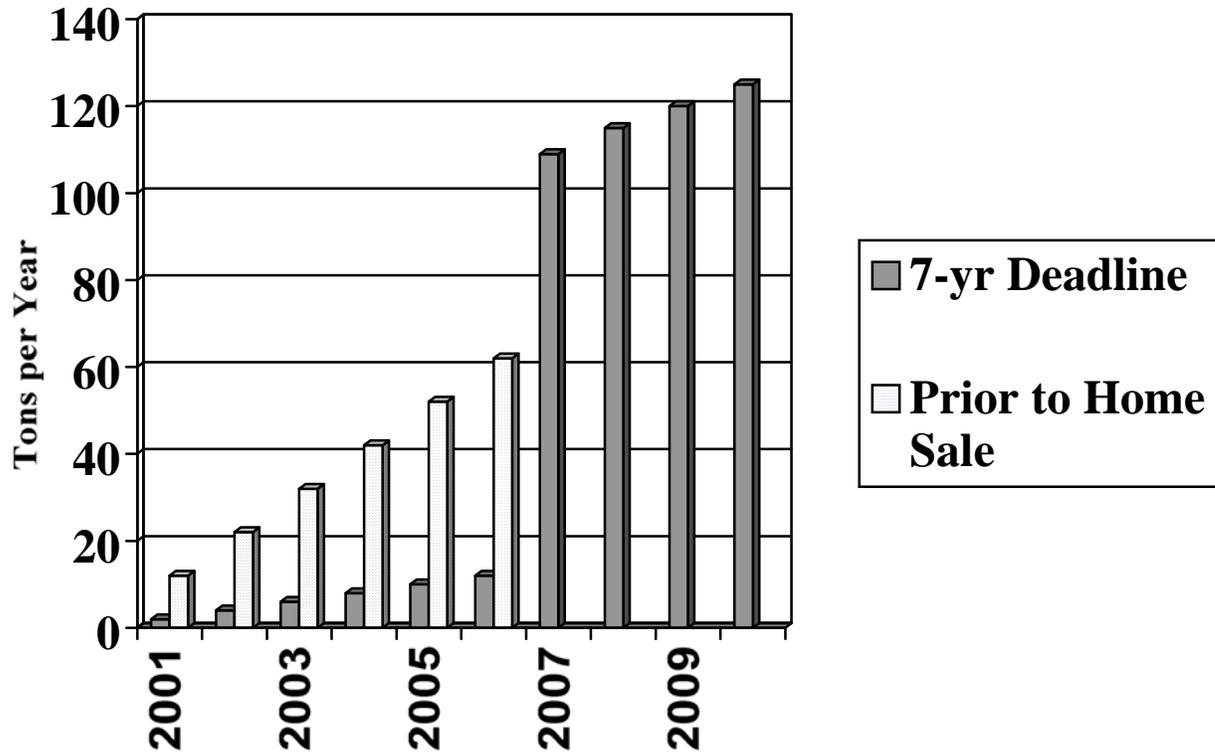
Emission Savings:

Removal Prior to Home Sale: Based on the assumptions in Appendix 2, it is estimated that non-certified woodstoves are found in one-third of all homes sold. Assuming that one-third of homeowners with a non-certified woodstove will replace it with an EPA Phase II woodstove and two-thirds will replace it with a pellet stove or gas-service stove or will not replace it all, it is estimated that this control strategy will result in annual emissions savings of 41 pounds for each home sold. Approximately 600 homes were sold in 1998 in Truckee. If this control strategy was in effect in 1998, the control strategy would have resulted in an annual reduction of 12.3 tons of particulate matter being emitted in the Truckee air basin. The increase in annual savings will decrease as the supply of homes with non-certified woodstoves becomes smaller and a lesser number of non-certified woodstoves are removed each year through this program. It is estimated that the removal of non-certified devices prior to home sale will result in an annual reduction of 60 tons of particulate matter emissions by the end of 2006.

Removal Within Seven Years: This part of the control strategy will result in minor reductions in particulate matter emissions in the first seven years because only a few homeowners will voluntarily remove their non-certified device before the end of the seven-year deadline. The reductions in particulate matter emissions for the first seven years will be less than 10 tons per year. After the seven-year deadline, emission savings will be substantial. It is estimated that the control strategy, in conjunction with the 60 tons of emissions savings from the "Removal Prior to Home Sale" program for the previous seven years, will reduce particulate matter emissions by 110 tons by the end of 2007 based upon 75% compliance at the end of the seven-year period. With aggressive enforcement of the ordinance, annual emission savings should increase to 125 tons by the end of 2010.

Figure 11

Annual PM₁₀ Emission Savings
Removal of Non-Certified Devices



Enforcement: This control strategy will be implemented by ordinance in the Municipal Code. Violations will be enforced by the Code Enforcement Officer through the enforcement provisions of the Development Code and special enforcement provisions contained in the ordinance.

Removal Prior to Home Sale: An enforcement program will be established in which the Code Enforcement Officer will review recorded deeds transferring property to verify that a notice of exemption or compliance with the Town ordinance was filed on the subject property prior to its transfer. If the property does not have the required notice, the property owner will be notified that they are in violation of the Town ordinance. The property owner will be able to resolve the violation by obtaining the required notice identifying that the property transfer was not subject to the Town ordinance or the property complies with the ordinance requirements.

Removal Within Seven Years: An enforcement program will be established as part of the ordinance. The enforcement program will include a method to identify those homes that may have a non-certified device and may include a registration and/or inspection program to catalogue homes with non-certified devices. At least six months prior to the end of the seven-year deadline, the Town will directly notify all property owners that may have a non-certified device of the deadline to remove any and all non-certified devices from their home. At the end of the deadline period, enforcement of the ordinance will be given high priority, and the Code Enforcement Officer shall

initiate a program to identify those property owners in violation and shall take swift action to compel removal of the non-certified devices in accordance with the ordinance.

Implementation Guidelines:

- (1) A Town-certified device to replace a non-certified device removed under this control strategy will be exempt from the mitigation fee required under the Solid Fuel Burning Device Emissions Offset program.
- (2) Fireplaces will not have to be removed or rendered inoperable under this control strategy. However, non-certified fireplace inserts must be removed.
- (3) The Town Manager will initiate discussions with Nevada County and Placer County on implementing this control strategy in areas within the Truckee air basin under their jurisdiction. The objective is to have Nevada County and Placer County adopt development regulations identical or of similar effect to those adopted by the Town. Town mitigation fees may be used for the removal of non-certified solid fuel burning devices in the Martis Valley area of Placer County and that portion of Nevada County within the air basin through cooperative agreements between the Town and Placer County and Nevada County.
- (4) Town staff will work with local woodstove retailers and the Tahoe Truckee Sierra Disposal Company to establish a formal program for the disposal of non-certified woodstoves once they are removed from a residence. This program may be incorporated into a financial assistance/incentive program with the Town funding all or a portion of the disposal costs.

Removal Prior to Home Sale

- (5) Prior to drafting the implementing ordinance, Town staff will meet with an ad-hoc committee of members of the real estate community to identify ways to streamline the review process, to provide better coordination and communication between the Town and property owners, and to limit the role of the real estate community in the process.
- (6) A realtor's responsibility under the ordinance will be limited to disclosure of the requirements of the ordinance to the seller and buyer. The Town will not hold a realtor responsible or subject the realtor to enforcement if the seller and/or buyer fails to comply with the regulations of the ordinance.
- (7) The ordinance will not become effective until the financial assistance/incentive program is in place and available to homeowners or May 1, 2000, whichever occurs first.
- (8) The control strategy will apply only to sales or transfers of property subject to the documentary transfer tax. Exemptions will be provided for gift deeds, minor transfers not involving financial consideration, foreclosure sales, trustee's sale, and involuntary transfers under a deed of trust. An exemption from the inspection requirements of the ordinance will be provided for homes that were built after 1993 and for which the building permit for construction of the new home was issued on or after January 1, 1994.
- (9) A property owner will not receive credit under the credit program described in Control Strategy #9 (Solid Fuel Burning Device Emissions Offset) for the removal of a non-certified

device if it is removed within one year either prior to or after the sale or transfer of the property.

- (10) The Town Manager will initiate discussions with the Northern Sierra Air Quality Management District to determine if the District would conduct the required home inspections in accordance with Town requirements, procedures, and timelines.
- (11) If the Northern Sierra Air Quality Management District cannot conduct the required home inspection program in accordance with Town requirements, the Community Development Director will establish a program to license individuals to inspect and certify that woodstoves and fireplace inserts in residences are certified. The licensing program will include license qualifications and requirements, licensing fees, and enforcement provisions. The Community Development Director will ensure that there are enough licensed individuals to conduct the required inspections without unreasonable delays. The Community Development Director will establish a random inspection program of previously inspected homes to confirm the accuracy of the work being done by the licensed individuals.

Removal Within Seven Years

- (12) A property owner will not receive credit under the credit program described in Control Strategy #9 (Solid Fuel Burning Device Emissions Offset) for the removal of a non-certified device if it is removed after January 1, 2005.
- (13) The Town Council will consider a phased, incremental, or area-by-area approach whereby the timing of the removal of non-certified devices is based on the availability of natural gas. Under this type of approach if implemented, non-certified devices may be required to be removed as early as within five years of the adoption of this plan if natural gas is available to no longer than nine years after adoption of this plan if natural gas is not available. This type of approach will have no affect on the “Removal Prior to Home Sale” regulations. If a phased, incremental, or area-by-area approach is not implemented, all non-certified devices will be removed within seven years of the adoption of this plan.

11. Street Sanding Guidelines

Description: The control strategy consists of the development of Street Sanding Guidelines that will apply to Town street sanding and cleaning/sweeping operations in order to reduce re-entrained road dust emissions. These guidelines will also be used as a framework to develop a memorandum of understanding with CalTrans on modifying their operations to reduce re-entrained road dust emissions. The guidelines will contain innovative strategies to reduce re-entrained road dust emissions by modifying the ways that agencies apply sand to roadways and clean and sweep dust from these roadways. The guidelines will also act as an educational tool for public agencies and their personnel on the proper methods of street sand application and cleaning/sweeping.

Targets: Re-entrained road dust, one of the two major sources of particulate emissions in the Truckee air basin, is the target of this control strategy with a goal to reduce PM₁₀ emissions from re-entrained road dust to offset future emissions that will be generated by increased traffic volumes on Town streets and State freeways and highways. Implementation of the guidelines should reduce PM₁₀ annual emissions and substantially reduce PM₁₀ 24-hour concentrations during poor air quality periods.

Advantages:

- (1) The guidelines will comprehensively look at all aspects of street sanding and sweeping equipment and operations. This is the only control strategy that addresses re-entrained road dust and is a vital part of this plan.
- (2) Particulate emissions have been reduced by up to 30% by the implementation of street sanding guidelines in other jurisdictions with characteristics similar to Truckee.
- (3) The guidelines will provide the Town with sufficient evidence that re-entrained road dust from State highway contributes significantly to the particulate matter air quality problem. The Town will have sufficient support to approach CalTrans and request improvements in their equipment and operations to reduce re-entrained road dust.

Disadvantages:

- (1) The guidelines will only apply to Town sanding and sweeping operations. Re-entrained road dust from State freeways and highways will not be affected unless agreed to by CalTrans.
- (2) The street sanding guidelines cannot compromise road safety. This may limit the type and extent of measures that can be implemented by the guidelines.

Costs to Private Citizens: No direct costs to private citizens.

Costs to Public Sector: It will cost approximately \$30,000 to prepare the street sanding guidelines. A portion of the cost may be funded from State grants administered by the NSAQMD, however, the remainder of the costs may need to be funded from the Town General Fund. Implementation of the guidelines may substantially increase Town equipment and operation costs to sand and sweep Town streets. These costs cannot be determined until the guidelines are prepared.

Emission Savings: Improvement in Town sanding and sweeping practices will reduce current emissions generated by re-entrained road dust. These emission savings may be substantial (up to

30% reduction in emissions) as demonstrated by similar programs in the Town of Mammoth Lakes and the State of Colorado. A 30% reduction in re-entrained road dust emissions from Town streets would result in annual emissions savings of 19 tons. A portion of these emissions savings will be negated by increases in traffic volumes that will increase re-entrained road dust emissions.

Enforcement: No enforcement provisions necessary.

Implementation Guidelines:

- (1) The guidelines should focus on preventive measures (prevent the deposition of materials onto roadway surfaces) before considering mitigative measures (removing materials which have been previously deposited onto roadway surfaces).
- (2) The guidelines will consider but not be limited to the following:
 - (a) Using abrasives more effectively through improvements in application techniques such as uniform spreading and specifications limiting the amount of sand that should be applied to travel lanes;
 - (b) Improving the quality of abrasive materials by establishing specifications on the amount of fine materials, material hardness, degradation factor, etc. Materials should have less than 4% silt by weight and a degradation factor of less than 24 (Washington Degradation Test);
 - (c) Identifying appropriate weather and air quality conditions for sweeping;
 - (d) Analyzing de-icing compounds as an alternative or supplement to road sand and as a dust suppressant in spray bars of vacuum sweepers;
 - (e) Establishing an annual training program for sanding and sweeping personnel;
 - (f) Identifying appropriate methods and frequency of sweeping to remove deposited materials;
 - (g) Identifying equipment needs to implement the guidelines including the most efficient vacuum sweepers presently available.
- (3) Silt loading factors will be measured monthly for a year to provide an average silt loading factor for Town streets and State freeways and highways.
- (4) Data on particulate matter air quality and CalTrans road sanding and sweeping operations will be analyzed to determine if there is a correlation between CalTrans road sanding and/or sweeping and poor air quality periods. The Town Manager will initiate discussions with CalTrans, District 3 to request that CalTrans implement programs and measures identified in the Street Sanding Guidelines that may reduce re-entrained road dust emissions from CalTrans sanding and sweeping operations on Interstate 80 and State highways in the Truckee air basin. Garnering CalTrans cooperation in reducing re-entrained road dust emissions is a high priority for the Town, and the Town will aggressively pursue attaining this cooperation, taking our request to the highest levels of CalTrans authority if necessary.
- (5) The costs and effectiveness for each implementation measure will be identified to allow the Town Council to consider cost-effectiveness before any measure is implemented.
- (6) Sweeping operations may be limited during yellow and red (poor air quality) periods as determined by the episodic curtailment program.

12. Sweeping Restrictions

Description: This control strategy applies to private sweeping operations not conducted by public agencies on roads and highways. Re-entrained road dust generated by sweepers, vacuums, and other mechanical equipment (not including public street sweeping) is a small contributor to annual particulate matter emissions. Since such operations occur during the winter and spring, they may unnecessarily add to unhealthy air levels. The sweeping of parking lots, driveways, private streets, and other paved surfaces will not be allowed during yellow and red (poor air quality) periods as determined by the episodic curtailment program.

Targets: Re-entrained road dust emissions from sweepers, vacuums, and other mechanical equipment is the target of this control strategy. The control strategy will target these emissions only during poor air quality periods and will reduce 24-hour concentrations of PM_{2.5} and PM₁₀ when air quality is poorest.

Advantages:

- (1) Because the control strategy only applies to sweeping operations during poor air quality periods, it will not unduly interfere with home and business owners from sweeping parking lots, driveways, and other paved surfaces.
- (2) The control strategy will help reduce 24-hour PM₁₀ concentrations during those periods that the Town is most likely to exceed National Ambient Air Quality Standards.
- (3) Town costs and efforts to implement the control strategy will be low.

Disadvantages:

- (1) The control strategy will be a regulatory measure. To be effective, it will require public education to make the public aware of the measure and strict enforcement to ensure the control strategy is properly implemented.

Costs to Private Citizens: There should be no additional costs to private citizens. Home and business owners may need to postpone sweeping for several days, but this should not increase costs to sweep.

Costs to Public Sector: In addition to the costs for administering and operating the voluntary curtailment program, the Town will need to support enforcement staff. Enforcement can probably be accomplished by current enforcement staffing levels, however such enforcement will reduce other enforcement efforts and may require funding for overtime.

Emission Savings: It is not known how much sweeping occurs during poor air quality periods, and emissions from sweeping during these periods cannot be estimated. However, the control strategy will ensure that sweeping does not generate re-entrained road dust emissions and does not contribute to particulate emission levels and concentrations during poor air quality periods.

Enforcement: The development regulations will be implemented by ordinance in the Municipal Code. The Code Enforcement Officer during poor air quality periods will conduct drive-around inspections and identify those that are sweeping by mechanical means in violation of the Municipal Code. Violators will be requested to stop sweeping until the poor air quality period has ended. The

Code Enforcement Officer will abate continued violations through the enforcement provisions of the Town Development Code.

Implementation Guidelines:

- (1) The development regulations will apply to all public agencies except those agencies sweeping public streets and highways.
- (2) The Town Manager will initiate discussions with Nevada County and Placer County on implementing this control strategy in areas within the Truckee air basin under their jurisdiction. The objective is to have Nevada County and Placer County adopt development regulations identical or of similar effect to those adopted by the Town.

13. Voluntary Episodic Curtailment

Description: This is a voluntary program requesting residents, visitors, and businesses to curtail the use of solid fuel burning devices on poor air quality days. Town staff with assistance from the NSAQMD will predict those days in which poor air quality is anticipated, inform the public of the poor air quality day designation, and request that residents, visitors, and businesses do not use or at least curtail their use of solid fuel burning devices. This program will be used in conjunction with other control strategies (e.g. sweeping restrictions, open burning) to determine when those activities may occur.

Targets: This strategy is targeted towards PM_{2.5} emissions from solid fuel burning devices. Its goal is to reduce particulate emissions from solid fuel burning devices during poor air quality periods. It will reduce 24-hour concentrations of PM₁₀ and PM_{2.5} and also result in reductions in annual emissions.

Advantages:

- (1) The control strategy is voluntary and does not impose mandatory restrictions or penalties on homeowners and residents on the use of their solid fuel burning devices during poor air quality periods.
- (2) The voluntary episodic curtailment program can be developed and implemented in a short period of time with minimal time and effort required by the Town and NSAQMD. Any emissions savings will be relatively free because of the low cost to implement the program.
- (3) It is anticipated that the control strategy will reduce 24-hour concentrations of both PM₁₀ and PM_{2.5} on the worst air quality days when the Town is most likely to exceed National Ambient Air Quality Standards.

Disadvantages:

- (1) Because the control strategy is voluntary and depends on citizen participation, its effectiveness will be limited. It will not *substantially* reduce particulate emissions from solid fuel burning devices.

Costs to Private Citizens: The control strategy will not impose mandatory costs on private citizens. Citizens that voluntarily participate by not using their solid fuel burning device on poor air quality days may have additional costs in using other heating systems.

Costs to Public Sector: There will be public costs associated with the preparation of the guidelines to implement the voluntary curtailment program. There will be operational costs associated with Town staff monitoring air quality from November to April and informing the public of voluntary no-burn days.

Emission Savings: Emission savings cannot be estimated at this time and will not be able to be quantified once the program is underway. Emission savings will vary dependent on citizen participation. The city of Lakeview, Oregon estimated emission savings of 5% to 10% from solid fuel burning devices upon implementation of their voluntary curtailment program.

Enforcement: This program is voluntary. No enforcement provisions are necessary.

Implementation Guidelines:

- (1) The program will include criteria and methods for identifying typical conditions when poor air quality days may occur (e.g. the day after winter storms early or late in the season) and for determining when poor air quality days should be called. Yellow days should be called when 24-hour concentrations of PM₁₀ of 100 ug/m³ or greater are predicted, and red days should be called when PM₁₀ 24-hour concentrations of 125 ug/m³ or greater are predicted.
- (2) The program will include a communication strategy to inform residents, visitors, and businesses when poor air quality days are called and of the Town request to not use or curtail use of solid fuel burning devices on these days. The communication strategy may use a variety of methods to advertise this information including cable television, radio, informational flyers, and community information boards.
- (3) The program will include a monitoring and surveillance program to estimate participation of homeowners and the program's effectiveness.

CHAPTER 8 EMISSION TARGETS

A. Introduction

This air quality management plan is a dynamic document that is subject to change in order to meet its goal of improving air quality in the Truckee air basin. Once the plan is implemented, air quality must be continuously monitored and analyzed in order to measure the effectiveness of the plan and its control strategies. If air quality does not improve or does not improve to the levels anticipated by this plan, the plan and its control strategies must be re-appraised in light of the plan's goal and objectives. The purposes of this chapter are to establish reporting guidelines for air quality monitoring data to determine if air quality is improving and to set emission targets so that the plan can be properly evaluated to determine its effectiveness. If the emission targets are not met, this signifies that the plan must be re-appraised and more stringent control strategies must be considered.

B. Monitoring Data Report

The Northern Sierra Air Quality Management District monitors PM₁₀ in the Truckee air basin to an excellent degree and began monitoring PM_{2.5} in January 1999. With the addition of meteorological sensors to the Truckee TEOM station to correlate air quality with weather conditions, Truckee will have an excellent array of monitors to measure and evaluate particulate matter air quality. The next step is to collect and analyze this data and provide reports to the decision-makers on the status of air quality in Truckee. This section establishes guidelines for an annual Town staff report on air quality and the effectiveness of the plan and the review of this staff report by the Town Council.

1. **Annual Report Timelines.** Beginning in March 2001 and annually thereafter in March, the Community Development Director will forward a report to the Town Council that discusses particulate matter air quality in the Truckee air basin for the previous year and progress towards complying with the emission targets of this plan. If the 24-hour concentration NAAQS is exceeded twice in any year (as measured by the Truckee TEOM monitoring station), the Community Development Director shall prepare the report as quickly as possible and forward it to the Town Council for their consideration at the next available Council meeting.
2. **Annual Report Contents.** The report will include the following:
 - a. An analysis of PM₁₀ and PM_{2.5} annual and 24-hour concentrations and compliance with the annual and 24-hour National and State ambient air quality standards;
 - b. Data on new development, woodstove installations and conversions, and natural gas conversions;
 - c. The results of the survey on homeowner's use of solid fuel burning devices as described in Implementation Guideline No. 2 for the Public Education and Information control strategy;
 - d. A discussion on the correlation of changes to particulate matter air quality with implementation of control strategies and to other factors beyond the scope of this plan and the Town's control (e.g. weather conditions, forest fires);
 - e. Conclusions on the effectiveness of the control strategies in reducing particulate matter emissions and whether the plan's emission targets are being met;

- f. Recommendations on future actions that the Town should undertake to implement the plan and meet its emission targets.
3. **Town Council Review.** The Town Council will review the report at the next available Town Council meeting. The Council will determine whether the plan is resulting in improved particulate matter air quality and the emission targets of the plan are being met (or satisfactory progress is being made to meeting those targets). If the air quality is improving and the emission targets are being met, no further action by the Council is necessary. However, if emission targets are not being met, the Council will consider accelerating the implementation of control strategies not fully implemented and also consider implementing other control strategies (Chapter 9) not originally recommended by the plan.

C. Emission Targets

The emission targets for this plan, in order of importance, are:

- 1. No exceedances of the 24-hour and annual National Ambient Air Quality Standards for PM₁₀ and PM_{2.5}.
- 2. A 10% reduction within 5 years of adoption of this plan in 24-hour PM₁₀ concentrations (based on the 99th percentile value) as described in Figure 12 and showing reasonable progress each year towards meeting this target. (The three-year average of values from the Truckee TEOM monitoring station for 1996, 1997, and 1998 will be used as the base-year figure.)
- 3. A 10% reduction within 5 years in annual PM₁₀ concentration as described in Figure 12 and showing reasonable progress each year towards meeting this target.
- 4. A 10% reduction within 5 years in the number of expected exceedances of the 24-hour PM₁₀ concentration SAAQS as described in Figure 12 and showing reasonable progress each year towards meeting this target.

Figure 12

Emission Targets for 2005

	Base Year Figure (Avg 1996-98)	Emission Target (Avg 2002-04)
Annual Concentration (ug/m3)	34.36	31.00
99th % 24-Hour Concentration (ug/m3)	105.72	95.00
24-Hour SAAQS Expected Exceedances/Yr	60	54
24-Hour NAAQS Expected Exceedance/Yr	0.7	0

(Note: Figures and targets based on monitoring data from Truckee TEOM station.)

CHAPTER 8 EMISSION TARGETS

A. Introduction

This air quality management plan is a dynamic document that is subject to change in order to meet its goal of improving air quality in the Truckee air basin. Once the plan is implemented, air quality must be continuously monitored and analyzed in order to measure the effectiveness of the plan and its control strategies. If air quality does not improve or does not improve to the levels anticipated by this plan, the plan and its control strategies must be re-appraised in light of the plan's goal and objectives. The purposes of this chapter are to establish reporting guidelines for air quality monitoring data to determine if air quality is improving and to set emission targets so that the plan can be properly evaluated to determine its effectiveness. If the emission targets are not met, this signifies that the plan must be re-appraised and more stringent control strategies must be considered.

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 - d. A discussion on the correlation of changes to particulate matter air quality with implementation of control strategies and to other factors beyond the scope of this plan and the Town's control (e.g. weather conditions, forest fires);
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- f. Recommendations on future actions that the Town should undertake to implement the plan and meet its emission targets.
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(Note: Figures and targets based on monitoring data from Truckee TEOM station.)

CHAPTER 9 OTHER CONTROL STRATEGIES

A. Introduction

There are a number of other control strategies that are available to the Town to address particulate matter pollution. The EPA has prepared a sourcebook that describes many of these control strategies and how cities, counties, and states throughout the nation have implemented these strategies. These control strategies were considered to determine if they were appropriate for Truckee at this time. It was determined that the following strategies were not appropriate for Truckee or they were not needed at this time. However, it is important to briefly describe these strategies because these strategies may need to be implemented in the future. The Town Council will consider the implementation of these strategies if the control strategies listed in Chapter 7 are not working to the level anticipated or if the emission targets identified in Chapter 8 are not being met.

B. Control Strategies

1. **Increased Fines and Penalties.** Because of the extent of the particulate pollution problem and health-related risks, this control strategy would impose higher fines and penalties for non-compliance with Town particulate matter regulations. These fines and penalties would be above and beyond the fines and penalties established in the Town enforcement provisions for other types of violations. The purpose of the higher fines and penalties is to achieve a higher rate of compliance with the other control strategies. However, fines and penalties that are too high may be counterproductive in achieving compliance, and the amount of the fine and penalty must be carefully considered. Also, the Town will need to determine if these revenues would be channeled into the general fund or into specific accounts for particulate matter control strategies.

Fresno, California charges a fine of \$2,000 for illegally installed woodstoves or fireplaces. In Crested Butte, Colorado homeowners are charged \$30 per month if they do not remove their non-certified solid fuel burning device. Some cities allow a waiver or reduction of the fine or penalty if the violator attends an educational class on particulate matter and solid fuel burning devices.

2. **Mandatory episodic curtailment program.** This strategy is the regulatory option of the voluntary episodic curtailment program. Instead of requesting voluntary cooperation, this strategy would prohibit the use of all solid fuel burning devices during red periods that designate the poorest air quality periods. It is targeted towards fine particulate matter emissions and those periods when the Town is likely to exceed the 24-hour concentration NAAQS for PM_{2.5} and PM₁₀. Non-compliance with this prohibition would be a violation of the Municipal Ordinance, and violators would be subject to fines and penalties. Exemptions may be provided for households that rely on solid fuel burning devices as their primary heating source. Because it is a regulatory measure, an aggressive enforcement program is necessary to ensure compliance.

Washoe County prohibits the use of solid fuel burning devices when the Pollutant Standard Index (PSI) reaches an unhealthful mark of 100 PSI. Washoe County implemented this drastic measure because the EPA designated the county as a non-attainment area for the

NAAQS and the Washoe County could not demonstrate how it would comply with the 24-hour concentration NAAQS without implementing a mandatory curtailment.

- 3. New solid fuel burning device prohibition.** This control strategy addresses fine particulate emissions from solid fuel burning devices and would prohibit the installation of new devices. It is designed to prevent increases in particulate emission levels that may result from new development and by itself would not significantly decrease existing emission levels. The strategy may exempt replacement devices. However, to be most effective, it should be implemented in conjunction with other strategies such as a change-out program or a removal program. The counterpart of this strategy is the mitigation fee program that allows the installation of new devices but requires the payment of a fee to be used in the removal of non-certified devices. If the mitigation fee strategy is not implemented, this strategy should be implemented in its place.

Washoe County prohibits the installation of EPA Phase II or equivalent woodstoves and fireplaces in new construction in the non-attainment area of Washoe County. Low-emitting devices (i.e. pellet stoves and gas-service stoves) are exempt from this prohibition. Washoe County implemented this drastic measure because the EPA designated the county as a non-attainment area for the NAAQS and the Washoe County could not demonstrate how it would comply with the 24-hour concentration NAAQS without implementing a mandatory curtailment.

- 4. Permit Program.** This control strategy establishes a permit program for the installation of new solid fuel burning devices. The permit program allows only a certain number of permits to be issued annually, thereby limiting the number of devices that can be installed per year. The program includes administrative procedures on how the permits will be issued (e.g. first-come first-serve, lottery). The number of allowed permits must be below demand in order to be effective. This strategy allows cities to manage particulate emissions generated by new development so they stay within reasonable levels. The permit program is most often used by cities that do not have a mitigation fee for installation of new devices, but a permit program could be implemented in conjunction with the mitigation fee program.
- 5. VMT Reductions.** For areas that have significant particulate matter emissions from re-entrained road dust, the development project may be required to reduce traffic, as measured by vehicle miles traveled, generated by the development. A plan would be required to demonstrate how traffic will be reduced. Traffic can be reduced by providing transit facilities, establishing carpool and transit programs for employees and customers, reducing the density and intensity of development, and providing cash payments to expand or improve area transit.

The City of Mammoth Lakes implemented this control strategy as part of their attainment program. Developments are required to demonstrate that VMTs for the development will be 40% less than under unrestricted conditions.

- 6. Wood moisture content restrictions.** Along with other factors, the moisture of wood will dictate the amount of particulate emissions that will be generated by the burning of the wood. “Green” wood emits more particulate matter than seasoned wood because it interferes with efficient combustion. This control strategy would restrict the wood moisture content of retail and private cordwood sales within the Town to no more than 20%. This

strategy is not effective if cordwood sales occur outside the regulatory agency's jurisdiction or if it is not strictly enforced with inspections of retail wood lots.

Mammoth Lakes restricts the wood moisture content of retail and private cordwood sales to no greater than 20% between July 1st and December 31st of each year. The Seattle area also restricts the sale of cordwood to no greater than 20% unless it is accompanied by a sales receipt stating that the wood is unseasoned and is illegal to burn until dried to less than 20%.

CHAPTER 10 GENERAL PLAN CONSISTENCY

A. Introduction

The Circulation and Conservation and Open Space elements of the Town General Plan address air quality issues in the Truckee air basin. Air pollution caused by particulate matter was identified in the General Plan EIR as a significant environmental impact that cannot be feasibly mitigated to a less than significant level. This is primarily due to the substantial exceedances of the State 24-hour ambient air quality standard for PM₁₀ and projected increases in particulate matter emissions from new development. Nonetheless, the General Plan sets forth goals and policies to address particulate matter pollution to the best extent possible.

This air quality management plan is an extension of the General Plan and analyzes more accurately the severity of the problem and identifies feasible measures to reduce particulate matter emissions to the greatest extent. Like any other action by the Town, the air quality management plan must be consistent with the goals and policies of the General Plan. This chapter discusses how the air quality management plan does not conflict with the General Plan goals and policies and provides findings in support of the General Plan consistency.

B. General Plan Policies and Consistency

The following General Plan goals and policies pertain to particulate matter air quality and are relevant to this air quality management plan. Supporting discussion is provided for each goal and policy in describing how the air quality management plan supports or does not conflict with that goal or policy.

- 1. Conservation and Open Space Policy 7.5:** Evaluate and implement methods for street cleaning that will minimize dust and sedimentation impacts, including a reduction in the amount of dirt and debris deposited in drainage channels.

Street cleaning methods will be evaluated and implemented through the street sanding guidelines. The guidelines should reduce the amount of silt deposited on roadways and improve street sweeping methods. The air quality management plan supports this policy.

- 2. Conservation and Open Space Goal 11:** Achieve and maintain ambient air quality standards established by the U.S. Environmental Protection Agency and the California Air Resources Board; and minimize public exposure to toxic, hazardous, or odoriferous air pollutants.

The goal of this plan is to achieve and maintain compliance with National Ambient Air Quality Standards for PM₁₀ and PM_{2.5}, and the plan includes control strategies to meet this goal. The plan recognizes that it will be impossible to meet the strict State Ambient Air Quality Standards without adopting draconian measures not envisioned by the General Plan. Nonetheless, the plan with its control strategies will strive to achieve State standards and will make reasonable progress towards achieving these standards. The air quality management plan is consistent with this policy.

- 3. Conservation and Open Space Policy 11.1:** Work with the Northern Sierra Air Quality Management District (NSAQMD) to develop and implement an Air Quality Management

Plan for controlling respirable particulates (PM₁₀).

This plan is the product of this policy.

4. **Conservation and Open Space Policy 11.2:** Prior to the adoption of the Truckee Air Quality Management Plan, discretionary development shall mitigate 100% of its impacts on PM₁₀ levels. Such mitigation may include prohibitions on wood burning stoves and fireplaces, purchase and/or replacement of non-EPA certified woodstoves within the community, prohibition on vegetation burning, dust control during construction, or other measures as appropriate.

This policy is not directly affected by the air quality management plan. The control strategy for large project emissions offsets will continue to require 100% mitigation of PM₁₀ and PM_{2.5} emissions for large projects. The plan is consistent with this policy. This policy will be amended to reflect the control strategies of the plan.

5. **Conservation and Open Space Policy 11.3:** Continue to enforce Ordinance 93-35 to minimize PM₁₀ emissions from fireplaces and other solid fuel burning appliances.

The control strategy for solid fuel burning device emissions limits will continue to implement Ordinance No. 93-35. The plan supports this policy.

6. **Conservation and Open Space Policy 11.4:** Establish paving requirements for new roadways to prevent generation of airborne dust.

The control strategy for road surfacing requires the paving of new roads and streets that serve five or more parcels and requires the incremental paving of existing dirt/gravel roads as new development occurs. The plan supports this policy.

7. **Conservation and Open Space Policy 11.5:** Work with the NSAQMD to expand air quality monitoring programs in Truckee for PM₁₀, Carbon Monoxide, and other regulated pollutants.

Air quality monitoring programs for PM₁₀ (and soon PM_{2.5}) in Truckee are of sufficient quality and degree except for inadequate meteorological sensors. As described in the control strategy for air quality monitoring, the Town will encourage and assist (through funding and staffing assistance) the NSAQMD in co-locating a full complement of meteorological sensors at the Truckee monitoring station. The plan supports this policy.

10. **Conservation and Open Space Policy 11.7:** Work with energy providers to encourage community-wide reductions in energy consumption through conservation practices.

Financial assistance and incentives for the removal or conversion solid fuel burning devices may be used for weatherization programs and alternative heating sources (e.g. ground source heat pumps, solar energy) to increase energy efficiency in homes. The plan supports this policy.

11. **Conservation and Open Space Goal 12:** Encourage project design that protects air quality and minimizes direct and indirect emissions of air contaminants.

The control strategy for large project emissions offset will require 100% mitigation of PM₁₀ and PM_{2.5} emissions from large projects. Such mitigation will include modifications to project design that reduces particulate emissions (e.g. minimizing the length of streets). The plan supports this policy.

12. **Conservation and Open Space Policy 12.3:** Require significant developments to assess and mitigate long- and short-term air quality impacts. Cooperatively review these studies with the NSAQMD.

The control strategy for large project emissions offset will require 100% mitigation of long-term PM₁₀ and PM_{2.5} emissions from large projects. The control strategy for construction / grading regulations will minimize short-term particulate emissions. The plan supports this policy.

C. Finding

The Particulate Matter Air Quality Management Plan and implementation of its control strategies is consistent with the goals and policies of the General Plan. The Air Quality Management Plan directly supports or implements the air quality policies of the Conservation and Open Space Policy and does not directly or indirectly conflict with the other goals and policies of the General Plan. This finding is supported by the discussion included in Chapter 10 (General Plan Consistency) of the Air Quality Management Plan.

CHAPTER 11

CALIFORNIA ENVIRONMENTAL QUALITY ACT

A. Introduction

The California Environmental Quality Act (CEQA) Statutes (Section 21084, Public Resources Code) authorize exemptions from the provisions of CEQA for certain types of projects. The CEQA Guidelines list those classes of projects that have been determined by the Secretary of Resources not to have a significant effect on the environment. These projects are declared to be categorically exempt from the requirement for the preparation of environmental documents.

The Class 8 categorical exemptions are actions taken by regulatory agencies to assure the maintenance, restoration, enhancement, and protection of the environment where the regulatory process involves procedures for protection of a natural resource or the environment (Sections 15307 and 15308, California Administrative Code). A relaxation of standards allowing environment degradation is not included in this exemption. Further, the exemption cannot be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances (Section 15300.2[c], California Administrative Code).

B. Support for Exemption

As a regulatory agency over land use, building construction, and natural resources within our boundaries, the Town of Truckee is adopting this air quality management plan to improve air quality in the Truckee air basin in respect to particulate matter. This constitutes an action by the Town to assure the maintenance, restoration, enhancement, and protection of air quality in the Truckee air basin and qualifies for an exemption from CEQA provisions as set forth in Sections 15307 and 15308 in the California Administrative Code. The following discussion is provided in support of the Town's determination that this air quality management plan is exempt from CEQA.

1. *Is the Town an agency authorized to take regulatory actions under State law or local ordinance?*

Although the California Air Resources Board and its agent the Northern Sierra Air Quality Management District are State agencies with the authority to protect air quality in Nevada County, the Town of Truckee is not pre-empted by State law to adopt local ordinances and regulations to address air quality impacts within its jurisdiction. The Town through its police powers to regulate land use and building construction and its duty to maintain and operate local streets may adopt regulations for activities that affect air quality in the region.

2. *Will the Town through the air quality management plan maintain, restore, enhance, or protect the environment?*

The air quality management plan upon its implementation will directly result in the improvement of air quality in relation to particulate matter above and beyond current regulations and activities.

3. *Will the air quality management plan relax standards that will allow environmental degradation?*

All current Town regulations and standards addressing particulate matter air quality will continue to be implemented through the air quality management plan. The plan will result in

additional regulations and standards that will be more restrictive than current standards.

4. *Will the air quality management plan result in any significant adverse change in air quality or other environmental resources?*

It is anticipated that the plan will result in beneficial changes in air quality relating to particulate matter, and no adverse changes in air quality are expected upon the plan's implementation. No adverse changes in other environmental resources (e.g. water quality) are anticipated as a result of implementation of the plan's control strategies.

C. Finding

The adoption of this particulate matter air quality management plan is exempt from the provisions of the California Environment Quality Act pursuant to Sections 15307 and 15308 of the California Environmental Quality Act Guidelines (Sections 15000 et seq., California Administrative Code). The plan constitutes an action by the Town to assure the maintenance, restoration, enhancement, and protection of air quality in the Truckee air basin. The plan will result in beneficial changes in air quality relating to particulate matter, and no changes in other environmental resources are anticipated as a result of implementation of the plan's control strategies. The plan will not have a significant effect on the environment, and there is no reasonable possibility that the plan will have a significant effect on the environment due to unusual circumstances.

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APPENDICES

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APPENDIX 1
1998 ANNUAL EMISSIONS INVENTORY

Source Category	Annual Emissions (Tons per Year)	% of Total Emissions
Stationary Sources		
Residential Wood Combustion	527.88	39.3%
Waste Burning and Disposal	21.60	1.6%
Solvent Use - Degreasing	5.40	0.4%
Industrial Processes - Mineral	27.00	2.0%
Misc. Processes - Construction and Demolition	291.55	21.7%
Paved Road Re-entrained Dust	387.71	28.9%
Fugitive Windblown Dust	5.40	0.4%
 Total - Stationary Sources	 1,266.53	 94.3%
Mobile Sources		
Vehicle Emissions	47.90	3.6%
Locomotives	28.28	2.1%
 Total - Mobile Sources	 76.19	 5.7%
 Total	 1,342.71 Tons Per Year	

APPENDIX 2

SOLID FUEL BURNING DEVICE EMISSIONS

Formula for Determining Solid Fuel Burning Device Emissions

By knowing the number and type of solid fuel burning (SFB) devices emitting particulate matter in the air and the amount of particulate matter emitted by each type of SFB device, an estimate of the total particulate matter emissions by SFB devices can be determined. Particulate matter emissions were estimated as follows:

- Step 1: The number and type of SFB devices in the Town were estimated.
- Step 2: The number and type of SFB devices in the Placer County portions of Donner Lake and Martis Valley were estimated.
- Step 3: The numbers in Steps 1 and 2 were added together to give an estimate of the total number and type of SFB devices in the Truckee air basin.
- Step 4: The emissions per type of SFB device were estimated by using EPA emission factors and estimating the type and amount of wood burned by the average permanent and seasonal residence.
- Step 5: The number and type of SFB devices (Step 3) were multiplied by the emissions for each type of SFB device (Step 4) to give an estimate of the total amount of particulate matter emitted in the air by SFB devices.

1. NUMBER OF SFB DEVICES IN THE TOWN OF TRUCKEE

- a. In estimating the number of SFB devices in the Town of Truckee, the following assumptions are made:
 - 89% of residential units contain a SFB device.
 - One SFB device per unit.
 - Of the residential units in existence prior to 1988 with SFBs, 82% contained woodstoves and 18% contained fireplaces.
 - Of the SFBs installed in residences between 1988 and 1992, 80% met Phase I certified or equivalent standard, 8% did not meet Phase I standards (uncertified), and 12% were fireplaces.
 - Of the SFBs installed after 1992, 100% met Phase II certified or equivalent standard.
 - Since 1988, 5% of uncertified woodstoves and fireplaces have been replaced annually with Phase I certified or equivalent standard woodstoves and inserts.

The number of residential units is based on General Plan data utilizing the 1990 Census and building permit records. The methodology for estimating residential units is consistent with the methodology used in the General Plan. The Truckee Donner PUD “1994 Residential End-Use Survey” was referenced to estimate the percentage of residences with SFB devices and the type of SFB device. The following information outlines how the number of SFB devices were estimated based on these assumptions:

b. Residential units as of January 1, 1988

6,584 units	
89% with SFB	5,860
11% with no SFB	724
5,860 SFBs	
82% woodstoves	4,805
18% fireplaces	1,055

4,805 Woodstoves (Assume all do not comply with Phase I or equivalent standards)

c. New Residential Units from January 1, 1988 to December 31, 1992

1,130 Units	
89% with SFB	1,006
11% with no SFB	124
1,006 SFBs	
80% Phase I certified or equivalent	805
8% Uncertified	80
12% Fireplaces	121

d. Residential Units from January 1, 1993 to December 31, 1997

1,501 Units	
89% with SFB	1,336
11% with no SFB	165

Total: All SFBs Phase II certified or equivalent

e. Uncertified stove and fireplace replacement from January 1, 1988 to January 1, 1998

2,409 uncertified woodstoves and fireplaces replaced with 1,068 Phase II and 1,341 Phase I woodstoves.

f. Annual Totals of SFB Devices, 1988 to 1998

See Figure A. This table includes the information contained in Sections 1.b, 1.c, 1.d, and 1.e.

g. SFB Devices as of January 1, 1998

This table calculates the number of SFB devices by halving the 1998 totals found in Figure A into 50% permanent occupancy residences and 50% seasonal occupancy residences.

Type	Occupancy	Total Units	% of Total
Phase II or equivalent	Permanent	1,179	12.86%
Phase II or equivalent	Seasonal	1,179	12.86%
Phase I or equivalent	Permanent	1,073	11.70%
Phase I or equivalent	Seasonal	1,073	11.70%
Uncertified	Permanent	1,467	16.00%
Uncertified	Seasonal	1,467	16.00%
Fireplaces	Permanent	359	3.91%
Fireplaces	Seasonal	359	3.91%
No RWC		1,014	11.06%

2. SFB DEVICES IN MARTIS VALLEY - PLACER COUNTY

a. In estimating the number of SFB devices in the Placer County portion of the Martis Valley, the following assumptions are made:

- The proportion of woodstoves (certified and uncertified), fireplaces, and non-SFB in residential units is similar to that of residences in the Town of Truckee. This proportion of devices is:

Phase II or equivalent	25.72%
Phase I or equivalent	23.40%
Uncertified Woodstove	32.00%
Fireplace	7.82%
No SFB/Vacant	11.06%

- Occupancy of residential units is 30% permanent and 70% seasonal based on 1990 Census data for Town of Truckee Area of Concern (Truckee General Plan, Volume III).

It is estimated there are 1,730 residences in the Placer County portions of Martis Valley and Donner Lake. (Source: Truckee Sanitary District in Placer County Sphere of Influence, April 16, 1996, pp. 14-17, and 5.03% increase in housing units from January 1996 to January 1998.)

b. The number and type of SFBs are shown in the following table:

Type	Occupancy	Total Units	% of Total
Phase II or equivalent	Permanent	133	7.7%
Phase II or equivalent	Seasonal	311	18.0%
Phase I or equivalent	Permanent	121	7.0%
Phase I or equivalent	Seasonal	283	16.4%
Uncertified Woodstove	Permanent	166	9.6%
Uncertified Woodstove	Seasonal	388	22.4%
Fireplace	Permanent	40	2.3%
Fireplace	Seasonal	94	5.5%
No RWC/Vacant		190	11.0%

3. SFB DEVICES IN TRUCKEE AIR BASIN

The following table sums the total number of SFBs by type in the Truckee air basin using the information on number of residences contained in Tables 1.g and 2.b:

Type	Town of Truckee	Placer County	Total
Phase II - Permanent	1,179	133	1,312
Phase II - Seasonal	1,179	311	1,490
Phase I - Permanent	1,073	121	1,195
Phase I - Seasonal	1,073	283	1,357
Uncertified - Permanent	1,467	166	1,633
Uncertified - Seasonal	1,467	388	1,855
Fireplace - Permanent	359	40	399
Fireplace - Seasonal	359	94	453
Total RWC Devices	8,156	1,538	9,694
No RWC/Vacant	1,014	190	1,204

4. SFB DEVICE EMISSIONS

a. The following table estimates the PM₁₀ emissions from a SFB device based on the type of device and the occupancy of the residential unit (permanent vs. seasonal). The estimates are based on the following assumptions:

- The average wood consumed for a permanent residence is 4.5 cords per year.
- The average wood consumed for a seasonal residence is 1.5 cords per year.

b. In calculating the density of wood for a typical cord of wood burned in Truckee, it is assumed that 80% of the cord is softwoods and the remaining 20% hardwoods. Utilizing information from *Wood Density, Handbook for Predicting Slash Weight of Western Conifer* (Incense cedar), *Chemical Engineering Handbook* (Black oak), and *Handbook for Tables for Applied Engineering Science* (Lodgepole pine, Ponderosa pine, Douglas fir) and 15% air space within a cord, it is estimated the density for a typical cord of wood is 1,446.4 kg/cord.

c. **Annual Emissions Per Unit**

$$\text{Emissions Per Unit (lbs/year)} = (\text{Emission Factor [g/kg]} \times \text{Annual Wood Use [cords]} \times \text{Wood Density [kg/cord]}) / 454 \text{ [grams per pound]}$$

Type of RWC/Use	Emission Factor ¹ (g/kg)	Annual		Emissions Per Unit (kg/year)	Emissions Per Unit (lbs/year)
		Wood Use (cords)	Wood Density (kg/cord)		
Phase II - NonCat/Permanent	7.3	4.5	1446.4	47.51	104.66
Phase II - NonCat/Seasonal	7.3	1.5	1446.4	15.84	34.89
Phase I - NonCat/Permanent	10.0	4.5	1446.4	65.09	143.37
Phase I - NonCat/Seasonal	10.0	1.5	1446.4	21.70	47.79
Non-certified Stoves/Permanent	15.3	4.5	1446.4	99.58	219.35
Non-certified Stoves/Seasonal	15.3	1.5	1446.4	33.19	73.12
Fireplaces/Permanent	17.3	4.5	1446.4	112.60	248.02
Fireplaces/Seasonal	17.3	1.5	1446.4	37.53	82.67
No RWC/Vacant	0	0	0	0	0

¹**Source:** The emission factors are from EPA Guidelines, AP-42, Fifth edition.

5. TOTAL SFB EMISSIONS

The following table estimates the total PM₁₀ emissions from SFB devices in the Truckee air basin from Step 3 and Step 4:

Type	Units	Emissions Per Unit (lbs/yr)	Total Emissions (lbs/yr)
Phase II - NonCat/Permanent	1,312	104.66	137,349
Phase II - NonCat/Seasonal	1,490	34.89	51,987
Phase I - NonCat/Permanent	1,195	143.37	171,277
Phase I - NonCat/Seasonal	1,357	47.79	64,831
Non-certified Stoves/Permanent	1,633	219.35	358,237
Non-certified Stoves/Seasonal	1,855	73.12	135,603
Fireplaces/Permanent	399	248.02	99,009
Fireplaces/Seasonal	453	82.67	37,465
No RWC/Vacant	1,204	0	0
Total			1,055,758 lbs
			527.88 tons

Figure A
Town of Truckee SFB Devices, 1988 to 1998

	Phase II or equivalent	Phase I or equivalent	Uncertified Stove	Fireplace	No RWC
1988 (As of 1/1)	0	0	4,805	1,055	724
New	0	126	13	19	19
Replacement	0	293	0	0	0
Removed	0	0	240	53	0
1989	0	419	4,577	1,021	744
New	0	122	12	18	19
Replacement	0	280	0	0	0
Removed	0	0	229	51	0
1990	0	821	4,361	988	763
New	0	172	17	26	27
Replacement	0	267	0	0	0
Removed	0	0	218	49	0
1991	0	1,260	4,160	964	789
New	0	143	14	22	22
Replacement	0	256	0	0	0
Removed	0	0	208	48	0
1992	0	1,659	3,966	938	811
New	0	242	24	36	37
Replacement	0	245	0	0	0
Removed	0	0	198	47	0
1993	0	2,146	3,792	927	849
New	384	0	0	0	47
Replacement	190	0	0	0	0
Removed	0	0	190	46	0
1994	574	2,146	3,602	881	896
New	295	0	0	0	37
Replacement	224	0	0	0	0
Removed	0	0	180	44	0
1995	1,094	2,146	3,422	837	933
New	264	0	0	0	33
Replacement	213	0	0	0	0
Removed	0	0	171	42	0
1996	1,571	2,146	3,251	795	965
New	204	0	0	0	25
Replacement	202	0	0	0	0
Removed	0	0	163	40	0
1997	1,977	2,146	3,089	755	990
New	189	0	0	0	23
Replacement	192	0	0	0	0
Removed	0	0	154	38	0
1998	2,358	2,146	2,934	717	1,014

APPENDIX 3 RAIL LOCOMOTIVE EMISSIONS

Formula for Determining Locomotive Emissions

The amount of pollutants emitted by a locomotive can be measured by estimating the amount of fuel consumed by the locomotive. Approximately 0.40401 pounds of PM₁₀ are emitted per gallon fuel consumed. By estimating the total amount of fuel consumed by all locomotives for the year within the Truckee air basin, annual PM₁₀ emissions from locomotives can be calculated. Emissions from idling locomotives are not calculated.

$$\text{Annual PM}_{10} \text{ emissions (tons)} = \text{Annual Gallons of Fuel Consumed} \times 0.04041 \text{ lbs} / 2,000$$

1. PM₁₀ Emitted per Gallon of Fuel

Particulate Matter (Assume 100% PM ₁₀)	0.01110 lbs/gallon
NO _x Secondary Particulate Matter (Assume 5% of NO _x converts to secondary PM ₁₀)	0.02560 lbs/gallon
SO _x Secondary Particulate Matter (Assume 10% of SO _x converts to secondary PM ₁₀)	0.00371 lbs/gallon
 Total Particulate Matter	 0.04041 lbs/gallon

Source: Memorandum from Rod Hill, Air Pollution Control Officer, Northern Sierra Air Quality Management District, 3/25/96.

2. Amount of Fuel Consumed

The amount of fuel consumed is estimated by determining the average weight per train, the travel length of each locomotive in the Truckee air basin, and the annual number of rail trips.

- Average weight per train = Average train length x average train weight
- Train ton-miles per year = Average weight per train x travel length (in Truckee air basin) x Annual number of rail trips
- One gallon of fuel is consumed per 628 ton-miles (Source: Memorandum from Rod Hill, March 25, 1996)
- Annual fuel consumed in gallons = Train ton-miles / 628

3. 1998 PM₁₀ Emissions

	Freight	Passenger
Average Train Length (feet)	5,000	850
Average Train Weight (tons per foot)	1.25	1.25
Average Weight per Train (tons)	6,250	1,063
Travel Length (miles)	21	21
Daily Rail Trips	18	2
Annual Rail Trips	6,573.6	730.4
Annual Train Ton-Miles	862,785,000	16,297,050
Total Annual Train Ton-Miles		879,082,050
Annual Fuel Consumed (gallons)		1,399,812
Annual PM10 Emissions (tons)		28.28

4. Projected PM₁₀ Emissions with Union Pacific Merger

	Freight	Passenger
Average Train Length (feet)	6,500	850
Average Train Weight (tons per foot)	1.25	1.25
Average Weight per Train (tons)	8,125.0	1,062.5
Travel Length (miles)	21	21
Daily Rail Trips	34	2
Annual Rail Trips	12,416.8	730.4
Annual Train Ton-Miles	2,118,616,500	16,297,050
Total Annual Train Ton-Miles		2,134,913,550
Annual Fuel Consumed (gallons)		3,399,544
Annual Projected PM10 Emissions (tons)		68.69

Source of average train length and annual rail trips: Nolte and Associates, *Railroad Merger Study for Town of Truckee*, February 1996

Source of average train weight: Memorandum from Rod Hill, Air Pollution Control Officer, Northern Sierra Air Quality Management District, March 25, 1996

Travel length of rail track from Hirschdale to Donner Summit

APPENDIX 4 PAVED ROAD EMISSIONS

Formula for Determining Paved Road Emissions

Significant particulate matter emissions are generated by vehicles traveling on paved roads. Vehicles disturb particulate matter sources on the road (e.g. winter road sand) by breaking down the matter into smaller fractions and propelling the particulate matter into the air. There are a number of variables that affect the release of paved road emissions into the air including vehicle weight and speed, road conditions, the coarseness of the matter, etc. To estimate the amount of paved road emissions, these variables are accounted for in the complex formula developed by the EPA. Estimates and default values have been developed for vehicle weight and speed, the percentage and type of vehicle utilizing roads, silt loading factors (the amount of silt in sand on roads), and emission factors (EPA Guidelines, AP-42, Fifth Edition; *Highway Statistics*, FHWA). 1996 data for vehicles miles traveled (VMTs) is available for all streets and roads in the Town of Truckee (General Plan Traffic Model), and the VMTs have been projected for 1998 using the General Plan annual growth rates for each road type.

Local and collector streets are not generally sanded and are not included in these calculations. Because VMT data is not available for roads outside the Town of Truckee, paved road emissions are not provided for roads and streets in the air basin outside the Town. Since generally only highways and major roads are sanded (and most paved road emissions in Truckee come from winter road sanding operations), only Highways 267 and 89 outside the Town are not calculated into the paved road emissions.

The paved road emission formula found in Section 13.2.1.3 of AP-42 is as follows:

$$E = k (sL/2)^{0.65} (W/3)^{1.5}$$

- E: Particulate matter emission factor (g/vmt)
- k: Particle size range base emission factor/multiplier (g/vmt)
- sL: Silt loading factor (g/m²)
- W: Average weight of vehicles (tons)

The silt loading factor is an average figure for the entire year. The silt loading factor and the emission factor will be greatest upon the initial sanding of roads and decrease thereafter. Silt loading factors are widely variable between road types and municipalities. The only way to obtain an accurate figure is to conduct silt loading testing on road sand applied to the Town streets and the State highways. This option was not available because of costs and time constraints. Default values from the EPA AP-42 Guidelines are used to estimate silt loading factors and emission factors for Town arterials, State highways, and Interstate 80. The AP-42 Guidelines compiled silt loading factors from cities and counties throughout the nation. The 90th percentile default values are utilized for Truckee because of the high frequency and amount of traction control sand applied in the winter.

1. Particulate Matter Emission Factor (g/vmt)

a. Urban Other Roads

$k = 7.3 \text{ g/vmt}$ (Default value, AP-42)

$sL = 0.38 \text{ g/m}^2$ (Default value 90th percentile, AP-42)

$W = 2.6 \text{ tons}$ (Default value, AP-42)

$E = 7.3 (7/2)^{0.65} (2.6/3)^{1.5} = \mathbf{2.00 \text{ grams per vehicle mile traveled}}$

b. Rural Interstate

$k = 7.3 \text{ g/vmt}$ (Default value, AP-42)

$sL = 0.057 \text{ g/m}^2$

(The AP-42 50th percentile default value is 0.015 g/m². Similar to urban other roads, the silt loading factor for Interstate 80 is assumed to be greater than the average or median value in the EPA database. The default value of 0.015 g/m² has been multiplied by 3.8 [the difference between the 50th and 90th percentiles for urban other roads] to give the silt loading factor for Interstate 80.)

$W = 6.8 \text{ tons}$ (Default value, AP-42)

$E = 7.3 (0.35/2)^{0.65} (6.8/3)^{1.5} = \mathbf{2.47 \text{ grams per vehicle mile traveled}}$

2. Vehicle Miles Traveled (within the Town of Truckee including Interstate 80 and State highways)

Rural Interstate (Interstate 80, Freeway Ramps)	312,148 VMTs (daily) x 365.2 = 113,996,492 annual VMTs
Urban Other – State Highways	77,923 VMTs (daily) x 365.2 = 28,457,444 annual VMTs
Urban Other – Town Arterials	78,581 VMTs (daily) x 365.2 = 28,697,928 annual VMTs

(Note: Town collector and local roads generally are not sanded. They are not included in the Urban Other figure.)

3. Annual Paved Road Emissions

Rural Interstate	113,996,492 VMTs * 2.47 g/vmt	281,154 kilograms
Urban Other – State Highways	28,457,444 VMTs * 2.00 g/vmt	56,949 kilograms
Urban Other – Town Arterials	28,697,928 VMTs * 2.00 g/vmt	57,430 kilograms
Total		395,534 kilograms

395,534 kilograms / 907 = 435.61 tons

(Note: This figure also represents vehicle tailpipe and tire emissions so 47.90 tons are subtracted.)

Total Emissions 387.71 tons

APPENDIX 5 VEHICLE EMISSIONS

Formula for Determining Vehicle Emissions

Vehicle emissions account for particulate matter which is generated by vehicle tailpipe emissions and wear and tear on tires. The General Plan traffic model provides vehicle miles traveled (VMT's) data for Interstate 80, Highways 267 and 89, arterials, collectors, and local streets (Section 1). Emission factors have been developed for vehicle emissions (in grams per vehicle mile travelled) based on the types of road being traveled and the type and percentage of vehicles utilizing those roads (EPA Guidelines, AP-42, Fifth Edition). The EPA emission factors for each road type estimates the vehicle type proportions for the road type and the emission factor (in grams per VMT) for each vehicle type, and these can be calculated into total emissions per vehicle mile for the road type (Section 2). Interstate 80 comes under the definition of "Rural Interstate", and all other highways and roads come under the definition of "Urban Other". These emission factors are multiplied by the vehicle miles traveled calculated for each road type (Section 3).

1. Vehicle Miles Traveled (within the Town of Truckee including Interstate 80 and State highways)

Rural Interstate (Interstate 80, Freeway Ramps)	312,148 VMT's (daily) x 365.2 = 113,996,492 annual VMT's
Urban Other (State highways, Arterials, Collectors, Locals)	259,047 VMT's (daily) x 365.2 = 94,604,128 annual VMT's

(Continued on next page)

2. Weighted Composition PM₁₀ Emission Factor (grams/vehicle mile) by Road Type

a. Rural Interstate

	Emission Factor (g/mile)	VMT Fraction by Vehicle Type	Total Emissions per Vehicle Mile (g)
Passenger Car	0.041	0.648	0.026568
Motorcycle	0.037	0.006	0.000222
Bus	1.432	0.003	0.004296
Truck (Pick-up)	0.089	0.158	0.014062
Other Trucks	0.469	0.029	0.013601
Combination Trucks	1.574	0.157	0.247118
Weighted Total			0.305867

b. Urban Other

	Emission Factor (g/mile)	VMT Fraction by Vehicle Type	Total Emissions per Vehicle Mile (g)
Passenger Car	0.041	0.738	0.030258
Motorcycle	0.037	0.004	0.000148
Bus	1.535	0.002	0.003070
Truck (Pick-up)	0.089	0.221	0.019669
Other Trucks	0.492	0.019	0.009348
Combination Trucks	1.689	0.017	0.028713
Weighted Total			0.091206

3. Annual Vehicle Emissions

Rural Interstate	113,996,492 VMTs * 0.305867 g/vmt	34,867,765 grams	38.40 tons
Urban Other	94,604,128 VMTs * 0.091206 g/vmt	8,628,464 grams	9.50 tons
Total		43,496,229 grams	47.90 tons

APPENDIX 6 OTHER EMISSIONS

Method for Determining Other Emissions

The California Air Resources Board (CARB) provides estimates to air quality districts on particulate matter emissions for each county. Estimates tailored specifically for Truckee were developed for vehicle emissions, paved road emissions, and residential wood combustion. However, resources are not available to estimate emissions in Truckee from other sources. For these emissions, the CARB estimates are used, proportioning the estimates based on the Town population to the County population. It is assumed that emissions in Truckee for these sources is the same as emissions in the County as a whole on a per capita basis.

To determine the proportion of the Town of Truckee population to Nevada County as a whole, the January 1995 population estimates from the California Department of Finance were utilized. The Department of Finance estimated the population of Truckee as 11,318 and for Nevada County as 85,933. Based on these figures, the Town contains approximately 13.2% of the County population. It is estimated that the population of Martis Valley in Placer County is approximately 12% of the Town's population. Annual emissions are increased by 12% to incorporate emissions emanating from Placer County. It is assumed that these types of emissions have not increased appreciably since 1995.

Estimates for Other PM₁₀ Emissions

Source	CARB Estimate Nevada County (tons per day)	Annual Emissions Nevada County (tons per year)	Annual Emissions Town of Truckee (tons per year)	Annual Emissions Placer County (tons per year)	Total Emissions (tons per year)
Waste Burning and Disposal	0.4	146.1	19.3	2.3	21.6
Solvent Use - Degreasing	0.1	36.5	4.8	0.6	5.4
Industrial Processes -Mineral Miscellaneous Processes - Construction and	0.5	182.6	24.1	2.9	27.0
Demolition	5.4	1,972.1	260.3	31.2	291.6
Fugitive Windblown Dust	0.1	36.5	4.8	0.6	5.4
Total			313.3	37.6	350.9

APPENDIX 7
PM10 MONITORING DATA SUMMARY

	Number of Sampling Days	Annual Arithmetic Mean Concentration	Annual Geometric Mean Concentration	Total Exceedances of 24-Hour SAAQS	Exceedances of SAAQS per 365 Sampling Days	Total Exceedances of 24-Hour NAAQS	99th % 24 Hour Concentration
Truckee TEOM							
1992	326	34.97	31.86	54	60.5	2	112.79
1993	263	34.57	25.33	51	70.8	3	160.11
1994	349	42.96	36.65	87	91.0	1	134.91
1995	353	39.82	34.92	76	78.6	1	120.37
1996	311	33.90	29.27	46	54.0	0	89.85
1997	355	37.22	31.18	68	69.9	2	127.80
1998	336	31.97	26.56	51	55.4	0	99.50
Truckee Hi-Vol							
1988	47	39.04	33.10	13	101.0	0	97.00
1989	45	34.25	29.74	6	48.7	0	91.00
1990	58	39.21	31.50	14	88.1	0	112.00
1991	60	38.44	32.90	15	91.3	0	110.22
1992	59	39.12	32.39	9	55.7	0	138.40
1993	56	41.77	36.39	9	58.7	0	144.61
1994	59	38.69	31.47	10	61.9	0	118.52
1995	54	33.34	30.05	9	60.8	0	94.63
1996	57	27.96	23.17	7	44.8	0	80.40
1997	54	32.92	27.39	11	74.4	0	136.44
1998	58	24.67	21.68	4	25.2	0	71.13
Glenshire Hi-Vol							
1992	55	37.84	34.96	12	79.6	0	93.82
1993	55	40.93	36.13	9	59.7	0	119.40
1994	57	36.78	31.35	9	57.6	0	107.03
1995	60	33.77	30.39	8	48.7	0	66.80
1996	60	30.42	26.21	8	48.7	0	79.11
1997	59	28.27	24.86	7	43.3	0	78.04
1998	56	25.10	21.99	3	19.6	0	91.88

APPENDIX 8 CALTRANS OPERATIONS AND PM₁₀ AIR QUALITY

CalTrans Operations – February and March 1993

Date	PM10 Concentration	% Fine Mass	% Coarse Mass	Sanding	Sweeping	Road Condition	Weather
February 7	51.54			Yes	No	Dry/Icy	Fog
February 8	16.54			Yes	No	Wet/Snow	Cloudy/Fog
February 9	24.59			Yes	No	Wet/Icy/Snow	Cloudy/Snow
February 10	45.73			Yes	No	Icy	Clear
February 11	30.36			Yes	No	Snow	Cloud/Snow
February 12	129.43	15%	85%	Yes	Yes	Dry/Icy	Clear/Cloudy
February 13	160.11			Yes	Yes	Dry	Clear
February 14	128.69			Yes	No	Dry	Clear
February 15	102.67			Yes	No	Dry	Clear
February 27	43.81			Yes	No	Wet	Cloudy
February 28	71.09			Yes	No	Dry/Icy	Clear/Fog
March 1	50.36			Yes	No	Dry/Icy	Clear/Fog
March 2	44.60	44%	56%	Yes	No	Dry/Icy	Clear/Fog
March 3	41.55			Yes	No	Wet/Icy	Cloudy
March 4	108.92			Yes	Yes	Dry	Clear
March 5	175.31			Yes	No	Dry	Clear
March 6	141.65			Yes	No	Dry	Clear
March 7	130.57			Yes	Yes	Dry/Icy	Clear
March 8	136.82	16%	84%	Yes	Yes	Dry/Icy	Clear/Cloudy
March 9	128.03			Yes	Yes	Dry/Icy	Clear/Cloudy
March 10	100.70			Yes	No	Dry/Icy	Clear

PM₁₀ Concentration data from Truckee TEOM monitoring station
 % of fine and coarse mass data from Truckee Dichot monitoring station
 All other information provided by CalTrans, District 3