Particulate Matter Pollution Fact Sheet

What is particulate matter pollution?

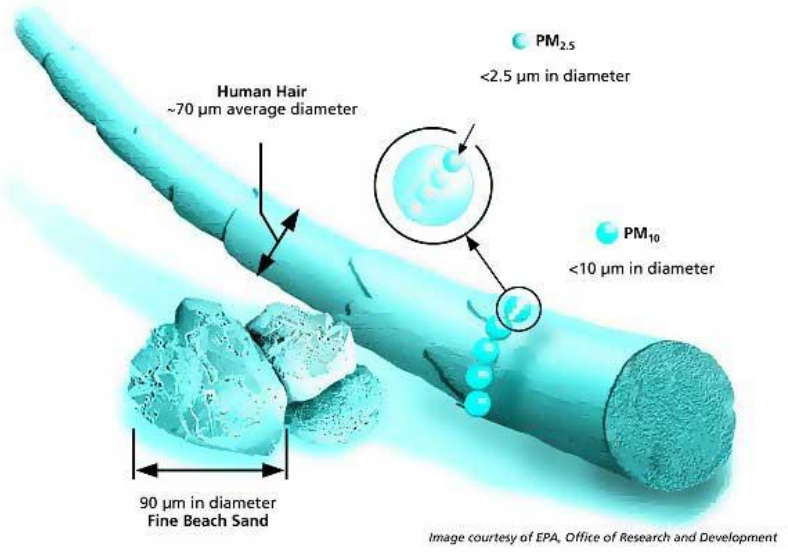
Particulate matter pollution generally consists of a mixture of very small particles of dust, pollen, ash, soot, metals and other various solid and liquid chemicals found in the atmosphere. The majority of compounds that form particle pollution can be grouped into five categories: sulfates, nitrates, elemental carbon, organic carbon, and crustal material. Particulate matter pollution that is directly emitted from sources is referred to as primary particles. Particulate matter pollution can also form as the result of the interaction of chemicals, such as SO_2, NO_x, and VOCs, with other compounds in the air. This type of particulate matter pollution is known as secondary particles.

Particulate matter pollution is also categorized by size. The U.S. Environmental Protection Agency (USEPA) groups particle pollution into two categories:

"Fine particles," such as those found in smoke and haze, are 2.5 microns in diameter and smaller. Fine particles are also referred to as $PM_{2.5}$. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries and automobiles react in the air. Because $PM_{2.5}$ is so small, it remains suspended in the air and can travel extremely long distances.

"Inhalable coarse particles," such as those found near roadways and dusty industries, are larger than 2.5 microns and smaller than 10 microns in diameter. These inhalable coarse particles are referred to as PM_{10}.

For reference, ten microns is about one-seventh the diameter of human hair.



Particles larger than 10 microns (sand and large dust) are not regulated by the USEPA.

Where does particulate matter come from?

Fine particles (PM2.5) are predominantly from combustion sources like vehicles, diesel engines and industrial facilities. Emissions of organic gases, nitrogen oxides (NOx), sulfur oxides (SOx) and ammonia react in the atmosphere, forming the tiny particles. These particles can remain suspended in the air for long periods and can travel great distances. Coarser particles are directly emitted from activities that disturb the soil including travel on roads, construction, mining, open burning or agricultural operations. Other sources include windblown dust, pollen, salts, brake dust and tire wear.

The Nevada Division of Environmental Protection, Bureau of Air Quality Planning compiled a 2001 base year emission inventory for Pahrump. Emissions from mobile sources including vehicle exhaust from on-road and nonroad vehicles, and fugitive dust emissions from roads accounted for 48,221.67 tons per year. Fugitive emissions from lands (disturbed, stable and native desert lands) totaled 67,559.47 tons per year. Construction which includes residential, commercial and highway construction totaled 143.68 tons per year. Finally, fires and stationary sources accounted for 63.0 tons per year and 12.95 tons per year respectively.

The 2001 inventory shows that fugitive emissions from unpaved roads and disturbed vacant land are the biggest sources of PM_{10} emissions in the Pahrump Valley. They accounted for 92 percent (40 percent and 52 percent, respectively) of the total emissions. Since 2001, Nye County has adopted dust control regulations (Nye County Ordinance 289 effective January 1, 2005) and conducted a paving and chip sealing program to reduce emissions from unpaved roads. Additionally, over the intervening years significant stabilization of disturbed vacant lands has occurred to reduce fugitive dust from that source.

What are the health effects associated with particulate matter pollution?

Particulate matter pollution affects our **health**. Particles 10 microns or less are capable of bypassing the body's natural defenses in the nose and throat and entering the lungs. Short-term exposures to particles (hours or days) can aggravate lung disease, causing asthma attacks and acute bronchitis, and may also increase susceptibility to respiratory infections. Long-term exposures, such as those experienced by people living for many years in areas with high particle levels, have been associated with problems such as reduced lung function and the development of chronic bronchitis, and even premature death.

Children are especially susceptible to particulate matter pollution for several reasons: their respiratory systems are still developing; they breathe more air (and air pollution) per pound of body weight than adults; and they're more likely to be active outdoors. Older adults are also more likely to be affected by particulate matter pollution, possibly because they are more likely to have chronic heart or lung diseases than younger people. In addition, people who have heart or lung disease, such as congestive heart failure, angina, chronic obstructive pulmonary disease, emphysema or asthma, are likely to experience health effects earlier and at lower particulate

matter pollution levels than healthy people. However, even if you are healthy, you may experience temporary symptoms from exposure to elevated levels of particle pollution.

Are the health effects of particulate pollution related to the size of the particle?

Yes. EPA is concerned about particles that are 10 microns in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the lungs and cause serious health effects. Depending on their size, these particles affect different parts of the respiratory tract. Particles 2.5 to 10 microns tend to collect in the upper portion of the respiratory system. Particles measuring 2.5 microns and smaller are so tiny they can penetrate deeper into the lungs and damage lung tissue.

How to avoid exposure to particulate matter pollution

If you have concerns about the level of particulate matter in the air you are breathing, you should minimize your exposure by avoiding outdoor physical activity (especially near high-traffic areas) and, if you have existing respiratory problems, by staying indoors with the windows closed and the air conditioning on. When driving in dusty or smoky air, running the car air conditioning may help to clean the cabin air by passing outside air through a filter on the way to the cabin. This technique may be ineffective in the re-circulate or maximum air conditioning mode if this mode bypasses the air conditioning filter and in cars without an air conditioning filter.

Particle levels can also be elevated indoors, especially when outdoor particle levels are high. Certain filters and room air cleaners can help reduce indoor particle levels. You also can reduce particle levels indoors by not smoking inside, and by reducing your use of other particle sources such as household products that cause fumes, candles, wood-burning stoves, and fireplaces.

What are the environmental impacts associated with particulate matter pollution?

Particulate matter can be carried over long distances by wind and then settle on ground or water. The effects of this settling include: making lakes and streams acidic; changing the nutrient balance in coastal waters and large river basins; depleting the nutrients in soil; damaging sensitive forests and farm crops; and affecting the diversity of ecosystems. Particulate matter pollution can contribute to **acid rain** issues. Acid rain can stain and damage stone and other materials, including culturally important objects such as statues and monuments.

Particles also affect **visibility**. They absorb and scatter light. Airborne particles are a primary component of the haze that obscures visibility in our cities, rural communities, and scenic parks.

What can you do to reduce your exposure to particulate matter pollution?

1. Reduce travel on days with poor air quality.
2. Avoid vigorous physical activity on days that have poor air quality.

3. Avoid using your wood stove and fireplace on days that have poor air quality.
4. Avoid using leaf blowers and other dust-producing equipment.
5. Drive slowly on unpaved roads and other dirt surfaces.
6. Do not burn leaves and other yard waste.
7. If you own or operate an industrial source of particulate matter, comply with local rules that apply to your operation. Work with local agencies to develop strategies that will further reduce particulate matter emissions.
8. Get involved with air quality improvement programs in your community.

What are the standards for particulate matter pollution?

The **Clean Air Act** requires USEPA to set **national ambient air quality standards** (NAAQS) for six **criteria pollutants**, particulate matter pollution is one of these. The Clean Air Act established two types of national air quality standards for particle pollution. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children and the elderly. Secondary standards set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation and buildings.

The nation's air quality standards for particulate matter pollution were first established in 1971 and were not significantly revised until 1987, when USEPA modified the indicator of the standards to regulate inhalable particles smaller than, or equal to, 10 microns in diameter. In 1997, USEPA revised the particulate matter standards, setting separate standards for fine particles ($PM_{2.5}$) based on their link to serious health problems ranging from increased symptoms, hospital admissions and emergency room visits for people with heart and lung disease, to premature death in people with heart or lung disease. The 1997 review retained the annual and 24-hour PM_{10} standards with a slight revision to the form of the 24-hour standard. PM_{10} measurements contain both fine and coarse particles.

USEPA revised the air quality standards for particulate matter in 2006. The 2006 standards tightened the 24-hour fine particle standard from 65 micrograms per cubic meter ($\mu g/m^3$) to $35\mu g/m^3$, and retained the annual fine particle standard at $15\mu g/m^3$. The 24-hour PM_{10} standard ($150\mu g/m^3$) was retained, while the annual PM_{10} standard was revoked. Nevada has 24-hour and annual standards for PM_{10} of $50\mu g/m^3$ and $150\mu g/m^3$, respectively.