

The invisible Killers -Respirable Suspended Particulate Matter PM2.5 and Ultrafines PM1

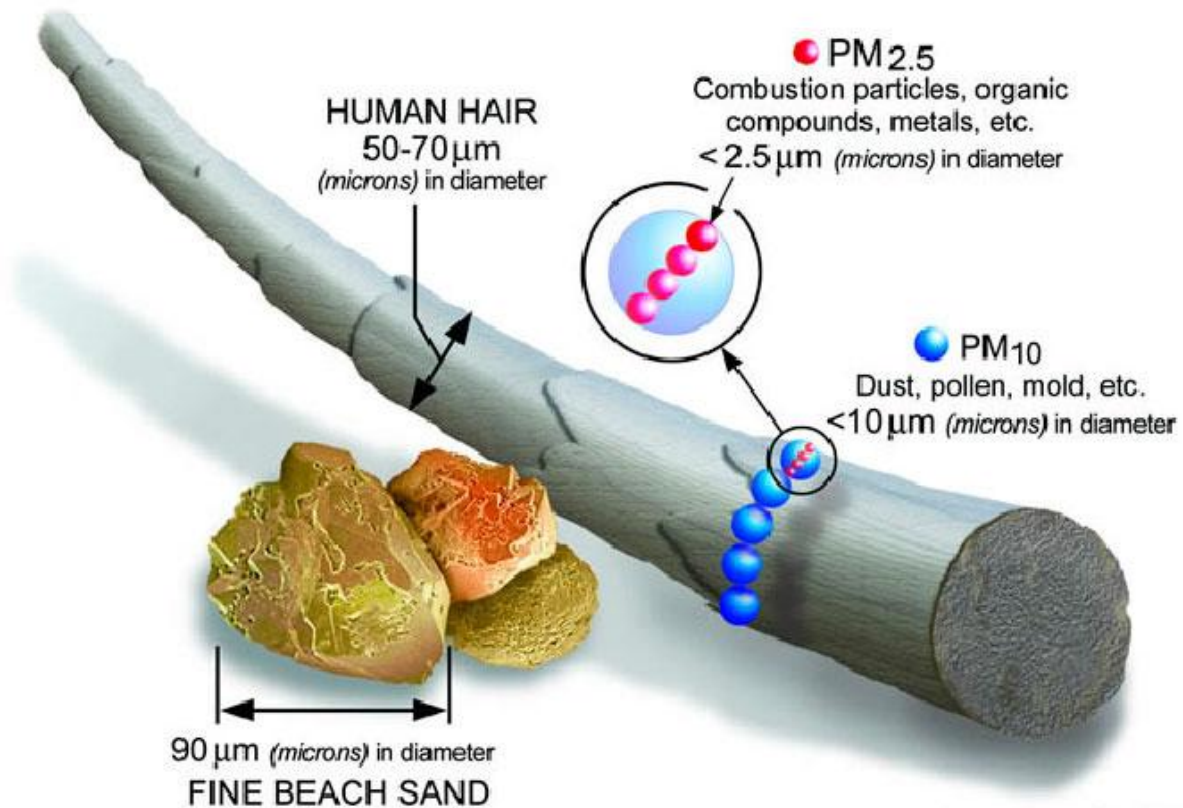


Image courtesy of the U.S. EPA

- one micron (μm) is one-millionth of a meter

Airborne particles

Airborne particles are lightweight solids suspended in the air.

Larger particles - larger than 100 μm

- terminal velocities > 0.5 m/s
- fall out quickly
- includes hail, snow, insect debris, room dust, soot aggregates, coarse sand, gravel, and sea spray

Medium-size particles - in the range 1 to 100 μm

- sedimentation velocities greater than 0.2 m/s
- settle out slowly
- includes fine ice crystals, pollen, hair, large bacteria, windblown dust, fly ash, coal dust, silt, fine sand, small dust articles, soot, vehicle emissions, shipping emissions

Small particles – PM_{2.5} to less than 1 μ m (ultrafines) Respirable – not blocked by cilia

- fall slowly, can take days to years to settle out of a quiet atmosphere. In a turbulent atmosphere they may never settle - Pass through standard face masks easily like a virus.
- can be washed out by water or rain
- include viruses, small bacteria, metallurgical fumes, soot, oil smoke, tobacco smoke, clay, and fumes from internal combustion, vehicles, ships, power generation, diesel machinery and trucks

Hazardous Dust Particles

Smaller dust particles can be hazardous to humans and carry heavy metals such as cadmium from internal combustion processes. In many first world jurisdictions dust fractions of specified particle sizes (PM_{2.5}) in working environments are required to be measured and mitigated on health grounds.

Respirable Inhalable Dust

Airborne particles which can enter the nose and mouth during normal breathing. Particles of <10 microns diameter or less.

Thoracic Dust

Particles that will pass through the nose and throat cilia , reaching the lungs. Particles of < 10 microns diameter and smaller. Referred to as PM_{2.5} to <PM₁₀ .

Respirable Dust PM_{2.5} ~ PM₁

Particles that will penetrate into the gas exchange region (pulmonary alveoli) of the lungs. A hazardous particulate size less than 3 *microns*. Particle sizes of 2.5 *microns* (PM_{2.5}) and less. Face masks, nose and throat hairs (cilia) cannot stop these particulates that can cause serious injury and death. Children with developing lungs are even more susceptible than adults and to roadside pollution.

