



AIR POLLUTANTS OF CONCERN

Today, reducing emissions from diesel engines is one of the most important air quality challenges facing ports. Though there are strict engine standards put into place in Europe, the United States and in other countries, diesel engines continue to produce emissions that are harmful to public health and the environment. Diesel engines emit large amounts of oxides of nitrogen (NOx) and particulate matter (PM). Both pollutants contribute to serious health problems such as premature mortality, asthma attacks, millions of lost work days, and numerous other health impacts. Several Health Authorities have listed diesel particulate matter (DPM) as a toxic air contaminant and a known human carcinogen.

Particulates from diesel exhaust irritate eyes and nose and aggravate respiratory problems, including asthma. NOx also contribute to the formation of 'ground level' ozone, the major ingredient in the smog that overwhelms cities around the world. Ground level ozone formed from the reaction of nitrogen oxides and hydrocarbons when combined with sunlight can irritate the respiratory system, invoke coughing, choking, and reduced lung capacity. Increased hospital visits for respiratory problems such as asthma especially among children are due to urban ozone pollution.

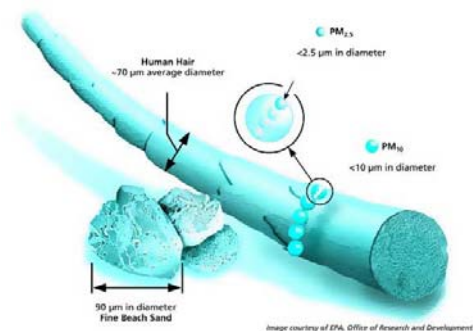
More and more, studies are finding direct linkages to health problems from exposure to diesel exhaust. The extremity of the impacts on human health from diesel emissions can no longer be ignored. This is why it is important that a balance is made between the growth in goods movement and the environment as ports make decisions for the future.

To give IAPH members a better understanding of air pollution and public health, this fact sheet provides information on the different harmful pollutants related to diesel emissions and their associated health effects.

Particulate Matter (PM)

Particle pollution also known as particulate matter (PM) is the term for a mixture of solid particles and liquid droplets found in the air. There are two forms of particle pollution that are regulated due to their potential impact to human health; inhalable coarse particles with diameters larger than 2.5 micrometers and smaller than 10 micrometers and fine particles that are 2.5 micrometers and smaller. How small is 2.5 micrometers? Think about a single strand of hair. The average human hair is about 70 micrometers in diameter, which is about 30 times the size of a fine particle.

How Big is Particle Pollution?





Health Effects of PM

PM contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. The size of the particles determines how severe the impact on human health. Particulates that are smaller than 10 micrometers can penetrate deeper into the lungs and can even enter the blood stream.

Oxides of Nitrogen (NO_x)

NO_x is a colorless and odorless gas and is formed when fuel is burned at high temperatures, as in a combustion process. As mentioned before, NO_x is a precursor to the development of ground level ozone. Environmental impacts from NO_x also include acid rain, nutrient overload in water bodies, visibility impairment when combined with atmospheric particles. The effects of ground level ozone are more frequent during the warmer summer months.

Health Effects of NO_x

One of the most harmful effects of NO_x on human health is its contribution to the formation of ground level ozone. As mentioned before, ground level ozone aggravates respiratory illnesses such as asthma. Children, elderly, and people who work or exercise outdoors are especially vulnerable to the impacts of ground level ozone. Health effects such as damage to the lung tissue and reduction in lung function may result from ozone. Today, there are millions of people that live in cities that do not meet air quality standards for ozone.

Sulfur Dioxide (SO₂)

SO₂ comes from the family of sulfur oxide gases (SO_x). Gases in this family can easily dissolve in water. Sulfur is found in raw materials such as crude oil, coal, and ore that contain common metals (aluminum, copper, zinc, lead, and iron). Fuel containing sulfur, such as coal and oil when burned can lead to the production of SO_x gases. SO_x emissions from ships are a huge concern in the maritime industry.

Health Effects of SO₂

SO₂ emissions negatively impacts public health and the environment. Because SO₂ interacts with other substances in the air, the results negatively impact sensitive groups who have asthma, are active outdoors, children and elderly. SO₂ also negatively impairs visibility and can add to the formation of acid rain

Carbon Monoxide (CO)

CO is a colorless and odorless gas that is formed when carbon in fuel is not burned completely. It is a common component of diesel exhaust. In the United States, 56 percent of all CO emissions are related to motor vehicle exhaust. Nonroad engines contribute 22 percent of CO emissions.



IAPH Tool Box for Port Clean Air Programs

Highest levels of CO occur during the colder months of the year when inversion conditions are more frequent and air pollutants become trapped near the ground beneath a layer of warm air.

Health Effects of CO

The health effects of CO can result from the reduction of oxygen delivery to the body's organs (such as the heart and the brain) and tissues. Cardiovascular effects are the most serious effects of CO for those who suffer from heart disease. There are also effects on the central nervous system. Breathing in high levels of CO can result in blurred vision, reduced ability to work or learn, and reduced manual dexterity. CO also contributes to the formation of smog.