

Health Concerns of Diesel

Does diesel exhaust affect a person's health?

Exhaust from diesel engines can be extremely harmful to a person's health. The U.S. Environmental Protection Agency (EPA) believes that diesel exhaust poses one of the greatest public health risks of all air pollutants. In New Jersey, nearly 400 premature deaths, 16,000 asthma attacks and 1,800 emergency-room visits could be prevented each year by reducing diesel soot emissions by 20 percent (1).

Why is diesel exhaust so dangerous?

Diesel combustion releases fine particles and gases into the air. Commonly called soot, these particles are typically smaller than 2.5 micrometers or 1/30 the width of a strand of hair. Diesel soot is part of fine particulate matter (PM_{2.5}), an air-quality contaminant regulated under the Clean Air Act. Diesel soot contains many toxics and can be inhaled into the deepest parts of the lungs where it is able to enter the bloodstream. It also can accumulate in lungs over time, obstructing oxygen transfer to the blood and causing many health problems. Scientific studies indicate that fine particles are linked directly to asthma; bronchitis; acute and chronic respiratory symptoms such as shortness of breath and painful breathing; cancer; and premature deaths. Scientists and health experts have been unable to identify a safe level of exposure to diesel exhaust, a level below which exposure to diesel exhaust has no health effects (2).

Does diesel soot actually kill people?

People with heart or lung disease are more likely to die when exposed to soot. By reducing soot by 20 percent, nearly 400 premature deaths can be avoided each year in New Jersey, approximately the number of homicides in New Jersey (1).

What does diesel exhaust have to do with asthma and other respiratory problems?

Diesel exhaust worsens the symptoms of asthma and can trigger an asthma attack in someone who never has had asthma (3). Diesel exhaust also worsens symptoms for people with chronic obstructive pulmonary disease, such as chronic bronchitis and emphysema (4).

Does diesel exhaust cause cancer?

According to the Health Assessment Document prepared by the EPA and corroborated by the International Agency for Research on Cancer, the National Institute for Occupational Safety and Health and the World Health Organization, diesel exhaust inhaled into the lungs likely causes cancer in humans. In urban areas, diesel exhaust may contribute as much as 70 percent of the cancer risk from toxic air pollution, which would make diesel emissions more harmful than all other toxic air contaminants combined (5).

Are any segments of society more affected than others?

Children, residents of urban areas and the elderly are particularly vulnerable to the effects of soot. Children have immune and respiratory systems that are still developing and breathe up to 50 percent more air per pound of body weight than adults do. Breathing in soot from diesel exhaust can cause both acute and chronic respiratory problems such as asthma. Asthma is the leading serious chronic illness among children and the leading cause of school absenteeism (6).

Soot levels are highest in urban areas, disproportionately exposing urban residents to potential health problems from soot. The risk of premature death is 26 percent greater in areas with high soot levels than in areas with less fine-particle pollution (4). Also disproportionately affected by diesel soot are

the elderly and others with weakened immune systems or other health problems such as cardiopulmonary diseases, which make them more susceptible.

Am I safe from diesel exhaust if I live in a rural or suburban area?

While soot concentrations may be higher in urban areas, diesel exhaust is a widespread problem. Soot levels are higher near major roadways, and nearly 500,000 New Jerseyans live within a football field's distance of such roads. Residents are exposed to diesel soot as they travel, work and shop throughout the state.

Are there any health standards for soot?

The EPA has established standards for concentrations of PM_{2.5} in the atmosphere and is reviewing them to determine whether they should be strengthened. Department of Environmental Protection (DEP) data show that 10 of New Jersey's 21 counties do not meet EPA's health-based standard or contribute to the soot problem in a nearby county. These counties are Bergen, Essex, Hudson, Mercer, Middlesex, Monmouth, Morris, Passaic, Somerset and Union. While this presents a broad, statewide picture of the problem, it should be noted that local concentrations could be higher. In recognition of the serious health risks posed by soot, the State of New Jersey is proposing a 20-percent reduction in fine particles statewide by 2014.

Are diesel engines the only sources of PM_{2.5}?

No, but they are a large contributor to the problem, as many diesel engines still have uncontrolled emissions. PM_{2.5} comes from all sorts of fuel combustion. Non-diesel automobiles, power plants, wood burning, industrial processes as well as diesel-powered autos, buses and trucks and off-road equipment contribute to the problem. The New Jersey Department of Environmental Protection estimates that more than 20 percent of the total PM_{2.5} emitted in New Jersey is from diesel exhaust, which generally is more toxic than non-diesel sources. The diesel proportion is significantly higher in urban areas.

Isn't most of New Jersey's PM_{2.5} coming from out of state?

A large percentage of New Jersey's air pollution problems originate from out-of-state, particularly from coal-burning power plants. New Jersey has joined with other states in the region to file lawsuits and take other joint actions to force compliance with the Clean Air Act by facilities in these upwind states. However, this does not relieve New Jersey of its obligation to protect the health and welfare of its citizens by addressing problems here at home. In urban areas of New Jersey, the biggest health threat is from diesel soot that originates from local sources, not out-of-state sources.

Will reducing idling really make a significant difference in reducing soot?

According to the EPA, the U.S. Department of Energy and other organizations, the average long-haul truck idles at least 1,830 hours per year, and, in the process, uses \$2,200 of unnecessary fuel and emits 17 tons of carbon dioxide, 10 pounds of fine particles and 615 pounds of nitrogen oxides every year. Reducing idling will lower maintenance costs on each vehicle, and save fuel and protect public health and air quality.

Wouldn't the continual shutting off and turning on of diesel engines actually damage the engine and emit more soot than idling?

Idling an engine for more than about 10 seconds actually uses more fuel than if the engine had been turned off. It is more efficient to turn an engine off if it will be stopped for more than 10 seconds. Frequent restarts of an engine will not have a negative impact on engine components (7).

Isn't it bad to drive a cold engine if it hasn't been warmed up?

Electronically controlled engines need no more than about 30 seconds to warm up. Driving a vehicle cuts warm-up times in half. The best way to warm up an engine is by driving it, while avoiding rapid acceleration and high speeds for approximately the first four miles in cold weather. (7).

Sources

- (1) NJDEP and Abt Associates, “The Particulate-Related Health Benefits of Reducing Power Plant Emissions”, October 2000.
- (2) Pope, C.A., et. al., “Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution”, Journal of the American Medical Association, March 6, 2002. (each 10 microgram/cubic meter increase in PM leads to 8 percent increased risk of lung cancer deaths, a 6 percent increased risk of cardiopulmonary mortality/heart attacks, and a 4 percent increased risk of death from general causes)
- (3) Pandya, Robert, et. al., “Diesel Exhaust and Asthma: Hypothesis and Molecular Mechanisms of Action”. Environmental Health Perspectives Supplements, Volume 110, Number 1, February, 2002.
- (4) Dockery, D.W., et. al., “An Association Between Air Pollution and Mortality in Six U.S. Cities,” New England Journal of Medicine, 329:1753-59, 1993. Pope III, C.A., et al., “Particulate Air Pollution as a Prospective Study of U.S. Adults,” American Journal of Respiratory Critical Care Medicine, 151:669-674, 1995; Shprentz, D., “Breathhtaking: Premature Mortality Due to Particulate Air Pollution in 239 American Cities,” New York, Natural Resources Defense Council, May 1996, pp. 13-32.
- (5) Fitz, Dennis for California Air Resources Board, “Characterizing the Range of Children’s Pollutant Exposure During School Bus Commutes”, October, 2003.
(www.arb.ca.gov/research/health/school/school)
- (6) American Lung Association’s “Asthma in Children” fact sheet, March 2003.
- (7) USEPA Region 2, “Reduce School Bus Idling”, Liana Reilly
(http://www.epa.gov/region02/cleanschoolbus/anti_idling_nypt.pdf)