

The Many Hazards of Diesel

*Why isn't this Warning on Every Diesel-powered Bus?
Exposure to Diesel Fuel and Exhaust Can be Hazardous to your Health.*

School systems across the country rely on a large number of diesel-powered school buses. Diesel engines offer the benefits of both fuel economy and durability.

Unfortunately there is a downside to the use of these vehicles –diesel fuel and diesel exhaust exposure. Diesel fuel and emissions from these buses are more than a smelly nuisance. They may pose a serious health hazard to those workers who drive and maintain diesel-powered engines.



Diesel Fuel

Diesel fuel is a complex mixture of chemicals produced by crude oil distillation. Sometimes the fuel can contain small amounts of known cancer-causing chemicals such as benzene. Often producers also mix in additives to help engine performance. Anyone responsible for fueling a school bus risks exposure to diesel fuel. Fuel splashed on skin is quickly and directly absorbed through the skin and can get into the blood stream. The vapors of the fuel can be inhaled.

WORK
shouldn't
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What are the Health Effects of Exposure

Diesel vapors can irritate eyes, nose, throat and lungs. Excessive short-term exposure can lead to dizziness, drowsiness, loss of coordination, blood pressure elevation, headaches, nausea, asphyxiation and lung damage. Breathing diesel vapors for long periods of time can cause kidney damage and reduce the clotting ability of blood.

Diesel fuel can irritate the skin and aggravate any existing skin condition. A large skin exposure can lead to severe redness, pain and chemical burn blisters. If the fuel is not cleaned from the skin quickly, it is absorbed into the blood stream where it can cause symptoms identical to inhalation exposure.

There has not been enough research to positively associate exposure to diesel fuel with cancers. However in one study, there was evidence of increased risk for lung cancer in men estimated to have had substantial exposure to diesel fuel. There was also an indication of an increased risk for cancer of the prostate in these workers.

Bus drivers and garage mechanics may be routinely exposed to diesel fuel. There has been too little research on the long-term, chronic effects of this type of exposure. Every effort, therefore, should be made to reduce or eliminate exposure.

What can be done to minimize exposure?

Fuel pumps should have vapor capture devices to prevent diesel fuel vapors from escaping into the breathing zone of the worker. When such devices do not exist, workers should avoid breathing the vapors and attempt to keep fuel spills to a minimum.

Wearing gloves may also help to reduce exposure. However, diesel fuel can easily penetrate most glove material. **Gloves made of nitrile or viton have been shown to be the most effective barrier against penetration of diesel fuel.** Neoprene gloves may also provide some limited protection. Vinyl gloves or butyl rubber gloves provide *little or* no protection.

Adequate first aid procedures are essential to minimize the health effects of exposure. If a worker gets diesel fuel on skin and/or clothing, he or she should flood the affected skin with water and remove and isolate all contaminated clothing (in a sealed plastic bag). The skin should be gently and thoroughly washed with soap and water. If symptoms such as redness or irritation develop, the worker should see a physician immediately.

If fuel is splashed into eyes, remove contact lenses. Flush eyes with water or normal saline solution for 20-30 minutes; at the same time contact the nearest hospital or poison control center.

When a worker is overexposed to the vapor, he or she should leave the contaminated area immediately and take deep breaths of fresh air. If the worker experiences symptoms such as wheezing, coughing, shortness of breath or burning in the mouth, throat or chest, the worker should immediately contact a physician and/or go to the hospital.

When cleaning up spills, remember to remove all sources of ignition. Use absorbant paper to pick up the spilled fuel. Seal contaminated paper in a bag for disposal. Wash all contaminated surfaces with ethanol followed by washing with a soap and water solution.

Diesel Exhaust Fumes



Exposure to diesel exhaust fumes is related to the combustion design of diesel engines. They use compression instead of spark plugs to ignite the fuel. The by-product of that process is a rich soup of gases (mostly oxides of nitrogen -NO_x), fine particles or particulate material (PM) and thousands of organic compounds – many of them toxic and cancer-causing. Emitted toxic chemicals often adhere to the fine particles. These fine particles can then be breathed or respired deep into the lungs where they can do damage.

Older engines are the worse offenders, but even newly designed engines continue to emit far too many oxides of nitrogen and PM or fine particles. In fact diesel engines can produce 20-100 times more particles than gasoline engines.

What are the health effects of exposure?

Diesel exhaust exposure can cause a wide range of health effects from mild irritation to cancer. Health effects will vary from individual to individual and will depend on the length of exposure to diesel exhaust and the concentration of exposure.

Short-term/Acute Effects: Many workers are familiar with the burning and irritating effects of exposure to diesel fumes. Common complaints include eye, nose and throat irritation, runny nose, sneezing, coughing and itchy eyes. Some workers may have a brief reduction in their lung capacity after an exposure. Most of these symptoms clear up when workers go home or exposure ends at work.

Chronic Effects:

Evidence is mounting that diesel exhaust exposure can have a serious effect on the immune system. Among other things diesel exhaust exposure:

- Probably promotes or worsens allergic rhinitis (i.e., sneezing, stuffiness)

- Can trigger or make asthma attacks worse in vulnerable individuals. Exposure may also be responsible for new cases of asthma, but the evidence is not yet clear

Long Term Effects - Cancer

For years, there has been a great deal of controversy over whether diesel exhaust fumes cause lung cancer and other respiratory diseases. Studies of bus and truck drivers and maintenance personnel at garages have been mixed – some have found a higher than normal incidence of lung cancer in study groups; others have not. This year, the Environmental Protection Agency (EPA) has drafted a document classifying diesel exhaust as a possible carcinogen. The agency states that “at low levels as well as high levels” diesel exhaust was likely to pose a risk of lung cancer and other respiratory disease. Similarly a panel of California state scientists concluded this year that diesel exhaust poses a serious threat of cancer to the general public. A group of researchers in Japan have isolated at least one extremely carcinogenic substance from diesel exhaust fumes - (3-nitrobenzathrone); these researchers found a remarkable increase in emission of this substance when engines were working under heavy loads.

The risk of lung cancer appears to increase with the years of exposure to diesel fumes.

The AFT believes that diesel exhaust fumes should be treated as a carcinogen and worker exposure should be kept to a minimum.

What can be done to minimize or eliminate exposure?

There are a number of steps that can be taken to reduce exposure to bus drivers and garage workers. Ideally, school systems should purchase new diesel-powered vehicles or engines that have reduced emissions. But even with older diesel –powered vehicles, measures can be taken to reduce or eliminate exposure.

In the garage and storage facilities:

- Exhaust systems should be placed to insure that mechanics and maintenance workers are not being overexposed

- Regular maintenance should be performed on exhaust systems to insure that they are connected and in working order; filters should be changed and maintained on a routine basis
- Measures should be taken to minimize diesel engine operation in a garage where no exhaust system exists. At a minimum, hoses that exhaust to the outside of the facility should be installed to the tailpipe of every bus that is running inside. The integrity of those hoses and clamps should be monitored to insure that no diesel exhaust escapes into the garage

School buses and diesel powered vehicles should:

- Have regular maintenance and frequent tune-ups; the exhaust system should be checked regularly for leaks
- Be fitted with emission control devices such as collectors, scrubbers and ceramic particle traps. Air cleaners should be checked regularly and replaced when they get dirty
- Not be idled for prolonged periods of time; drivers should not be in a vehicle if it must idle for a long period of time
- Checked for any cracks that would permit diesel exhaust to seep into the bus. Any cracks should be filled and repaired to insure that exhaust does not enter the vehicle
- Not have any holes in the floor; they too should be repaired
- Be fueled with the cleanest burning diesel fuel available (Fuel Grade 1K)

Are there OSHA standards for diesel fuel and diesel exhaust?

Unfortunately, there are no Occupational Safety and Health Administration standards for exposure to diesel fuel or exhaust. Diesel fuel, however, is covered under the Hazard Communication Standard (“right to know”). Employers are required to implement a training program for workers regarding the hazards of diesel fuel during bus fueling (and other chemicals the worker is exposed to) and protective measures. Workers also must be trained to read diesel fuel material safety data sheets (MSDS’s) and given the proper personal protective equipment (i.e. gloves) to prevent exposure.

Some limited protection to the particles found in diesel exhaust can be found under the nuisance dust standard that limits exposure to respirable dust to a concentration of 5 (micrograms) per cubic feet over an eight hour day. Locals who feel that their members are

working under a cloud of diesel fumes should probably contact OSHA or ask the school district to invite OSHA consultation to do air testing for particles especially when buses are idling for long periods of time in the bus yard or in school yards.

Every school district needs a comprehensive program to protect workers exposed to diesel fuel and diesel exhaust. Local health and safety committees can take steps to identify those jobs that put workers at risk of exposure, discuss methods of control and make recommendations for improvement to the school district.

For more information on diesel exhaust or health and safety committees, contact the AFT Occupational Safety and Health Program at (800)-238-1133 extensions 5674 or 4365.