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WORK SHOULDN'T HURT

The Many Hazards of Diesel Fuel and Exhaust

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 the workers who drive and maintain diesel-powered engines.



Diesel fuel

Diesel fuel is a complex mixture of chemicals produced by crude oil distillation. Diesel is a [hazardous chemical](#) as defined by the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard.

Often, producers also mix in [additives](#) with the fuel to help increase engine performance.

Health effects of exposure to diesel fuel

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 bloodstream. The vapors of the fuel can also be inhaled.

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 bloodstream where it can cause symptoms identical to inhalation exposure.

What can be done to minimize exposure to diesel fuel?

- Fuel pumps should have vapor capture devices to prevent diesel fuel vapors from escaping into the breathing zone of the worker. Some [state and local governments](#) do not require vapor capture devices at the pump. In these locations, 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

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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 to 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 absorbent 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 emissions

Exposure to diesel exhaust emissions is related to the combustion design of diesel engines. Diesel engines use compression instead of spark plugs to ignite the fuel. The byproduct of that process is a rich soup of gases, fine particles or particulate material and thousands of organic compounds—many of them toxic and cancer-causing.

Emitted toxic chemicals often adhere to the fine particles, which can then be inhaled deep into the lungs where they can do damage. Older engines are the worst offenders, but even newly designed engines continue to emit far too many oxides of nitrogen and particulate material or fine particles. In fact, diesel engines can produce 20 to 100 times more particles than gasoline engines.

Health effects of exposure to diesel exhaust

Short-term/Acute Effects: Many workers are familiar with the burning and irritating effects of exposure to diesel exhaust. 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 adverse effects of 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 causes 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.
- The Environmental Protection Agency 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 that diesel exhaust poses a serious threat of cancer to the public.
- According to the National Institute for Occupational Safety and Health, human and animal studies show that diesel exhaust should be treated as a human carcinogen. It may take many years after the first exposure for diesel-related cancer to develop.

What can be done to minimize exposure to diesel exhaust?



A number of steps can be taken to reduce exposure to bus drivers and garage workers. Ideally, school systems should purchase electric buses or 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 ensure that mechanics and maintenance workers are not being overexposed.
- Regular maintenance should be performed on exhaust systems to ensure that they are connected and in working order; filters should be changed and maintained routinely.
- 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 ensure 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 ensure 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 (i.e., fuel grade IK).

Unfortunately, there are no OSHA standards for exposure to diesel fuel or exhaust. Diesel fuel, however, is covered under the Hazard Communication Standard.

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 safety data sheets 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 foot over an eight-hour day.

Locals that think their members are working under a cloud of diesel exposure 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.

For more information, contact the health and safety team at 4healthandsafety@aft.org [May 2022]