

## **DIESEL EXHAUST**

Diesel engines are used by an increasing number of automobiles, generators, light-duty and heavy-duty vehicles, and railroad locomotives. When diesel fuel burns in an engine, the resulting exhaust is made up of soot and gases which may contain thousands of different chemical substances.

The *soot* consists of very small *particles* that can be inhaled and deposited in the lungs. Diesel exhaust contains 20-100 times more particles than gasoline exhaust. These particles carry cancer-causing substances known as *polynuclear aromatic hydrocarbons (PAHs)*. Gases in diesel exhaust, such as nitrous oxide, nitrogen dioxide, formaldehyde, benzene, sulfur dioxide, hydrogen sulfide, carbon dioxide and carbon monoxide can also create health problems.

Those most likely to be exposed to diesel exhaust include bridge, tunnel and loading dock workers, auto mechanics, toll booth collectors, truck and forklift drivers, and people who work near areas where these vehicles are used, stored or maintained.

### **HEALTH EFFECTS OF DIESEL EXHAUST**

#### **Short-Term (Acute) Effects**

Workers exposed to high concentrations of diesel exhaust have reported the following short-term health symptoms:

- irritation of the eyes, nose, and throat
- lightheadedness
- feeling “high”
- heartburn
- headache
- weakness, numbness, and tingling in extremities
- chest tightness
- wheezing
- vomiting

## Long-Term (Chronic) Effects

Although there have been relatively few studies on the long-term health effects of diesel exhaust, the available studies indicate that diesel exhaust can be harmful to your health.

According to the National Institute for Occupational Safety and Health (NIOSH), human and animal studies show that diesel exhaust should be treated as a human *carcinogen* (cancer-causing substance). These findings are not surprising since several substances in diesel exhaust are known to cause cancer. It may take many years after the first exposure for diesel-related cancer to develop.

Exposure to diesel exhaust in combination with other cancer causing substances may increase your risk of developing lung cancer even more. Other exposures that are known to cause lung cancer include cigarette smoke, welding fumes and asbestos. All of these exposures may interact with diesel exhaust to magnify your risk of lung cancer and should be kept to a minimum.

Some studies have suggested that workers exposed to diesel exhaust are more likely to have *chronic respiratory symptoms* (such as persistent cough and mucous), bronchitis and reduced lung capacity than unexposed workers.

People with preexisting diseases, such as emphysema, asthma and heart disease, may be more susceptible to the effects of diesel exhaust.

Studies in animals suggest that diesel exhaust may have other effects as well:

Mice developed *skin cancer* when extracts of diesel exhaust were applied to their skin.

Diesel exhaust caused lung injury in exposed laboratory animals.

Exposure to diesel exhaust reduced animals' resistance to bacterial infection.

Laboratory animals exposed to high concentrations of diesel gases showed a *reduced level of activity and coordination*.

In addition, many of the individual components of diesel exhaust are known to be hazardous. For example, *nitrogen oxides* can damage the lungs and *carbon monoxide* can aggravate heart disease and affect coordination.

## CONTROL OF DIESEL EXHAUST

### Substitution

Where possible, replace diesel engines with propane-burning engines. Propane burns more completely and more cleanly than diesel fuel.

## **Ventilation**

Diesel exhaust in garages, warehouses or other enclosed areas should be controlled using ventilation.

*Local exhaust ventilation* is the best way to reduce potential hazards to diesel exhaust. A good ventilation system should include both intake and exhaust fans that remove harmful fumes at their source. Tailpipe or stack exhaust hoses should be provided for any vehicle being run in a maintenance shop.

*General ventilation* uses roof vents, open doors and windows, roof fans or floor fans to move air through the work area. This is not as effective as local exhaust ventilation, and may simply spread the fumes around the work area. General ventilation may be helpful, however, when used to supplement local exhaust ventilation.

## **Isolate the Worker**

Another way of controlling diesel exhaust exposures is to isolate the worker from diesel fumes.

- Trucks should have air-conditioned cabs to isolate the driver from fumes. Windows should be rolled up so that fumes do not seep inside.
- Toll booth collectors can be protected from fumes by working in air-conditioned booths.

## **Safe Work Practices**

Following the safe work practices below can also reduce exposure to diesel exhaust:

- Fuel grade 1K should be used instead of Diesel 1. Grade 1K is more expensive but burns more cleanly.
- All diesel equipment should have regular maintenance and frequent tune-ups. The exhaust system should be checked for leaking fumes.
- Vehicles should be fitted with emission control devices (air cleaners), such as collectors, scrubbers and ceramic particle traps. Air cleaners should be checked regularly and replaced when they get dirty.
- Prolonged idling of machinery should be avoided. A worker should not be in the vehicle when it is idling for a long period.
- Any cracks in the vehicle should be fitted with weather stripping to prevent fumes from seeping in.
- The floor of the vehicle should not have any holes.

## Personal Protective Equipment

Respirators are usually the *least* effective method of controlling exposures, and they should be used only as a last resort. If a respirator is used, it should be a combination air-purifying respirator that protects against acid gases, organic vapors and particulates should be used.

It is not enough for your employer to toss you a respirator and tell you to go to work. Respirators must be specific to the hazard, and fitted, cleaned, stored, inspected and maintained in accordance with OSHA's Respiratory Protection Standard. In addition, you must be trained on how to use a respirator properly and receive a medical exam to assure that you are physically fit to wear a respirator.

Prevent skin contact with diesel exhaust by wearing protective clothing (gloves, long pants, long-sleeved shirts and face and eye protection) if necessary.

## OSHA STANDARDS

There is no OSHA standard for diesel exhaust. However, OSHA does have workplace exposure limits for individual components of diesel exhaust, such as carbon monoxide, sulfur dioxide, benzene, carbon dioxide, nitrogen dioxide, acrolein and formaldehyde.

In addition, OSHA has a standard for "nuisance" dust that is applicable to the soot in diesel exhaust. The standard limits "respirable" dust exposures (particles that are small enough to lodge in the lung) to 5 milligrams per cubic meter of air ( $5 \text{ mg/m}^3$ ) averaged over eight hours.

Because diesel exhaust has been shown to cause cancer, NIOSH recommends that diesel exhaust exposures be reduced to the lowest feasible limits.

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For more information about protecting workers from workplace hazards, please contact the AFSCME Research & Collective Bargaining Department, Health and Safety Program at (202) 429-1215. You can also contact our office located at 1625 L Street, NW Washington, DC 20036.