

Diesel engines generate dangerous gases



- Thousands of different chemical substances.
- 90% of the soot consists of $<1\mu$ diameter particles that can be inhaled and deposited in the lungs.
- The particles carry absorbed cancer causing substances known as polynuclear aromatic hydrocarbons



9000 compounds in diesel fumes are carcinogenic

Major Components

- Carbon dioxide
- Carbon monoxide
- Nitrogen dioxide
- Nitric oxide
- Sulfur dioxide,

Minor Components

- Acrolein
- o-Anisaldehyde
- Benzene
- 2,3-Benzofuran
- Coumarin
- Formaldehyde
- 4-Hydroxycoumarin
- m-Hydroxyacetophenone
- 2-Hydroxy-4-methoxyacetophenone
- Menadione
- 6-Methoxytetralone
- 6-Methylcoumarin
- 3-Methyl-2-cyclopentene-2-ol-one
- Trimethylbenzene

- Polynuclear aromatic hydrocarbons
- Acenaphthene
- Acenaphthylene
- Anthracene
- Benz[a]anthracene
- Benzo[b]fluoranthene
- Benzo[k]fluoranthene
- Benzo[ghi]perylene
- Benzo[a]pyrene
- Benzo[e]pyrene
- Crysene
- Dibenz[a,h]anthracene
- Fluoranthene
- Fluorene
- Indeno[1,2,3-cd]pyrene
- Naphthalene
- Phenanthrene
- Pyrene





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- Studies show workers exposed to higher levels of diesel exhaust are more likely to develop lung cancer
- In 1990, the state of California identified diesel exhaust as a chemical known to cause cancer
- The International Agency for Research on Cancer has concluded that diesel exhaust probably causes cancer in humans
- The EPA(United States Environmental Protection Agency) has proposed classifying diesel exhaust fumes as a probable human carcinogens





NIOSH - The National Institute for Occupational Safety and Health
www.cdc.gov/niosh



OSHA U.S. Department of Labor Occupational Safety & Health Administration
www.osha.gov/SLTC/diesel_exhaust

“Human exposure to diesel exhaust is an “occupational carcinogenic hazard”





The International Association of Fire Fighters
www.iaff.org

“Cancer as one of the major occupational hazards facing fire fighters”





National Fire Protection Association
www.nfpa.org

The carcinogenic effect of diesel exhaust is present even if the particulates (soot) are filtered out of the exhaust



Short term symptoms



US Environmental
Protection Agency
www.epa.gov

- Irritation of the eyes, nose and throat
- Light-headedness
- Feeling “high”
- Heartburn
- Headache
- Weakness, numbness and tingling in extremities
- Chest tightness
- Wheezing
- Vomiting



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“Passive” exposure

International Personnel Protection, Inc. study

“Diesel exhaust can penetrate into and absorb onto clothing, furniture and other items which fire fighters routinely get in contact with, where it can later absorb into a fire fighters skin”

- Rest rooms
- Offices
- Canteens
- Fire protection clothes
- Private clothes and belongings



How to control diesel exhaust exposure



Recommendations from
Health and Safety Executive, UK
www.hse.gov.uk

1. Connect tailpipes to local exhaust ventilation equipment
2. Use general ventilation, fans or ventilation that serves the whole workshop to dilute the diesel exhaust and to minimize its build up within a workshop.
3. Cabs or cabins of vehicles can be provided with filtered air and or air conditioning to prevent diesel exhaust from entering the cabin.



Emissions accumulate at floor level



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Diesel exhaust are trapped between vehicles



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Let's give your mission a fresh start!



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