



Diesel Engine Exhaust

Burden of Occupational Cancer Fact Sheet



WHAT IS DIESEL ENGINE EXHAUST?

The combustion of diesel fuel in engines produces diesel engine exhaust, a **complex mixture of gases and particulates**. This mixture can contain other known and suspected carcinogens such as benzene, polycyclic aromatic hydrocarbons (PAHs), metals, and particulate matter.

The composition of the mixture depends on a number of factors including the type of engine (heavy or light duty), the type of fuel and oil, sulphur levels, speed and load of operation, and emission control systems.

The International Agency for Research on Cancer classifies diesel engine exhaust as a **known carcinogen** (IARC 1).

WHAT ARE ITS HEALTH EFFECTS?

- Lung cancer
- Bladder cancer (suspected)
- Irritation to eyes, throat, and bronchi
- Light-headedness, nausea, cough, and phlegm
- Allergic reactions

THE BURDEN OF CANCER FROM WORKPLACE EXPOSURE TO DIESEL EXHAUST IN CANADA

The term 'burden' refers to the human impact (deaths, illness, years of life lost) and the economic costs (health care, productivity) associated with a cause or group of causes of disease.

560

Lung cancers due to workplace diesel exhaust exposure

Approximately **560 lung cancers** and possibly **200 suspected bladder cancers** are due to occupational exposure to diesel engine exhaust each year in Canada, based on past exposures (1961-2001). This amounts to **2.4% of lung cancer cases** and **2.7% of suspected bladder cancer cases** diagnosed annually.

WHAT IS THE ECONOMIC IMPACT?

Work-related diesel engine exhaust exposure resulted in approximately **\$684 million in costs for newly diagnosed lung and suspected bladder cancer cases** in 2011.

This includes approximately:

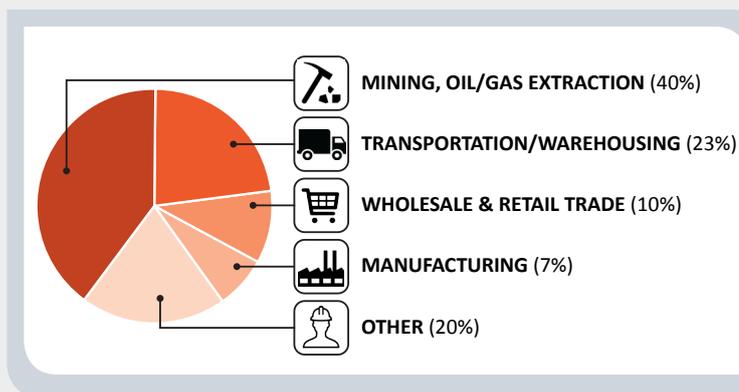
- 65% in health-related quality of life losses
- 7% in direct costs including health care, out of pocket expenses, family care giving, and workers' compensation administration
- 28% in indirect costs including output and productivity losses

\$684 million

Estimated yearly cost of lung and suspected bladder cancers due to workplace diesel exhaust exposure

WHAT WORKERS ARE MOST AFFECTED?

Most occupational lung cancers associated with diesel engine exhaust occur among workers in the **mining and oil and gas extraction sector** (see pie chart on right). These cancers also occur among workers in the transportation and warehousing, wholesale and retail trade, and manufacturing sectors. Some of the other sectors affected include construction, forestry and logging, and public administration.



CAREX CANADA ASSESSMENT OF OCCUPATIONAL EXPOSURE TO DIESEL ENGINE EXHAUST

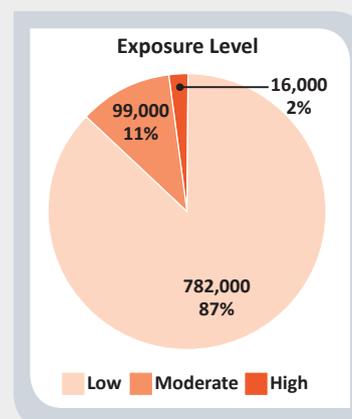
Inhalation is the most common route of exposure to diesel engine exhaust. Approximately 897,000 Canadians are exposed to diesel engine exhaust at work.

Industries with the largest number of exposed workers in Canada include:

- **Truck transportation** (206,000 people exposed)
- **Transit and ground passenger transportation** (110,000 exposed)
- **Public administration** (42,000 exposed)

Occupations with the largest number of exposed workers include:

- **Truck drivers** (305,000 exposed)
- **Heavy equipment operators** (83,000 exposed)
- **Transit operators** (79,000 exposed)



Results show the majority of workers exposed to diesel engine exhaust are in the low exposure level category, with a significant number at risk for moderate to high exposure (see pie chart above). To learn more about how these exposure levels are defined, visit the [CAREX Canada website](#).

HOW CAN EXPOSURE BE REDUCED?

Outside of the mining industry, there are currently no occupational exposure limits for diesel engine exhaust in any Canadian jurisdiction. Strategies for reducing exposure include replacing old diesel engines, using diesel fuel alternatives, performing regular engine maintenance, implementing exhaust treatment systems, and using exhaust extraction systems in indoor work environments. For more details, visit the [OCRC exposure controls webpage](#).

ABOUT THE BURDEN OF OCCUPATIONAL CANCER STUDY

The Burden of Occupational Cancer Study quantified the number of cancers that are caused by exposure to carcinogens in the workplace in order to identify priority areas for prevention. It was a collaboration between researchers at OCRC, CAREX Canada, the Institute for Work & Health (who led the economic analyses), University of British Columbia, Université de Montréal, Institut de recherche Robert-Sauvé en santé et en sécurité du travail, and Imperial College London.

 For more information, please visit OCRC at www.occupationalcancer.ca or CAREX Canada at www.carexcanada.ca.

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