Construction Exposure Profiles:

Diesel Engine Exhaust

PROVINCIAL BUILDING & CONSTRUCTION TRADES COUNCIL OF ONTARIO

Diesel engine exhaust is a complex mixture of soot particles, ash, sulfates, silicates, nitrogen oxides, carbon monoxide, polycyclic aromatic hydrocarbons (PAHs) and other toxic substances produced when diesel burns in an engine. The composition of the exhaust can vary depending on the type of machinery due to different types of engines, fuels, loads, and emission control systems. It is a significant health hazard in the building and construction trades.

CAREX Canada estimates that

36,000

Ontario construction workers are exposed to diesel engine exhaust.

Health Effects

Diesel engine exhaust causes lung cancer and may cause bladder cancer. Short term acute effects include light-headedness, nausea, and respiratory symptoms as well as irritation of the eyes, throat, and bronchi. Diesel exhaust may also initiate allergic reactions, cause asthma, and may increase the risk of cardiovascular diseases such as heart attacks (acute myocardial infarction (AMI)).

Exposure Sources and Construction Trades

Workers can be at risk for diesel engine exhaust exposure when diesel powered machines are being used, repaired, and tested. It can accumulate to higher levels in enclosed spaces. Workers in the building and construction trades can be exposed when operating or working near diesel construction equipment such as:

- Heavy equipment
- Trucks
- Generators
- Compressors
- Pumps
- Heaters
- Air conditioners
- Cranes
- Compacters
- Concrete mixers

OCRC conducted a study to measure the levels of diesel engine exhaust exposure in Ontario construction workers and found the highest average exposure in those working underground, operating equipment in unenclosed cabins and enclosures. Diesel engine exhaust exposure levels observed in construction settings can sometimes be as high as in some mining operations. Many exposures in this study exceeded health-based limits that have been proposed for diesel engine exhaust based on the most recent studies of lung cancer.

Occupational Disease Risks

OCRC's Burden of Occupational Cancer in Ontario report estimates workplace exposure to diesel engine exhaust causes 12 lung and bladder cancers among Ontario construction workers each year. According to the Future Burden of Cancer in Construction Project, 400 lung cancers in Ontario construction workers will be caused by diesel engine exhaust between 2030 and 2060 if strong prevention actions are not taken. Workers in excavating, grading, and paving were identified as having high exposure to diesel engine exhaust in the Occupational Disease Surveillance System (ODSS). The following Table 1 shows the percent increase for selected diseases in specific construction trades occupations compared to all other workers in the ODSS.

Table 1. Increased risk of lung cancer, bladder cancer, and AMI in specific construction trades occupations compared to all other workers in the ODSS.

	Lung Cancer	Bladder Cancer	AMI
Excavating, grading and related	37%*	13%	31%*
Paving, surfacing and related	22%	-	75%
Labouring and other elemental work in excavating, grading and paving	55%*	5%	41%*
Excavating, grading, paving and related, not elsewhere classified.	35%*	29%	19%

**Statistically significant*

- no increased risk observed or case numbers too small to report any increased risk

PROVINCIAL BUILDING & CONSTRUCTION TRADES COUNCIL OF ONTARIO

Provincial Building and Construction Trades Council of Ontario
75 International Blvd., Suite 401, Toronto, ON M9W 6L9
Tel: (416) 679-8887 **Fax:** (416) 679-8882
info@ontariobuildingtrades.com www.ontariobuildingtrades.com

Construction Exposure Profiles: **Diesel Engine Exhaust**

Prevention

There is currently no occupational exposure limit for diesel engine exhaust in construction, although a new limit of 160 µg/m³ (total carbon) has been proposed. However, the OCRC recommends that exposures be kept below 20 µg/m³ (elemental carbon) and kept as low as possible to prevent health effects. Recent research indicates that levels above 1 µg/m³ (elemental carbon) increase the risk of lung cancer.

Elimination would involve the use of alternative energies like electric which do not produce diesel engine exhaust. Rebuilding or using newer engines with stricter emissions regulations are a form of substitution. Engineering controls such as local exhaust ventilation or enclosed cabs can help to isolate the worker from the hazard. Preventative maintenance of diesel engines, limiting idling, and operator training are administrative controls. Use of personal protective equipment, such as respirators, should be used if no other controls are possible.

Diesel engine exhaust continues to be a common occupational hazard for workers in the construction trades. Workplace exposure data is likely underestimating diesel engine exhaust exposure in workers. Better controls and prevention strategies are necessary to reduce exposure in construction workers.

This profile was prepared by the Occupational Cancer Research Centre in collaboration with the Ontario Building Trades Council with funding from the Ontario Ministry of Labour, Immigration, Training and Skills Development.

OCRC Occupational Cancer Research Centre

Resources

Canadian Centre for Occupational Health and Safety - OSH Answers Fact Sheets - Diesel Exhaust:
https://www.ccohs.ca/oshanswers/chemicals/diesel_exhaust.html

CAREX Canada - Diesel Engine Exhaust Profile:
https://www.carexcanada.ca/profile/diesel_engine_exhaust/

Government of Canada - Control measures for diesel engine exhaust emission in the work place:
https://www.canada.ca/en/employment-social-development/services/health-safety/reports/control-diesel-emissions.html

Workers Health & Safety Centre - Diesel Exhaust:
https://www.whsc.on.ca/files/resources/hazard-resource-lines/diesel-exhaust-whsc-resource-line.aspx

Ontario Occupational Disease Statistics - Diesel engine exhaust:
https://www.occdiseasestats.ca/#/exposure?id=2&locale=en

Occupational Cancer Research Centre - Burden of occupational cancer in Ontario:
https://www.cancercareontario.ca/sites/ccocancercare/files/assets/OCRCBurdenofOccupationalCancerReport.pdf

To access this fact sheet and other health and safety and prevention information please visit:
www.obtworkplaceresource.com/health-safety