

# The United Steelworkers Diesel Particulate Project

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April 20, 2023



## Presentation Overview-Part A

- Project Background
- DPM Exposure in Mining
- Current & Recommended OELs for DPM in Mining
- Diesel Particulate Health Hazards (Short Term & Long Term)

## Presentation Overview-Part B

- The ADDIE Model
- Project Timeline/Objectives
- Key Takeaways
- Summary

# Background

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USW approached the MLITSD about lowering the OEL for diesel particulate in June 2020.

The USW continues to advocate for this initiative.

# Diesel Particulate Exposure in Mining

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- Diesel exhaust is made up of gas and **particles**.
- Diesel particulate matter (DPM) is the component of diesel exhaust is made of soot particles.
- DPM is comprised of a solid core of elemental carbon (EC) with other substances attached.

- Total carbon (TC) is the sum of EC and organic carbon.
- Ontario currently measures diesel particulate in TC.
- EC is the most accurate way to measure DPM that comes from diesel exhaust only.

Ontario mining operations employ the most miners of any province<sup>[3]</sup> ...



**over 29,000 workers**

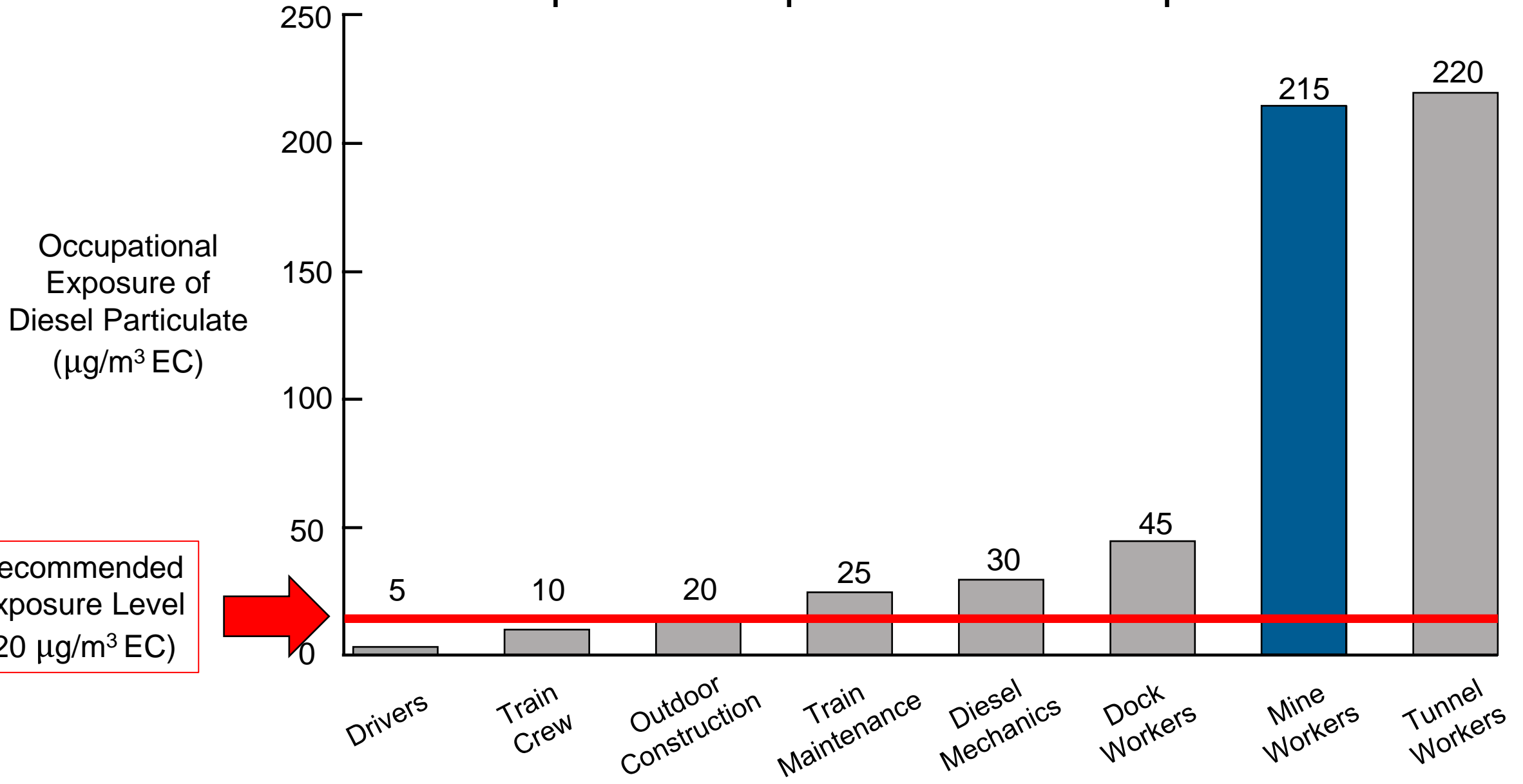


Ontario uses the *highest* Occupational Exposure Limit (OEL) for diesel particulate in Canada.

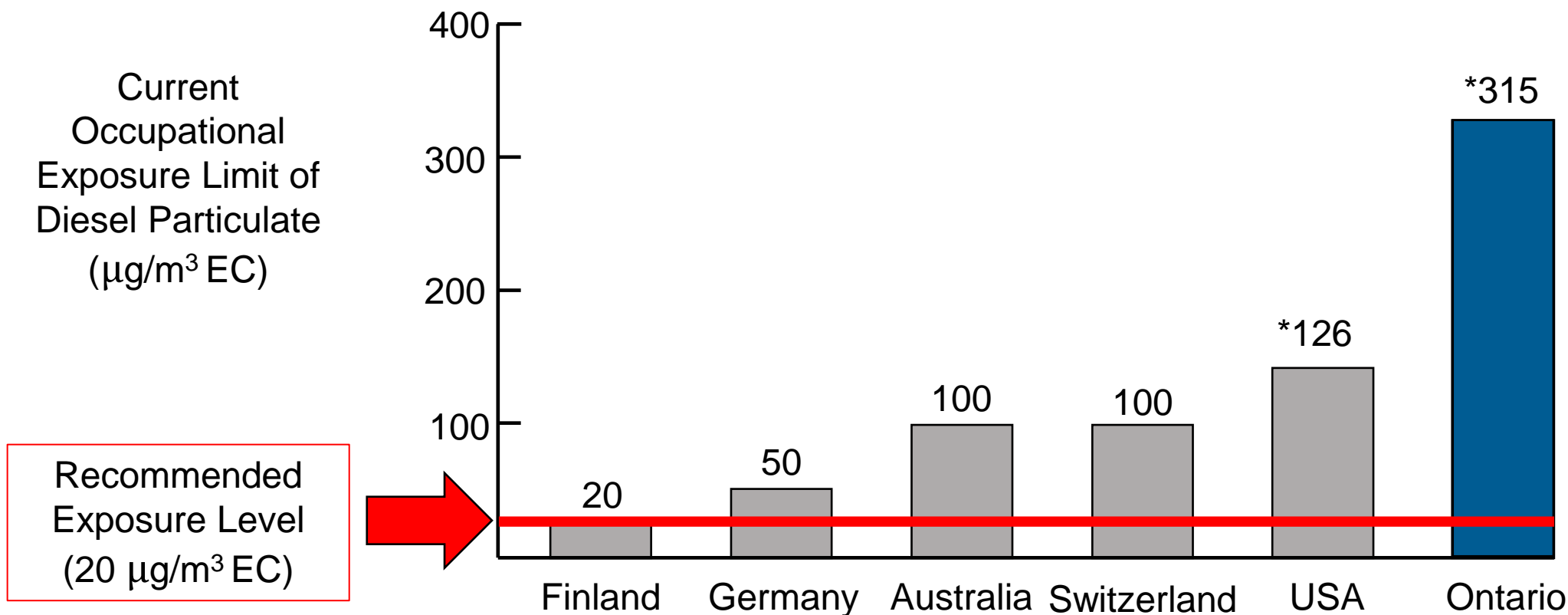


**400  $\mu\text{g}/\text{m}^3$  TC**

Ontario mine workers have some of the highest occupational exposures to diesel particulate<sup>[5]</sup>.



Other countries are recommending or enforcing tougher regulations on diesel particulate exposure to protect workers<sup>[4]</sup>.



\* Ontario and USA measure in TC and the values have been converted to EC by dividing TC/1.27=EC

USW is proposing **20  $\mu\text{g}/\text{m}^3$  EC**

Based on:



The MLITSD needs to lower Ontario's Occupational Exposure Limit for diesel particulate.

# Diesel Particulate Health Hazards

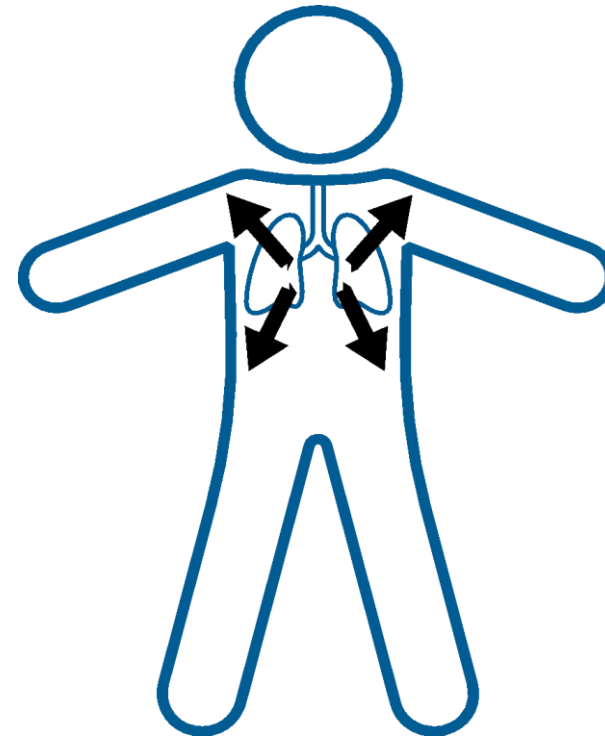
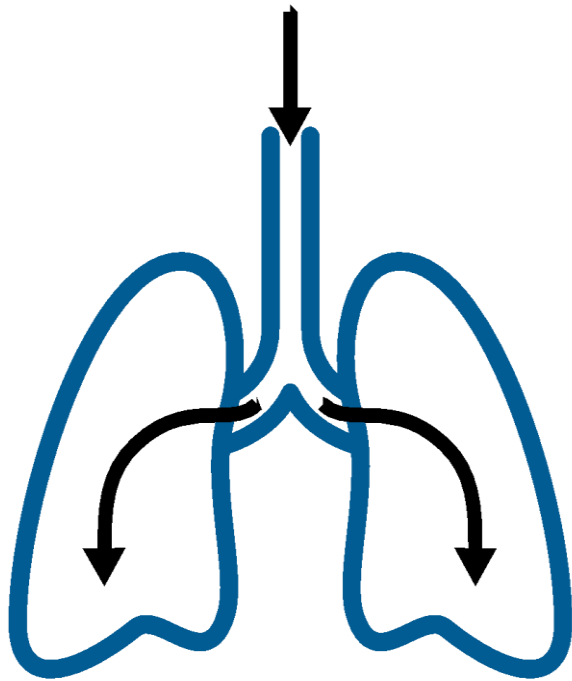
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# Why is diesel particulate so harmful?



- Diesel particulate is classified as a Group 1 **known human carcinogen** (IARC)\*: it causes or contributes to lung and bladder cancer.
- Inhaled diesel particulate damages lung tissue.
- The smallest particles penetrate deep within the lungs and can enter the bloodstream, travelling to the heart and other organs.

The smallest particles are the most harmful because they get into the deepest parts of the lungs and can enter the rest of the body.



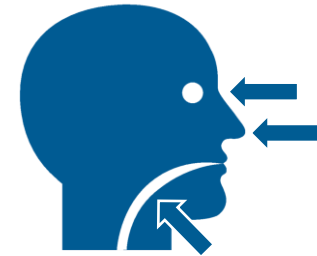
Within hours to days, exposure to high levels diesel particulate may cause:



Headaches



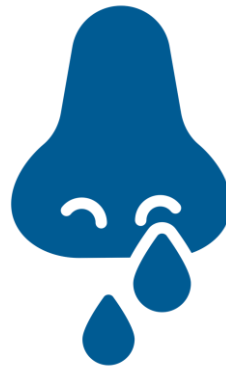
Dizziness



Irritation of eyes, nose,  
and throat



Wet cough, phlegm



Runny nose, allergy  
symptoms



Asthma attack



# Years of diesel particulate exposure can cause or may contribute to:



- Cancer
- Cardiovascular Disease (CVD)
- Idiopathic Pulmonary Fibrosis (IPF)
- Chronic Obstructive Pulmonary Disease (COPD) / Emphysema
- Onset of asthma or worsening of asthma
- Worsening of diabetic comorbidities

In 2011, in the Canadian mining industry, **diesel particulate** caused or is suspected to cause:

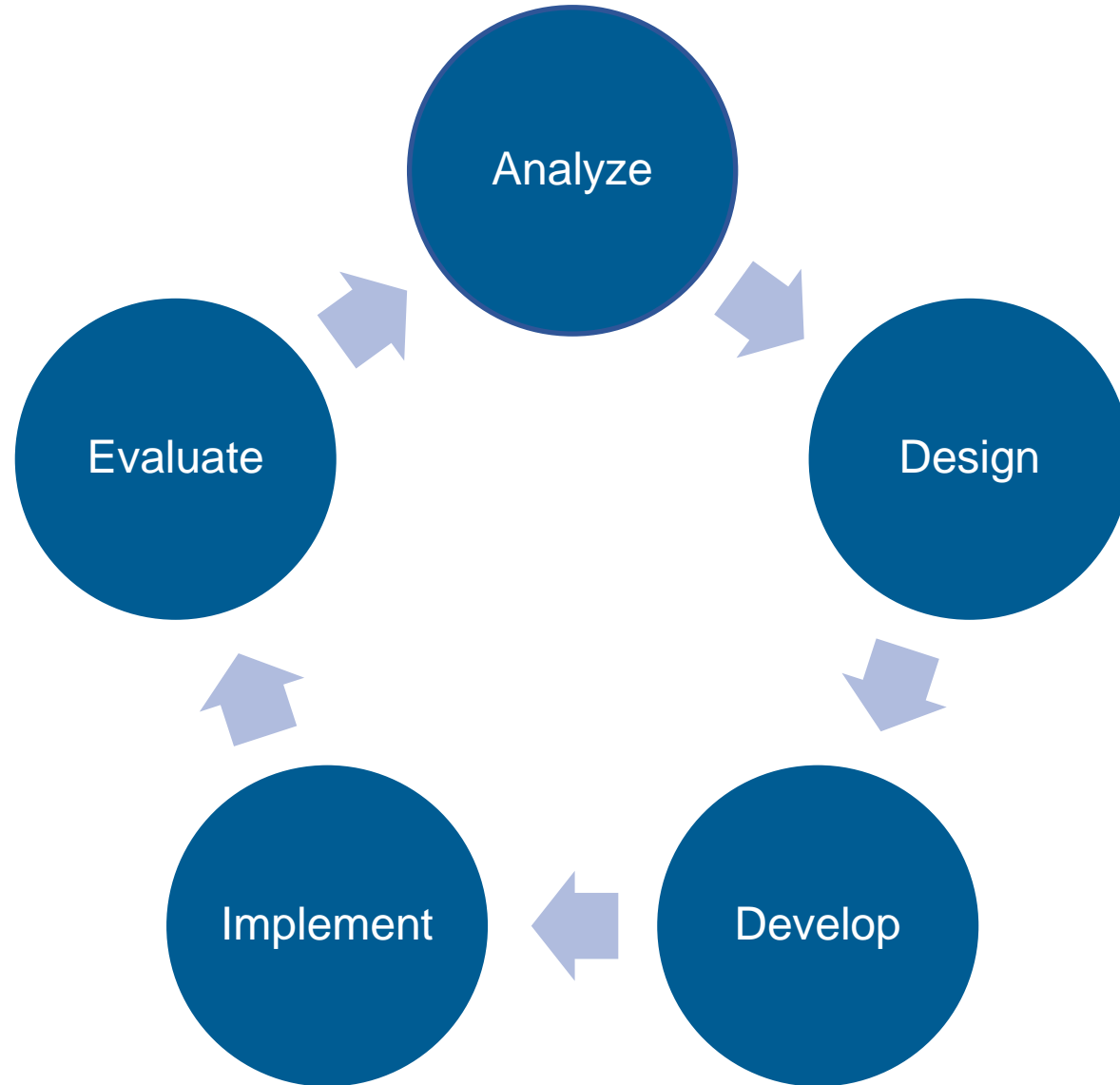


**Lung Cancer in  
220 Workers**

**Bladder Cancer in  
20 Workers**

# Project Strategy and Evaluation

# ADDIE Model

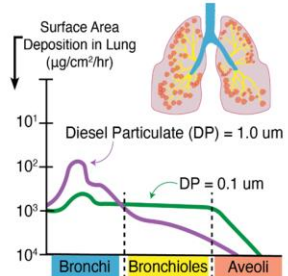


## Diesel Engine Exhaust

Diesel engines produce tailpipe emissions that are a mixture of gases and particles. Although the gases in diesel exhaust have harmful components, the focus of this project is on the particulates in exhaust.

Diesel particulates are made up of: soot particles, carbon, ash, polycyclic aromatic hydrocarbons (PAHs), metallic abrasion particles, sulfates, and silicates. 90% of particles are smaller than 1 µm (about the size of a virus). [1]

Inhalation is the most common way that workers are exposed to diesel particulates and very small particles can travel to the deepest parts of your lungs and cross into your body tissues. [2]



## Learn more at:

[www.dieselparticulateproject.com](http://www.dieselparticulateproject.com)



Let's Make 20 µg/m³ the Limit!

## Questions? Reach out to:

Sean Staddon  
WSIB Worker Representative  
United Steelworkers Local 6500  
(705)675-3381 ext 229  
pac@uswsudbury.ca

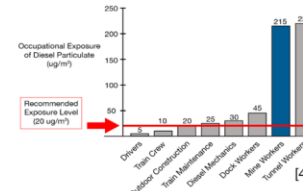


References listed at  
[www.dieselparticulateproject.com](http://www.dieselparticulateproject.com)  
This brochure was published in

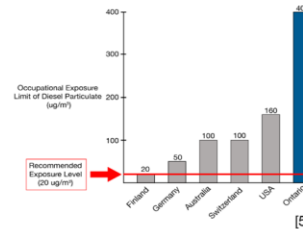


## You are being overexposed to harmful diesel particulates

Mine workers are exposed to some of the highest levels of diesel particulates of Ontario workers.



This is because Ontario mines have the highest Occupational Exposure Limits in the world at 400 µg/m³.



## Diesel particulates cause occupational disease

The International Agency for Research on Cancer (IARC) classifies diesel particulates as Category 1A. This category includes substances that are known to be cancer-causing in people. [4]

Research shows diesel particulate causes or contributes to: **lung and bladder cancer; lung diseases; heart and vascular diseases.** [6]

## The mining industry has the highest rate of diesel exhaust-related lung cancer.



Diesel particulate exposure worsens symptoms from existing health conditions including: **diabetes; asthma and other lung diseases; high blood pressure, heart disease, and peripheral artery diseases.** [6]

Short-term exposure can cause: **headaches; dizziness; shortness of breath/asthma attack; nose, throat and eye irritation; productive cough and phlegm.** [6]

## The Government of Ontario must reduce the OEL for diesel particulate in mining

The goal is 20 µg/m³

The Occupational Cancer Research Centre recommends an Occupational Exposure Limit (OEL) for diesel particulate emissions of 20 µg/m³ to protect miners' health and provide safe working conditions. [7]

Make the change happen!

## What to do:

Attend the USW information session

Fill out a WSIB exposure form

Speak up about the risks of diesel particulate exposure

Speak to your worker health and safety rep or Joint Occupational Health and Safety Committee

Request that your exposure level be measured at work

Learn more at:

[www.dieselparticulateproject.com](http://www.dieselparticulateproject.com)

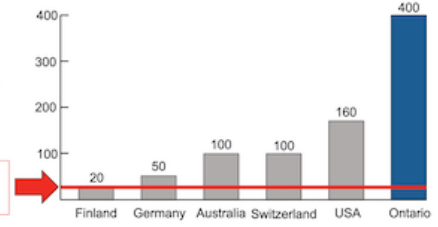
# Educational Materials

## You are being overexposed to harmful diesel particulates.



Current Occupational Exposure Limit of Diesel Particulate ( $\mu\text{g}/\text{m}^3$ )

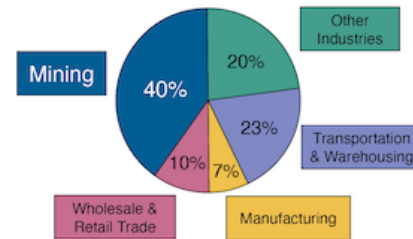
Recommended Exposure Level ( $20 \mu\text{g}/\text{m}^3$ )



[1]

## Diesel particulates cause occupational diseases.

The mining industry has the highest rate of diesel exhaust-related lung cancer.



Adapted from [2]

Ontario mine workers have a greater risk of developing a respiratory disease.

Lung Cancer	1.4x
Chronic Obstructive Pulmonary Disease (COPD)	1.2x
Idiopathic Pulmonary Fibrosis (IPF)	1.2x

[3]

## The Government of Ontario must reduce Occupational Exposure Limits for diesel particulates.



The goal is  $20 \mu\text{g}/\text{m}^3$   
(Elemental Carbon)  
Make the change happen:  
Fill out a WSIB exposure form!



# Project Timeline



May-August 2022 – Analysis, Design, and Development

September-December 2022 – Pilot Project, Train the Trainers, Website/Social Media Campaign, Intake Clinic/Information Session

January-April 2023 – Evaluation of Data/Draft Reports Written, Reviewed, and Finalized

May 2023 – Dissemination of Data (Final Report Sent to MLITSD)

# Project Objectives

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# Project Objectives



## Five Objective Headings:

1. **Process/Administrative** – 13 sub-objectives
2. **Learning** – 4 sub-objectives
3. **Action/Behavioural** – 11 sub-objectives
4. **Environmental** – 2 sub-objectives
5. **Project** – 3 sub-objectives

# Process/Administrative

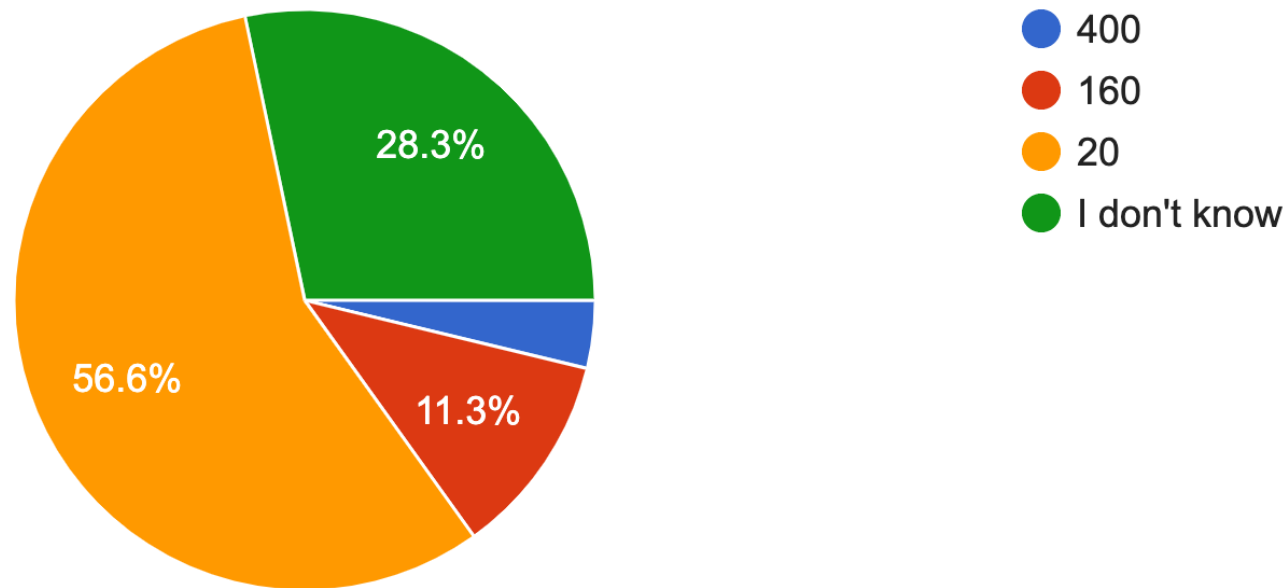


- Research ethics approval through LU REB.
- Two presentations completed September 11<sup>th</sup> and 22<sup>nd</sup>, 2022.
- Reach out to individuals and family members willing to provide video testimonials.
- Design and launch website, social media for project.

# Learning

What is the USW Diesel Particulate Project recommending the Occupational Exposure Limit (OEL) for diesel exhaust particulate ( $\mu\text{g}/\text{m}^3$ ) be changed to, for miners in Ontario?

53 responses



# Learning



What are the short-term health effects of too much diesel particulate exposure? (Select all that apply)

52 responses

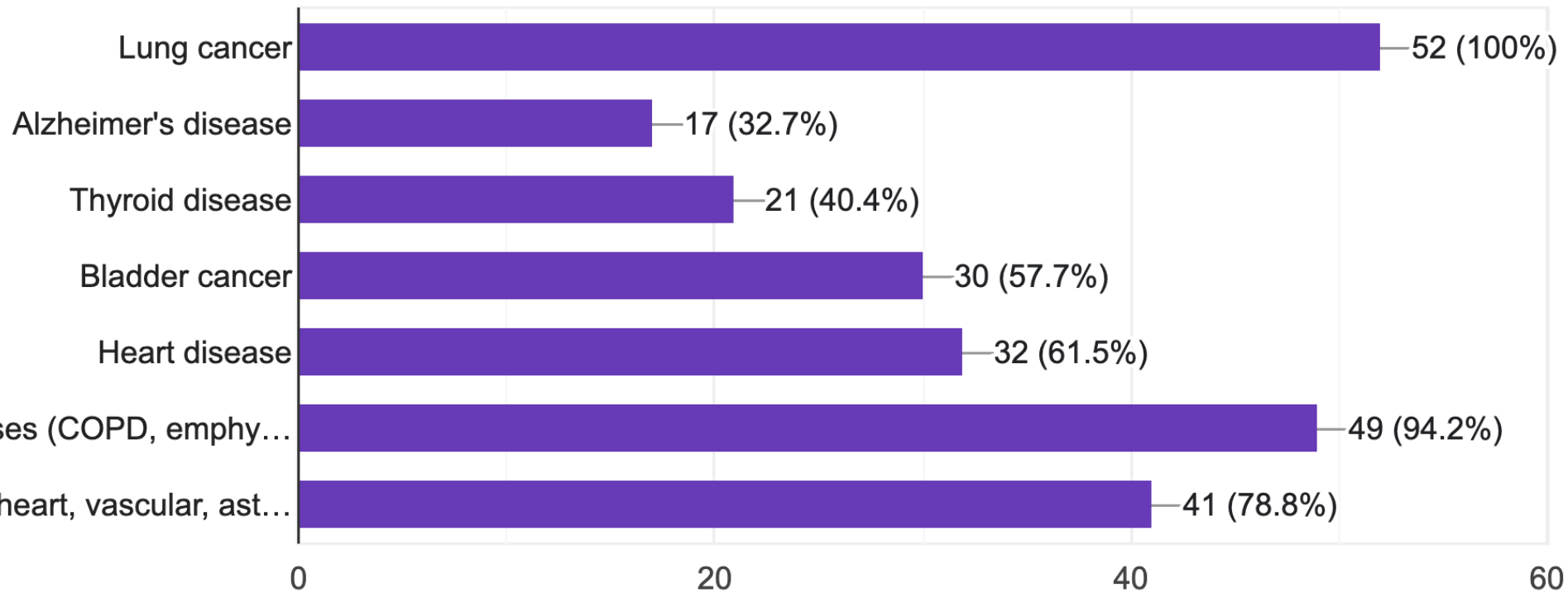


# Learning



What are the long-term health effects of too much diesel particulate exposure? (Select all that apply)

52 responses

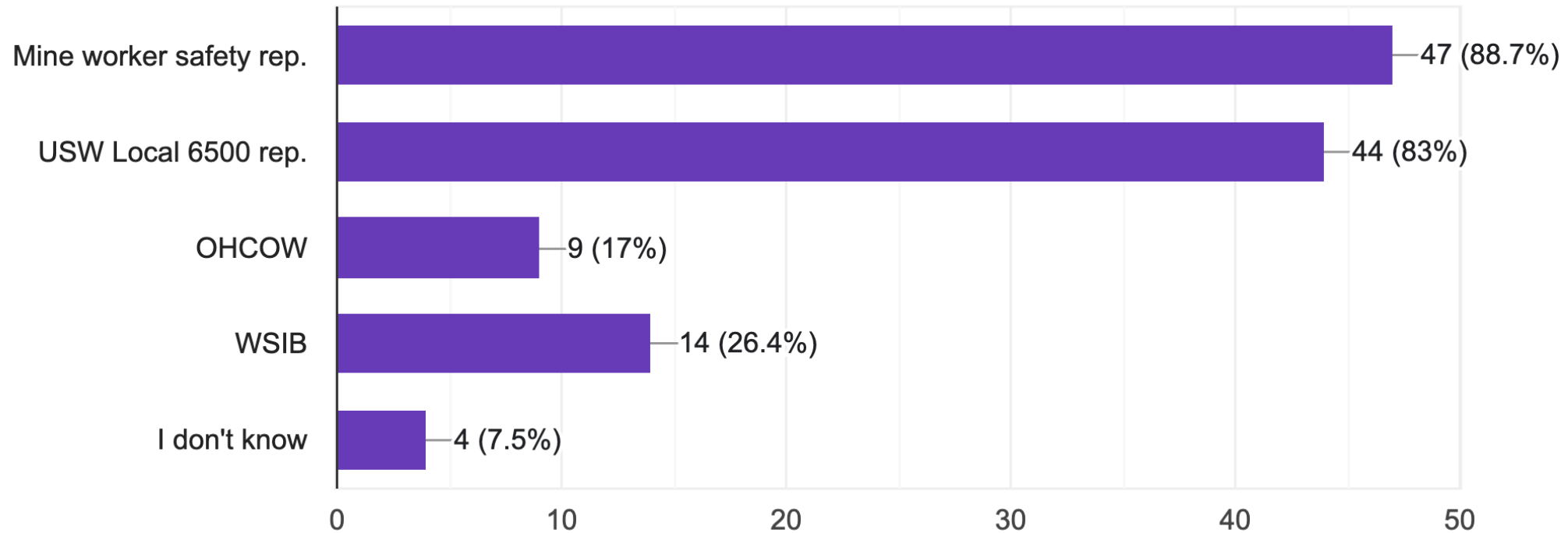


# Learning



Who would you speak to, in your workplace, if you have a concern about diesel particulate exposure? (Select all that apply)

53 responses



# Action/Behavioural



- Engage and motivate USW members to act.
- Our Primary Goal was for members to fill out **2,000 exposure forms** by the end of January 2023.
- **413** exposure forms were completed.

# Action/Behavioural



- To have **1000** mine workers complete an online questionnaire via project website.
- **53** questionnaires were completed.
- Only a small number were completed via website.
- Majority were completed only after the questionnaire was re-posted on social media platforms.



- 20% increase in DPM monitoring requests by mine workers. There has not been a statistically significant increase in DPM monitoring requests to date.
- 25% increase in WSIB claims related to DPM exposure. USW has seen a 400% increase in claims since the project launch in Fall 2022.

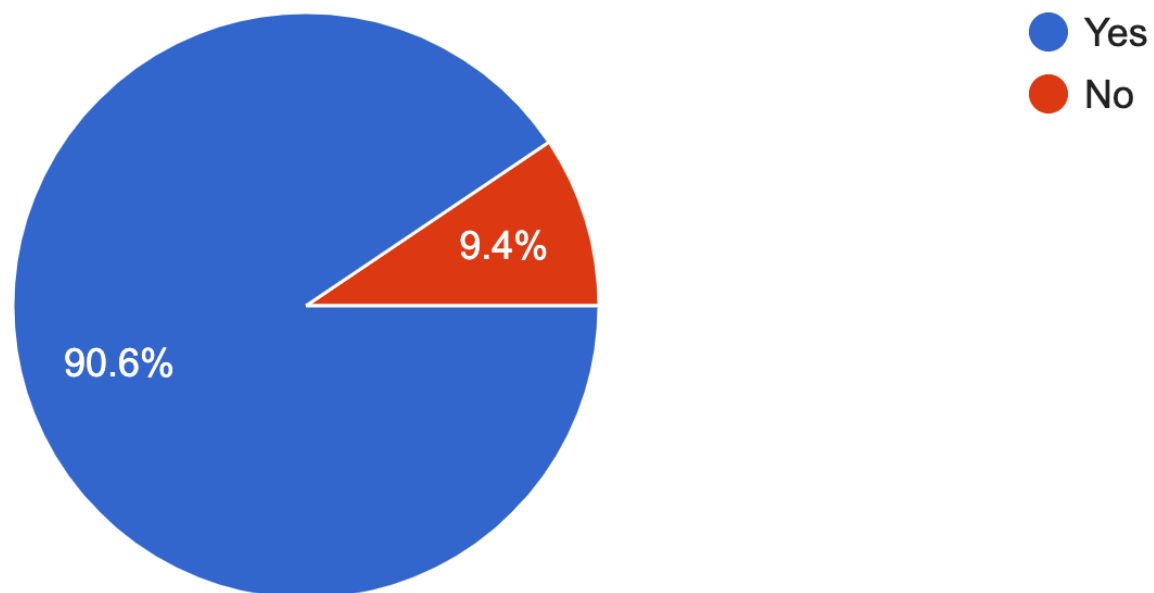
- OEL for DPM will be lowered incrementally over the next five years.
- Discussion with the Ministry has started.
- On April 11, 2023, MLITSD announced that effective September 1, 2023, the OEL for DPM will be lowered to  $120 \mu\text{g}/\text{m}^3$  EC.

# Key Takeaways

# Mine workers feel they are overexposed to diesel particulate.

Do you feel you are being overexposed to diesel particulate in your workplace?

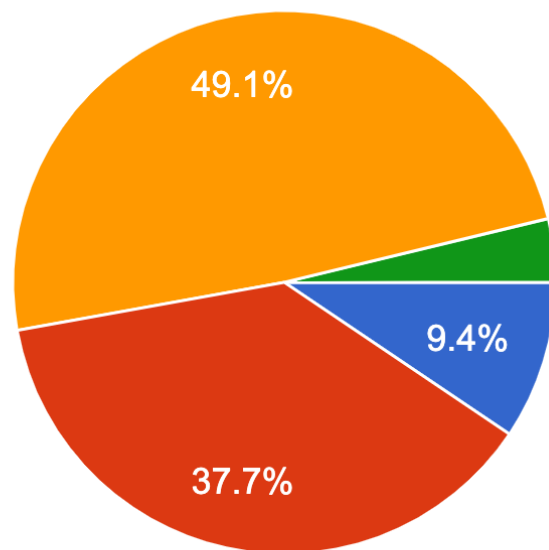
53 responses



# Increased worker knowledge about diesel particulate is required.

How would you rate your knowledge about diesel particulate at work prior to reviewing the project content?

53 responses

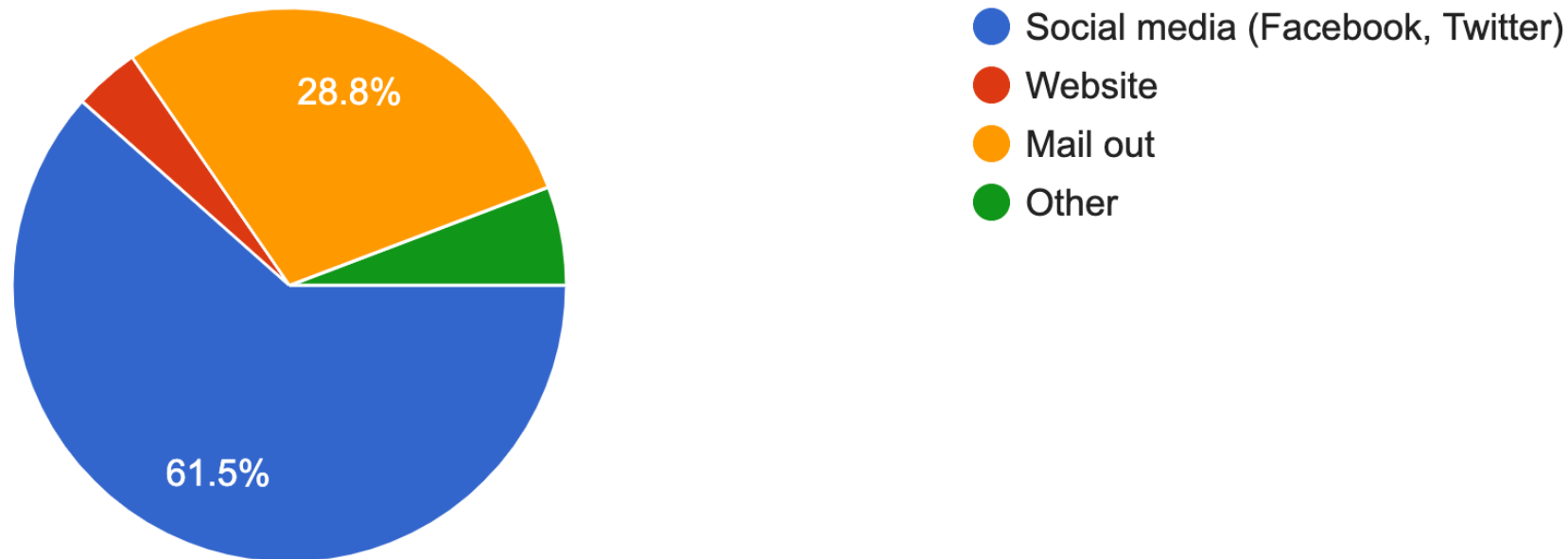


- Very knowledgeable (I learned nothing I did not already know in these materials)
- Moderately knowledgeable (I knew some of this content, but learned some new information)
- Somewhat knowledgeable (Most, but not all this content was new to me)
- I did not know that diesel particulate was a health issue in mining

# Social media is the most effective way to communicate with mine workers.

What was the most effective way of communicating the educational materials with you?

52 responses



# Summary

# Summary

- **The OEL for diesel particulate needs to be lowered** in order to protect workers' health.
- To increase mine worker engagement, a strategic communication strategy is required.
- Mine workers deserve educational support, in a format and language that fits their needs, about the health risks of DPM and what they can do if they have concerns.





# Project Partners

Occupational Health Clinics for Ontario Workers

Centre de santé des travailleurs et travailleuses de l'Ontario

# Project Contact

USW Diesel Particulate Project Website: [dieselparticulateproject.com](http://dieselparticulateproject.com)

Sean Staddon Email: [sstaddon@uswsudbury.ca](mailto:sstaddon@uswsudbury.ca)

George Flagler Email: [gflagler@laurentian.ca](mailto:gflagler@laurentian.ca)

OHCOW Diesel Exhaust Lung Cancer Relative Risk Calculator:  
<https://www.ohcow.on.ca/resources/apps-tools-calculators/diesel-exhaust-relative-risk-calculator/>

# Your Questions

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8. CAREX Canada. (2017). Diesel engine exhaust: Burden of occupational cancer fact sheet for mining. <http://ocrcnew.wpengine.com/wp-content/uploads/2017/03/FACT-SHEET-Diesel-in-mining.pdf>