

The cancer risk from diesel emissions in underground works

ITA President, Arnold Dix here discusses how the better management of potentially carcinogenic diesel emissions is long over-due



Exposure to diesel emissions causes cancer. The risk of contracting cancer from exposure to Diesel emissions is readily managed. However, after more than a decade since the link between cancer in miners from diesel emission exposure there is neither a shared understanding of this risk nor common industry practices. The main difficulty seems to be acknowledging it is a real risk factor that needs managing. Its actual management is similar to silicate dust management – achievable and well understood.

The problem

All vehicles generate particulates and gases that are known to harm human health^[3]. All particles harm human health whether they are artificially or naturally generated^{[4][5][6][7][8][9][10][11][12][13]}.

It is now well understood that the exposure of humans to particles generated by internal combustion engines and some gases causes ill health. Originally the particles were regulated in the PM10 range (particles at or less than 10µM (microns)^{[15][16][17]}. As techniques improved to measure the particles regulatory control of PM2.5 (particles at or less than 2.5µM) and most recently PM1.0^{[18][19][20][21][22][23][24][25]}.

The composition of these particles can also impact the severity of the risk to human health with diesel derived particulates generally considered more harmful than gasoline derived particulates^[26]. Nitrogen dioxide is also recognised as an important cause of adverse health effects^{[27][28]}.

There is a known direct relationship between cancer and exposure to diesel engine exhaust.

Directives on diesel emissions and cancer

Directive (EU)2019/130 of 16th January 2019 amending Directive 2004/37/EC on the protection of works from the risk related to exposure to carcinogens or mutagens at work.

Clause 16 provides:

‘There is sufficient evidence of the carcinogenicity of diesel engine exhaust emissions arising from the combustion of diesel fuel in compression ignition engines.’

The regulation of diesel emission under the EU Directive in 2019 was just the latest in a series of technical pronouncements which began on the 12th of June 2012 by the World Health Organisation’s International Agency for Research on Cancer. The National Institute for Occupational Safety and Health concluded a study in 2012 into cancers contracted by 12,000 mine workers. The National Toxicology Program’s finding of 27th July 2015 and the US EPA’s findings on diesel particulates both related diesel emission exposures to cancer.

Since 12th June 2012, each of the above noted independent health agencies have either directly or by implication raised concerns about the causative link between diesel emissions for mine workers and cancer.

While exposure to regular operational tunnel users of tunnels is now highly controlled under a range of regulatory frameworks, the management of the risk to underground construction workers remains adhoc and mostly tunnel project specific.

Sustainability Development Goals – United Nations

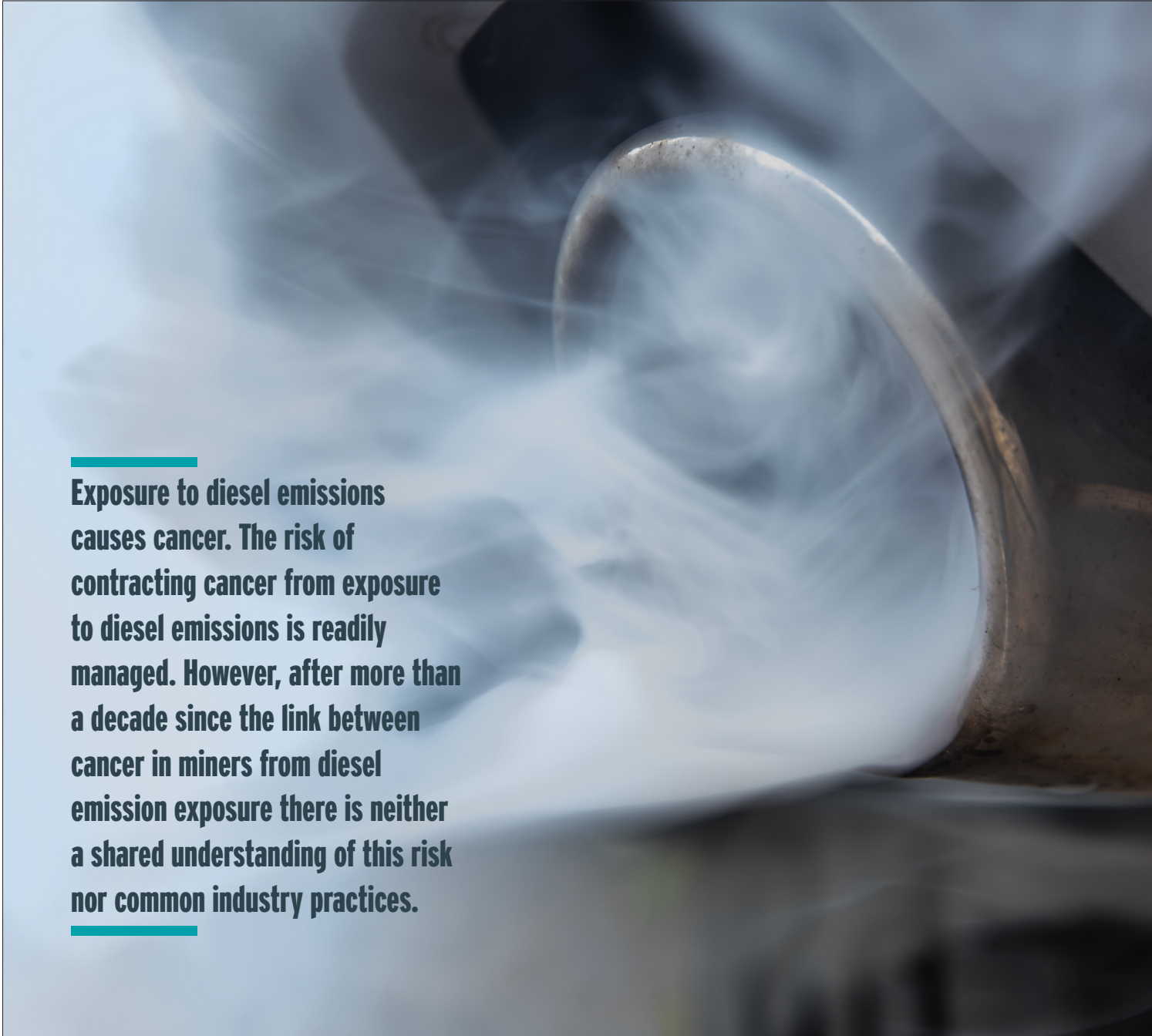
The United Nations Sustainability Development goals provide a useful framework for determining if action should be taken about the link between diesel emissions and cancer.

Strategic Development Goal 3 encourages the provision of good health and wellbeing while Strategic Development Goal 8 encourages decent work and economic growth.

In combination SDG 3 and 8 entirely support ensuring diesel emission exposures are managed during the construction phase of an underground project.

Ensuring the exposure of tunnel workers to diesel emissions is appropriately mitigated should be “business as usual” after more than a decade of the link between mine workers and diesel emissions being identified in epidemiological studies. The 2019 EU directive is merely a restatement of what has been long known since 2012.

The mitigation measures for diesel emissions are similar to particulates in that their elimination is the highest priority and where that cannot be achieved measures to reduce exposure to human beings are appropriate. Appropriate tunnel ventilation, vehicle



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maintenance and fuel selection are examples of practical ways of managing diesel emission exposure.

It is time as an industry that we elevate the diesel emissions issue for consideration in a similar way as silicate and other dusts have been escalated. It is likely that mitigation strategies for dust and diesel emissions will be complimentary. A coordinated approach will achieve the best health outcomes for tunnel workers.

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Looking ahead

Diesel powered construction equipment will play a significant role in underground construction for at least the next few decades. The migration to other

energy sources for construction equipment will continue – but diesel will have a place.

Management of diesel emission exposure is not new. Acknowledging and mitigating the risks is not especially difficult. Management can even result in reductions in energy consumption once exposure issues are quantified and mitigated.

It's been a decade since the link between cancer in mine workers and diesel emissions was identified – as an industry it's time to address it as business as usual – manage it – and at the same time satisfy the United Nations SDGs 3 and 8.

This risk of cancer for our underground construction workers from diesel emissions must be acknowledged and addressed now. After more than a decade of the link between cancer in underground workers and diesel emission exposure managing it should be as routine as protective footwear, eye protection, high visibility vests and a hard hat.

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