PUBLIC COMMENT

Consultation on a proposed workplace exposure standard for diesel particulate matter

Instructions

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- Use the saved version to enter your responses under each question below.
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Submissions will be accepted until **11:59 pm (AEST) on Sunday, 4 June 2023.**

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- submissions containing defamatory material, and
- submissions containing views or information identifying parties involved in hearings or inquests which are currently in progress.

Your details and background

(Please leave blank if you wish to remain anonymous)

1. Name or organisation

[redacted]

2. Email used to log into Engage

[redacted]

Questionnaire

If you are commenting on particular aspects of the expert report, please identify the particular sections or pages concerned. Your response should, where possible, provide evidence to support your statement.

1. Do you support the proposed workplace exposure standard (WES) for diesel particulate matter (DPM) to protect workers from the adverse health effects of exposure to diesel engine emissions (DEE)?

   ○ Yes

   ◉ No

2. What are your reasons for your response to Question 1? Please provide evidence or information to support your response.

   Subsequent to seeking professional advice, including a literature review on the topic, review of SafeWork Australia supplied technical paper, discussions with industry bodies and development of a working group our organisation have concluded that the introduction of a WES to the proposed time weighted average (TWA) of 15 µg REC/m³ (0.015mg/m³) is infeasible. Our organisations reasoning for not supporting the introduction of a DPM WES is exclusively based on the feasibility of controlling DPM to below 0.015 mg/m³ when considering the current technological and practical constraints. It is our conclusion that certain parts of the industry (e.g. mining, tunnelling etc.) could not comply with the proposed WES level.

   Please refer to the supporting position paper which outlines in detail our organisations position inclusive where applicable evidence via references.

3. Is there an alternative WES to DPM as respirable elemental carbon, or additional WES that should be considered to protect workers from DEE? Please provide evidence or information to support your response.

   Multiple regulators around the world including Australian mines regulator, and Australian Institute of Occupational Hygienists (AIOH), have adopted a WES of 0.05 or 0.1 mg/m³ REC respectively. These organizations, governments and associations have selected these levels via review of scientific research, feasibility, economic impact, technological advancement, impact to workers, unintended consequences etc. basically taking the issue

in totality and not in isolation. Contrary to the technical paper issued by SLR consulting the current scientific consensus is that an upper bound for the cumulative exposure of 2.5 mg/m³-years respirable elemental carbon (REC) seems to be sufficient to prevent a detectable increase of lung cancer risk. This value they put as corresponding to an average annual exposure value of 0.05 mg/m³ REC assuming an 'exposed' working life of 45 years [Möhner and Wendt (2017)]. Our organisation proposes that a level of **0.05 mg/m³** is a more appropriate level than the proposed level of 0.015 mg/m³.

4. What changes would you need to make in your workplace (over and above any controls currently in place) to ensure workers and others at the workplace are not exposed to levels of DPM above the proposed WES?
    a. Please include in your response:
        i. a description of the control measures currently in place at your workplace(s) to minimise exposure of workers and others to DEE.
        ii. details of any costs to implement the WES for DPM (e.g., upgrade of ventilation systems in area X, costing approximately $XXX).

(i) In relation to road tunnelling (without the use of a tunnel boring machine) using roadheader, excavator works the only feasible ways to meet the proposed WES is by transitioning to electric powered plant and equipment or by extending the programs to mitigate the amount of equipment required to be utilised underground.

(ii) Our organisation currently owns >$150,000.000.00 worth of plant and equipment dedicated to quarry, excavation and tunnelling within Australia. This plant and equipment would require replacement with alternative technology (electric) which is currently not as advanced, durable, provides the appropriate power, provides the appropriate working time let alone the current public infrastructure could not support this transition (power supply) or the skills required by mechanics to maintain this type of equipment or the manufacturers and suppliers to provide the amount we would need to transition over to let alone the rest of the industry.

Please refer to the supporting position paper which outlines in detail this question.

5. Is there additional evidence or information that you think should be considered?

A preliminary review of the sources of information included within the SLR Consulting Australia Pty Ltd Research Report 'Workplace Exposure Standard for Diesel Particulate Matter' report was undertaken as part of this submission. Our organisation identified the following:

- The majority of literature was sourced from PubMed, Embase and MedLine using strict search criteria and thus it is possible that relevant studies were missed.
- Studies were only included if they were written in English and thus relevant studies in other languages were missed.
- Very few of the studies researched exposed human, animal or tissue to "new technology" exhaust and thus further research is needed to confirm the findings of this review.
- Information reported was based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid. This report is written as a Meta Analysis of current literature, however, has not been peer reviewed or journaled.
- Limited

It would seem like the above issues should be addressed and further research undertaken. Especially further studies in diesel exhaust exposure effects should concentrate on using newer technology engines and after-treatment devices in order to consolidate the health effects of exposure to “new technology” engine exhaust before it becomes more widely used in an occupational setting.

6. Are there any additional comments you would like to make? (free text box with option to upload an attachment)

Please refer to the supporting position paper which outlines in detail our position.

2 June 2023

Safe Work Australia

Re: Consultation on a proposed workplace exposure standard for diesel particulate matter

General

[redacted] have helped deliver some of Australia's most significant infrastructure projects. For more than 25 years, [redacted] has delivered roads, bridges, tunnels, railways, dams, solar farms, windfarms and other projects within Australia. [redacted] also operates multiple precast facilities which manufacture a range of pre-stressed and reinforced concrete products, including concrete girders, planks, super-T bridge beams, noise walls, barriers, arches and other precast products. As a global leader in sustainability, [redacted] promotes sustainable and transformational infrastructure with a strong emphasis on renewable energy.

In light of the risks associated with diesel engine emissions (DEE) (along with other occupational hygiene issues) within the civil construction and infrastructure industry, [redacted] has adopted new ways to conduct business in an effort to overcome the status quo and meet best outcomes for our workforce (staff, employees and sub-contractors). To achieve this [redacted] have contributed to various occupational health and hygiene technical papers and regulator / government initiatives. Specifically, over the last 5 years [redacted] has:

- Contributed to the Australasian Tunneling Society Air Quality Working Group, by sharing findings and lessons learnt with industry regulators and other industry bodies.
- Contributed to the Major Infrastructure Consultative Committee by providing a subject matter expert to be a lead contributor to the SafeWork NSW Silica Working Party.
- Contributed to the SafeWork NSW Advisory Group – Updating Code of Practice: Tunnels Under Construction by providing multiple subject matter experts at various levels of our organization in the combined effort to provide a better document for future tunnelling.
- Implemented a transformational partnership with Wollongong University to affect change by utilizing PHD scholars and statistical professionals to advise [redacted].
- Implemented the development of an Occupational Hygiene Team (employing industry professionals) to manage and drive change to the way [redacted] addresses occupational hygiene hazards.

[redacted] is dedicated to being an industry leader in all aspects of its business with Occupational Health and Hygiene an area of excellence.

Response

Considering SLR Consulting Australia Pty Ltd Research Report *'Workplace Exposure Standard for Diesel Particulate Matter'* and SafeWork Australia proposed introduction of a Workplace Exposure Standard for diesel particulate matter (DPM) as a surrogate for DEE exposure, [redacted] has provided the following response.

Subsequent to seeking professional advice, including a literature review on the topic, review of SafeWork Australia supplied technical paper, discussions with industry bodies and development of a working group [redacted] has concluded that the introduction of a WES to the proposed time weighted average (TWA) of 15 µg REC/m^3 (0.015mg/m^3) is infeasible. [redacted] reasoning for not supporting the introduction of a DPM WES is exclusively based on the feasibility of controlling DPM to below 0.015 mg/m^3 when taking into account the current technological and practical constraints. It is our conclusion that certain parts of the industry (e.g. mining, tunnelling etc.) could not comply with the proposed WES level. The following sections outline in further detail [redacted] position.

Practical Feasibility:

[redacted] concludes that at this point in time the proposed DPM WES of 0.015 mg/m³ is not achievable. It has been extensively documented that the mining, tunneling and construction industries have significant challenges meeting the current recommended WES of 0.1 mg/m³ due partly to the available technology, supply chain accountability and the lack of legislation / regulatory clarity.

Some of the constraints currently affecting the civil construction and infrastructure industry and implementation of a DPM WES of 0.015 mg/m³ are listed in detail below:

- ***Technology deficit (elimination control)*** – a suitable way to reduce diesel emissions is for eliminating diesel plant and equipment by the introduction of electric alternatives. [redacted] has reviewed the electric vehicle, mobile plant and equipment industry and the implementation of electric vehicles into our fleet. At present [redacted] is transitioning its light vehicle fleet to hybrid vehicles as well as transitioning selected heavy plant (roadheaders, Brokk excavators, jumbo drills), however our review findings and lessons learnt from implementation identified the current level of technology it is not environmentally, practically or economically feasible to conduct widescale (not currently scalable). Additionally, it would take significant investment and long lead times to replace all plant and equipment within [redacted] fleet would. This would need to include a collective advocacy by government, industry and public to overcome prohibitors like infrastructure for power supply.
- ***Market position*** – a review of the electric vehicle mobile plant and equipment industry has identified that manufacturers and suppliers would not be able to service the demand for widescale uptake of electrical plant and equipment. This is due to many factors including current technological barriers (power, durability, maintenance expertise) manufacturers infrastructure, availability of raw materials, variety of vehicles available and warranties.
- ***Technology deficit (engineered controls)*** – a suitable way to reduce diesel emissions is through engineering out the problem unfortunately the gold standard in emission control via engineering has been proved neutral in reducing health impacts. Multiple studies have provided lines of evidence that current exhaust after-treatment devices had little to no impact on the resulting health effects of diesel exhaust exposure, despite exhaust after-treatment devices such as a diesel particulate filter (DPF) being capable of removing over 90% of diesel exhaust particles by mass. Several studies exposed subjects to exhaust both with and without a DPF equipped and found similar health impacts. Thus “new technology” diesel exhaust treatment cannot reduce exhaust emissions to a level that can mitigate adverse health effects. (Katherine R. Landwehr, Alexander N. Larcombe, Alison Reid, Benjamin J. Mullins).
- ***Available technology / equipment*** – the Plant and Equipment companies that supply the industry are currently not supplying plant and equipment designed for DPM mitigation (i.e. adequate filtration units, electric alternatives etc). Additionally, [redacted] have conducted numerous meetings with suppliers in an effort to design more effective plant and equipment and have been repeatedly advised that the Australian Market is too small (<2 % in some cases) for the supply businesses to invest in research and development programs to design more effective plant and equipment, additionally other markets (domestic and overseas) have not shown advocated for these designs.
- ***Unintended consequences*** – consideration must be made into the unintended consequences of implementing a low-level WES. Some consequences could include:
  - Currently the mining, tunnelling and construction industries are struggling to meet the current DPM WES of 0.1mg/m³. If the WES of 0.015 mg/m³ is introduced and these industries understand that they will not be able to reduce levels below the WES does SafeWork Australia run the risk that the industry will become disenfranchised. This may cause the industry to veer away from implementation of engineering controls and mandate RPE (default to lowest control) reasoning that “the WES is unachievable and unmeasurable”. This should be reviewed in totality and SafeWork must understand the follow-on consequences of using RPE to protect workers (e.g. poor visibility, poor communication, improper use and/or maintenance etc.)

- Drain on public infrastructure, for example localized disruptions to the power grid due to required energy required if significant electric powered plant is used or the introduction of diesel generators to power the plant and equipment and the effect on noise exposure to the public and workers etc.
- A highly successful safety control for reducing diesel exhaust emissions in the tunnelling and mining industries has been to reduce amount of plant working within sections of the tunnel or mine which allows the ventilation system to remove diesel and replace with fresh air these calculations are currently undertaken against the recommended exposure level of 0.1 mg/m^3. If the proposed WES is stipulated this would have major impacts on the time and cost of major infrastructure projects. The obvious solution to increase ventilation can not be achieved due to wind speeds within the tunnel or mined environment and or the knock-on effect of drying out all the spoil material and generating a greater risk from Respirable dust and/or respirable crystalline silica.

- ***Supply chain responsibilities*** – the proponents of the projects currently do not undertake risk assessments of the risks associated with how they set up the project (alignment, program and lining types). The proponents risk assessment should form part of the contract, which will set the requirements and expectations of the intended project.
- ***Supply chain responsibilities*** – Environmental Impact Statements (EIS) are researched and documented by the proponent of the works which dictates program, design constraints, alignment etc. The principal contractor is unable to change this document and must comply with it throughout the project. These constraints could have a negative effect on the required plant and equipment to complete these works.
- ***Supply chain responsibilities*** – Due to the decisions and constraints listed above one of the typical outcomes for the Principal Contractors is that acceleration of program is required to mitigate any liquidated damages the proponent can claim if the program is not delivered on time. The lack of accountability within the supply chain has real world impacts that will detrimentally affect the amount of diesel equipment utilsied within a tunnel. A responsible approach to mitigate elevated levels of DPM within a tunnel would be to have accountabilities for all levels of the supply chain similar to the HV Chain of Responsibility Legislation.

Measurement and Analysis Information:

It has been reported to [redacted] that there are significant limitations in current monitoring and analysis technology which effect the accurate measurement of DPM exposures at low concentrations i.e >0.03mg/m^3. It should be understood that measurement accuracy in relation to exposure monitoring is important for the following reasons:

- Limitations in measuring DPM exposure at low concentrations will lead to significant issues in enforcing the proposed 0.015 mg/m^3 WES in practical application of the legislation.
- In the event that monitoring measurements are not accurate the flow on consequence is that the precision of monitoring program data / findings is also brought into question (lack of precision or reproducibility of data due to inaccuracy).
- Brings into question information in understanding who is at risk which would flow onto PCBUs prioritize funding, personnel etc. to implement and maintain effective controls.
- It is the understanding of [redacted] that WES are calculated off an 8 hour working day (40 hour working week) over the lifetime of a worker, in the construction, engineering and services divisions of our company the site staff (direct or indirect employees) of our projects exceed these hours, therefore our projects rely on our internal / external occupational hygienists to conduct WES shift adjustments to reflect the health risks posed by DPM over the actual hours worked per project. When applying a shift adjustment to the proposed 0.015 mg/m^3 the WES would be further reduced which would encroach on the limit of detection (LOD), which further compounds the issues with accuracy.
- [redacted] has adopted the industry practice of utilising a trigger system, in summary if the results of exposure monitoring exceed 50 % of the exposure limit, this triggers a review of exposure controls and their effectiveness. Applying this action limit to a shift adjusted WES of 0.015mg/m^3 could cross the threshold of the LOD and therefore further put into question the testing method. “If the result of an analysis cannot be

trusted, then it has little value and the analysis might as well have not been carried out (Eurachem Guide 2014)".

Toxicological Information Comment:

The multiple regulators around the world including Australian mines regulator, and Australian Institute of Occupational Hygienists (AIOH), have adopted a WES of 0.05 or 0.1 mg/m³ REC respectively. These organizations, governments and associations have selected these levels via review of scientific research, feasibility, economic impact, technological advancement, impact to workers, unintended consequences etc. basically taking the issue in totality and not in isolation. Country to the technical paper issued by SLR consulting the current scientific consensus is that an upper bound for the cumulative exposure of 2.5 mg/m³-years respirable elemental carbon (REC) seems to be sufficient to prevent a detectable increase of lung cancer risk. This value they put as corresponding to an average annual exposure value of 0.05 mg/m³ REC assuming an 'exposed' working life of 45 years [Möhner and Wendt (2017)].

[redacted] proposes that a level of 0.05 mg/m³ is a more appropriate level than the proposed level of 0.015 mg/m³.

Review of sources referenced:

A preliminary review of the sources of information included within the SLR Consulting Australia Pty Ltd Research Report 'Workplace Exposure Standard for Diesel Particulate Matter' report was undertaken as part of this submission. [redacted] identified the following:

- The majority of literature was sourced from PubMed, Embase and MedLine using strict search criteria and thus it is possible that relevant studies were missed.
- Studies were only included if they were written in English and thus relevant studies in other languages were missed.
- Very few of the studies researched exposed human, animal or tissue to "new technology" exhaust and thus further research is needed to confirm the findings of this review.
- [redacted] further identified that SLR Consulting Australia Pty Ltd are a consulting practice which is constrained in its recommendations by insurers, directors etc. which could pose a more conservative approach than is required.
- The scope of works for this body of work was isolated to scientific research and did not account for real world implications and therefore is not reflective of a true risk assessment of exposure to DPM or the potential unintended consequences of implimentation.
- Information reported was based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid. This report is written as a Meta Analysis of current literature, however has not been peer reviewed or journaled.

Questions that require consideration:

[redacted] has outlined questions that should be answered and considered as part of the risk assessment undertaken when implementing a new WES, which was not part of the scope provided to SLR Consulting Australia Pty Ltd and was not addressed within the technical report:

- Is a DPM WES of 0.015 mg/m³ achievable with current constraints?
- Has this level or similar been implemented, measured and outcomes achieved in oversea industries?
- Has a review of current legislation targeting DPM (or lack thereof) been conducted and outcomes considered?
- Has SafeWork Australia other body undertaken or will undertake a risk assessment of all facts regarding DPM prior to implementing such a significantly low WES?
- How does the proposed WES align with the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022?
- Do we understand the economic impacts to current and future projects of implementing the proposed WES?

Recommendations:

- Current legislation (or lack thereof) – legislation does not support current DPM WES. Historically legislation is a conduit of change and should be considered prior to implementation of a low WES for DPM.
- Supply chain responsibilities – the proponents of the projects should have obligations of the entire supply chain with respect to working with DPM (similar to the HV Chain of Responsibility Legislation).
- Clients to perform analysis on the capabilities of contractors to comply with the limits based on construction methodology including analysis of project feasibility knowing the typical construction methodologies used compared to the exposure standards proposed.
- Collective pressure / incentives on Plant and Equipment supplies to design mitigation measures into their products inclusive of incentives to provide electric / hybrid plant and equipment.
- Appropriate time to implement alternative technologies (electric).
- Clients (ie. Government) to specify minimum plant and equipment standards.
- Organize a centralized Australian register for the reporting of dust diseases.
- Additional research and investigation into cases of DPM related diseases and likely exposure levels, factoring in the interactions with other contaminants (respirable dust, cigarette smoke).
- Future studies in diesel exhaust exposure effects should concentrate on using newer technology engines and after-treatment devices in order to consolidate the health effects of exposure to “new technology” engine exhaust before it becomes more widely used in an occupational setting.

Kind regards

[redacted]