

Bitumen fumes

ISCRR Research Impact Showcase 2023



A joint initiative of WorkSafe Victoria and Monash University

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Background

- In road construction, heated bitumen emits a complex mixture of vapours and particulate matter
- Following complaints about 'fuming loads', WorkSafe asked ISCRR to review the evidence on the risks of bitumen exposure for roadside paving workers

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Research Methodology

Evidence Review

- Adverse health effects associated with bitumen exposure
- Strategies to minimise the health risks to roadside workers

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Environmental Scan

Online resources from asphalt companies, government institutions and research agencies, nationally and internationally, as well as interviews

Key research questions

1. What is the bitumen and asphalt industry profile, e.g. sources, types and road paving crew work conditions, in the Victorian context?
2. What adverse health effects have been associated with exposure to bitumen contents and fumes in the course of road construction and/or repairs?
3. What factors are shown to mitigate the risk of, or protect workers from exposure to, bitumen contents and fumes during road construction and repairs?

Health effects of bitumen exposure

Acute effects

- Decline in lung function
 - Pre- versus post-shift
 - Exposed versus non-exposed workers
- Increased respiratory symptoms
 - cough, wheezing, shortness of breath, chest tightness
- Increased inflammatory markers
- Increased eye irritation

Chronic effects

- Development of some cancers
- Increased biomarkers that represent organ toxicity, tissue injury or DNA damage

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Evidence review

Risk mitigation



Reduced risk of exposure with:

- Personal protective clothing
- Air-purifying respiratory mask
- Substituting wheel for cleaning equipment
- Design-integrated fume capture system on paver machines was more efficient than other models

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Environmental Scan findings

Types of asphalt

Job role

Diesel



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Hot mix
Warm mix
Cold mix

Paver and screed operators were more exposed compared to other job taskers

When diesel is used as slip agent and to clean paving equipment, there are more fumes.

Environmental Scan findings

Acute health effects



Eye, nose, throat and skin irritation, headache, nausea, vomiting and respiratory discomfort.

Incidence



Workers revealed symptoms were common while asphalt companies said there were only odd cases.

Under-reporting



- Worker characteristics
- Desire to get the job finished
- Fear of reprisals
- Perceived lack of response from management

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The Impact Journey

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ISCRR research

One research project producing two reports and several presentations to WorkSafe representatives and other stakeholders. Guidance material created for further research dissemination.

Informed action

Leading to WorkSafe funding an OHS Bitumen Fumes Officer role and the formation of a key stakeholders forum.

Identified gaps

Initiatives were developed based on the identified gaps in evidence and perceptions of risk.

Identified opportunities

Proposed considerations investigated including the usage of warm mix asphalt, and improved fume monitoring and consultation.

Bitumen contents and fumes impacts

Key stakeholder meetings

Department of Transport
specification and industry switch to
warm mix asphalt

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Standardised testing method to
identify hazardous compounds in
bitumen

Alternative slip release
agents/products

Bitumen contents and fumes

Key factors for impact success

- Researcher engagement throughout project life cycle
- Champions driving agenda
- Resource commitment to address research problem
- Engagement with industry leaders

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Thank you

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