



Mines Safety Bulletin No. 174

Subject: High pressure water cleaning creates mists and aerosols causing Legionnaires' disease

Date: 27 May 2020

Background

An underground miner was recently diagnosed with Legionnaires' disease after suffering severe respiratory distress and pneumonia that developed quickly from flu-like symptoms.

Despite being young, fit and healthy, the miner required urgent medical intervention in an intensive care unit before he fortunately made a full recovery.

Department of Health officers investigated all possible sources of exposure to *Legionella* bacteria. High levels of *Legionella pneumophila* were identified at the underground wash bay where the miner had used high pressure water blasting equipment to clean heavy machinery during his last roster.

Department of Health officers concluded that inhalation of mists from this water supply was the likely cause of his serious illness. Subsequently, all water supplies with the potential to create mists at this workplace were decontaminated and risk management strategies implemented to prevent further exposures to potentially contaminated water.



Legionella bacteria

Summary of hazard

Legionnaires' disease is a severe form of pneumonia with a high fatality rate. Infection is caused by inhaling droplets or mists infected with *Legionella* bacteria, which can be prevalent in sources of fresh, raw and brackish water, although infection is usually low in healthy individuals.

Legionella infections can cause serious respiratory illness ranging from a short flu-like condition (Pontiac fever) that may progress to severe pneumonia (Legionnaires' disease) with organ failure and may even be fatal in susceptible patients.

Detection of Legionnaires' disease is deemed a serious occurrence, notifiable to the District Inspector (s. 79 of the *Mines Safety and Inspection Act 1994*) and an occupational disease notifiable to the State Mining Engineer (r. 3.39 of the *Mines Safety Inspection Regulations 1995*).

For those diagnosed with Legionnaires' disease in Australia, the fatality rate can be up to 50 per cent. Therefore, all cases of Legionnaires' disease must be reported to the Department of Health to enable immediate investigation and remediation of the source to prevent an outbreak with prompt, targeted treatment of affected people.

Effective risk management, i.e. identification, assessment and control, is necessary to reduce the risk of workers inhaling mists or aerosols that are contaminated with *Legionella*.

Contributory factors

Dust suppression, drill sprays and high pressure washing creates water mist. Inhalation of these mists present a heightened risk for workers developing disease if *Legionella* is present in the water. The risk of infection is proportional to the bacterial count, the frequency and duration of exposures and the number of personnel exposed to the mists.

Elevated concentrations of *Legionella* is regularly measured in non-potable water supplies. However, recycled and natural water sources for non-potable applications are not routinely monitored for microbial contamination, including *Legionella*.

Other contributory factors that influence potential risk of *Legionella* infections include:

- source water temperatures less than 60°C - *Legionella* survives in temperatures of 20-50°C and thrives in 25-42°C
- presence of biofilm nutrient sources - algae, non-pathogenic bacteria or amoeba in the water reticulation system (tanks, pipework and fixtures) provides a nutrient source supporting growth of *Legionella*
- water stagnation - prolonged periods of stagnation from occasional use, long distances from source to end supply outlets, and/or deadlegs in the system allow bacteria growth
- ventilation systems that fail to remove contaminants
- personal risk factors - smoking, chronic heart or lung disease, diabetes, some forms of cancer, immunosuppression (HIV/AIDS, transplant recipients, autoimmune disease), males over 45 years of age, and excessive alcohol consumption all increase the likelihood of infection.

Actions required

The Department's Code of Practice: Prevention and control of Legionnaires' disease provides information on possible sources, risk management strategies and treatment protocols.

In summary, mines should:

- identify all sources of water mists and aerosols from mining operations, facilities and ancillary functions
- assess the risk of exposure to sources of mists and aerosols
- review risk management strategies for tasks and activities that generate mists and aerosols

- implement controls to restrict *Legionella* growth and prevent exposure
- apply the hierarchy of controls:
 - use alternate, clean water sources
 - use engineering controls such as residual biocides, drift-eliminators, or extraction ventilation
 - if required, use personal protective equipment such as respirators
- implement a *Legionella* monitoring strategy to verify control effectiveness
- enact appropriate planned maintenance, remedial treatment or corrective actions to prevent *Legionella* as necessary
- ensure that the site emergency response plan includes management of potential infection outbreaks.

Further information

Further information can be obtained from:

http://www.dmp.wa.gov.au/Documents/Safety/MSH_COP_PreventionAndControlOfLegionairesDisea

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