



DEFENCE WHS FACT SHEET No 27 – October 2012

LONG-TERM EXPOSURE TO DIESEL EXHAUST EMISSIONS

BACKGROUND

1. On 12 June 2012, the International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO), classified diesel engine exhaust as *carcinogenic to humans (Group 1)*, based on sufficient evidence that exposure is associated with an increased risk for lung cancer. The most powerful evidence came from a retrospective study of underground coal miners from West Virginia, taking into account potential confounders such as recall bias and smoking. IARC had previously classified diesel exhaust as *probably carcinogenic to humans (Group 2A)*.

KEY ISSUES

2. Diesel exhaust fumes are ubiquitous, as large numbers of diesel-powered vehicles and other equipment are operated in the civilian and ADF environments. As well as surface vehicles, many NAVY vessels are powered by diesel engines.
3. Large populations are exposed to diesel exhaust in everyday life, whether through their occupation or through the ambient air. People are exposed not only to motor vehicle exhausts but also to exhausts from other diesel engines, including from other modes of transport (e.g. diesel trains and ships) and from power generators. However, the exposure of the general population is quite different from that found in the IARC evidence, which was based on high, prolonged exposure in underground miners. This latest IARC determination is primarily based on assessments of health outcomes following many years of past exposure to diesel engine exhaust, and it is unclear what (if any) health impact there will be from new exposure to today's diesel engines. The exposures relating to cancer were likely to have been much higher than what most Defence members or the public would experience.
4. Although there have been changes in diesel engine technologies, such as reduction of the sulphur content of fuel, changes in engine design to burn diesel more efficiently, and reduction in emissions through exhaust control technologies, it is not yet clear how the changes may translate into altered health effects. Existing fuels and vehicles without such modifications will take some time to replace.
5. The potential for a higher level of exposure to diesel exhaust fumes exists wherever workers are in close proximity to operating diesel equipment. In most cases the fact that the equipment is operating in an open environment will significantly reduce the potential for excessive exposure. However, operating diesel equipment in confined areas will increase the level of exposure.
6. In the absence of an Australian/New Zealand Standard, exposure standards recommended by the Australian Institute of Occupational Hygienists (AIOH) were used in exposure monitoring work of M113 crew carried out in June 2012. This work found that levels of exposure to diesel particulate matter (DPM) were well within the AIOH recommended occupational exposure standard of 0.1 mg/m³, measured as submicron elemental carbon. Sulphur dioxide levels were within the Australian Safety and Compensation Council (ASCC) Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003 (1995)] TWA standard of 2 ppm, and no significant carbon monoxide or volatile organic compounds exposure was detected. This report is at http://intranet.defence.gov.au/armyweb/sites/DAH/docs/M113_Air_Monitoring_Report-obr.pdf.

CONCLUSIONS

7. It is not feasible to ban diesel engines, so action to mitigate the risk will concentrate on assessing the extent of the occupational health risk, and instituting work practices which will limit exposure.
8. Assessment of the potential occupational health risk within particular workplaces should involve reviews and risk assessments of workplaces to identify possible issues relating to diesel exhaust fumes and diesel



particulate matter (DPM). This should be followed by air sampling for workplaces (where highlighted by the risk assessment) for diesel exhaust fumes to determine whether DPM, sulphur and carbon monoxide exposure levels are within the AIOH recommended exposure standards, and evaluation of existing work practices and controls to determine whether they provide adequate protection to personnel.

9. Upstream assessments will help highlight where risks are already well controlled (or not) and highlight areas of greater risk. The assessment process within each unit should address issues such as: what items of plant are the likely offenders; who are the most at risk personnel and whether AC563s need to be raised to document their exposure; the need to ensure that guidelines are provided to relevant units and personnel on how to reduce emissions.
10. There is no single control technology for control of worker exposure to diesel engine exhaust. Control options might include low emission engines, low emission fuel, adequate ventilation systems, a good standard of engine maintenance, exhaust filtration systems, air-conditioned operator's cabins on mobile plant, review of operating practices, appropriate personal protective equipment (PPE) and driver/workforce education.
11. There are no special health monitoring or other predictive health tests that are of use in following up past diesel exposures.
12. **Veterans' health.** The Repatriation Medical Authority (RMA) comprises a panel of five practitioners eminent in fields of medical science, whose role is to determine Statements of Principles (SOPs) for any disease, injury or death that could be related to military service, based on sound medical-scientific evidence. The SOPs state the factors which "must" or "must as a minimum" exist to cause a particular kind of disease, injury or death. There are existing SOPs applicable under the MRCA and the Veterans Entitlement Act (VEA) that provide treatment and compensation for conditions linked to diesel exhausts.

WHAT SHOULD I DO?

13. *Current serving members.* If you believe that you have been exposed to diesel exhaust fumes through your service employment, and you believe that your health has been affected by this exposure, you should submit form AC563 Defence WHS Incident Report and contact your local Health Services to arrange an exposure evaluation. You may also lodge a claim with the Department of Veterans' Affairs (DVA) if you believe that your health has been affected by this exposure to diesel exhaust fumes. DVA can be contacted on 133 254 or 1300 550 461.
14. *Former ADF members.* If you believe that you have been exposed to diesel exhaust fumes through your service employment, and you believe that your health has been affected by this exposure, you should contact Medibank Health Solutions to arrange a medical assessment. You may also lodge a claim with the Department of Veterans' Affairs (DVA) if you believe that your health has been affected by this exposure to diesel exhaust fumes.
15. *Current and former civilian employees.* If you believe that you have been exposed to diesel exhaust fumes, and you believe that your health has been affected, through your Defence employment, you should contact Medibank Health Solutions to arrange a medical assessment. Current employees must also submit an AC563 Defence WHS Incident Report.
16. *ADF Cadets, Instructors of Cadets and Officers of Cadets.* If you believe that you have been exposed to diesel exhaust fumes through your service employment, and you believe that your health has been affected by this exposure, you should submit form AC563 Defence WHS Incident Report and contact Medibank Health Solutions to arrange a medical assessment.
17. *Contractors and visiting personnel to Defence establishments.* Under the Work Health and Safety Act, Defence has a duty to take all reasonably practical steps to protect the health and safety of contractors, their staff and other persons at or near Defence controlled workplaces. However these workers have no entitlement to Defence-provided medical counselling and preliminary medical examinations. They will need to contact their employer for further information.



FIRST AID AND EMERGENCY TREATMENT

18. In the event of poisoning due to excessive acute exposure to diesel exhaust fumes, remove the victim from the source of the exposure, making sure not to endanger the rescuer, who should wear suitable personal protective equipment. If the victim is not responsive, commence CPR, making sure not to contaminate the rescuer. If the patient shows signs and symptoms of poisoning, ring **000** for an ambulance, and contact the **National Poisons Information network** (telephone **13 11 26**) for detailed guidance on handling the emergency.
19. Send the patient for medical evaluation as soon as possible. In more severe cases the patient may need to be transported by ambulance.

NOTE FOR CLINICIANS

20. In the event of acute poisoning, further guidance should be obtained from an experienced clinical toxicologist at an early stage.

RESOURCES AND FURTHER INFORMATION

21. Further information may be obtained from:
 - a. International Agency for Research on Cancer: http://press.iarc.fr/pr213_E.pdf
 - b. Silverman DT *et al* (2012) The diesel exhaust in miners study: a nested case – control study of lung cancer and diesel exhaust. *J Natl Cancer Inst* **104**:1 8–5 154–868.
<http://jnci.oxfordjournals.org/content/104/11/855.full.pdf+html>
 - c. Attfield MD *et al* (2012) The diesel exhaust in miners study: a cohort mortality study with emphasis on lung cancer. *J Natl Cancer Inst* **104**:1–15.
<http://jnci.oxfordjournals.org/content/early/2012/03/05/jnci.djs035.full.pdf+html>
 - d. American Cancer Society (2012) Diesel exhaust.
<http://www.cancer.org/Cancer/CancerCauses/OtherCarcinogens/Pollution/diesel-exhaust>
 - e. Diesel Particulate Matter Exposure Monitoring. Occupational Hygiene Procedure. Chapter 11, HLTHMAN 20, Preventive Medicine (in preparation).

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