

CHAPTER 22

BLAST OVERPRESSURE—REPEATED LOW-LEVEL EXPOSURE

INTRODUCTION

22.1 Blast overpressure is caused by a shock wave over normal atmospheric pressure and is typically the result of explosions. Injuries related to high blast overpressure exposures have been well characterised. Understanding of the health effects from repeated lower-level blast exposures is evolving, but it may constitute a health risk.

AIM

22.2 This chapter details procedures to minimise exposure and manage the health risks associated with incidental and occupational exposure to blast overpressure.

SCOPE

22.3 This chapter is written for health practitioners who provide health support and services in Defence.

EXPOSURE

22.4 Low level blast overpressure exposure most frequently occurs in the training environment and may result from breaching activities, small arms fire, or mortar and artillery emissions. There is no regulated 'safe threshold' limit, and 4 psi (28 kPA) is often used as an exposure limit (based on the threshold for tympanic membrane perforation) and these types of activities have shown overpressure exposures between 1 psi (7kPA) to 12 psi (83kPA). During training there may be multiple repetitions and even those with low peak exposure levels and multiple repetitions may receive a high cumulative exposure.

22.5 Repeated exposure to repeated low level blast overpressure (<3psi) has been demonstrated to have measurable but generally transient health effects and the evidence base continues to develop. Given the uncertainties around what constitutes a safe exposure threshold for repeated low level blast overpressure and potential associated health effects, a precautionary approach should be taken to minimise exposure where possible.

Minimising exposure

22.6 In accordance with the [Work Health and Safety Act 2011](#)²¹¹ and [Work Health and Safety Regulations 2011](#)²¹², and the [Model Code of Practice](#)²¹³, risk owners are required to clearly characterise and manage the risk related to blast overpressure using the hierarchy of controls so far as is reasonably practicable. The higher-level controls are elimination, substitution and engineering measures. These are preferred to lower-level controls as they provide a more reliable risk reduction, the lower-level controls rely on appropriate application and efficacy is impacted by human factors. The following are controls which could be considered to minimise exposure in the training environment:

- a. **Elimination.** Where controls do not adequately manage risk, it needs to be considered whether the risk to members associated with a training activity justifies the training requirement. Elimination is the highest level of control.
- b. **Substitution.** The activity is changed or substituted with an alternate activity to reduce hazardous exposure; examples include use of different techniques with reduced or no blast exposure, and remote or simulated activities
- c. **Engineering controls.** These are measures which use an engineering measure to reduce the exposure. For blast overpressure this would be barriers placed between participants and blasts to reduce exposures (closing hatches or erecting barriers to protect crew).
- d. **Administrative controls.** This includes measures applied to reduce exposure. Mitigations may include:
 - (1) limits on proximity (safe distance), location, total number and size of crew
 - (2) limits on blast size, frequency of activity
 - (3) blast gauge monitoring (personal and area)
 - (4) limiting exposure based on monitoring
 - (5) recording exposure and any health effects
 - (6) signage and warning
 - (7) training and education on the health effects of exposure and the importance of controlling exposure.

²¹¹ <https://www.legislation.gov.au/Series/C2011A00137>

²¹² <https://www.legislation.gov.au/Series/F2011L02664>

²¹³ <https://www.safeworkaustralia.gov.au/doc/model-code-practice-how-manage-work-health-and-safety-risks>

- e. **Personal protective equipment.** May include use of appropriately rated helmets, ear protection, body armour and mouth guards where appropriate. It is the lowest level of protection. It should be ensured that equipment is appropriate for the activity and fits well.

22.7 More information can be found in the Defence Safety Manual (SafetyMan). SafetyMan is the primary source of work health and safety policy for Defence and is to be used in conjunction with the [Work Health and Safety Act 2011](#) and [Work Health and Safety Regulations 2011](#). Information about risk management can be found at [Defence WHS Risk Management Process](#)²¹⁴.

HEALTH EFFECTS

22.8 The evidence about health effects associated with repeated exposure to low level blast overpressure is evolving. Available evidence shows:

- a. **Acute effects.** Exposure to repeated low-level blast overpressure has been associated with transient health effects, including tinnitus, sleep disturbance, balance, mood change and irritability, headaches, changes in reaction time, cognition and memory
- b. **Chronic effects.** Exposure to repeated low-level blast overpressure has not been found to be causally-linked with chronic human health effects
- c. **Carcinogenicity.** Exposure to repeated low-level blast overpressure has not been found to be carcinogenic.

HEALTH MONITORING

22.9 If a Defence workplace identifies a requirement for health monitoring, the commander or manager is to assess the requirement in accordance with *Defence Health Manual* (DHM) [Vol 1 Part 14 Chapter 1](#)²¹⁵—‘Occupational health monitoring’. If required, health monitoring should occur in accordance with [DHM Vol 3 Part 14 Chapter 1](#)²¹⁶—‘Health monitoring procedures’.

ASSESSMENT FOLLOWING INCIDENTAL EXPOSURE

22.10 Defence health practitioners are to enter the data related to the exposure in the member’s health record via the electronic health system, or via [Form AE777](#)²¹⁷—‘ADF Acute Occupational Exposure Record’ if the electronic health system is not available.

22.11 A suitably qualified health practitioner is to counsel the Defence member following exposure. Counselling should include information about the likely risk associated with exposure.

22.12 Defence members are responsible for reporting work health and safety events on [Sentinel](#)²¹⁸. If the member has not reported the exposure, the MO should encourage the member to report it via [Sentinel](#).

Historical exposures

22.13 Defence members can record historical exposures on [Form AE775](#)²¹⁹—‘ADF Historical Occupational Exposure Record.’

ADVICE

22.14 Health practitioners can seek advice from the Joint Health Command [Senior Medical Adviser Occupational and Environmental Medicine](#)²²⁰.

SPONSOR: Assistant Secretary Health Protection and Policy