



Physical Hazards: Mobile Plant

Core Body of Knowledge for the
Generalist OHS Professional



Safety Institute
of Australia Ltd



Australian OHS Education
Accreditation Board

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The OHS Body of Knowledge for Generalist
OHS Professionals has been developed under the
auspices of the **Health and Safety Professionals Alliance**



The Technical Panel established by the Health and Safety Professionals Alliance (HaSPA) was responsible for developing the conceptual framework of the OHS Body of Knowledge and for selecting contributing authors and peer-reviewers. The Technical Panel comprised representatives from:



The Safety Institute of Australia supported the development of the OHS Body of Knowledge and will be providing ongoing support for the dissemination of the OHS Body of Knowledge and for the maintenance and further development of the Body of Knowledge through the Australian OHS Education Accreditation Board which is auspiced by the Safety Institute of Australia.



Synopsis of the OHS Body Of Knowledge

Background

A defined body of knowledge is required as a basis for professional certification and for accreditation of education programs giving entry to a profession. The lack of such a body of knowledge for OHS professionals was identified in reviews of OHS legislation and OHS education in Australia. After a 2009 scoping study, WorkSafe Victoria provided funding to support a national project to develop and implement a core body of knowledge for generalist OHS professionals in Australia.

Development

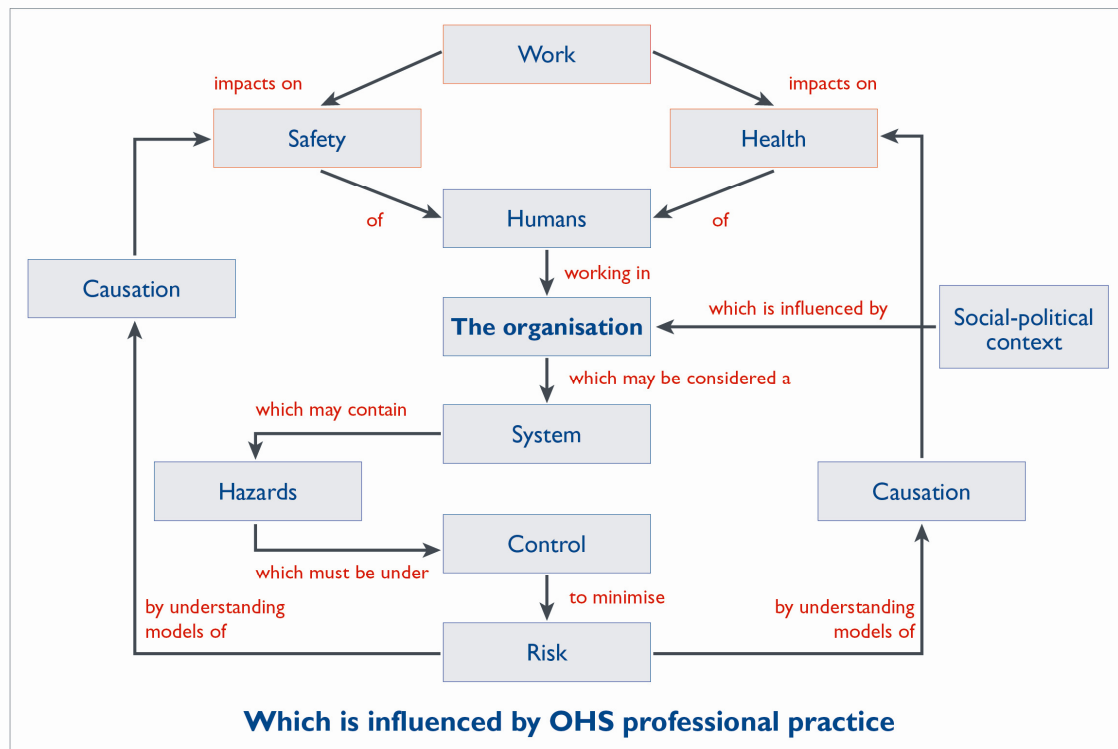
The process of developing and structuring the main content of this document was managed by a Technical Panel with representation from Victorian universities that teach OHS and from the Safety Institute of Australia, which is the main professional body for generalist OHS professionals in Australia. The Panel developed an initial conceptual framework which was then amended in accord with feedback received from OHS tertiary-level educators throughout Australia and the wider OHS profession. Specialist authors were invited to contribute chapters, which were then subjected to peer review and editing. It is anticipated that the resultant OHS Body of Knowledge will in future be regularly amended and updated as people use it and as the evidence base expands.

Conceptual structure

The OHS Body of Knowledge takes a ‘conceptual’ approach. As concepts are abstract, the OHS professional needs to organise the concepts into a framework in order to solve a problem. The overall framework used to structure the OHS Body of Knowledge is that:

Work impacts on the **safety** and **health** of humans who work in **organisations**. Organisations are influenced by the **socio-political context**. Organisations may be considered a **system** which may contain **hazards** which must be under control to minimise **risk**. This can be achieved by understanding **models causation** for safety and for health which will result in improvement in the safety and health of people at work. The OHS professional applies **professional practice** to influence the organisation to being about this improvement.

This can be represented as:



Audience

The OHS Body of Knowledge provides a basis for accreditation of OHS professional education programs and certification of individual OHS professionals. It provides guidance for OHS educators in course development, and for OHS professionals and professional bodies in developing continuing professional development activities. Also, OHS regulators, employers and recruiters may find it useful for benchmarking OHS professional practice.

Application

Importantly, the OHS Body of Knowledge is neither a textbook nor a curriculum; rather it describes the key concepts, core theories and related evidence that should be shared by Australian generalist OHS professionals. This knowledge will be gained through a combination of education and experience.

Accessing and using the OHS Body of Knowledge for generalist OHS professionals

The OHS Body of Knowledge is published electronically. Each chapter can be downloaded separately. However users are advised to read the Introduction, which provides background to the information in individual chapters. They should also note the copyright requirements and the disclaimer before using or acting on the information.

Hazards: Mobile Plant

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**Core Body of
Knowledge for the
Generalist OHS
Professional**

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Hazards: Mobile Plant

Abstract

Mobile plant is used in many Australian workplaces. The use of mobile plant has inherently high risk and every year is associated with a significant number of workplace fatalities and injuries. This chapter describes types of mobile plant commonly used in workplaces, the advantages and disadvantages of its use and the associated risk factors. An overview of the current legislative approach to regulating mobile plant is provided together with a review of the strategies for controlling hazards associated with mobile plant. A case study demonstrates the role of the generalist Occupational Health and Safety (OHS) professional in managing mobile-plant-related safety.

Keywords

mobile plant, hazard, risk, injury, legislation, control

Contents

| | | |
|-----|---|----|
| 1 | Introduction | 1 |
| 2 | Historical context | 1 |
| 3 | Extent of the problem | 2 |
| 4 | Understanding mobile plant | 3 |
| 4.1 | Types of mobile plant | 3 |
| 4.2 | Advantages and disadvantages of using mobile plant | 4 |
| 4.3 | Risk factors and injuries associated with use of mobile plant | 5 |
| 4.4 | Risk assessment | 6 |
| 5 | Legislation and standards | 7 |
| 6 | Control of hazards associated with use of mobile plant..... | 8 |
| 6.1 | Elimination..... | 8 |
| 6.2 | Substitution | 8 |
| 6.3 | Engineering controls | 9 |
| 6.4 | Administrative controls..... | 9 |
| 6.5 | Personal protective equipment..... | 11 |
| 7 | Implications for OHS practice..... | 11 |
| 8 | Summary | 12 |
| | Key authors and thinkers | 13 |
| | References | 13 |
| | Appendix 1: Australian Standards applicable to mobile plant | 14 |

1 Introduction

Mobile plant of varying capacity is used in most industries in Australia and around the world. The Australian model *Work Health and Safety Act* (Safe Work Australia, 2011) defines ‘plant’ as:

- (a) any machinery, equipment, appliance, container, implement and tool; and
- (b) any component of any of those things; and
- (c) anything fitted or connected to any of those things (WHS s 4).

The draft model *Work Health and Safety Regulations* (Safe Work Australia, 2010a) define ‘powered mobile plant’ as:

plant that is provided with some form of self-propulsion that is ordinarily under the direct control of an operator (WHSR 1.1).

Types of powered mobile plant that come under this definition include:

- Plant designed to lift or move people or materials, e.g. forklifts, lift trucks, industrial reach trucks, elevating work platforms, mobile cranes, dumpers, sweepers, concrete-placing units, pile drivers
- Earth-moving machinery, e.g. bulldozers, excavators, front-end loaders, backhoes, ditch diggers, scrapers, graders, draglines, bobcats, pile drivers, skid-steer loaders
- Tractors.

After brief consideration of the historical context of mobile-plant safety and the extent of the problem, this chapter reviews types of mobile plant, advantages and disadvantages of its use in the workplace and potential risk factors. An overview of the legislative approach provides a basis for a discussion of control measures. The chapter concludes with a case study that demonstrates the role of the generalist Occupational Health and Safety (OHS) professional in managing mobile-plant safety.

2 Historical context

The mechanical principles of cranes have been applied to lifting items since the times of the early Greeks and Romans. The middle nineteenth century through the early twentieth century saw the developments that led to today's modern forklifts with battery powered platform trucks used for moving luggage on trains in the US; their use expanded and the development of different types of handling equipment in the UK and the US in response to labor shortages caused by the World War I. World War II also spurred the use of forklift trucks with more efficient methods for storing products in warehouses requiring more maneuverable forklift trucks that could reach greater heights. The 1970s and 80s saw the development of elevating work platforms and scissor lifts.

Historically, due to the associated high risk, plant (including mobile plant) safety has been highly regulated in all Australian jurisdictions under the principal health and safety Acts and regulations. Most Australian jurisdictions developed detailed codes, guidance material and industry standards to compliment the regulations, and address particular types of plant and plant-related activities in specific industries. A *National Standard for Plant* (NOHSC, 1994) was developed and incorporated to varying degrees into legislation in all jurisdictions. The practical nature of the plant-safety-management guidance material developed in the jurisdictions generally has been well received by Australian industries.

3 Extent of the problem

Mobile plant is a major cause of workplace incidents in Australia and around the world. The essential characteristics of mobile plant – its mobility in combination with the level of operator skill and experience, the particulars of the workplace environment, the presence of people in the workplace, design and manufacture limitations and maintenance requirements – result in inherently high risk.

Australian workers' compensation claim data (Safework Australia) indicate that although serious mobile-plant-related workers' compensation claims resulting in a fatality, permanent incapacity or temporary incapacity with an absence from work of one working week or more have steadily decreased since 1997–98, mobile plant still represents a serious risk to the health and safety of Australian workers
Table 1(Table 1).

Table 1: Claims related to operation of mobile plant 1997–98 to 2006–07 (Safe Work Australia, 2006–07)

| Agency | 1997/ 98 | 1998/ 99 | 1999/ 00 | 2000/ 01 | 2001/ 02 | 2002/ 03 | 2003/ 04 | 2004/ 05 | 2005/ 06 | 2006/ 07 |
|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | No. claims | No. claims | No. claims | No. claims | No. claims | No. claims | No. claims | No. claims | No. claims | No, claims |
| Self-propelled plant | 1115 | 995 | 935 | 990 | 925 | 940 | 940 | 1030 | 945 | 905 |
| Semi-portable plant | 930 | 905 | 890 | 775 | 660 | 700 | 785 | 795 | 825 | 825 |
| Other mobile plant | 3345 | 3045 | 3025 | 2910 | 2710 | 2715 | 2830 | 2820 | 2580 | 2545 |
| Total | 5390 | 4945 | 4850 | 4675 | 4295 | 4355 | 4555 | 4645 | 4350 | 4275 |

In the year 2006–07¹ there were 4275 claims (3.2% of all claims) associated with use of mobile plant; of these, nearly 50% involved sprains and strains, 17% involved contusions or open wounds, and 13% involved fractures, dislocations or amputations. A total of 70% of the claims involved two or more weeks' absence from work. Seven people died during 2006–07 as a result of work-related use of mobile plant (Safe Work Australia, 2006-7).

The industries of construction and manufacturing together accounted for 32% of claims related to mobile plant; agriculture, forestry and fishing; mining; retail trade; transport and storage; property and business services; and health and community services each accounted for 7–8% of claims related to use of mobile plant (Safe Work Australia, 2006-7).

4 Understanding mobile plant

While generalist OHS professionals are not expected to be experts on health and safety issues associated with mobile plant, they should be aware of the types of mobile plant that might be used in the workplace, and the advantages, disadvantages and risk factors associated with its use.

4.1 Types of mobile plant

As noted in section 1, mobile plant includes plant designed to lift or move people or materials, earth-moving machinery and tractors. Table 2 provides examples of types of mobile plant used in specific industries.

Table 2: Types of mobile plant commonly used by industry

| Industry | Mobile Plant Commonly Used |
|-----------------------------------|---|
| Manufacturing | Forklifts, mobile cranes, elevating work platforms, sweepers, lift trucks, industrial reach trucks |
| Mining | Excavators, bulldozers, front-end loaders, mobile cranes, backhoes, pile drivers, scrapers, skid-steer loaders, power shovels, draglines, rollers, concrete-placing units |
| Construction | Forklifts, mobile cranes, elevating work platforms, excavators, front-end loaders, backhoes, ditch diggers, sweepers, dumpers, pile drivers, hole borers, scrapers, skid-steer loaders, rollers, concrete-placing units |
| Agriculture, Forestry and Fishing | Tractors, graders, excavators, backhoes, scrapers, forklifts, telehandlers, timberjack delimiters, mobile cranes, elevating work platforms, front-end loaders |
| Transport and Storage | Forklifts, telehandlers, elevating work platforms, mobile cranes, container-handling carriers |

¹ This was the most up-to-date complete data available at the time of writing.

| | |
|---------------------------------------|---|
| Communications | Forklifts, mobile cranes, elevating work platforms, excavators, backhoes, pile drivers, hole borers, concrete-placing units |
| Government Administration and Defence | Forklifts, mobile cranes, elevating work platforms, excavators, front-end loaders |
| Retail and Wholesale Trade | Forklifts, mobile cranes, elevating work platforms |
| Electricity, Gas and Water Supply | Forklifts, concrete-placing units, mobile cranes, elevating work platforms, excavators, front-end loaders |
| Health and Community Services | Forklifts, mobile cranes, elevating work platforms |

4.2 Advantages and disadvantages of using mobile plant

There are many reasons for using mobile plant. The fact that the plant is mobile is the fundamentally advantageous characteristic as it enables people, materials and earth to be lifted and moved for various reasons and in various environments where the requirement for mobility cannot be satisfied by static plant. Specific advantages and disadvantages of mobile plant depend on the industry and its requirements, and the type of mobile plant and how it is used. Generally, however, use of mobile plant has the following operational and financial advantages:

- Operational
 - can be used at various locations
 - can eliminate or reduce certain risks, such as the requirement for manual-handling activities and working-at-heights activities
 - can be used for a wide variety of activities and tasks
 - various types are available in various shapes, sizes and capacities to meet the demands of different tasks and environments
- Financial
 - Productivity – can dramatically increase productivity levels, save time, effort and cost
 - Cost effectiveness – can be hired and used as required, when required; does not necessarily need to be purchased by the business.

The major disadvantage of the use of mobile plant is increased risk associated with its mobility; however, other operational issues to be managed include:

- High maintenance – requirements are generally quite specific and can result in down time
- Increased training and qualification requirements – operator license and training requirements are specific and costly; operators are required to hold a High Risk Work License

- Increased impact on workplace design – a workplace redesign may be required to accommodate mobile-plant travel paths
- Increased costs involved in hiring/purchasing, operating and maintaining mobile plant.

4.3 Risk factors and injuries associated with use of mobile plant

The essential characteristic of mobile plant – its mobility – presents a fundamental workplace hazard. Common causes of mobile-plant-related incidents can be grouped into four categories:

- Organisation of work
 - Lack of, or inadequate, supervision
 - Failure to communicate
 - Time pressures
 - Poor planning and design of the workplace, the task or the plant
- Equipment
 - Poor selection of plant
 - Lack of, or inadequate, maintenance
 - Lack of, or inadequate or faulty, control measures
 - Manufacturing faults
 - Design faults
 - Environmental factors such as terrain
- Procedures
 - Lack of, or inadequate, procedures or failure to adhere to procedures
 - Over-use or inappropriate use
 - Maintenance or operation by unauthorised persons
- People
 - Lack of, or inadequate, training in plant use, operation or maintenance
 - Lack of, or inadequate, knowledge of and/or experience with the plant and its operation, maintenance and limitations
 - Lapses of concentration by the operator or people in proximity to the plant
 - Unauthorised access.

Types of injuries associated with use of mobile plant depend on the type of mobile plant as well as the industry and working environment. Table 3 gives some examples of the mechanism of injuries commonly caused by various types of mobile plant.

Table 3: Types of injuries associated with use of mobile plant

| Mobile Plant | Common Types of Injuries Caused by Use |
|-------------------------|--|
| Mobile Crane | Crushing, caught between or entrapment, electrocution, sprains and strains, falls, striking, hearing loss, hitting |
| Forklift | Crushing, caught between or entrapment, electrocution, sprains and strains, striking |
| Tractor | Crushing, caught between or entrapment, sprains and strains, falls, striking, hitting |
| Elevating work platform | Crushing, caught between or entrapment, electrocution, sprains and strains, falls, striking, hearing loss, hitting |
| Excavator | Crushing, caught between or entrapment, electrocution, sprains and strains, falls, striking, hearing loss |
| Bobcat | Crushing, caught between or entrapment, electrocution, sprains and strains, falls, striking, hitting |

4.4 Risk assessment

In general, the risks associated with use of mobile plant and the control measures are known. Accordingly, as discussed in the draft code of practice on managing risk (Safe Work Australia, 2010a), risk assessments may not be the most effective risk-management method for mobile plant. In circumstances where the levels of risk are clearly high (as is often the case with mobile plant) it is recommended that rather than consuming time and energy on risk assessment, the OHS professional and work team should focus directly on risk control. The combined critical characteristics of the type of mobile plant, the working environment and the nature of the activity will determine whether or not, and to what extent, risk assessment is necessary. For example, the pre-job safety assessment for use of a mobile crane should address planning, setting up and operating the crane safely in a specific situation. While this assessment would require specialist knowledge and experience, Figure 1 indicates the minimum requirements where the generalist OHS professional may have a role.

Examples of items to be considered in preliminary assessment for use of mobile cranes

- ☐ The working environment inclusive of safe access, egress and operation
- ☐ Other activities being undertaken, and people working in the work environment who may be exposed to risks associated with the operation of the mobile crane, and the impact of the operation of the mobile crane on the working environment and work activities
- ☐ Other hazards that may be present in the working environment such as powerlines, underground services, other mobile plant, etc.
- ☐ The loads to be lifted and the working activity to be undertaken
- ☐ Ground stability and suitability for the work to be undertaken
- ☐ Type and capacity of mobile crane required to undertake the work activity
- ☐ Limits on loads and reach of the mobile crane that may require the development of engineering computations and drawings
- ☐ Inspections, records, documentation and evidence necessary to confirm that the mobile crane is safe for operation
- ☐ Training, licenses and qualifications required for the work activity, and the necessary evidence or compliance
- ☐ Any notifications that may be required.

Figure 1: Example of pre-job safety assessment for mobile plant

5 Legislation and standards

Traditionally, the principal health and safety Act in each jurisdiction has placed general duties not only on employers, but on a range of upstream parties (including persons who design, manufacture, import, supply, install and erect plant), whose actions have the potential to impact mobile-plant-related health and safety. The regulation of mobile plant under the national model *Work Health and Safety Act* (Safe Work Australia, 2011) does not vary dramatically from previous legislation. While persons managing or controlling plant at a workplace must ensure, so far as is reasonably practicable, that the plant is safe and without risks (WHS s 21), designers, manufacturers, importers, suppliers and those commissioning mobile plant all have responsibilities specific to their role to ensure that the mobile-plant-related risks to health and safety are eliminated or minimised. These duties extend to people who install, use or carry out any reasonably foreseeable activity at a workplace in relation to the proper use, decommissioning or dismantling of the plant or are in the vicinity, and whose health and safety may be affected (WHS s 23). There are also requirements for the designs of specific type of mobile plant to be registered (WHSR 5.2).

The obligations of persons conducting a business or undertaking (PCBU) involving the management or control of mobile plant are described in the model *Work Health and Safety Regulations* (Safe Work Australia, 2010b). These obligations include eliminating as far is reasonably practicable the risk of:

- (a) the plant overturning; or
- (b) things falling on the operator of the plant; or
- (c) the operator being ejected from the plant; or
- (d) the plant colliding with any person or thing (WHSR 5.1).

Also, the PCBU must ensure that “no person other than the operator rides on powered mobile plant unless the person is provided with a level of protection that is equivalent to that provided to the operator” and that suitable warning devices are fitted (WHSR 5.1).

In addition, most jurisdictions have developed industry standards and codes that do not have a legal status but allow duty holders to follow the standard or alternative action that achieves equivalent or better level of management. The *National Standard for Plant* (NOHSC, 1994), intended to be the basis for a uniform regime of OHS regulation for plant, was variously adopted under mandatory Commonwealth, state and territory regulations as well as codes of practice. Also, many Australian Standards address various types of mobile plant and their safe design, operation, use and maintenance (Appendix 1).

6 Control of hazards associated with use of mobile plant

A range of strategies can reduce the risk associated with use of mobile plant; the ideal combination of strategies depends on the type of plant, the work environment, the work task, and the skills and knowledge of the operators and those working in the area. As with other hazards, the hierarchy of control provides a useful framework for considering controls.

6.1 Elimination

The preferred control option is to eliminate risks during the planning stages of a mobile-plant design, workplace design or work activity; this can save time and money as well as eliminate risks to health and safety. Eliminating the hazard by designing it out may be as simple as designing a work environment so that pedestrians are removed from the working area of the mobile plant and are not exposed to risk associated with its operation. Another example of eliminating risks through planning and design is using alternative power sources to eliminate fumes and toxic emissions.

6.2 Substitution

Selecting the right plant for the task is critical to the safe use of mobile plant in a workplace; poor or incorrect selection is a major contributing factor to mobile-plant risks. Substituting mobile plant with safer types (e.g. using a crane instead of a forklift to lift certain types of loads) is an effective method of reducing risk levels, as is replacing old plant with newer models that have improved design characteristics (e.g. better visibility, noise insulation, built-in guards, less emissions). Also, substitution may be based on a

requirement to use a safer power supply (e.g. changing from diesel to electric for an indoor environment).

6.3 Engineering controls

Engineering controls – the primary mode of ensuring that mobile-plant risks are reduced and controlled – are essential to mobile-plant safety. Examples include noise insulation, guarding, enclosures, material from which the plant is constructed, and power-supply variations (e.g. diesel, gas, electricity). Safe design of mobile plant can include engineering controls built into the plant's design or added at a later stage. Built-in engineering controls – such as emergency cut-offs, alarms and self-regulating controls – can warn the operator of a fault or if the plant is being used beyond its capacity (e.g. mobile cranes, earth-moving machinery, elevating work platforms). Engineering controls are not limited to the mobile plant; they can be applied to the working environment to control mobile-plant risks (e.g. extraction systems, isolation systems, warning systems, alarm systems and traffic management).

6.4 Administrative controls

While the preference is for elimination, substitution or engineering controls, administrative controls such as Safe Work Method Statements, training and licensing of operators and those who work near the mobile plant, and procedures such as traffic management to control the work environment, all make an important contribution to mobile-plant safety.

6.4.1 Safe Work Method Statements

A requirement for the preparation of Safe Work Method Statements (SWMSs) for all high-risk construction activities is included in the national model WHS regulations (WHSR 6.3). These statements combine a risk assessment with a safe-work procedure to identify, assess and control risks associated with the specific mobile plant, work activity and working environment. The simple, efficient and task-specific nature of an SWMS accommodates the high-risk, dynamic and often complicated nature of mobile plant use in various working environments and facilitates the effective management of health and safety risks associated with all such works.

6.4.2 Work procedures

Effective work procedures are a fundamental aspect of mobile-plant safety and are required for many aspects of mobile-plant operation. Procedures must be developed to address, as a minimum:

- Safe operation of the particular types of mobile plant

- Wearing of seat belts and use of safety devices
- Safe and proper service, maintenance and inspection of the mobile plant
- Traffic management for mobile plant and pedestrians
- Safe shut down, fuelling, parking and isolation procedures.

Requirements for the development of procedures will vary depending on the type of plant and its use. Effective implementation of procedures requires all affected parties to be trained in those procedural requirements. Procedures should be reviewed regularly and improvements made as necessary, particularly when changes have been made to the working environment, activities, mobile plant or processes.

6.4.3 Training and licensing of operators

Traditionally, training and license requirements for mobile-plant operators have been highly regulated in OHS legislation. Operators of a range of mobile plant are required to hold a High Risk Work License (WHSR schedule 3) and there are specific requirements for application, issuing and maintenance of the licenses (WHSR 4.5). While training to hold such licenses is specified by legislation (WHSR schedule 5) it should not be limited to the regulated requirements. After obtaining a High Risk Work License to operate a particular type of mobile plant, it is essential for an operator to be trained in the specifics of the particular workplace and work environment, and in operation of the mobile plant in that environment. Also, workplace training should address the particular task and SWMS for that task. The level of detail required for this task-related training will vary depending on the type of plant being used and the nature of the task. Refresher training covering procedures and plant operation should also occur.

6.4.4 Training for workers working in the vicinity of mobile plant

It is essential that those working in the vicinity of mobile-plant operation are provided with appropriate training and instruction. Workplace induction should include training on all relevant matters associated with their position and the operation of the mobile plant in that particular work environment. Also, they must understand the task-related (SWMS) procedures, and the type of risks presented to them as well the necessary protective control measures. The same principle applies to visitors to the workplace. Anyone entering the workplace where mobile plant is in operation must be trained on the risks associated with the operation of that plant and the requirements for safety controls to prevent injury or incident.

6.4.5 Servicing, maintenance and inspection

Whether undertaken by external specialists or in-house, it is imperative that mobile-plant service, maintenance and inspection schedules comply with manufacturers' requirements,

current legislation and Australian Standards. Records must be kept of all servicing, maintenance and inspection for the life of the plant. Procedures must be developed to address and manage the servicing, maintenance and inspection of all mobile plant, and all service personnel (external or in-house) must be trained in these procedures and suitably qualified to undertake such work; records of training and qualifications must be maintained.

6.4.6 Procedures for controlling the environment in which mobile plant is operated

Traffic management is a crucial element of effective mobile-plant safety. Designing and implementing safe, efficient and operator-centred traffic-management systems for mobile equipment, other vehicles and pedestrians is of key importance in almost all industrial domains (Horberry, 2011). To ensure the effectiveness of traffic-management systems in reducing risks associated with mobile plant, it is essential that existing standards and guidelines are referred to in conjunction with workplace-specific requirements, environmental conditions, activities and mobile plant in use.

6.5 Personal protective equipment

Personal protective equipment does not provide protection from the primary hazard of the mobile plant (i.e. that it is moving), however mobile-plant operators and possibly those working in the vicinity will be exposed to a range of other related hazards. Consequently, the range of personal protective equipment that may be required includes hearing protection, hand protection, eye protection, foot protection, skin protection, suitable attire (pants, tops, etc.), high-visibility clothing, hair net and head protection.

7 Implications for OHS practice

While many aspects of mobile-plant safety require specialist expertise (e.g. relating to design, manufacture, service, inspection, maintenance, and technical details as well as operation), the generalist OHS professional is critical to the effective control of mobile-plant risks in a workplace. Consequently, it is imperative for OHS professionals to be cognisant of those aspects of mobile-plant-safety management that require specialist expertise and to apply substantial knowledge of the working environment where the mobile plant is operating and a system approach to managing OHS. The level of involvement of the OHS professional in managing safety of mobile plant will depend on the industry type and business size. The case study below illustrates how the OHS professional might work with specialist advisors and those in the workplace to effectively control mobile-plant risks.

Case study

A manufacturing company hires various mobile plant (including forklifts, elevating work platforms and mobile cranes) to assist in major service and maintenance works that are undertaken during complete shut-down periods of the manufacturing plant. The duration of hire varies from one day to up to a month. The generalist OHS professional working for the manufacturing company must ensure that all hired plant is safe, complies with legislation and has all necessary supporting documentation, information, instructions and records, and that the plant is operated by suitably trained and licensed operators. To do this, the generalist OHS professional must:

1. Confirm the task or activity to be undertaken and the requirements for mobile plant to be hired to assist with such works
2. Seek specialist advice as required (e.g. engineering, traffic management, maintenance knowledge of specific type of mobile plant, construction operations)
3. Plan how the works are to be undertaken, including how the mobile plant will enter and exit the workplace, and undertake the necessary works; consider emergency requirements, operator-licensing requirements and the impacts of the mobile plant on other activities in the working environment
4. Ensure that the working environment is safe and made ready for the mobile plant to safely enter and safely undertake the necessary works
5. Ensure that the plant selected is suitable for the task and capable of safely undertaking the task
6. Refer to relevant legislation and obtain an understanding of the legislative requirements and relevant Australian Standards pertaining to the mobile plant
7. Refer to guidance material and statistical data pertaining to the types of risks associated with the mobile plant
8. Develop pre-acceptance and pre-operation inspection tools and checklists; consider what inspections, documentation and records are required to ensure the mobile plant is safe and suitable for operation
9. Ensure that the plant-hire company is reputable and has confirmed that the plant is safe, complies with legislation and will be supplied with all necessary documentation, instruction, information and records; visit the plant-hire company, inspect the condition of their plant, peruse their system and procedures, and ask for references; obtain all necessary documentation
10. Develop the necessary procedures and SWMSs for the specific work activities
11. Develop a training program and train all affected workers.

8 Summary

Most industries rely on the use of mobile plant. Unsurprisingly, given its high-risk nature, the use of mobile plant is highly regulated. Regardless of industry type or organisational size, generalist OHS professionals require a basic understanding of the issues associated with mobile plant use as well as the regulatory structure and accepted framework for the management of mobile-plant safety in Australian workplaces. Accordingly, this chapter has outlined types of mobile plant along with the advantages, disadvantages, risk factors and legislation associated with its use. Risk-assessment and risk-control measures were discussed, and implications for OHS practice were considered in the context of a case example.

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Appendix 1: Australian Standards applicable to mobile plant

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| Mobile cranes | |
| AS 1418.5-2002 | Cranes, hoists and winches - Mobile cranes |
| AS 1418.5-2002 / Amdt 1-2004 | Cranes, hoists and winches - Mobile cranes |
| AS 2550.1-2011 | Cranes, hoists and winches - Safe use - General requirements |
| AS 2550.5-2002 | Cranes, hoists and winches - Safe use - Mobile cranes |
| Elevating work platforms | |
| AS 2550.10-2006 | Cranes, hoists and winches - Safe use - Mobile elevating work platforms |
| AS 2550.10-2006 / Amdt 1-2009 | Cranes, hoists and winches - Safe use - Mobile elevating work platforms |
| Tractors | |
| AS 1121.1-2007 | Agricultural tractor power take-offs - Rear-mounted power take-off types 1, 2 and 3 - General specifications, safety requirements, dimensions for master shield and clearance zone |
| AS 1121.2-2007 | Agricultural tractor power take-offs - Rear-mounted power take-off types 1, 2 and 3 - Narrow-track tractors, dimensions for master shield and clearance zone |
| AS 1121.3-2007 | Agricultural tractor power take-offs - Rear-mounted power take-off types 1, 2 and 3 - Main PTO dimensions and spline dimensions, location of PTO |
| AS 1121.4-2007 | Agricultural tractor power take-offs - Guards for power take-off (PTO) drive-shafts - Strength and wear tests and acceptance criteria |
| AS 1636.1-1996 | Tractors - Roll-over protective structures - Criteria and tests - Conventional tractors |
| AS 1636.2-1996 | Tractors - Roll-over protective structures - Criteria and tests - Rear-mounted for narrow-track tractors |
| AS 2012.1-1990 | Acoustics - Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors - Stationary test condition - Determination of compliance with limits for exterior noise |
| AS 2012.2-1990 | Acoustics - Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors - Stationary test condition - Operator's position |
| AS/NZS 2153.1:1997 | Tractors and machinery for agriculture and forestry - Technical means for ensuring safety - General |
| AS/NZS 2153.3:1997 | Tractors and machinery for agriculture and forestry - Technical means for ensuring safety - Tractors |
| AS/NZS 2153.4:1997 | Tractors and machinery for agriculture and forestry - Technical means for ensuring safety - Forestry winches |
| AS/NZS 2153.5:1997 | Tractors and machinery for agriculture and forestry - Technical means for ensuring safety - Power-driven soil-working equipment |
| AS/NZS 2153.6:1998 | Tractors and machinery for agriculture and forestry - Technical means for ensuring safety - Equipment for crop protection |
| AS/NZS 2153.7:1997 | Tractors and machinery for agriculture and forestry - Technical means for ensuring safety - Combine harvesters, forage and cotton harvesters |
| AS/NZS 2153.9:1997 | Tractors and machinery for agriculture and forestry - Technical means for ensuring safety - Equipment for sowing, planting and distributing fertilizers |
| AS 4594.10-1999 | Internal combustion engines - Performance - Engines for agricultural tractor and marine use - Test code, net power |
| Earth-moving machinery | |
| AS 4772-2008 | Earth-moving machinery - Quick hitches for excavators and backhoe loaders |
| AS 4987-2002 | Earth-moving machinery - Tip-over protection structure (TOPS) for compact excavators - Laboratory tests and performance requirements |
| AS 2958.1-1995 | Earth-moving machinery - Safety - Wheeled machines - Brakes |

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| AS 2958.3-1992 | Earth-moving machinery - Safety - Roller compactors - Brake systems |
| AS 2012.1-1990 | Acoustics - Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors - Stationary test condition - Determination of compliance with limits for exterior noise |
| AS 2012.2-1990 | Acoustics - Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors - Stationary test condition - Operator's position |
| AS 2294.1-1997 | Earth-moving machinery - Protective structures – General |
| AS 4457.1-2007 | Earth-moving machinery - Off-the-road wheels, rims and tyres - Maintenance and repair - Wheel assemblies and rim assemblies |
| AS 4457.2-2008 | Earth-moving machinery - Off-the-road wheels, rims and tyres - Maintenance and repair - Tyres |
| AS 3868-1991 | Earth-moving machinery - Design guide for access systems |
| AS 4242-1994 | Earth-moving machinery and ancillary equipment for use in mines - Electrical wiring systems at extra-low voltage |
| Forklifts / industrial lift trucks | |
| AS 4983-2010 | Gas fuel systems for forklifts and industrial engines |
| AS 2359.10-1995 | Powered industrial trucks - Fork-lift trucks - Hook-on type fork arms - Vocabulary |
| AS 2359.11-1995 | Powered industrial trucks - Fork-lift trucks - Hook-on type fork arms and fork carriers - Mounting dimensions |
| AS 2359.3-1995 | Earth-moving machinery - Safety - Roller compactors - Brake systems |
| AS 2012.1-1990 | Powered industrial trucks - Counterbalanced fork-lift trucks - Stability tests |
| AS 2359.4-1995 | Powered industrial trucks - Reach and straddle fork-lift trucks - Stability tests |
| AS 2359.8-1995 | Powered industrial trucks - Pallet stackers and high-lift platform trucks - Stability tests |
| AS 4973-2001 | Industrial trucks - Inspection and repair of fork arms in service on fork-lift trucks |
| AS 2550.19-2007 | Cranes, hoists and winches - Safe use - Telescopic handlers |
| Pile drivers | |
| AS 2159-2009 | Piling - Design and installation |
| AS 2159-2009 / Amdt 1-2010 | Piling - Design and installation |
| Mobile concrete pumps | |
| AS 1418.15-1994 | Cranes (including hoists and winches) – Concrete placing equipment |
| AS 1418.15-1994 / Amdt 1-1995 | Cranes (including hoists and winches) - Concrete placing equipment |
| AS 2550.15-1994 | Cranes - Safe use - Concrete placing equipment |