



Government of **Western Australia**
Department of **Mines and Petroleum**
Resources Safety

**Implementing an effective program to manage the risks
associated with manual tasks**

Guidance for mining workplaces

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Introduction

The term manual task covers any activity that requires a person to use his or her physical body (musculoskeletal system) to perform work. This includes the use of force for lifting, lowering, pushing, pulling, carrying, moving, holding or restraining anything. It also includes work involving repetitive actions or sustained postures and concurrent exposure to vibration.

Resources Safety's [Manual Tasks in Mining Fact Sheet 1](#) provides an overview of the manual task terminology.

Injuries from performing manual tasks at work, collectively known as musculoskeletal disorders, are a significant burden for the Western Australian Mining Industry. Reducing the extent and severity of such injuries is beneficial to all industry stakeholders. Furthermore all duty holders under the *Mines Safety and Inspection Act 1994* and the *Mines Safety and Inspection Regulations 1995* have a legal obligation to reduce the risk of injury to employees performing manual tasks.

[Manual Tasks in Mining Fact Sheet 2](#) and [Manual Tasks in Mining Fact Sheet 10](#) provide more detail on the extent and cost of injuries and the legislation respectively.

Injuries from performing manual tasks at work can result from sudden damage to the musculoskeletal system. More commonly, however, they result from the cumulative wear and tear on the musculoskeletal system. The risk management process of hazard identification, risk assessment, risk control and control evaluation provides a framework within which all manual task risk factors that cause or contribute to the development of musculoskeletal disorders can be considered. This assists in managing the cumulative nature of these injuries.

It is imperative that the risk management process be effectively implemented at the workplace. Current best practice is a participative ergonomics approach, which involves workers, assisted by an ergonomist or occupational safety and health (OSH) personnel with skills in ergonomics, undertaking the risk management process.

[Manual Tasks in Mining Fact Sheet 3](#), [Manual Tasks in Mining Fact Sheet 4](#) and [Manual Tasks in Mining Fact Sheet 5](#) provide more detail on how manual tasks at work cause injury, the risk management process and participative ergonomics, respectively. Appendix 1 lists resources for manual task risk management.

Each mining workplace is different so there will be some variation in the most suitable approach to implement and administer a program to manage the risks associated with manual tasks. Key factors for effective programs that are applicable to all workplaces are described below.

Management commitment

Strong top-down management commitment is essential to the success of the program. It is strongly recommended that management:

- appoints a champion to lead, advocate and promote the program;
- develops and integrates key performance indicators (KPIs) for managing hazardous manual tasks;
- supports the participation of front-line supervisors; and
- allocates adequate resources to the program.

Integration into OSH risk management systems

There should be an integrated systems approach to managing manual task risk. The following should be considered to facilitate hazardous manual tasks being addressed through existing OSH systems:

- establish KPIs, including lead indicators such as specific targets to control identified hazardous manual tasks;
- include hazardous manual tasks in safe work procedures (SWPs) or job safety analyses (JSAs); and

- ensure manual task hazard reports, risk assessments and control measure implementation plans are incorporated into OSH risk management documentation.

Access to expertise

Access to expertise may be necessary. Ergonomists or staff with ergonomics skills can provide training to key personnel on managing risks associated with manual tasks as well as assist in the management of particularly difficult or complex problems. Engineers and designers can assist in devising and developing design or engineering risk control measures.

Consultation

Consultation between employers and employees (including contractors) on OSH matters is a requirement of the legislation. Consultation is fundamental to the success of the risk management process of hazard identification, risk assessment, risk control and control review. Further information on consultative processes can be found in the [code of practice on consultation](#), available from the publications section of the Resources Safety website.

Design and purchasing procedures

Many risks associated with manual tasks result from poor design or tools and equipment not being “fit for purpose”. To reduce the overall risk associated with manual tasks, workplaces should implement systems to ensure:

- all design and planning activities include hazard and risk analysis procedures to identify where potentially hazardous manual tasks can be designed out;
- ergonomics specifications are incorporated into the design and purchase of all items such as tools, plant, buildings and structures;
- reporting procedures are in place so workers can report equipment, tool and plant issues that have resulted in musculoskeletal discomfort and/or injury; and
- workers who complete manual tasks in a building or structure or use or operate equipment, tools or plant are consulted during planning, design and purchasing processes.

[Manual Tasks in Mining Fact Sheet 6](#), [Manual Tasks in Mining Fact Sheet 7](#), [Manual Tasks in Mining Fact Sheet 8](#) and [Manual Tasks in Mining Fact Sheet 9](#) provide more detail on whole-body vibration, hand–arm vibration, machinery and vehicle cab design and safe design, respectively. A number of tools have been developed to assist mining workplaces to assess the risks associated with using or operating equipment and tools, and select and purchase equipment or tools – see Appendix 2.

Training

Training should provide information on:

- the risk management process applied to managing risks associated with manual tasks; and
- task-specific safe work methods for a manual task, including the safe use of items and safe systems of work.

All employees need to be:

- able to identify hazardous manual tasks;
- aware of the risk factors that increase the risk of injury; and able to contribute to the development of risk control measures.

The risk management training should be commensurate with the role and responsibility of personnel. A good approach is to use examples from the workplace (or mining industry in general) to demonstrate

how the risk factors can lead to injury. Building in-house expertise in managing the risks associated with manual tasks risk is recommended. This should include training for key personnel such as employees involved in selecting and purchasing equipment and tools.

Employees undertaking manual tasks need to receive task-specific training to ensure they have the knowledge and skills to employ safe work practices when completing manual tasks. Such training is a supplementary control and should not be implemented as the single control measure to reduce the risk of a hazardous manual task causing injury. There is compelling evidence that safe-lifting type training alone is ineffective in reducing injuries from performing manual tasks.

Resources Safety has developed a training package *Prevention of Musculoskeletal Disorders from Performing Manual Tasks in Mining Workplaces* to assist workplaces to develop and implement training for employees and contractors on the risk management process applied to manual tasks. The training package is available from the [hazardous manual tasks section](#) of the Resources Safety website.

Effective risk management procedures

A risk management approach is recommended to deal with all hazards, including hazardous manual tasks. A successful risk management process is one of continuous improvement, as shown in Figure 1.

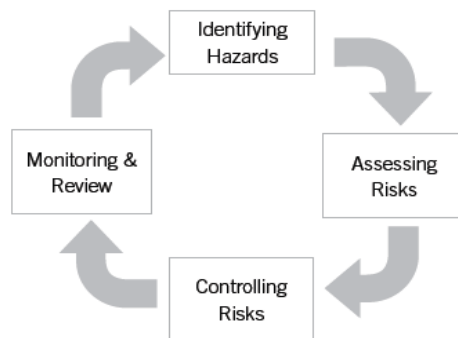


Figure 1 Risk management process

Source: National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work

An effective participative ergonomics approach to manual task risk management is for “risk assessment teams”, grouped by occupation, to undertake the risk management process. The teams should include the supervisor and a small group of workers. The teams need:

- training in manual tasks risk management;
- sufficient time allocated to complete the process; and
- access to assistance from an ergonomist or personnel with skills in ergonomics.

There must be effectual hazard identification, risk assessment, risk control and control review processes in place.

Hazard identification

It is important all hazardous manual tasks are identified and reported. There must be procedures in place to:

- identify all potentially hazardous manual tasks;
- report injuries and incidents associated with performing manual tasks; and
- ensure worker participation.

Manual tasks that are potentially hazardous include those:

- that have one or more of the characteristics of a hazardous manual task such as
 - repetitive or sustained application of force
 - repetitive or sustained awkward postures
 - repetitive or sustained movements
 - application of high force
 - exposure to sustained vibration
 - involve handling of person or animal
 - involve handling of unstable or unbalanced loads that are difficult to grasp or hold;
- where an injury, or pain or discomfort have been reported; and
- that workers are physically incapable of performing or can only do for a short time.

All workers at a mining workplace should be encouraged to report tasks they consider hazardous, including tasks that result in pain or discomfort. To complement general OSH hazard reporting forms, there are a number of manual task hazard identification forms and discomfort surveys. Appendix 2 lists some manual task hazard identification tools.

If there are a number of hazardous manual tasks identified the tasks need to be prioritised for assessment and control.

Risk assessment

A risk assessment of all identified hazardous manual tasks that cannot immediately be eliminated must be completed. The risk assessment must:

- consider all risk factors that lead or contribute to the risk of injury (i.e. musculoskeletal disorders) and identify the source/s (i.e. root cause/s) of the risk;
- rate the severity of the risk arising from the identified hazardous manual tasks for prioritisation within existing OSH risk management systems; and
- be completed in consultation with employees who do the task.

Direct risk factors

- Postures and movements of the worker including repetitive and/or awkward postures or movements, and sustained and/or awkward postures or movements
- The forces (or exertion) involved in the task, including high force, jerky or unexpected forces, speed and force
- The frequency, repetition and duration of the task

Indirect risk factors

- The work environment including heat, cold, humidity, wind, lighting, floor or ground surfaces and housekeeping
- Systems of work, work organisation and work practices including high workloads, tight deadlines, low worker control, unsuitable or insufficient resources, and extended shifts
- Exposure to vibration including whole body vibration and hand–arm vibration

Possible sources of risk

- Work area design and layout;
- Nature of the item or load being used or handled
- Working environment
- Systems of work, work organisation and work practices

Risk assessment tools

To assist in the risk assessment process, a manual task risk assessment tool can be used, and some examples are listed in Appendix 2. No one tool is best-fit for every workplace and each workplace should select the most appropriate tool for it.

If the risk assessment tool does not rate the severity of the risk then this can be determined by considering the likelihood of injury and the severity of those injuries using a general risk matrix, as shown in Figure 2.

CONSEQUENCE	LIKELIHOOD			
	Very Likely	Likely	Unlikely	Highly Unlikely
Fatality	HIGH	HIGH	HIGH	MEDIUM
Major injuries	HIGH	HIGH	MEDIUM	MEDIUM
Minor injuries	HIGH	MEDIUM	MEDIUM	LOW
Negligible injuries	MEDIUM	MEDIUM	LOW	LOW

Figure 2 Example of a risk matrix

Source: bizline.docep.wa.gov.au/safetyline/media/Risk%20Management.pdf

Risk control

Where the risk of a hazardous manual task is assessed as medium or high, control measures must be implemented to eliminate or reduce the risk that:

- follow the hierarchy of controls
 - where practicable, the hazardous manual task is eliminated
 - where elimination is not practicable, design controls are implemented to reduce the risk as far as is practicable
 - administrative controls are implemented as an interim measure or to supplement design controls;
- address the source/s of the risk identified in the risk assessment; and
- are devised and developed in consultation with workers who do the task.

Risk control programs must assign responsibilities and include completion dates. It is best practice to document risk control measures and the plan for their implementation. Some forms to record manual task risk control measure planning and implementation are listed in Appendix 2.

Information on solutions can be sourced from a variety of resources such as:

- [Chamber of Minerals and Energy \(Western Australia\) Safety and Health Innovation Awards](#)
- [Minerals Industry Risk Management Gateway \(MIRMgate\)](#)

Monitoring and reviewing controls

All implemented control measures must be reviewed and monitored, with procedures in place to:

- evaluate the effectiveness of the implemented control measure;

- identify if any new hazards have been introduced; and
- ensure worker participation.

It is good practice to re-assess the task immediately after the control measures have been implemented, and to repeat the assessment at a suitable interval following implementation.

Documentation

All documentation related to identification, assessment, control and control review of hazardous manual tasks should be stored and made accessible across the organisation to facilitate information sharing.

Appendix 1 Resources

Standard

Australian Safety and Compensation Council (2007) *National Standard for Manual Tasks*, Australian Government, Canberra.

The *National Standard for Manual Tasks* sets out the principles for the effective management of hazardous manual tasks to prevent injury (musculoskeletal disorders) arising from manual tasks in the workplace. It includes detail on the responsibilities of Duty Holders and an overview of the risk management process.

The [Standard](#) is available from the “National standards, codes of practice and related guidance” section of the Safe Work Australia website at www.safeworkaustralia.gov.au

Codes of practice and guidance documents

The resources listed below provide background information and practical guidance for workplaces to manage the risk of injury (i.e. musculoskeletal disorders) associated with manual tasks. The risk management process of hazard identification, risk assessment, risk control and control evaluation applied to the management of manual task risk is detailed.

Industry – generic

1. Procedure for managing injury risks associated with manual tasks

Burgess-Limerick, R. (2008) *Procedure for Managing Injury Risks Associated with Manual Tasks*. <http://www.burgess-limerick.com/download/manualtasksprocedure.pdf>

This [guidance document](#) is available from the Burgess-Limerick & Associates website at www.burgess-limerick.com

2. National code of practice for the prevention of musculoskeletal disorders from performing manual tasks at work

Australian Safety and Compensation Council (2007) *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work*; Australian Government, Canberra

The [Code](#) is available from the Safe Work Australia website at www.safeworkaustralia.gov.au

3. Practical ergonomics: application of ergonomics principles in the workplace

McPhee, B (2005) *Practical Ergonomics: Application of Ergonomics Principles in the Workplace*. Coal Services Health and Safety Trust, Sydney.

This [guidance document](#) is available from the Jim Knowles Group website at www.jkggroup.com.au

Industry – mining

4. Managing musculoskeletal disorders: a practical guide to preventing musculoskeletal disorders in the NSW mining and extractives industry

NSW Government, Industry and Investment (2009) *Managing Musculoskeletal Disorders: A Practical Guide to Preventing Musculoskeletal Disorders in the NSW Mining and Extractives Industry*. NSW Mine Safety Advisory Council and Industry and Investment NSW, Sydney.

This [guidance document](#) is available from the Department of Primary Industries section of the NSW Government Industry and Investment website at www.dpi.nsw.gov.au

5. Ergonomics processes: implementation guide and tools for the mining industry

Torma-Krajewski J., Steiner L.J., and Burgess-Limerick, R. (2009) *Ergonomics Processes: Implementation Guide and Tools for the Mining Industry*. DHHS (NIOSH) Publication No. 2009-107, Information Circular 9509. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Pittsburgh.

This [publication](#) is available from the NIOSH website at www.cdc.gov/niosh

6. Ergonomics for the control of sprains and strains in mining

McPhee, B. (1993) *Ergonomics for the Control of Sprains and Strains in Mining*. The Joint Coal Board Health and Safety Trust and Worksafe Australia, Sydney.

This [publication](#) is available from the Safe Work Australia website at www.safeworkaustralia.gov.au

7. Reducing musculoskeletal risk in open cut coal mining

Burgess-Limerick, R., Leveritt, S., Nicholson, S., and Straker, L. (2004) *Reducing Musculoskeletal Risk in Open Cut Coal Mining. ACARP Project C11058 Final Report*. Australian Coal Association Research Program, Brisbane.

The [handbook and DVD](#) from this project can be purchased from the ACARP website at www.acarp.com.au.

Case studies

The publications listed below describe the effective implementation of the manual task risk management process in mining workplaces using a participative ergonomics approach.

1. Implementation of the participative ergonomics for manual tasks (PERforM) programme at four Australian underground coal mines

Burgess-Limerick, R., Straker, L., Pollock, C., Dennis, G., Leveritt, S., & Johnson, S. (2007). Participative ergonomics for manual tasks in coal mining, *International Journal of Industrial Ergonomics* 37, 145-155

This [article](#) is available from the Burgess-Limerick & Associates website at www.burgess-limerick.com

2. Ergonomic interventions at Vulcan Materials Company

Torma-Krajewski, J., Hipes, C., Steiner, L., & Burgess-Limerick, R. (2007) Ergonomics interventions at Vulcan Materials Company. *Mining Engineering*. Nov; 59(11):54-58

This [publication](#) is available from the NIOSH website at www.cdc.gov/niosh

3. Ergonomic interventions at Unimin

Porter, W.L., Mayton, A.G. & O'Brien-AD (2008) Ergonomic Interventions at Unimin, *Transactions, Society for Mining, Metallurgy and Exploration*. Dec; 324:61-66

This [publication](#) is available from the NIOSH website at www.cdc.gov/niosh

4. Ergonomics and mining: charting a path to a safer workplace

Torma-Krajewski J., Steiner L.J., Lewis, P., Gust, P & Johnson, K. (2009) *Ergonomics and Mining: Charting a Path to a Safer Workplace. DHHS (NIOSH) Publication No. 2009-107, Information Circular, 9491*. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Pittsburgh.

This [publication](#) is available from the NIOSH website at www.cdc.gov/niosh

Appendix 2 Checklists and forms

Equipment and tools

Mining equipment

1. Checklist for assessing risk of MSD – mining equipment

Section 4.2 (page 27) in NSW Industry and Investment (2009) *Managing Musculoskeletal Disorders: A Practical Guide to Preventing Musculoskeletal Disorders in the NSW Mining and Extractives Industry*

http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/291784/Guide-to-the-prevention-of-musculoskeletal-disorders-in-the-mining-and-extractives-industry-in-NSW.pdf

2. Checklist - purchasing large mining equipment

Section 4.4 (pages 29-30) in NSW Industry and Investment (2009) *Managing musculoskeletal disorders: A practical guide to preventing musculoskeletal disorders in the NSW mining and extractives industry*

http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/291784/Guide-to-the-prevention-of-musculoskeletal-disorders-in-the-mining-and-extractives-industry-in-NSW.pdf

3. Ergonomics of mining equipment: checklist

Section 4 (pages 35-36) in McPhee, B (1993) *Ergonomics for the Control of Sprains and Strains in Mining*

<http://www.safeworkaustralia.gov.au/NR/rdonlyres/EBA2992C-F39D-4C3B-9E3A-51A2F053F1C2/0/ErgonomicsSprainsStrainsMining.pdf>

4. Generic ergonomics risk assessment tool for underground coal mining equipment

Part 2 (page 26 on) in Burgess-Limerick, R. (2007) *Reducing injury Risks Associated with Underground Coal Mining Equipment: A Handbook Arising from ACARP Project C14016*

http://www.burgess-limerick.com/site/Underground_Equipment_files/handbook.pdf

Handtools

5. Hand tool checklist

Tool E, Section IV (pages 30-32) in Torma-Krajewski J., Steiner L.J., and Burgess-Limerick, R. (2009) *Ergonomics Processes: Implementation Guide and Tools for the Mining Industry*. NIOSH Information Circular 9509

<http://www.cdc.gov/niosh/mining/pubs/pdfs/2009-107.pdf>

6. Checklist – hand-tool selection and use

Section 4.3 (page 28) in NSW Industry and Investment (2009) *Managing Musculoskeletal Disorders: A Practical Guide to Preventing Musculoskeletal Disorders in the NSW Mining and Extractives Industry*

http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/291784/Guide-to-the-prevention-of-musculoskeletal-disorders-in-the-mining-and-extractives-industry-in-NSW.pdf

Seating

7. Vehicle operator/driver seating checklist

Section 4 (pages 30-32) in McPhee, B. (1993) *Ergonomics for the Control of Sprains and Strains in Mining*

<http://www.safeworkaustralia.gov.au/NR/rdonlyres/EBA2992C-F39D-4C3B-9E3A-51A2F053F1C2/0/ErgonomicsSprainsStrainsMining.pdf>

8. Passenger seating checklist

Section 4.6 (pages 33-34) in McPhee, B. (1993) *Ergonomics for the Control of Sprains and Strains in Mining*

<http://www.safeworkaustralia.gov.au/NR/rdonlyres/EBA2992C-F39D-4C3B-9E3A-51A2F053F1C2/0/ErgonomicsSprainsStrainsMining.pdf>

Hazard identification

1. Manual task hazard identification form

Appendix A in Burgess-Limerick, R. (2008) *Procedure for Managing Injury Risks Associated with Manual Tasks*

<http://www.burgess-limerick.com/download/manualltasksprocedure.pdf>

2. Risk factor report card

Tool A, Section IV (pages 4-8) in Torma-Krajewski, J., Steiner L.J., and Burgess-Limerick, R. (2009) *Ergonomics Processes: Implementation Guide and Tools for the Mining Industry*. NIOSH Information Circular 9509

<http://www.cdc.gov/niosh/mining/pubs/pdfs/2009-107.pdf>

3. Hazardous manual tasks identification worksheet

Appendix 1A (page 93) in Australian Safety and Compensation Council (2007) *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work*

http://www.safeworkaustralia.gov.au/NR/rdonlyres/65298783-6262-4D0D-A41D-13296040703D/0/ASCC_ManualTasks_COP.pdf

4. Musculoskeletal discomfort form

Tool B, Section IV (pages 9-11) in Torma-Krajewski, J., Steiner, L.J., and Burgess-Limerick, R. (2009) *Ergonomics Processes: Implementation Guide and Tools for the Mining Industry*. NIOSH Information Circular 9509

<http://www.cdc.gov/niosh/mining/pubs/pdfs/2009-107.pdf>

5. Discomfort survey form

Appendix 1B (page 94) in ASCC (2007) *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work*

http://www.safeworkaustralia.gov.au/NR/rdonlyres/65298783-6262-4D0D-A41D-13296040703D/0/ASCC_ManualTasks_COP.pdf

Risk assessment

1. Manual task risk assessment (ManTRA)

Appendix B in Burgess-Limerick, R. (2008) *Procedure for Managing Injury Risks Associated with Manual Task*

<http://www.burgess-limerick.com/download/manualltasksprocedure.pdf>

2. Quick exposure checklist (QEC)

Page 16 in Part 2* (QEC form and *Reference Guide*) of David, G., Woods, V., and Buckle, P. (2005) *Further Development of the Usability and Validity of the Quick Exposure Check (QEC)* HSE Research Report 211

<http://www.hse.gov.uk/research/rrpdf/rr211.pdf>

3. Risk assessment checklist

Section 4.2 (pages 24-25) in McPhee, B (1993) *Ergonomics for the Control of Sprains and Strains in Mining*

<http://www.safeworkaustralia.gov.au/NR/rdonlyres/EBA2992C-F39D-4C3B-9E3A-51A2F053F1C2/0/ErgonomicsSprainsStrainsMining.pdf>

4. Risk Assessment Checklist

Step 2 in Mining and Quarrying Occupational Health and Safety Committee (2008) *Manual Handling Hazard Management, Manual Handling Audit Tool*

http://www.maqohsc.sa.gov.au/upload_docs/20080129031123%2EMiningAuditTool%2Epdf

5. Risk assessment form

Appendix 1C (pages 95-110) in Australian Safety and Compensation Council (2007) *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work*

http://www.safeworkaustralia.gov.au/NR/rdonlyres/65298783-6262-4D0D-A41D-13296040703D/0/ASCC_ManualTasks_COP.pdf

Risk control

1. Risk control checklist

Section 4.3 and 4.4 (page 26) in McPhee, B. (1993) *Ergonomics for the Control of Sprains and Strains in Mining*

<http://www.safeworkaustralia.gov.au/NR/rdonlyres/EBA2992C-F39D-4C3B-9E3A-51A2F053F1C2/0/ErgonomicsSprainsStrainsMining.pdf>

2. Risk control checklist and action plan

Steps 3 and 4 in Mining and Quarrying Occupational Health and Safety Committee (2008) *Manual Handling Hazard Management, Manual Handling Audit Tool*

http://www.maqohsc.sa.gov.au/upload_docs/20080129031123%2EMiningAuditTool%2Epdf

3. Risk control form

Appendix 1C (pages 111-112) in Australian Safety and Compensation Council (2007) *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work*

http://www.safeworkaustralia.gov.au/NR/rdonlyres/65298783-6262-4D0D-A41D-13296040703D/0/ASCC_ManualTasks_COP.pdf