



Manual Handling Review of WA Mining Industry Project: Scoping Study

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1.0 EXECUTIVE SUMMARY

Manual tasks* are recognised as a major occupational safety and health risk for the Mining Industry. *Manual task injuries*, musculoskeletal disorders (MSD) from performing manual tasks, consistently account for approximately one third of all injuries occurring in Western Australian mining workplaces. Furthermore about two thirds of manual task injuries are serious, resulting in 14 or more days lost from work. The direct and indirect costs associated with these injuries are considerable, with almost 40% of the total compensation claim costs and 45% of the total days lost attributed to manual task injuries.

The findings of this scoping study strongly support the need and want for the development and implementation of strategies aimed at reducing the extent and severity of manual task injuries in the Western Australian Mining Industry. Resources Safety Division (RSD) is best placed to take a leadership role to develop and implement these strategies and to raise manual task standards. It is recommended that a tripartite *Manual Task Working Group* be established to engage all stakeholders in the process (refer Recommendations 1-2).

The initial RSD strategy needs to be aimed at increasing the state of knowledge of manual task risk and the management of the risk in the Mining Industry sector through information and education activities. To facilitate access to information resources for mining workplaces it is recommended a *Manual Task* section be included on the RSD website. The development of one to two page *Fact Sheets* on manual task topics, including references to existing information resources, are suggested. Established forums such as the RSD Roadshow, annual CFMEU forums for employee representatives and other mining expositions present excellent opportunities for education activities (refer recommendations 3-4).

A systematic risk management process of hazard identification, risk assessment and risk control is the most effective way for workplaces to manage manual task risk. A participative ergonomics approach to manual task risk management is current best practice. To support mining workplaces to implement manual task risk management systems it is recommended that RSD develop or modify existing manual task risk management guidance material and risk assessment tools/processes. Any tools/processes developed will need to be trialled in all Mining Industry sectors (refer Recommendations 5-6).

A number of hazardous manual tasks common to mining workplaces were identified in this scoping study. To assist mining workplaces to implement controls for these tasks it is recommended that RSD develop and administer a shared *Hazardous Manual Task Solution Base*. The development of one to two page *Solution Sheets* based on existing solutions published in literature and/or implemented by industry are suggested (refer Recommendations 7).

Maintaining an up to date knowledge of manual task literature, projects and activities through ongoing collaboration/consultation with national and international Mining Industry stakeholders will ensure RSD incorporates current best practice into information products and education activities. A formal collaborative arrangement between RSD and the Queensland Department of Mines and Energy and the NSW Department of Primary Industries on the project they are currently undertaking *Preventing Musculoskeletal Disorders in Mining* is strongly recommended. This collaboration will provide the opportunity to co-develop guidance material, tools, solutions and other information products that may be used uniformly throughout Australia, in line with the objectives of the National Mine Safety Framework (refer Recommendations 8-9).

Following an initial period of information/education it is recommended that RSD undertake compliance activities to assist in ensuring all mining workplaces are adequately managing manual task risk. Completing targeted audits on poor performing companies is suggested. A *Manual Task High Impact Function Audit* tool will assist in both education and compliance activities. RSD Inspectors will need education/training to undertake the compliance activities (refer Recommendation 10).

To support compliance activities consideration of the development and implementation of specific manual task legislation by way of a manual task regulation is recommended. This regulation could be based on the existing State regulation requiring Duty Holders to identify hazardous manual tasks, assess the risk and control the risk (refer Recommendation 11).

The AXTAT database can provide RSD and industry with detailed manual task injury information. Including specific information on manual task injuries in RSD publications such as the *Annual Safety Performance Accident and Injury Summaries* will provide an overview of significant manual task injury trends. Good and poor performers can be identified from the data and this information will assist RSD to prioritise both education/information and compliance activities. Some modifications to the coding of manual task injuries may enhance information (refer Recommendation 12).

Reducing the extent and severity of manual task injuries will be of substantial benefit to all Western Australian Mining Industry stakeholders. Implementing the recommendations from this scoping study will be a positive step in raising manual task standards and achieving this outcome.

* The term *manual task* replaces the term *manual handling* in line with the Australian Safety and Compensation Council *National Standard for Manual Tasks (2007)* and *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work (2007)*. Refer to Appendix 1 for details of the terminology.

2.0 INTRODUCTION

The purpose of this scoping study is to gather information in order to scope directions, strategies and activities to reduce injuries, specifically musculoskeletal disorders (MSD) from performing manual tasks at work (referred to in this document as *manual task injuries*) in the Western Australian Mining Industry.

The steps undertaken to gather information included:

- An analysis of the accident/injury data;
- A review of information including a review of the current literature and consultation with Western Australian and Australian Mining Industry stakeholders.

Recommendations on directions, strategies and activities to reduce manual task injuries have been based on the information gathered.

There has been a shift in the terminology whereby the term *manual handling* has been replaced with *manual task*. In August 2007 the Australian Safety and Compensation Council (ASCC) declared the *National Standard for Manual Tasks (2007)* and the *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work (2007)*. These documents supersede the *National Standard for Manual Handling [NOHSC: 1001(1990)]*, the *National Code of Practice for Manual Handling [NOHSC: 2005(1990)]* and the *National Code of Practice for the Prevention of Occupational Overuse Syndrome [NOHSC: 2013(1994)]*. The terms, manual handling and manual tasks are used interchangeably. In line with the ASCC documents *manual task* is the term used in this scoping study. Detail of terminology is at Appendix 1.

3.0 ANALYSIS OF ACCIDENT/INJURY DATA

3.1 INTRODUCTION

The purpose of the analysis of accident/injury data is to gather information on manual task injuries in the Western Australian Mining Industry. The aim of the analysis is to establish/identify the:

- Extent of manual task injuries in the WA Mining Industry;
- Cost of manual task injuries to the WA Mining Industry; and
- Priority areas.

3.2 BACKGROUND

The accident/injury data was sourced from the AXTAT data-base administered by Resources Safety Division (RSD). Data pertaining to manual task injury compensation costs was sourced from WorkCover Western Australia. Manual task injury data was defined as a subset of the accident/injury data. Standard terminology and abbreviations have been used.

3.2.1 Sources of data

The AXTAT data-base was identified as the best data source for the analysis. The AXTAT data-base records both lost time injuries (LTIs) and disabling injuries (DIs) and therefore captures all accidents/injuries whether or not there is time lost from work. Additionally the data is specific to the target population of this project. The cost of accident/injury claims are not recorded on AXTAT therefore manual task injury compensation claim costs have been obtained from WorkCover Western Australia.

3.2.2 Defining manual task injuries

Manual task injuries have been defined as all injuries coded in AXTAT as *Type of Accident: Overexertion Strenuous Movement (4000)* and include:

- 4100: Overexertion lifting unassisted
- 4200: Overexertion lifting assisted
- 4300: Overexertion carrying
- 4400: Overexertion lifting and carrying
- 4500: Overexertion pulling/pushing
- 4600: Overexertion moving object
- 4700: Overexertion no object involved
- 4800: Strenuous movements
- 4810: Strenuous movements – no specific event
- 4900: Vibration – not motor vehicle

When WorkCover provides reports on manual handling injuries (referred to in this analysis as manual task injuries) it includes injuries classified by *Mechanism of Incident:*

Group 4: Body Stressing. This is equitable to the *Type of Accident: Overexertion Strenuous Movement (4000)* classification in the AXTAT data base.

It is acknowledged that the 4000 data set does not include manual task injuries resulting from, or in part resulting from, exposure to whole body vibration. A dump of the data for all accident types coded 2900: *Motor vehicle/equipment jolting/jarring* was provided. An analysis of the data revealed that assumptions would need to be made to identify injuries resulting from exposure to whole body vibration. For example in an incident recorded in AXTAT as *Type of Accident: Motor vehicle/equipment jolting/jarring*, the employee sustained a muscle strain to the lower back. The incident description was; *the employee had been operating the loader over the rough ground*. Although it is probable the operator sustained a back injury at least in part because of exposure to whole body vibration it cannot be confirmed from the recorded information. It was therefore decided to exclude this data. The importance of exposure to whole body vibration will however be considered in this scoping study.

3.2.3 Terminology and abbreviations

The following terms and abbreviations are used:

1. *Lost time injury (LTI)* - A work injury that results in an absence from work of at least one full day or shift any time after the day or shift on which the injury occurred.
2. *Disabling injury (DI)* - A work injury, not a lost time injury, that results in the injured person being unable to fully perform his or her ordinary occupation (regular job) any time after the day or shift on which the injury occurred, and where either alternative or light duties are performed.
3. *Serious LTI* - A lost time injury that results in the injured person being disabled for a period of two weeks or more and in which the injured person is absent from work for at least one day.
4. *Serious DI* - An injury which does not result in any lost time but which results in the injured person being disabled for a period of two weeks or more from their ordinary occupation (i.e. alternative duties worked).
5. *Minor LTI* - A lost time injury that results in the injured person being disabled for a period of less than two weeks and in which the injured person is absent from work for at least one day.
6. *Minor DI* - An injury which does not result in any lost time but which results in the injured person being disabled for a period of less than two weeks from their ordinary occupation (i.e. alternative duties worked).
7. *Recurrent Injury* - A recurrent injury is one where a person requires more time off work as a result of a previous injury from which he or she had already returned.

The two weeks mentioned in the above serious/minor definitions is derived from the "days off" figure. An injury becomes serious when the "days off" is 14 or more. A disabling injury (serious or minor) becomes a lost time injury if even one day is lost.

3.3 EXTENT OF MANUAL TASK INJURIES

Manual task injuries consistently account for approximately one third of all new LTIs and DIs (refer Figure 1) and over half of all injury recurrences (refer to Figure 2) in the Western Australian Mining Industry. Of significant relevance is the proportion of both new and recurrent manual task injuries classified as serious, that is, the injury results in 14 or more days/shifts lost. Approximately two thirds of all new manual task injuries are serious. The recurrences show an even higher proportion, with almost 90% being serious. Figures 1 and 2 show serious manual task injuries as a percentage of all serious injuries; minor manual task injuries as a percentage of all minor injuries; and total manual task injuries as a percentage of total injuries for new injuries and recurrences respectively. Figure 3 shows serious LTIs, serious DIs, minor LTIs and minor DIs as a percentage of total manual task injuries.

Figure 1: Extent of manual task injuries

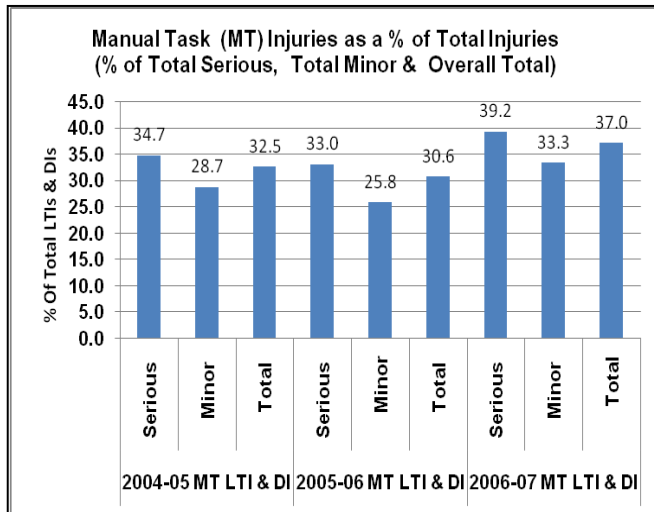


Figure 2: Extent of manual task injury recurrences

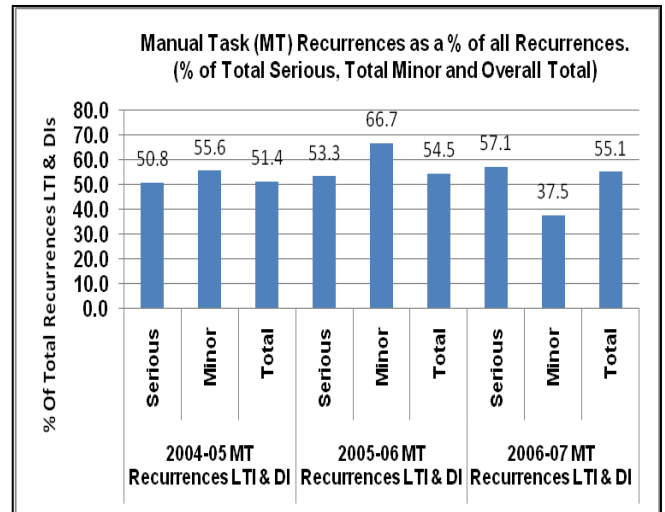
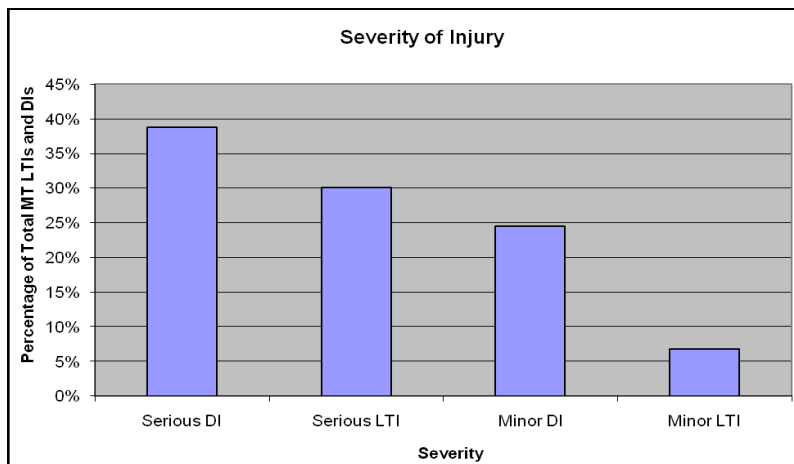


Figure 3: Percentage of total manual task injuries by severity



Clearly manual task injuries account for a significant proportion of all injuries in the Western Australian Mining Industry. Furthermore a considerable percentage of these injuries are serious.

3.4 COST OF MANUAL TASK INJURIES

Data from WorkCover Western Australia revealed that between July 2004 and June 2006 workplace manual task injuries in the Mining Industry resulted in 643 lost time claims and 1,064 no lost time claims. This represents 38.5% of all lost time compensation claims and 30% of all no lost time compensation claims in the Industry.

The total cost of the manual task lost time claims in the period was \$23.9million (37% total lost time claims cost) and the cost of no lost time claims was \$1.8million (30% total no lost time claims cost). The average cost of a manual task injury claim was \$36, 891 per lost time claim and \$1,719 per no lost time claim. Costs for no cost claims include medical and other rehabilitation costs.

A total of 96,763 days were lost as a result of manual task injuries in the period, representing 45% of the total days lost from mining workplace injuries. A copy of the WorkCover data is at Appendix 2.

In addition to the direct compensation claims costs, a workplace manual task injury will also incur other costs. Other costs to organisations include lost productivity, staff replacement and training costs, loss of expertise and administrative overheads. The costs of manual task injuries to the injured worker include pain and suffering, loss of income and possible long term disability.

Obviously the compensation costs and other costs of manual task injuries are a major contributor to total injury costs in the WA Mining Industry. Reducing the number and severity of these injuries would be of considerable cost benefit to all stakeholders.

3.5 DETAILED ANALYSIS

The detailed analysis is of all new manual task LTIs and DIs in mining recorded on the AXTAT data-base in the three year period 2004/05, 2005/06 and 2006/07. One thousand and sixty nine (1,069) manual task injuries, that is *Type of Injury* in the 4000 category, were recorded in that period. The manual task injury data was analysed by:

- Location (surface/underground and work area);
- Commodity;
- Occupation;
- Activity;
- Nature of Injury;
- Part of body;
- Age;

- Shift time;
- Incident description;
- Agency; and
- Sub groups of type of injury.

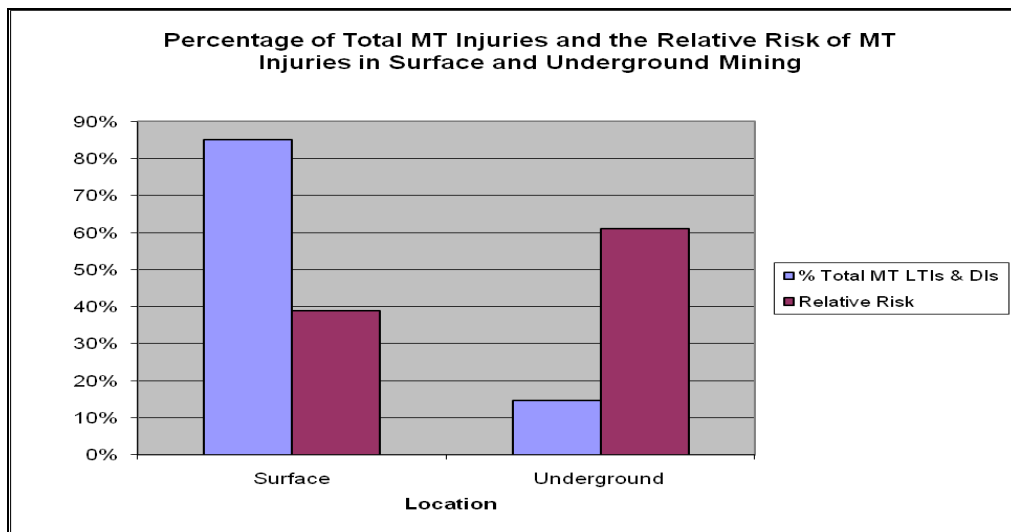
The analysis by location (including work area), commodity, occupation, activity, nature of injury, part of body, age and shift time has been completed and the findings reported. The incident descriptions of a sample of the data (218 of 1069, approximately 20%) were analysed and the findings reported. Preliminary analysis by agency revealed a broad range of agency descriptions making further analysis of little value. Analyses by the sub groups of type of injury revealed mismatches between the injury detail and the classification. Analysis of these parameters therefore was not reported.

3.5.1 Location

3.5.1a Surface / Underground

Eighty five percent of all manual task injuries occur in surface mining and 15% occur in underground mining. Surface mining clearly accounts for the bulk of all manual task injuries, there are however far more surface miners than underground miners in Western Australia. When taking into account the workforce populations and calculating relative risk it is found that underground miners are over 50% more likely to suffer manual handling injuries than surface miners (refer Figure 4). This indicates that both underground and surface mining operations justify inclusion in any strategies developed to reduce manual task injuries.

Figure 4: Percentage of total manual task injuries and relative risk: surface and underground mining



3.5.1b Surface work areas

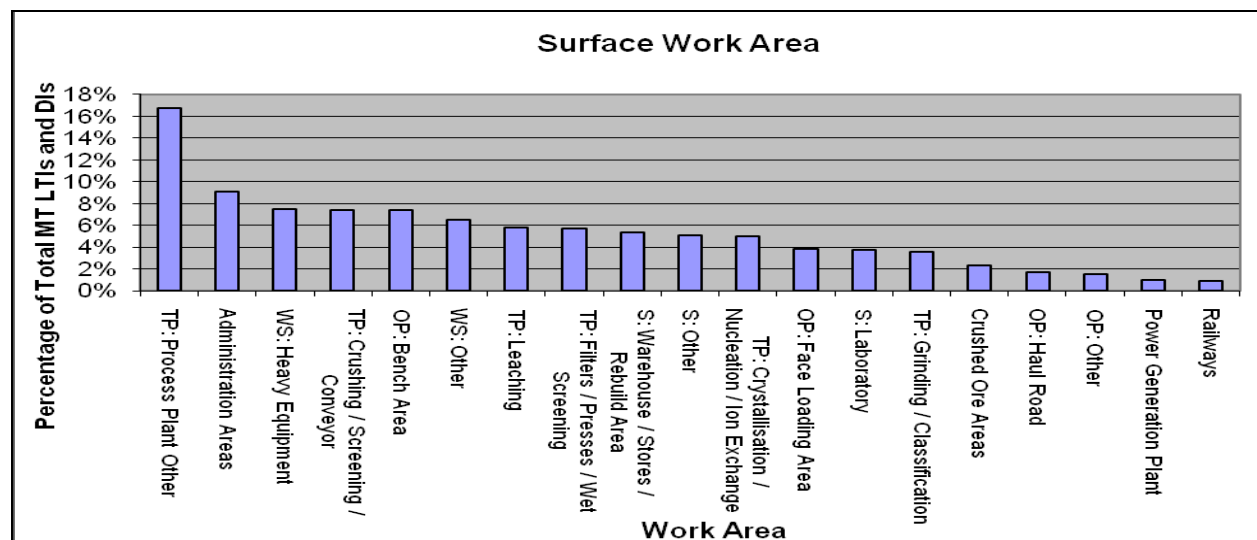
In surface mining almost half of the manual task injuries (47%), occur in treatment plants/ore processing. Open pit production/development areas, surface work areas

general and workshops follow at 15%, 14% and 13% respectively. Of note is the proportion of manual task injuries that occur in administration areas in surface mining, accounting for nine percent of the total. Table 1 shows the percentage of total manual task injuries occurring in specific work areas within the broader work area categories. Figure 5 shows the percentage of manual task injuries that occur in specific work areas.

Table 1: Percentage of total manual task injuries by surface work area

<u>Treatment Plant / Ore Processing</u>		47%
TP: Process Plant Other	17%	
TP: Crushing / Screening / Conveyor	7%	
TP: Leaching	6%	
TP: Filters / Presses / Wet Screening	6%	
TP: Crystallisation / Nucleation / Ion Exchange	5%	
TP: Grinding / Classification	4%	
TP: Crushed Ore Areas	2%	
<u>Open Pit Production/Development Areas</u>		15%
OP: Bench Area	7%	
OP: Face Loading Area	4%	
OP: Haul Road	2%	
OP: Other	2%	
<u>Surface Work Areas General</u>		14%
S: Warehouse / Stores / Rebuild Area	5%	
S: Other	5%	
S: Laboratory	4%	
<u>Workshop Surface</u>		13%
WS: Heavy Equipment	7%	
WS: Other	6%	
Administration Areas		9%
Power Generation Plant		1%
Railways		1%

Figure 5: Percentage of total manual task injuries by surface work area



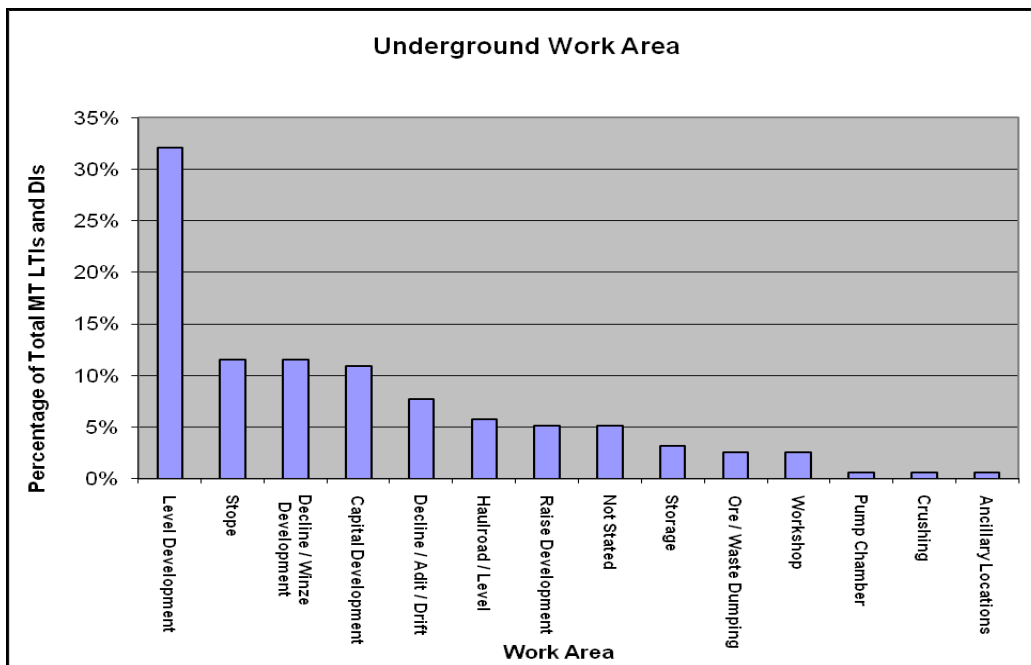
3.5.1c Underground work areas

In underground mining 72% of manual task injuries occur in underground production/development areas. Of significance is level development where 32% of all of the manual task injuries occur. Table 2 shows the percentage of injuries in specific work areas within the broader work area categories. Figure 6 shows the percentage of manual task injuries that occur in the specific work areas.

Table 2: Percentage of total manual task injuries by underground work area

<u>Underground Production/Development Areas</u>		72%
Level Development	32%	
Stope	12%	
Decline / Winze Development	12%	
Capital Development	11%	
Raise Development	5%	
<u>Access/Travelling/Haulage Ways</u>		14%
Decline / Adit / Drift	8%	
Haul road / Level	6%	
Not Stated		5%
Storage		3%
Ore / Waste Dumping		3%
Workshop		3%
Pump Chamber		1%
Crushing		1%
Ancillary Locations		1%

Figure 6: Percentage of total manual task injuries by underground work area



3.5.2 Commodity

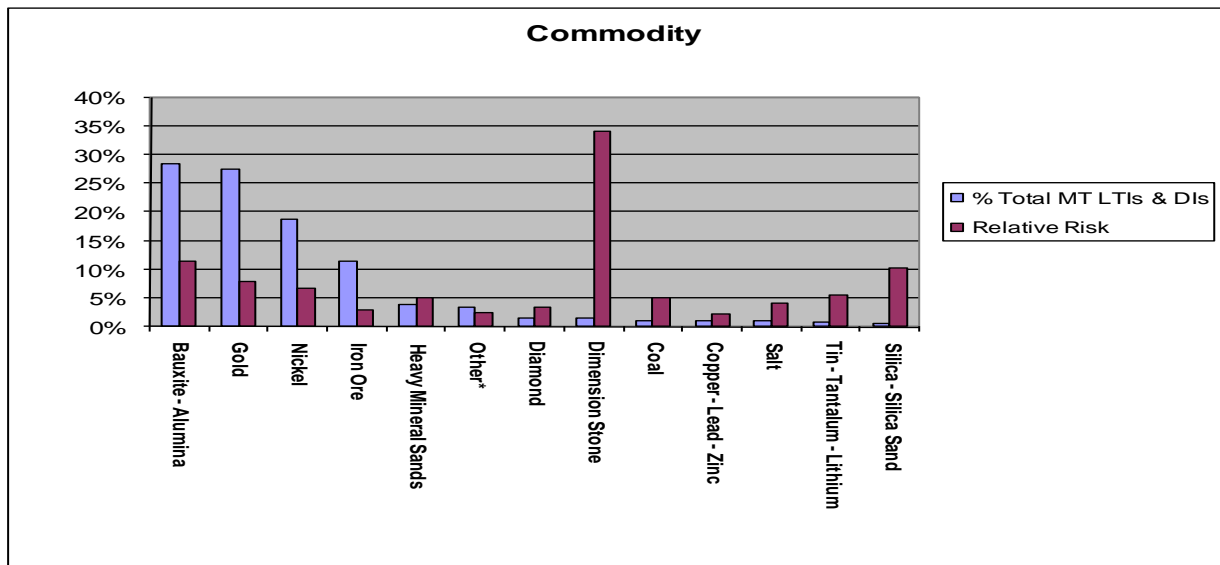
Eighty five percent of manual task injuries occur in Bauxite–Alumina (28%), Gold (27%), Nickel (19%) and Iron ore mining (11%). In terms of numbers of manual task injuries these commodities are the most significant (refer Figure 7). When taking into account the commodity workforce populations (refer Table 3) and calculating relative risk, Dimension Stone has almost triple the risk of manual task injuries than other commodities. It must be noted that Dimension Stone has a small workforce population (146). Likewise Silica Sand rates as the third highest relative risk and has a small workforce population (196). Of significance is that Bauxite-Alumina, Gold and Nickel have high numbers of manual task injuries and a higher relative risk than most other commodities. Strategies developed to reduce manual task injuries must consider all commodities though some priority activities are justified for Bauxite-Alumina, Gold and Nickel mining.

Table 3: Manual task injury and workforce count by commodity

	MT Injury Count	Workforce Count (average 05-06-07)
Bauxite - alumina	302	8873
Gold	292	12585
Nickel	199	9929
Iron ore	120	13772
Heavy mineral sands	41	2765
Other	18	2579
Diamond	16	1562
Dimension stone	15	146
Coal	11	734
Copper - lead - zinc	11	1705
Salt	10	824
Tin - tantalum - lithium	8	493
Silica - silica sand	6	196

*Other includes fields: Chemicals, Manganese Ore, Construction Materials and Limestone – Limesand

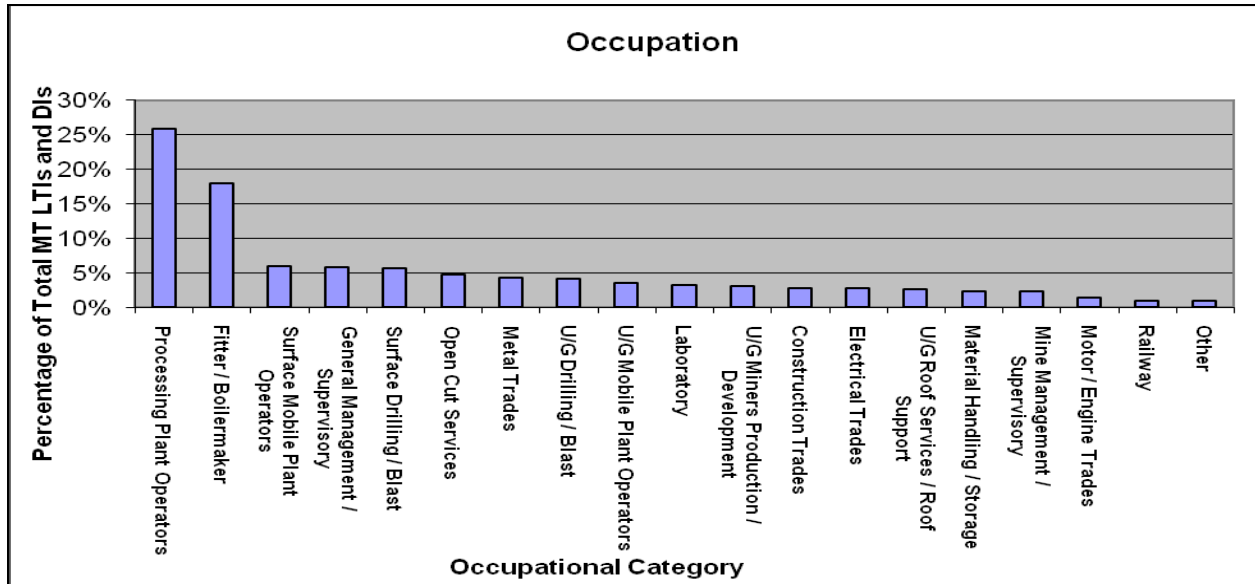
Figure 7: Percentage of total manual task injuries and relative risk: commodity



3.5.3 Occupation

Processing Plant Operators account for 26% of all manual task injuries and Fitters/Boilermakers account for 18% (refer Figure 8). If surface and underground Mobile Plant Operators are placed in the same occupational category they become the third highest risk occupation, accounting for nine percent of all manual task injuries.

Figure 8: Percentage of total manual task injuries by occupation

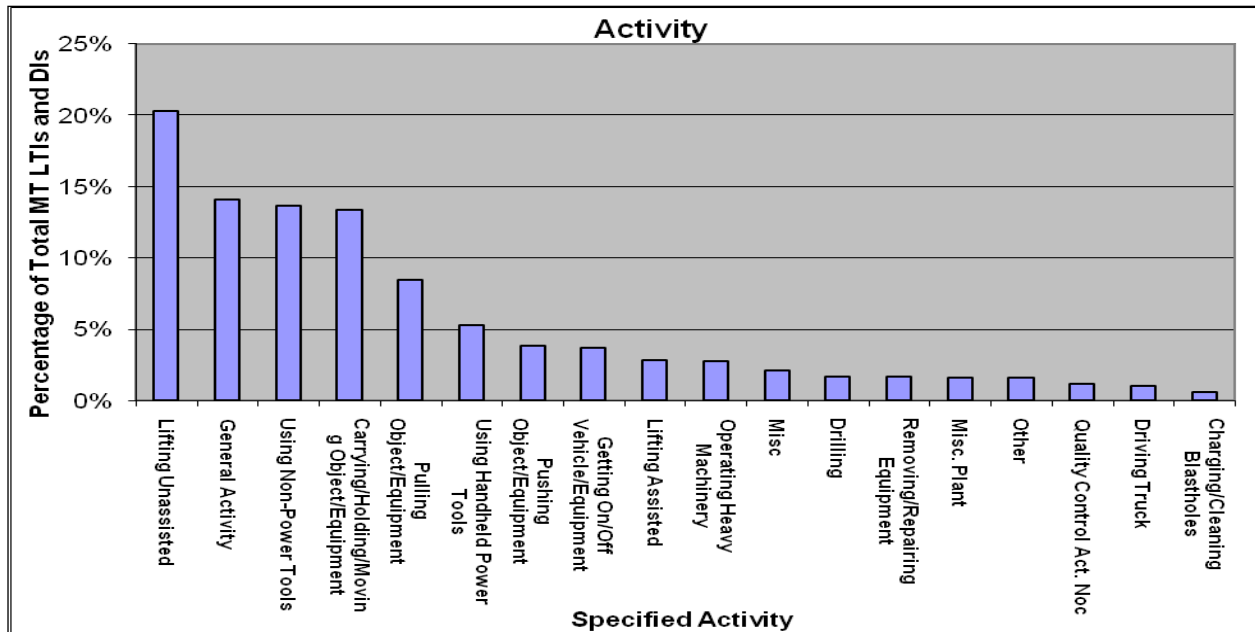


*Other includes fields: Final Product Handling / Transport and Conveyor Belt Repair

3.5.4 Activity

Lifting unassisted is the most likely activity to cause manual task injuries resulting in 20% of the total injuries. Using non-power tools, carrying / holding / moving object /equipment and general activity are next in line each accounting for 13 to 14% of total manual task injuries (refer Figure 9). When looking at the severity of injury caused by lifting unassisted, it appears there is a higher prevalence of serious LTIs in comparison to manual task injuries caused by other activities. Therefore, not only is lifting unassisted the activity resulting in the highest number of manual task injuries it is more likely to result in a serious injury.

Figure 9: Percentage of total manual task injuries by activity

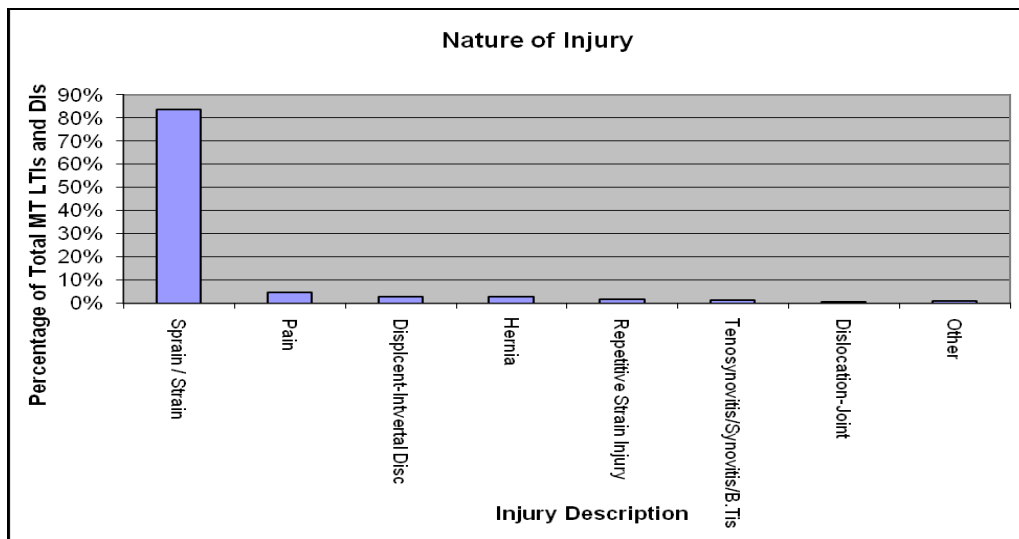


*Other includes fields: Installing Equipment, Clearing Buildings / Accommodation, Management / Administration Tasks, Moving / Travelling NOC, Lubricating Vehicle, Labouring / Assisting Tradesman.

3.5.5 Nature of injury

Sprains and strains are clearly the most likely outcome of manual task injuries accounting for 84% of all manual task injuries (refer Figure 10).

Figure 10: Percentage of total manual task injuries by nature of injury

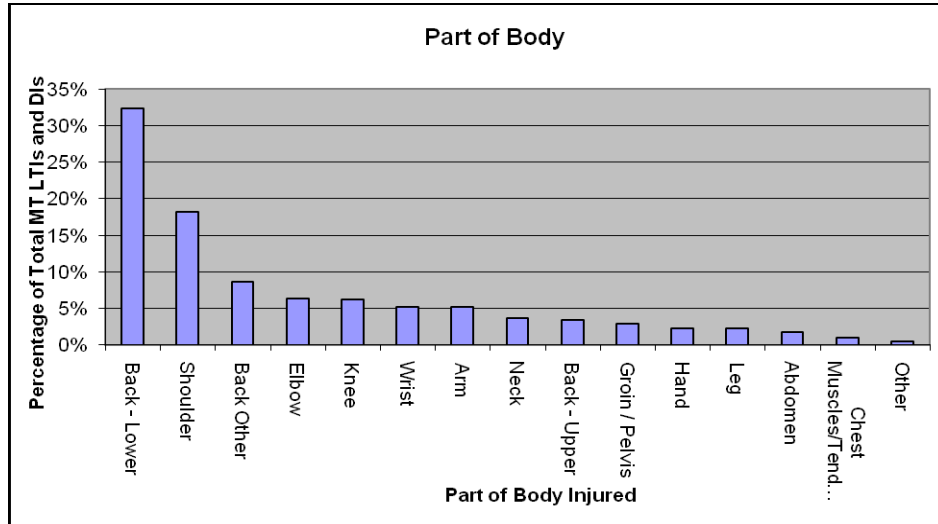


*Other - Includes fields: Bruise/Contusion, Dislocation, Fractures/Breaks, Inflammation-Joints/Tendons, Jarring, Muscular Skeletal-Unspecified, Swelling

3.5.6 Part of body

The part of body affected by manual tasks injury is varied however lower backs (32%) and shoulders (18%) are the most common parts of the body to be affected (refer Figure 11).

Figure 11: Percentage of total manual task injuries by part of body

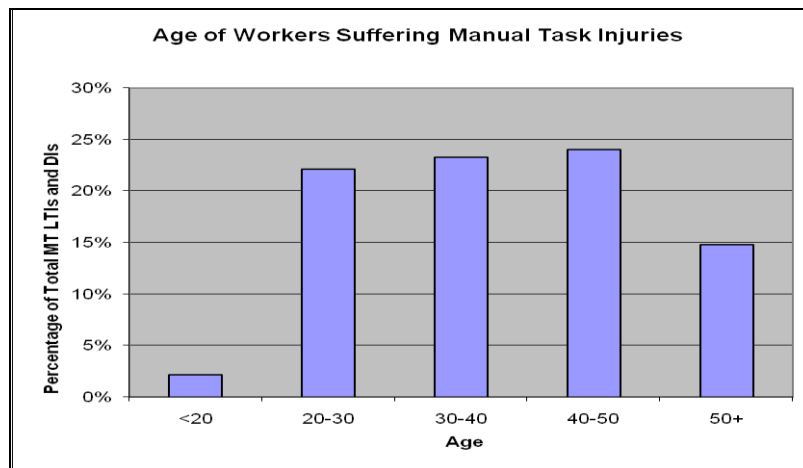


*Other includes fields: Foot /Ankle and Trunk/Limbs

3.5.7 Age

The age of miners suffering manual task injuries appears to be slightly skewed toward the older workers (refer Figure 12). This however mirrors the age distribution of the workforce identified by analysis of MineHealth data (Lindy Nield, personal communication). All age groups therefore need to be considered in strategies developed to reduce manual task injuries.

Figure 12: Percentage of total manual task injuries by age



3.5.8 Shift time

Most manual task injuries for day shift workers occur early in the shift, with a mean of 5.0 hours and a mode of 1.0 hour into the shift. Manual task injuries for night shift workers tend to happen later in the shift, with a mean of 6.3 hours and a mode of 8.0 hours into the shift (refer Figures 13 and 14).

Figure 13: Percentage of total manual task task injuries by shift time – day shift

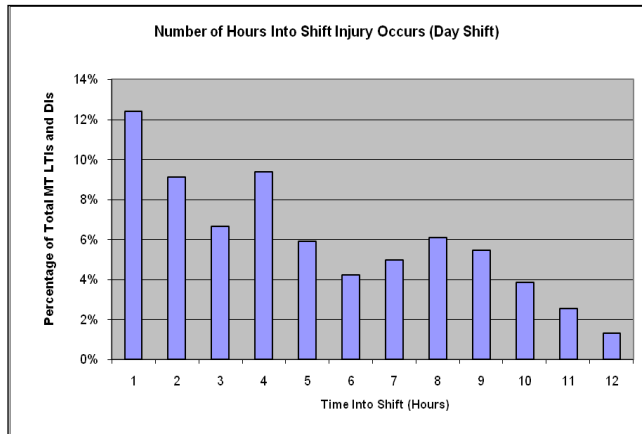
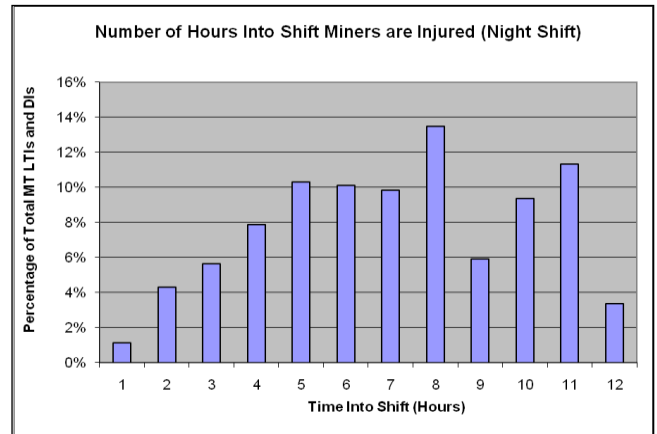


Figure 14: Percentage of total manual task task injuries by shift time – night shift



* All shift lengths greater than 12 hours have been omitted to reduce the likelihood of data entry errors

3.5.9 Incident description

Of the 218 incident descriptions analysed in detail, 69 (32%) described a lifting task to be the cause of injury with most reporting a single lifting event. Almost a quarter of these incidents described lifting items to/from vehicles.

Using hand held tools was described as the cause of injury in 42 (19%) of the incident descriptions with non-power tools accounting for 26 and power tools 16. Extended and/or prolonged use and/or working in awkward postures when using the tools was featured in the majority of the incident descriptions.

Pulling/pushing/dragging tasks were described as the cause of injury in 20 (9%) of the incident descriptions. Significant in these descriptions was the number of incidents where hoses or other items got stuck unexpectedly.

Operating machinery/vehicles was described as the cause of injury in 18 (8%) incident descriptions. Prolonged use of controls or poor postures or access/egress was described in the majority of incidents.

A number of the incident descriptions, 17 (8%), described the task that was being completed at the time of the injury. The tasks were varied. No trends were identified however when considering all tasks described in all of the incident descriptions handling valves was significant. Cleaning tasks were described in two reports.

Awkward postures whilst completing tasks featured as the cause of injury in 10 (5%) of the incident descriptions. Awkward postures were described as a contributory factor in a significant proportion of the incident descriptions, in particular above head height work.

Moving objects was described in eight (4%) of the injury descriptions as the cause of injury. Unspecified forceful actions were described in eight (4%). Valve handling was the most common task being completed.

Cumulative or prolonged manual task activities were described as the cause of injury in seven (3%) of the incident descriptions. Repetitive manual tasks were described as the cause of injury in seven (3%) reports. Repetitive, cumulative or prolonged exposure was a significant contributory factor in a significant proportion of incident descriptions.

Of the remaining incident descriptions four had inadequate information and four described non-overexertion events that caused the injury and were discounted. Non-work tasks were described in one and descending stairs carrying no load in one.

The numbers of incidents that may have been incorrectly classified as *type of injury-overexertion* were insignificant indicating a high standard of data classification.

3.6 RECOMMENDATIONS FOR AXTAT

Current accident and injury statistical reports do not provide specific information on manual task injuries. Including such information could be of major benefit to Industry and should be considered in the development of documents such as the *Annual Safety Performance Accident and Injury Summaries*.

The coding of *Type of Accident Overexertion Strenuous Movement (4000)* in AXTAT could be modified to reflect the full range of characteristics of hazardous manual tasks as per the definition in the *ASCC National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work (2007)*. The coding could include for example:

- Overexertion lifting/lowering
- Overexertion pushing/pulling
- Overexertion carrying
- Overexertion moving object,
- Overexertion holding or restraining anything
- Repetitive actions
- Sustained postures
- Exposure to vibration: hand/arm
- Exposure to vibration: whole body.

Generally the coding in AXTAT was of a high standard. The exception was the coding of incidents into the sub groups of the *Type of Accident: Overexertion Strenuous*

Movement (4000). A number of incidents were classified as *overexertion pushing/pulling* when this did not match the other incident details.

3.7 SUMMARY AND CONCLUSIONS

Manual task injuries account for a significant proportion of all injuries in the Western Australian Mining Industry. Furthermore a considerable proportion of these injuries are serious injuries, that is result in 14 or more days/shifts lost. The costs of manual task injuries are a major contributor to the total injury costs to the Industry. The extent and cost of manual task injuries support the need to develop and implement strategies to reduce the number and severity of these injuries.

Information from the detailed accident/injury data analysis indicates targeted strategies/activities/information:

- By work area for surface mining treatment plants/ore processing and for underground mining production/development areas, in particular level development.
- By commodity for Bauxite-Alumina, Nickel and Gold.
- By occupation for Processing Plant Operators, Fitters/Boilermakers and Mobile Plant Operators.
- By activity for lifting unassisted.
- By nature of injury for sprains and strains.
- By part of body for lower back and shoulder injuries.
- By shift time for the early part of day shift and for the later part of night shift.
- By incident description for lifting tasks, in particular on/off vehicles; using hand held tools; operating machinery; pushing/pulling tasks; cumulative/prolonged/repetitive exposure; working in awkward postures and tasks to open/close valves.

Given that it is often a single event that is reported as the direct cause of a particular injury when the injury is in reality the result of long periods of exposure to sub-critical stress/strain (wear and tear, cumulative injury) the findings of the detailed analysis need to be considered with the findings of the *Review of Information* in order to best identify priorities.

4.0 REVIEW OF INFORMATION

4.1 INTRODUCTION

The purpose of the *Review of Information* in this scoping study is:

- To establish the state of knowledge of managing manual task risks in the Mining Industry;
- To assist in identifying common hazardous manual tasks in the Western Australian Mining Industry; and
- To help identify what activities and strategies would be the most effective in assisting the Western Australian Mining Industry to achieve a reduction in workplace injuries from performing manual tasks.

To source the information the following steps were undertaken:

- A review of scientific and industry literature;
- Consultation with the Western Australian Mining Industry stakeholders; and
- Consultation with Australian Mining Industry stakeholders.

4.2 REVIEW OF SCIENTIFIC AND INDUSTRY LITERATURE

The review of the scientific and industry literature pertaining to manual tasks in the Mining Industry included a search of:

- Relevant scientific literature by way of a search of the Medline database, the WorkSafe Western Australia Library Catalogue, the Ergonomics Australia Journals, the NIOSH publications and various University/research databases;
- Australian jurisdictional (mining industry) and the Australian Safety and Compensation Council (ASCC) websites;
- Australian Mining Industry Peak Body websites
- International OSH jurisdictional websites.
- Other related websites.

A full bibliography of all references that were reviewed have been organised into the following Reference Lists:

Reference List A: Manual task risk management

Reference List B: Manual task risk:

B.1 Overview

B.2 Posture and load

B.3 Vibration and heat stress

B.4 Individual factors (age), job design & shiftwork/hours of work.

Reference List C: Machinery, equipment and vehicles

Reference List D: Manual task risk controls in mining

Reference List E: Manual task injury/accident statistics

The Reference Lists are at Appendix 3. Individual references are mentioned within the document only when the information is specific to that reference. Details of the cited references can be found in the Reference Lists. Information products considered to be good quality and relevant for the Mining Industry are listed within the document.

4.2.1 The extent of manual task injuries

Both the national and international literature has identified the significance of manual tasks as a major occupational safety and health (OSH) risk for the Mining Industry. Injuries, MSD from performing manual tasks have been a significant issue for the Western Australian Mining industry for a number of years. WorkCover Western Australia reports that body stressing (muscular stress from performing manual tasks including repetitive movements) has consistently been the most common mechanism of injury or disease for lost-time injury claims in the Western Australian Mining Industry accounting for approximately one third of all lost-time claims lodged in each year between 1999-00 and 2002-03. The extent of manual task injuries is reflected nationally. The ASCC reports that the most common cause of compensated injury and disease in the Australian Mining Industry in 2004-05 was muscular stress due to manual handling or repetitive movements, accounting for 34% of claims.

A list of statistical reports and summaries is at Reference List E.

4.2.2 Injuries from performing manual tasks

Injuries caused from performing manual tasks, collectively referred to as MSD, can occur as a result of a single event of exertion. More commonly however the injuries are a result of cumulative “wear and tear”, on the musculoskeletal system. Often a single event maybe reported as the direct cause of a particular injury however it is in reality the result of long periods of exposure to sub-critical stress/strain (Simpson, 2000). There is therefore an overlap between musculoskeletal disorders from performing manual tasks that are considered as “musculoskeletal injuries,” that are the result of a single exposure, and those that are considered as “musculoskeletal diseases”, that are the result of repeated or long term exposure (Driscoll, 2007).

It is widely acknowledged in the literature the cumulative nature of manual task injuries needs to be considered to effectively manage manual task risk. There needs to be a focus on all manual task risk factors in the job not just those that are immediate precursors to an accident/injury. Simpson (2000) suggests that manual task risks need to be considered as an occupational health issue rather than an occupational safety issue with emphasis on long-term, coordinated programmes.

(Simpson, 2005 – Reference List B.1; Driscoll, 2007 – Reference List E)

4.2.3 Managing manual task risk

There is consensus in the literature that the essential components of effective manual task programmes/interventions are management commitment, effective risk management systems, worker participation and access to expertise.

The risk management process of hazard identification, risk assessment and risk control provides a systemic framework to manage manual tasks risk. Utilising this systematic process assists in identifying the link between exposures, whether single or cumulative, to specific risk factors and injury. It also provides a framework to prioritise and control risks. A risk management process has the advantage that safety personnel understand it and manual task risk management can be integrated into existing OSH programmes. The ASCC *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work* (2007), herein referred to as *The Code*, provides generic industry guidance on implementing the risk management process.

The risk management process has been utilised to manage manual task risks within the Mining Industry for a number of years. For example WorkSafe Australia and the Joint Coal Board jointly funded the development of the handbook *Ergonomics for the control of sprains & strains in mining* (McPhee, 1993). This handbook provides guidance on implementing the manual task risk management process in the Mining Industry.

Consultation with workers performing the manual tasks is essential to the success of the manual task programmes/interventions. The current literature recommends a participative ergonomics approach to manual task risk management. The participative ergonomics approach asserts that workers performing the manual tasks are the “experts” (Burgess-Limerick, et al, 2005). It is asserted that, provided with sufficient training and motivation, workplace teams are in the best position to effectively undertake hazard identification, risk assessment and risk control activities. Participative ergonomics programmes have been successful in reducing manual task injuries in a number of workplaces across industries (Burgess-Limerick, et al, 2005). The handbook produced from the ACARP funded project C11058 *Reducing musculoskeletal risk in open cut coal mining* provides guidance and includes tools and case studies on the participative ergonomics programme PERforM. A number of case studies reported by NIOSH provide further examples of a participatory approach in particular the Information Circular: *Ergonomics and Mining: Charting a Path to a Safer Workplace*.

A list of Codes of Practice, handbooks, guidance material, case studies and research papers on the manual task risk management process and its implementation through consultative/participative approaches is at Reference List A.

(Burgess-Limerick et al, 2005 – Reference List A)

4.2.4 Manual task risk

4.2.4a Risk assessment

To understand manual task risk the literature concurs that a careful and systemic risk assessment is required. *The Code* says to assess whether a task is likely to pose a risk

of injury, risk factors that are known to lead or contribute to injury need to be examined. Consideration of all risk factors is essential in risk assessment. Risk assessment tools can be found in the Codes of Practice and guidance materials in Reference List A.

4.2.4b Risk factors

Handling heavy/awkward loads and working in constrained/awkward postures while completing manual tasks is common in the Mining Industry. This results from the nature of the work and the workplace/equipment design. A large body of research into working postures and load handling, both within Mining and across industry, has been undertaken and specific guidelines and recommendations developed (Reference List B.2).

Over recent years mining work has changed. Many jobs are partially or fully mechanised. Much more work involves operating machinery and driving vehicles. A lot of the work is sedentary and there is often little task variety (McPhee, 2004). Within the literature there is a body of research and guidance material on machinery, vehicles and equipment in the Mining Industry (Reference List C). The handbook produced from the ACARP funded project C14016 *Reducing injury risks associated with underground coal mining equipment* provides examples of best practice and includes tools and guidance in risk assessment.

A significant proportion of workers in the Mining Industry are exposed to whole body vibration. Whole-body vibration is commonly experienced by drivers, operators and passengers in a wide variety of vehicles such as bulldozers, dump/haul trucks, personnel and equipment transport. Research on whole-body vibration identification, assessment and control has been undertaken and guidelines and recommendations developed (Reference List B.3). *Bad Vibrations: A handbook on whole-body vibration exposure in mining* (McPhee et al, 2001) provides assistance to personnel in the Mining Industry to identify and manage risks associated with whole body vibration exposure.

Hand-arm vibration is also a common risk factor within the mining industry. It is well known that the vibrating tools can cause hand-arm vibration syndrome. Exposure to hand-arm vibration is an important consideration when evaluating manual task injuries to the upper limb (Reference List B.3). The HSE provides guidance material to employers and employees on identifying and managing risk associated with hand-arm vibration in its publications *Control the risks from hand-arm vibration: Advice for employers* and *Hand-arm vibration: Advice for employees*.

There a number of contributory risk factors that affect manual task risk in mining workplaces. The work environment in many mining workplaces contributes to manual task risk. Workplaces are often poorly lit, hot, poorly ventilated and have uneven ground. The move towards working longer hours increases stress and fatigue, both of which contribute to manual task risk. Furthermore the workforce is aging and this leads to questions regarding the impact of age on work capacity and the effect on manual task risk. All of these factors have been researched and guidelines and recommendations developed (Reference List B.3 and B.4).

(McPhee, 2004 – Reference List B.1)

4.2.5 Manual task risk control

The hierarchy of risk controls is an underlying principle of the manual task risk management process. Elimination of hazardous manual tasks is the most preferred control. When the hazardous manual tasks cannot be eliminated then design changes to remove or reduce risk (engineering controls) is the next preferred option. Administrative controls such as task rotation or specific task training are recommended to be additional and/or short-term controls while alternative elimination or engineering controls are developed (Burgess-Limerick, et al, 2005). Manual task training is an important supplement to risk control however teaching safe lifting techniques is ineffective as a stand alone control. It is agreed that focusing on individual capabilities is not effectual.

There are a number of manual task innovative solutions and case studies providing examples of elimination and engineering controls successfully implemented in the Mining Industry. A full list of these is included in Reference List D.

The Code describes duties for designers, manufacturers and suppliers. The literature agrees eliminating manual task risks at the early stages of development, that is during design, is the best approach. The ASCC Guidance note, *Guidance on the Principles of Safe Design for Work* (2006), provides generic industry guidance on safe design.

A significant portion of the research and literature on design in the Mining Industry is on the ergonomics of large machinery (Reference List C). The recent research done by Earth Moving Equipment Safety Round Table (EMESRT) provides Design Philosophies (DPs) for key issues that impact on the human factors design of earth moving equipment. The DPs aim to provide information to assist with equipment design to reduce risks to an acceptable level.

There is some debate on the role of fitness for work programmes in the management of manual task risk. Tasks need to be safe for all workers and designing and/or changing the work to fit workers rather than changing the workers to fit the task is a fundamental principal. This literature review does not cover the role of pre-employment screening or fitness for work programmes, however a number of references can be found on the websites included in the Reference Lists.

There are a number of resources providing guidance on management of manual task risks in industries other than Mining on state and international OSH jurisdictional and industry websites. Such resources can be useful to the Mining Industry when addressing issues for personnel involved in such work as cleaning, maintenance and construction. These are too voluminous to list however it is important to be aware of this information.

(Burgess-Limerick et al, 2005 – Reference List A)

4.2.6 Summary and conclusions

Injuries caused from performing manual tasks at work in the Mining Industry have been recognised as a significant issue for a number of years. A systematic risk management process with a participative ergonomics approach is the most effective way to manage manual task risk.

Known manual task risk factors in mining workplaces are handling heavy/awkward loads, working in awkward/constrained/sustained postures and exposure to whole body and hand-arm vibration. The duration and frequency of manual tasks is also significant.

Eliminating manual task risks at the design phase is the most effective risk control. There are however many existing hazardous manual tasks in mining workplaces that need to be managed and controls implemented to eliminate or reduce risk.

A number of information products are available to assist mining workplaces to implement the manual task risk management processes. Furthermore a number of solutions have been developed and published. Facilitating access to these resources would assist mining workplaces, the following are recommended:

Managing manual tasks risks: Codes of Practice and guidance material.

1. The ASCC *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work* (2007) provides up to date practical guidance on implementing a manual task risk management process.
2. The National Occupational Safety and Health Commission and Joint Coal Board handbook *Ergonomics for the control of sprains and strains in mining* (McPhee, B. 1993) provides Mining Industry specific guidance on the manual task risk management process.
3. The handbook produced from the ACARP project C11058, *Reducing musculoskeletal risk in open cut coal mining* is an excellent example of a participative approach to managing manual task risks in the Mining Industry and includes risk assessment tools and case studies.

Guidance material for managing exposure to vibration

1. The handbook produced by Barbara McPhee et al for The Joint Coal Board Health and Safety Trust, *Bad Vibration: A handbook on whole-body vibration exposure in Mining* (2001) on the assessment and management of whole body vibration is an excellent resource for Mining Industry.
2. The HSE guidance material *Control the risks from hand-arm vibration: Advice for employers* and *Hand-arm vibration: Advice for employees* provides good information on managing hand-arm vibration for employers and employees

Equipment, machinery and vehicles

1. The handbook produced from the recent ACARP research programme C14016: *Reducing injury risks associated with underground coal mining equipment* provides excellent information and guidance and includes risk assessment tools and examples.
2. The NIOSH website provides a number of useful resources relating to machinery, equipment and vehicles in the mining industry.

Risk controls

1. The *Surface Control Document* on the University of Queensland website provides 20 examples of risk controls successfully implemented to reduce manual tasks risks in the Open Cut Coal Mining Industry.
2. A list of innovative solutions to manual tasks risks can be found at the MIRMgate website.
3. The NIOSH website provides a number of risk control solutions

Design

1. The ASCC Guidance note, *Guidance on the Principles of Safe Design for Work* (2006), provides generic industry guidance on safe design.
2. The outcomes of the EMESRT project including the Design Philosophies (DPs) for key issues that impact on the human factors design of earth moving equipment are a valuable reference.

Bibliographies

The MIRMgate and NIOSH websites provide a collective index of resources pertaining to manual tasks in the Mining Industry and are useful sources of information.

4.3 CONSULTATION WITH WESTERN AUSTRALIAN MINING INDUSTRY STAKEHOLDERS

Consultation was sought with Western Australian Mining Industry Stakeholders. The following processes were undertaken:

- A workshop with the Chamber of Mineral and Energy member representatives;
- A workshop with Resource Safety Division (RSD) Inspectors;
- A meeting with the union representative on MIAC; and
- An article in *MineSafe* magazine inviting input to the project.

4.3.1 Chamber of Minerals and Energy workshop outcomes

An initial presentation to the Chamber of Minerals and Energy Occupational Safety and Health (OSH) Standing Committee was given outlining the *Manual Handling Review of*

Manual Handling Review of WA Mining Industry Project: Scoping Study

WA Mining Industry project aims and inviting consultation and input into the scoping phase of the project. There was very strong support for the project and the OSH Committee endorsed a working group meeting to provide input into this scoping study. There was also strong support for the continuation of the project and the Chamber members continuing to input into any future activities. A full summary of the workshop outcomes is at Appendix 4.

There were six industry representatives at the workshop and the OSH Project Officer from the Chamber. The companies represented included:

- Fortescue Metals Group
- Iluka Resources
- Downer EDI Mining
- Alcoa
- Talison Greenbushes
- Premier Coal

Musculoskeletal injuries from employees performing manual tasks at work were rated as either significant or highly significant by the participants. It was considered that the extent and cost of manual task injuries is underestimated by as much as 20% by the injury/accident data. This suggests that manual task injuries are even more significant than indicated by the analysis of the injury/accident data.

Reducing manual task injuries was considered extremely important from the companies' perspectives. Participants expressed that the primary driver to reduce manual task injuries is economy, particularly in relation to reducing injury costs and improving productivity. Manual task injuries are considered to have a significant negative impact on productivity. Improving corporate image is also seen as an important driver. Prosecution is not seen as an effective driver, yet legislative input is considered essential for the more reactive companies.

Most participants were aware of the ASCC *National Standard for Manual Tasks* and *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work*. Although used as a reference by some companies the provision of guidance material specific to the Mining Industry on manual task risk management was strongly supported. Development of this guidance material was seen as a positive step to assist in uniformity across the industry and to raise industry standards. Some companies utilise a systematic approach to managing manual task risks but felt they could do it better with more specific guidance material.

Current practices to manage manual task risks are varied. Some form of manual task training is undertaken by most companies. All participants indicated that there are many opportunities to improve the management of manual task risk and this was seen as very important. Worker participation in the risk management process and in the development of effective solutions was seen as essential. Commitment from executive management was also considered fundamental as was assigning specific personnel to be responsible

for any follow-up. A change in corporate culture to incorporate safe work practices into everyday work was seen as a desired outcome.

There was overwhelming support for the development of a shared solution base. There was a strong commitment indicated for industry representatives to be involved in a working party to collaboratively develop/share solutions. The suggested format of the solutions is one-page solution sheets and/or posters and/or toolbox topics published on the RSD website. The topics should include known common high risk activities/tasks. There was a lot of interest in job fitness and the role of warm-up exercises.

The major manual task issues/problems identified in workplaces were common to many companies. Specific high risk tasks/occupations/injuries identified by the working group included:

- Mobile plant operators
 - Access/egress
 - Seating – design and worn out seats; and
 - Pre-start checks
- Vibration in large equipment
- Levers and ratchets above shoulder height
- Valve operation
 - Pipeline design issues such as location, access for maintenance
 - Lack of consultation at design stage: Commissioning identifies issues and the retrofits are expensive and present own hazards.
- Ore loading – train load-out: Accountants remove essential safety features without consultation with operators and maintenance crews.
- Workshop workers - fitters/boilermakers.
- Process tasks
- Process plant operators working cold to sort out problems in emergency situations, particularly night shift workers.
- Loading into utes without dropping tailgates
- Injuries to hand, shoulder trauma, repetitive strain injury (RSI), backs, knees and ankles are frequent.

Common concerns and experiences relating to manual task risk management included:

- The reporting of manual task hazards tends to occur only after an incident or injury, in spite of workers being aware that the manual task is indeed hazardous.
- Young workers are more likely to undertake high risk behaviour.
- Older workers are more susceptible to wanting to get the job done even if there is hazardous manual handling involved.
- Loads and forces required to do some jobs exceed the capabilities of some workers. Particular concern with more females working in the industry.
- The current labour-market requires acceptance of staff who exhibit mediocre safety culture.

- Many companies feel like they are training up good people who then move up north to the big money.
- Risk has and continues to be contracted out in many organisations.

There was consensus that a more proactive rather than a reactive response to dealing with manual task risks could be developed by up-streaming legislative responsibilities to:

- Designers
- Manufacturers
- Suppliers
- Importers

It was indicated that information on how companies can follow up on designer, manufacturer, supplier and importer responsibilities would be very helpful to mining companies.

4.3.2 RSD Inspectors workshop outcomes

A workshop was held in Perth and a second planned for Kalgoorlie. The second workshop was cancelled as a result of Inspectors not being available to attend. The Inspectors workshop was conducted in the same format as the workshop with the Chamber. A good representation of the Inspectorate attended with one Senior Mining Engineer, two District Inspectors, three Machinery Inspectors, one Special Inspector (Radiation), one Special Inspector (Kalgoorlie Process Plant) and two Special Inspectors. A full summary of the workshop outcomes is at Appendix 4.

Inspectors rated musculoskeletal injuries from employees performing manual tasks at work in mining workplaces as moderately significant to significant. Most mine sites have some sort of programme like *JHAs* or *Take 5* if not *Standard Work Procedures* to manage occupational safety and health (OSH). The programmes may not be specific to hazardous manual tasks but they are included as any other hazard.

Inspectors considered “the bottom line” is the main driver for companies to improve manual task standards. Publishing information from the AXTAT data-base on manual task injuries on the RSD website was seen as a useful way to inform companies of the significance of manual task injuries. It was suggested that companies needed to remove bonuses for productivity and low reporting of injuries and remove benefits associated with injuries for real improvements to be made. Prosecutory actions would be an effective driver to initiate change according to some District Inspectors.

There was general consensus that RSD should lead from the front to assist industry to improve manual task standards and reduce the extent of manual task injuries. The development of information on hazardous manual tasks was seen as the first step. The format/type of information suggested included:

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- A shared solution database with well ordered information that can be easily accessed and cross-referenced, similar to the MIRMgate website. It was recommended the solutions base should be on the RSD website so it was accessible to all companies. The solutions base should include solution sheets for specific hazardous manual tasks. It was agreed that there should be a tie-in with solutions already in existence.
- Guidance material on managing hazardous manual tasks specific to the Mining Industry. It was suggested that existing tools to assist in the risk management process should be utilised. It was suggested the tools have the RSD badge. This was seen as a positive step to National uniformity
- *A High Impact Function Audit* on Manual Tasks for the RSD homepage for industry and Inspectors to utilise. It was suggested that the audit tool could be sent to poorly performing companies. The audit tool needs to be introduced after guidance material is available. It was noted that Inspectors would need training in application of such an audit tool.
- The Inspectors supported the implementation of RSD Initiative Awards to promote good practice to industry. The awards could tie into the solutions data-base.

There was strong support for RSD Inspectors to be involved in an education role rather than an enforcement role. It was suggested the worst performers in terms of manual task injuries be identified and this information be distributed to District Inspectors so they can prioritise visits and follow-up with inspections. It was suggested that RSD employ a Specialist Inspector to follow up on sprains and strains reported to AXTAT. According to the participants the main barrier to Inspectors to enforce manual task standards is lack of resources. It was discussed that District Inspectors are the main inspectors involved with prosecution and as they rotate and rarely hand-over histories of performance, important information on performance is lost making a manual task prosecution more difficult.

The major manual task issues/problems identified by Inspectors in workplaces were common to many companies. Specific high risk tasks/occupations/injuries identified by Inspectors included:

- Cleaning around and under conveyors
- Valves above shoulder height
- Access/egress to/from machinery/plant
- Lifting
- Repetitive movements during sample collection
- Poor plant design
- Hand-held power tools, in particular hand-arm vibration
- Tyre handling in particular 4WD and truck drivers changing tyres unassisted
- Whole body vibration
- Poor design of machinery
- No limits are set for work time. Workers can spend up to 12 hours doing the same repetitive task.

Common concerns and experiences relating to manual task risk management included:

- Working cold is a major issue. There was an opinion that warm-up for work programs are effective, but Australians don't get involved
- Injuries arise primarily because individuals are not following safe procedures.
- Catering and hospitality staff get overlooked for inclusion in training about hazardous manual tasks.
- Shutdowns are the most hazardous activities as risk is contracted out, and personnel are not properly supervised or given adequate training. It was noted that very few lessons appear to be learned from incidents that occur during shutdowns.

4.3.3 MIAC Union Representative meeting outcomes

The project received strong support from the Union. It was suggested that involvement of the Unions WA OSH Officer will be beneficial to a *Manual Task Working Group* if the project proceeds.

It was recommended that the recently developed *Code of Practice for Consultation* would assist with industry getting involved with finding useful solutions to eliminating hazardous manual tasks by involving employees and their representatives.

It was suggested that RSD should produce simple information for employee representatives (Safety and Health Representatives-SHRs) on how to recognise hazardous manual tasks and manual task risk assessment. Background on the significance of manual task injuries would also be beneficial.

The CFMEU runs OSH forums annually for SHR's and this forum, as well as the RSD Roadshow would be a useful way to explain to SHR's how and who to consult with to identify and fix hazardous manual tasks. There was some concern that smaller sites don't have SHR's, but suggested that there is a role for the Employee Inspectors to educate the smaller sites.

Major manual task issues from the union perspective include:

- Mobile plant for surface mining
- Uneven ground in underground mining causing sprains and strains of ankles and knees
- Twisting whilst getting into/out of trucks
- Whole body vibration is a major contributory factor to manual task injuries.
- Organisational issues, specifically long hours working with equipment, plant and machinery.

Reference to the EMESRT (Earth Moving Equipment Safety Round Table) was made and it was suggested that RSD tap into this resource.

4.3.4 Responses to MineSafe Article

A number of email responses were received following an article in the *MineSafe* magazine requesting input into the project. The article is at Appendix 5. A proportion of the emails provided references to useful websites. These have been included in the review of the literature. Additionally a number of company websites were provided and included information on programmes currently being run by companies to manage manual task hazards. The response reinforces the high level of interest from the industry stakeholders to improve manual task standards.

4.3.5 Summary

All Stakeholders indicated strong support for the project. There was consensus that RSD should take a leadership role to assist industry to improve manual task standards and reduce the extent of manual task injuries. All Stakeholders indicated willingness to participate in an ongoing *Manual Task Working Group* to develop activities/strategies. Valuable information for this scoping study was gained from the consultation including the identification of:

- A number of hazardous manual tasks;
- Barriers to reducing manual task risk;
- Current industry practice; and
- Activities and strategies to improve industry standards and reduce manual task injuries.

4.4 CONSULTATION WITH AUSTRALIAN MINING INDUSTRY STAKEHOLDERS

Consultation was sought with Australian Mining Industry stakeholders, primarily with other jurisdictional bodies. Manual task projects/activities currently being undertaken by industry stakeholders were identified and reported.

4.4.1 Jurisdictional consultation

Up to this point manual tasks have not been a priority for Victoria, South Australia, Tasmania and Northern Territory jurisdictional bodies in the Mining industry. A number of these states are currently changing or have recently changed such that Mining OSH legislation is under the umbrella of the general State OSH legislation. It is therefore probable that state based manual task legislation will be adopted in some way in the Mining Industry.

Queensland and New South Wales are undertaking some significant work in the area of manual tasks. The Queensland Department of Mines and Energy has employed a Principal Ergonomist. The key priority of the Principal Ergonomist is to help reduce musculoskeletal disorders (MSD) in the Queensland Mining Industry.

A joint cross jurisdictional project between NSW Department of Primary Industries and the Queensland Department of Mines and Energy *Preventing Musculoskeletal Disorders in Mining* is currently underway. The purposes of the project is *to develop*

practical guidance material on MSD prevention using systematic risk management focusing on risk reduction, establish a formal liaison across jurisdictions in prevention of MSD and share experiences and engage industry on common issues. The outcome of the project will be the development of guidance material, some which may be based on existing material and tools.

4.4.2 Mining Industry manual task projects

The following manual task projects are currently being undertaken by Industry and Union bodies around Australia.

4.4.2a EMESRT

The Earth Moving Equipment Safety Round Table (EMESRT) was formally established in 2006 by a group of major mining companies from around the world. The purpose of EMESRT is to *accelerate development and adoption of leading practice designs for earth moving equipment to minimise the risk to Health and Safety through a process of Original Equipment Manufacturers (OEM) and user engagement for key issues that impact on the human factors design of earth moving equipment* (<http://www.mirmgate.com/emesrt.asp>). A number of Design Philosophies (DPs) have been or are planned to be developed. A Manual Handling and Whole-body Vibration DP have been published and are available on the MIRMgate website.

4.4.2b Australian Workers' Union: South Australian Branch

A project *Critical OHS Vulnerabilities: Manual Handling* has been undertaken in South Australia by the Australian Workers Union. The finalised project report is to be submitted to the Mining and Quarrying Occupational Health and Safety Committee in the near future. The draft Executive Summary summarised four fundamental reasons underlying the high incidence of manual handling injuries including the acceptance of risk by the industry, the lack of timeliness in controlling risk, the lack of consultation/worker participation and the resources boom putting pressure on labour resources. A number of recommendations were included in the draft report that were directed at increasing employee participation, sharing between organisations, empowering workers in OHS and having an industry wide manual handling training programme.

4.4.3 Summary

Strategies undertaken to reduce manual task injuries will be enhanced by ongoing collaboration with other jurisdictional bodies. The establishment of a formal collaborative arrangement between RSD and the Queensland Department of Mines and Energy and the NSW Department on the project they are currently undertaking will be beneficial to this project. Furthermore co-developing guidance material and risk assessment tools will promote uniformity in line with the objectives of the National Mine Safety Framework. Having an up to date knowledge of manual task projects and activities within the Mining Industry will be of ongoing benefit to RSD in developing strategies and identifying best practice.

4.5 SUMMARY AND CONCLUSIONS

The findings of this *Review of Information* support the need and the want for the development and implementation of strategies to reduce manual task injuries in the Western Australian Mining Industry. There is strong evidence that RSD is best placed to take a leadership role to raise manual task standards within the Industry. It is indicated that initial strategies should be aimed at providing Industry with education/information.

There are existing information products/resources to assist the Western Australian mining workplaces to manage manual task risk. Assisting mining workplaces to access this information could be achieved by RSD developing and administering a *Manual Task* webpage listing references/links to the information products/resources as listed in Section 4.2.6.

A systematic risk management process with a consultative, participative ergonomics approach is the most effective way to manage manual task risk. Although there are some existing guidance materials and tools to assist mining workplaces to implement manual task risk management systems it is indicated that there is a need for RSD to develop products for the Western Australian Mining Industry. The development of guidance material and tools will be enhanced by:

- Basing products on the existing resources identified in the literature review;
- Ongoing collaboration with other jurisdictions, in particular NSW and Queensland;
- Ongoing industry consultation; and
- Including information from AXTAT and WorkCover Western Australia on the extent and cost of manual task injuries.

There are number high risk tasks/activities, occupations and exposures common to mining workplaces identified in this *Review of Information* including:

- Access to and egress from plant and machinery
- Operation of mobile plant
- Seating in mobile plant and machinery
- Lifting (in particular loading and unloading vehicles)
- Valve design and maintenance (in particular working on valves in poor postures)
- Extended hours of work and shift work
- Manual tasks in processing plants
- Manual tasks in level development
- Whole body vibration
- Manual task for fitters/boilermakers
- Design – process plants, machinery and equipment
- Hand-held tools (in particular exposure to hand-arm vibration)
- Shutdowns

These findings in combination with the findings of the detailed analysis of manual task injuries (refer Section 3.7) will assist in identifying priorities.

The development of a Hazardous *Manual Task Solution Data-base* administered by RSD to assist Industry to implement manual task risk controls was strongly supported. The development of the data-base will be assisted by:

- Utilising existing solutions identified in the literature such that they can be easily accessed by mining workplaces;
- Facilitating solution sharing by consulting with Industry;
- Getting input from RSD Inspectors who have seen solutions in workplaces; and
- Identifying areas of priority from this scoping study.

Ongoing collaboration and consultation with all Industry Stakeholders will ensure RSD has an up to date knowledge of manual task projects and activities within the Mining Industry and this will enhance the strategies developed. Formalising collaboration with the Queensland Department of Mines and Energy and the NSW Department of Primary Industries on the project they are currently undertaking *Preventing Musculoskeletal Disorders in Mining* will be beneficial in developing guidance material and tools. This collaboration will promote uniformity in line with the objectives of the National Mine Safety Framework.

5.0 RECOMMENDATIONS

The findings of this scoping study strongly support the need for strategies and activities to be developed and implemented to reduce manual task injuries in the Western Australian Mining Industry. The following recommendations to RSD on directions, strategies and activities are based on the information gathered in this scoping study.

Recommendation 1

RSD take a leadership role in the development and implementation of strategies and activities to assist industry to improve manual task standards and reduce the extent and severity of manual task injuries. The initial strategy needs to be aimed at increasing the state of knowledge of manual task risks and the management of the risks in mining workplaces through the development of information products and education activities. Following a period of information/education it is recommended compliance activities are undertaken to ensure all mining workplaces are adequately managing manual task risks.

Recommendation 2

Engage all stakeholders in the process facilitated by way of the establishment of a tripartite *Manual Task Working Group*.

Recommendation 3

RSD develop or modify existing information products, publishing them in a *Manual Task* section on the RSD website. It is recommended the following information products are given priority:

1. A summary of useful references to facilitate access to existing information products as summarised in section 4.2.6.
2. One to two page *Fact Sheets* on:
 - i. Manual task terminology
 - ii. Extent and cost of manual task injuries in the Western Australian Mining Industry
 - iii. Causation of MSD from performing manual tasks at work
 - iv. The manual task risk management process. (Including references for ASCC *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work* (2007); The NOHSC and Joint Coal Board handbook *Ergonomics for the control of sprains and strains in mining* (McPhee, B. 1993); and ACARP project C11058, *Reducing musculoskeletal risk in open cut coal mining handbook*).
 - v. The participative ergonomics approach. (Including references for ACARP project C11058, *Reducing musculoskeletal risk in open cut coal mining handbook*).
 - vi. Whole body vibration. (Including references for The Joint Coal Board Health and Safety Trust, *Bad Vibration: A handbook on whole-body vibration exposure in Mining* (Barbara McPhee et al, 2001)

- vii. Hand-arm vibration. (Including reference to the HSE documents, *Managing hand-arm vibration for employers* and *Managing hand-arm vibration for employees*).
- viii. Reducing injury risks associated with mining equipment. (Including reference for ACARP research programme C14016: *Reducing injury risks associated with underground coal mining equipment*).
- ix. Safe design. (Including references for the ASCC document, *Guidance on the Principles of Safe Design for Work* (2006) and the EMESRT *Design Philosophies*).
- x. Manual task legislation (highlighting current legislation pertaining to manual tasks)

Fact Sheets and other guidance material can be added to the webpage as they are developed.

Recommendation 4

Undertake manual task education activities at established forums such as the RSD Roadshow, annual CFMEU forums for employee representatives and other mining expositions.

Recommendation 5

RSD facilitate mining workplaces to implement systematic manual task risk management processes, recommending a participative ergonomics approach. There would need to be an initial period of education/information followed by compliance activities.

Recommendation 6

Develop or modify manual task risk management guidance material and risk assessment tools that RSD could badge and publish. It is recommended that any tools/processes developed be trialled in all Mining Industry sectors.

Recommendation 7

Develop and administer a shared *Hazardous Manual Task Solution Base*. It is suggested that one-two page *Solution Sheets* for common hazardous manual tasks based on existing solutions published in literature and/or implemented by industry be developed. Where such solutions do not exist, research and develop solutions in liaison with all industry stakeholders. Priority needs to be given to the tasks/activities identified in the *Review of Information* and the *Analysis of Injury and Accident data* including:

- i. Access to and egress from plant and machinery
- ii. Lifting (in particular loading and unloading vehicles)
- iii. Valve design and maintenance (in particular working on valves in poor postures)
- iv. Extended hours of work and shift work
- v. Manual tasks in processing plants
- vi. Manual tasks in level development

Recommendation 8

Establish a formal collaborative arrangement between RSD and the Queensland Department of Mines and Energy and the NSW Department of Primary Industries on the joint project they are currently undertaking *Preventing Musculoskeletal Disorders in Mining* to co-develop guidance material that may be used uniformly throughout Australia, in line with the objectives of the National Mine Safety Framework.

Recommendation 9

Maintain an up to date knowledge of manual task literature, projects and activities within the Mining Industry to ensure RSD is aware of current best practice. To achieve this it is recommended that there is ongoing collaboration and consultation with all industry stakeholders nationally and internationally.

Recommendation 10

RSD undertake compliance activities on manual tasks following a period of education/information. Targeted audits on poor performing companies are recommended. To assist in the audit process it is suggested a *Manual Task High Impact Function Audit* tool be developed and published on the RSD homepage for Industry and Inspectors to utilise. Inspectors will need education/training in order to undertake manual task compliance activities.

Recommendation 11

Consider the development and implementation of specific manual task legislation by way of a manual task regulation. This regulation could be based on the existing State regulation requiring Duty Holders to identify hazardous manual tasks, assess the risk and control the risk.

Recommendation 12

Utilise the information from AXTAT on manual task accident and injury statistics. Including specific information on manual task injuries in RSD publications such as the *Annual Safety Performance Accident and Injury Summaries* will provide an industry overview on significant manual task injury trends. To better prioritise education/information and compliance activities RSD can identify poor and good performers from AXTAT. Some modifications to the coding of *Type of Accident Overexertion Strenuous Movement (4000)* in AXTAT could be made to reflect the full range of characteristics of hazardous manual tasks as per the definition in the ASCC *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work (2007)* to enhance the information.

To implement the above recommendations RSD will need to provide adequate resources. Sufficient technical expertise will need to be provided to assist in the development of information products, education activities and compliance tools. RSD Inspectors will need to be provided with adequate resources and education/training in order to undertake education/information and compliance activities.

Acknowledgements

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RSD Health Management Branch personnel

RSD Inspectors

RSD Contract Analyst

Chamber and Minerals and Energy OSH Officer

Chamber and Minerals and Energy Occupational Safety and Health (OSH) Standing Committee

Workshop participants

MIAC Union representative

Principal Ergonomist, Queensland Department of Mines and Energy

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Terminology

Manual Tasks

Manual task is a label given to any activities that require a person to use their physical body (musculoskeletal system) to perform work. This includes work that involves the use of force for lifting, lowering, pushing, pulling, carrying, moving, holding or restraining anything. It also includes work that involves repetitive actions, sustained postures and involves concurrent exposure to vibration. This replaces the term previously used *manual handling*.

Hazardous Manual Tasks

Almost every activity involves some form of a “manual task.” To distinguish between those that are potentially a problem and those that are not, the term *hazardous manual task* is used. *Hazardous manual tasks* refer to any manual task that involves certain characteristics that increases the risk of injury. These characteristics include:

- 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; or
- Involve handling of unstable or unbalanced loads that are difficult to grasp or hold.

Musculoskeletal disorders

Hazardous manual tasks can lead to a variety of injuries and conditions collectively referred to as *musculoskeletal disorders (MSD)* including:

- Sprains and strains of muscles, ligaments and tendons;
- Back injuries, including damage to the muscles, tendons, ligaments, spinal discs, nerves, joints and bones;
- Joint injuries or degeneration, including injuries to the shoulder, elbow, wrist, hip, knee, ankle, hands and feet;
- Bone injuries;
- Nerve injuries;
- Muscular and vascular disorders as a result of hand-arm vibration; and
- Soft tissue hernias.

Hazardous manual tasks are a main cause of work related *MSD*.

Reference

ASCC, *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work* (2007).

WorkCover Data
WA Mining Industry Compensation Claim Costs

Table 1: All Lost Time Claims

Year Claimed	Number of Lost Time Claims	Estimated total cost	Days lost	Average Estimated Cost per Claim
2004/05	836	\$32,809,770	124,580	\$39,246
2005/06	833	\$31,852,698	89,319	\$38,239
2004/05 and 2005/06	1,669	\$64,662,468	213,899	\$38,742

Table 2: Manual Task Lost Time Claims (mechanism 41, 42, 43, 44)

Year Claimed	Number of Lost Time Claims	Estimated total cost	Days lost	Average Estimated Cost per Claim
2004/05	346	\$14,075,079	62,182	\$40,679
2005/06	297	\$ 9,831,625	34,581	\$33,103
2004/05 and 2005/06	643	\$23,906,704	96,763	\$36, 891

Table 3: All No Lost Time Claims

Year Claimed	Number of Lost Time Claims	Estimated total cost	Average Estimated Cost per Claim
2004/05	1,844	\$2,639,792	\$1,432
2005/06	1,787	\$3,527,036	\$1,974
2004/05 and 2005/06	3,631	\$6,166,828	\$1,703

Table 4: Manual Task No Lost Time Claims

Year Claimed	Number of Lost Time Claims	Estimated total cost	Average Estimated Cost per Claim
2004/05	522	\$ 885,327	\$1,696
2005/06	545	\$ 949,499	\$1,742
2004/05 and 2005/06	1067	\$1,834,826	\$1,719

Reference Lists

Reference List A: Manual Task Risk Management

Reference Title/Type	Direct link to document (D) and/or source link website (S) and/or reference detail (R)
National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work <i>Code of Practice</i>	R ASCC. (2007) <i>National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work</i> . ASCC D http://www.ascc.gov.au/NR/ronlyres/5B5FB389-7BBD-42F9-ADE0-7B859E0D4910/0/2239DEWRCodeOfPractice_FINAL.pdf
Guidance note Guidance on the Principles of Safe Design for Work <i>Guidance material</i>	R ASCC (2006) <i>Guidance note Guidance on the Principles of Safe Design for Work</i> . ASCC. D http://www.ascc.gov.au/NR/ronlyres/D648D9A8-0448-4FD7-8CBC-F13CA9BC2EEB/0/Safedesignwebdoc.pdf
Ergonomics for the control of sprains and strains in mining <i>Handbook</i>	R McPhee, B. (1993). <i>Ergonomics for the control of sprains and strains in mining</i> . National Occupational Safety and Health Commission. D (permission to download and/or include hyperlink required). http://www.jkgroup.com.au/documents/ErgonomicsSprainsStrainsMining.pdf Hard copies can be ordered through Coal Services website. http://coalservices.com.au/index.php?option=com_virtuemart&page=shop.product_details&flypage=shop.flypage_coalservices&category_id=5&product_id=19&Itemid=108
Reducing musculoskeletal risk in open cut coal mining <i>Handbook and Research Report</i>	S http://www.acarp.com.au/Completed/abstracts/C11058abstract.htm A copy of the final report, handbook and DVD can be purchased through ACARP http://www.acarp.com.au/Completed/abstracts/C11058abstract.htm
Prevention of Back Injuries in the Western Australian Mining Industry Booklet <i>Handbook</i>	S http://www.mirmgate.com/MCA_Innovation_Profiles/1999/Back_Injuries_Prevention.pdf A copy of the booklet can be obtained from South-West OHS Committee Chamber of Minerals and Energy of Western Australia Inc Phone: (08) 9734 8311
Participative ergonomics for manual tasks in coal mining (2005)	R Burgess- Limerick, R; Dennis, G; Straker, L; Pollock, C; Leveritt, S and Johnson, S. (2005) Participative

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<p><i>Conference Paper</i></p>	<p>ergonomics for manual tasks in coal mining. <i>Queensland Mining Industry Health & Safety Conference</i>. S http://www.grc.org.au/conference/dbase_upl/SafeConf05.pdf</p>
<p>Implementation of the participative ergonomics for manual tasks (PERforM) Program at four Australian underground coal mines. <i>Journal Paper</i></p>	<p>R and D Burgess-Limerick, R., Straker, L., Pollock, C., Dennis, G., Leveritt, S., & Johnson, S. (2007). Participative ergonomics for manual tasks in coal mining. <i>International Journal of Industrial Ergonomics</i> 37, 145-155. (rbletalijie06.pdf)</p>
<p>Ergonomics interventions at Vulcan Materials Company (2007) <i>Case study/journal paper/conference paper</i></p>	<p>R Torma-Krajewski, J., Hipes, C., Steiner, L., & Burgess-Limerick (in press) Ergonomics interventions at Vulcan Materials Company. <i>Mining Engineering</i>. D http://www.burgess-limerick.com/site/Vulcan%20Materials_files/jtketalsme07.pdf</p>
<p>Xstrata Copper Australia – Mt Isa Operations. Manual handling – reducing injuries. <i>Case study/conference paper</i></p>	<p>R Cameron, P (2003) Manual handling- reducing injury. Xstrata Copper Australia. <i>Queensland Mining Industry Health & Safety Conference</i> D http://www.grc.org.au/conference/dbase_upl/03_spk019_cameron.pdf</p>
<p>NIOSH: <i>Case studies/information circulars/research papers</i> 1. An Approach to Identify Jobs for Ergonomic Analysis 2. Ergonomic Assessment of Musculoskeletal Risk Factors at Four Mine Sites: Underground Coal, Surface Copper, Surface Phosphate, and Underground Limestone 3. Ergonomic Interventions at Badger Mining Corporation 4. Ergonomic Interventions at Unimin 5. Ergonomics and Mining: Charting a Path to a Safer Workplace 6. Ergonomics: Beyond Compliance 7. Implementation of an Ergonomics Process at a US Surface Coal Mine 8. What Works (and What Doesn't) in Mining Ergonomics</p>	<p>D (index) http://www.cdc.gov/niosh/mining/pubs/programareapubs4.htm</p>
<p>Work Related Musculoskeletal Disorder Prevention Guide in Mining: Training Guide <i>Guidance material</i></p>	<p>R Ministry of Energy, Mines and Petroleum. (Updated 2006). Work Related Musculoskeletal Disorder Prevention Guide in Mining: Training Guide. British Columbia. D http://www.em.gov.bc.ca/subwebs/mining/Healsafe/oc/cu/MSD-erg/manual.htm</p>

Reference List B: Manual task risk

B.1 Manual task risk: Overview

Reference Title/Type	Direct link to document (D) and/or source link website (S) and/or reference detail (R)
Reducing Manual Handling Injury: The Holy Grail of Health and Safety <i>Conference paper</i>	R Simpson, G.C., (2000) Reducing Manual Handling Injury: The Holy Grail of Health and Safety. (pp 259-267). Minesafe International 2000. Perth
In-depth review: Ergonomics in mining <i>Journal article</i>	R McPhee, B. (2004) In-depth review: Ergonomics in mining. <i>Occupational Medicine</i> , 54:297-303.
NIOSH- research papers 1. Prevalence and Cost of Cumulative Injuries Over Two Decades of Technological Advances: A Look at Underground Coal Mining in the U.S.	D (index) http://www.cdc.gov/niosh/mining/pubs/programareapubs4.htm

B.2 Manual task risk: Posture and load

Reference Title/Type	Direct link to document (D) and/or source link website (S) and/or reference detail (R)
NIOSH- Research Papers 2. Biomechanical Modelling of Asymmetric Lifting Tasks in Constrained Lifting Postures 3. Work Sampling Applied to a Human Factors Analysis of Mine Worker Positioning 4. Working in Unusual or Restricted Postures 5. Effects of Lifting in Four Restricted Postures 6. Effects of Posture on Back Strength and Lifting Capacity 7. Effects of Posture on Dynamic Back Loading During a Cable Lifting Task 8. The Effects of Restricted Workspace on Lumbar Spine Loading 9. The Effects of Scaling Height and Scaling Bar Design on Applied Forces and Bilateral Muscle Activity of the Back and Shoulders 10. An Exploratory Study of Loading and Morphometric Factors Associated with Specific Failure Modes in Fatigue Testing of Lumbar Motion Segments 11. Trunk Extension Strength and Muscle Activity in Standing and Kneeling Postures 12. Lifting in Stooped and Kneeling Postures: Effects on Lifting Capacity, Metabolic Cost, and Electromyography of Eight Trunk Muscles 13. Physical Limitations and Musculoskeletal Complaints Associated With Work in Unusual or Restricted Postures: A Literature Review 14. Physical Strength Assessment in Ergonomics 15. Developing Random Virtual Human Motions and Risky Work Behaviors for Studying Anthropotechnical Systems	D (index) http://www.cdc.gov/niosh/mining/pubs/programareapubs4.htm

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Manual Materials Handling in mining: the effect of rod heights and foot positions when lifting “in-the-hole” drill rods <i>Journal article.</i>	Phamondon, A., Delisle A., Trimble, K., Desjardins, P., & Rickwood, T. Manual Materials Handling in mining: the effect of rod heights and foot positions when lifting “in-the-hole” drill rods <i>Medline</i> PMID: 16545338
Relationships of physical job tasks and living conditions with occupational injuries in coal miners. <i>Journal article.</i>	Bhattacharjee, A., Bertrand, J.P., Meyer, J.P., Benamghar, L., Otero Sierra, C., Michaely J.P., Ghosh, A.K., d’Houtaud, A., Mur, J.M., Chau, N., & Lorhandicap Group. Relationships of physical job tasks and living conditions with occupational injuries in coal miners. <i>Medline</i> ; PMID 17485883

B.3 Manual task risk: Vibration and heat stress

Reference Title/Type	Direct link to document (D) and/or source link website (S) and/or reference detail (R)
Whole-body vibration	
Bad Vibrations: A handbook on whole-body exposure in mining. <i>Handbook.</i>	R McPhee, B., Foster, G., & Long, A.,(2001) Bad Vibrations: A handbook on whole-body exposure in mining. Joint coal Board Health & Safety Trust, Sydney, NSW. D (permission to download and/or include hyperlink required). http://www.jkgroup.com.au/documents/badvibrations.pdf Hard copies can be ordered through Coal Services website. http://coalservices.com.au/index.php?option=com_virtuemart&page=shop.product_details&flypage=shop_flypage_coalservices&category_id=5&product_id=29&Itemid=108&vmcchk=1
Whole-body Vibration Standards. <i>Journal article</i>	R McPhee, B., Foster,G., & Long, A. (1998). Whole-body vibration standards. <i>Ergonomics Australia</i> Vol12, Mining Ergonomics special issue.. D http://ergonomics.uq.edu.au/eaol/mining.pdf
RR400 - Whole-body vibration on construction, mining and quarrying machines <i>Guidance material</i>	A J Scarlett., R M Stayner 2005 Silsoe Research Institute for the Health and Safety Executive 2005 S http://www.hse.gov.uk/research/rrpdf/rr400.pdf
NIOSH <i>Research Papers</i> 1. Whole-Body Vibration and Postural Stress among Operators of Construction Equipment: A Literature Review 2. Physiological Responses and Subjective Discomfort of Simulated Whole-Body Vibration From a Mobile Underground Mining Machine	D (index) http://www.cdc.gov/niosh/mining/pubs/programareapubs4.htm
Hand-arm vibration	
Control the risks from hand-arm vibration Advice for employers on the Control of Vibration at	R HSE (2005) <i>Control the risks from hand-arm</i>

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Work <i>Guidance material</i>	<i>vibration: Advice for employers on the Control of Vibration at Work.</i> HSE, UK D http://www.hse.gov.uk/pubns/indg175.pdf
Hand-arm vibration: Advice for employees <i>Guidance material</i>	R HSE (2005) Hand-arm vibration: Advice for employees. HSE, UK D http://www.hse.gov.uk/pubns/indg296.pdf
Carpal tunnel syndrome in association with hand-arm vibration syndrome: a review of claimants seeking compensation in the Mining Industry. <i>Research paper</i>	Burke, F.D., Lawson, I, J., McGeoch, K.L., Miles, J.N., & Proud, G. Carpal tunnel syndrome in association with hand-arm vibration syndrome: a review of claimants seeking compensation in the Mining Industry. <i>Medline. PMID 15757775</i>
Assessment of hand-arm vibration syndrome in a northern Ontario base metal mine. <i>Research paper</i>	Hill, C., Langis, W.J., Petherick, J.E., Campbell, D.M., Haines, T., Anderson, J., Conley, K.K., White, J., Lightfoot, N.N., & Bissett, R.J. Assessment of hand-arm vibration syndrome in a northern Ontario base metal mine. <i>Medline. PMID 11779422</i>
Heat stress	
Heat Stress in Mining <i>Research report</i>	R Leveritt, S. (1998) Heat Stress in Mining. Ergonomics Australia. Vol12, Mining Ergonomics special issue D http://ergonomics.uq.edu.au/eaol/leveritt.pdf

B.4 Manual task risk: Individual factors (age), Job design and shiftwork

Reference Title/Type	Direct link to document (D) and/or source link website (S) and/or reference detail (R)
Age	
NIOSH <i>research papers</i> 1. Comparison of Fatigue Failure Responses of Old Versus Middle-Aged Lumbar Motion Segments in Simulated Flexed Lifting 2. What Difference Does Age Make? Part 1: Mining in All Commodities 3. What Difference Does Age Make? Part 3: Metal Ore Mine Injuries	D (index) http://www.cdc.gov/niosh/mining/pubs/programareapubs4.htm
Age-related accident risks: Longitudinal study of Swedish iron-ore miners. <i>Journal article</i>	La flame, L., & Blank, V.L., Age-related accident risks: Longitudinal study of Swedish iron-ore miners. <i>Medline. PMID 8892554</i>
Job design	
NIOSH – research and guidance material 1. A Method for Evaluating System Interactions in a Dynamic Work Environment 2. Job Design: An Effective Strategy for Reducing Back Injuries 3. Predicting System Interactions in the Design Process	D (index) http://www.cdc.gov/niosh/mining/pubs/programareapubs4.htm

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Shiftwork	
NIOSH – Guidance material and research articles 1. Shiftwork: A Guide for Schedule Design 2. Overtime and Extended Work Shifts: Recent Findings on Illnesses, Injuries and Health Behaviors	D (index) http://www.cdc.gov/niosh/mining/pubs/programareapubs4.htm

Reference List C: Machinery, equipment and vehicles

Reference Title/Type	Direct link to document (D) and/or source link website (S) and/or reference detail (R)
ACARP Project: Reducing injury risks associated with underground coal mining equipment. <i>Final research report Handbook.</i>	D: Final Report http://www.burgess-limerick.com/site/Underground%20Equipment_files/C14016%20final%20report.pdf D: Handbook http://www.burgess-limerick.com/site/Underground%20Equipment_files/handbook.pdf DVD and handbook can be purchased on the Burgess Limerick website. http://www.burgess-limerick.com/site/Underground%20Equipment.html
EMSERT: Design Philosophies Equipment access and egress Working at heights Whole-body vibration Fire Isolation of energy, including parking Visibility/collision detection and avoidance Tires and rims Manual handling <i>Design Guidelines</i>	D (index) http://www.mirmgate.com.au/emesrt.asp
Applying ergonomics to underground coal mining equipment <i>Journal article</i>	R Burgess-Limerick, R. (2007) Applying ergonomics to underground coal mining equipment. <i>Ergonomics Australia</i> , 21 NO2:4-12. D http://ergonomics.uq.edu.au/eaol/jul07.pdf
Reducing injury risks associated with underground coal mining equipment <i>Conference paper</i>	R Burgess-Limerick, R., & Johnson, S. (2005). Reducing injury risks associated with underground coal mining equipment. Queensland Mining Industry Health & Safety Conference 2005, p85-87. D http://www.qrc.org.au/conference/_dbase_upl/SafeConf05.pdf
Ergonomics in large machinery design	R McPhee, B.(2007) Ergonomics in large machinery design. <i>Ergonomics Australia</i> , 21, No2,:22-25.

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<i>Journal article</i>	D http://ergonomics.uq.edu.au/eaol/jul07.pdf
Ergonomics in the design process	O'Sullivan, J. (2007) Ergonomics in the design process. <i>Ergonomics Australia</i> . 21, No2:13-20.
<i>Journal article</i>	D http://ergonomics.uq.edu.au/eaol/jul07.pdf
The ups and downs of access to heavy vehicles in the Mining Industry.	R Gibson, I (1998) The ups and downs of access to heavy vehicles in the Mining Industry. <i>Ergonomics Australia</i> Vol12, Mining Ergonomics special issue..
<i>Journal article</i>	D http://ergonomics.uq.edu.au/eaol/mining.pdf
NIOSH – <i>research papers, guidance material;</i> 1. Biomechanical Modelling of Spinal Loading Due to Jarring and Jolting for Heavy Equipment Operators 2. A Checklist for Evaluating Cab Design of Construction Equipment 3. Comparison of Jolting and Jarring in a Newer and Older Dozer at a Highway Construction Site 4. Effect of Operator Position on the Incidence of Continuous Mining Machine/Worker Collisions 5. An Ergonomic Evaluation of Excavating Operations: A Pilot Study 6. Ergonomic Risk Factors: A Study of Heavy Earthmoving Machinery Operators 7. Field Evaluation of Seat Designs for Underground Coal Mine Shuttle Cars 8. Injuries Associated with Continuous Miners, Shuttle Cars, Load-haul-dump, and Personnel Transport in New South Wales Underground Coal Mines 9. Motion Editing and Reuse Techniques and Their Role in Studying Events Between a Machine and its Operator 10. Self-Reported Musculoskeletal Symptoms Among Operators of Heavy Construction Equipment 11. Systematic Comparison of Different Seats on Shuttle Cars Used in Underground Coal Mines 12. Upper Extremity Joint Moment and Force Predictions When Using a Joystick Control	D (index) http://www.cdc.gov/niosh/mining/pubs/programarea_pubs4.htm
Effects of joystick stiffness, movement speed and movement direction on joystick and upper limb kinematics when using hydraulic-actuation joystick controls in heavy vehicles. <i>Journal article</i>	R &S Oliver M, Tingley, m., Rogers, J., & Biden, E. Effects of joystick stiffness, movement speed and movement direction on joystick and upper limb kinematics when using hydraulic-actuation joystick controls in heavy vehicles. <i>Medline. PMID: 17457745.</i>

Reference List D: Risk controls

Reference Title/Type	Direct link to document (D) and/or source link website (S) and/or reference detail (R)
<p>SURFACE CONTROLS DOCUMENT <i>Washplant Controls</i> <i>Conveyor systems: Conveyor Spillage</i> 1. BACT 2. Upgrading walkways <i>Roller Change out</i> 3. Air bags 4. Conveyor Jacks <i>Other</i> 5. Cleaning magnets 6. Coal Sampling 7. Hosing Access 8. Tilting Screen for Maintenance <i>Workshop Controls:</i> 9. Work Platforms 10. Transporting Heavy items (eg. gas cylinders) 11. Changing Tyres 12. Unloading Delivery Truck <i>Mining Controls</i> 13. Pin Change out 14. Transporting Dragline Pins 15. Cable Pulling 16. Decanting Oil 17. Washing Vehicles <i>Vehicle design features</i> 18. Access to Material Bin/Top of Truck 19. Access to Cabin 20. Operator Views <i>Specific examples of risk controls.</i></p>	<p>R and D Nicholson, M., & Leveritt, S. (2004) Manual Tasks Controls for Open Cut Coal Mining. The University of Queensland http://www.ergonomics.uq.edu.au/download/surfacecontrols.pdf</p>
<p>INNOVATIVE SOLUTIONS 1. Longwall Roof Support Leg Lifting Device 2. Potable Water on Draglines 3. Face Bretby Handling System 4. Reducing Hazards to Tyre Changing Employees 5. Monorail Chain-Removing Tool 6. Taking the back work out of fitting and removing a shuttle car tyre 7. Dozer Non-Slip Track Mat 8. "The Truss Master" - Removing the Operator from the Hazards of Hand-Held-Bolters 9. Longwall Bretby Lifter (Bret-Louge) & Longwall Bretby Safety Brackets (Bret-Safe) 10. SCS Rockbolt Resin Cartridge Inserter 11. Truck fill boom for coolant and</p>	<p>D – Index: All entries of the type “Innovation” http://search.mirmgate.com/CMD/get?mode=advanced&format=summary2&nratt=2&op0=wd&val0=%22Occupational+health+%7C+Musculoskeletal+%7C+Manual+tasks%22&att0=MIRMGate.Hazard&combiner0=and&op1=wd&att1=MIRMGate.Energies&combiner1=and&interval=20&val1=&Find.x=23&Find.y=8</p>

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<p>potable water</p> <ol style="list-style-type: none"> 12. Burty-Weise Bar 13. Powerhouse Ergonomics 14. Hori Board 15. New Towing Device for Heavy Equipment 16. New Towing Device for Heavy Equipment 17. Safety Improvements at Chandala Laboratory 18. Redesign Horizontal Borer Work Area Elimination of Fall and Ergonomic Risks 19. Post-grouted spinbolt leading to an integrated and proactive ground support/mining system 20. Dragline tub high voltage cable plug 21. Filter cloth winch for belt filters eliminates manual handling risks 22. Gas cylinder trolley 23. Return roller change-out jig 24. Gas Cylinder Handle 25. Prevention of Back Injuries in the Western Australian Mining Industry Booklet 26. JND Drill-rod Handling System 27. Horizontal Rotor Impactor Change 28. Conveyor Belt Lifting Device 29. King pin removal attachment. Attachment for the forklift 30. Bulldozer track roller change-out tool 31. Strut tensioning adapter tool 32. Safe installation of screen panels in the Coal Handling Preparation Plant 33. Safety and productivity improvements at the core farm 34. Automated air seeder 35. Core Tray Mate 36. Reduction of manual handling in the Case Shop 37. Relocation of air conditioner compressor on a d11n dozer 38. Control of manual handling hazards associated with plant maintenance 39. Block casting line 2 upgrade 40. A.S.E Vest (Austin s Support & Equipment Vest) 41. The Safe Working Practice of Changing Out a Raisebore Reaming Head Underground 42. Evans Roller Frame 43. Dump rope stand 	
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<p>44. Conveyor Leg Installer 45. Manual Handling Personal Risk Calculator 46. Ergonomic Improvement, Changing Scraper Cutting Edges 47. Worsley Valve Lifting Frame 48. The West Angelas Transmission Jig 49. Workshop Haul Truck Safety Platform 50. Lightning Lock 51. Health Strategy Implementation 52. "Adjust it yourself" Operator Adjust Mirrors</p> <p><i>Innovative controls for manual task risks from the Australian Mining Industry.</i></p>	
<p>Platform In Mechanics Pit</p>	<p>D http://www.ewtpimp.com.au/</p>
<p>NIOSH - Specific Controls, research into controls.</p> <ol style="list-style-type: none"> 1. A case study of Roof Bolting Tasks to Identify Cumulative Trauma Exposure and Musculoskeletal stress on miners performing Roof screening operations. (controls within documents) 2. Technology News - Development of a mobile manipulator to reduce lifting accidents 3. Technology News 459 - Ergonomic Seat Reduces Shock for Low-Seam Shuttle Car Operators 4. Back Injury Control Measures for manual lifting and Seat Design 5. Ergonomic Seat With Viscoelastic Foam Reduces Shock on Underground Mobile Equipment 6. Improved Seat Reduces Jarring/Jolting for Operators of Low-Coal Shuttle Cars 	<p>D (index) http://www.cdc.gov/niosh/mining/pubs/programareapubs4.htm</p>
<p>US Department of Labor: Mine Safety and Health Administration</p> <ol style="list-style-type: none"> 1. Miners tips and safety ideas. Back injuries: <ul style="list-style-type: none"> • Conveyor belt installations • Mechanical means of lifting • Overcast design • Conditioning • Proper lifting • Track installations 2. Conveyor clean up 	<p>D (index) Mine Safety and Health Administration (MSHA) - Accident Prevention Program - Safety Ideas and Tips by Categories - Back Injuries</p> <p>D</p>

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<p>3. Pre packaged belt move</p> <p><i>Control ideas for manual tasks from US mining industry</i></p>	<p>Mine Safety and Health Administration (MSHA) - Accident Prevention Program Safety Ideas - Conveyor Cleanup D Mine Safety and Health Administration (MSHA) - Accident Prevention Program Safety Ideas - Conveyor Cleanup</p>
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Reference List E: Statistics

<p>ASCC: Information Sheet Mining</p> <p><i>Statistical summary</i></p>	<p>D http://www.ascc.gov.au/NR/rdonlyres/E84E474B-D42E-4922-A5B7-0DC7BD7084AE/0/ASCCfactsheet_Mining.pdf</p>
<p>Research Note 2: 2005 Claims lodged by workers in the Mining Industry in the Western Australian Workers Compensation System 1999-00 to 2002-3.</p> <p><i>Statistical summary</i></p>	<p>D: http://www.workcover.wa.gov.au/NR/rdonlyres/2AE8D9C5-1957-4B80-BFD8-3F1B3900C168/0/ResearchNoteClaimsLodgedbyWorkersintheMiningIndustryintheWesternAustralianWorkersComp.pdf</p>
<p>Summary of literature review of health issues related to NSW mining.</p> <p><i>Injury statistic related report</i></p>	<p>Driscoll, T (2007) <i>Summary of literature review of health issues related to NSW mining</i>. NSW Department of Primary Industries</p>

Summary of Workshops

1. Summary of Workshop: Chamber of Minerals and Energy

A presentation outlining the terminology, statistics and available resources to assist the Mining Industry to manage hazardous manual tasks in their workplaces was given. Feedback from the participants during the presentation included:

- The reporting of manual task hazard tends to occur only after an incident or injury, in spite of workers being aware that the manual task is indeed hazardous.
- Both young and old workers need to be managed in unison.
- The statistics recorded on AXTAT underestimates the manual task injury numbers by at least 20% of what is really seen on mine sites.
- Similarly, the compensation costs of reported injuries seriously underestimate the real costs of injury. Significant costs result from losses in productivity due to finding, training and supervising an appropriate replacement to complete tasks.

Following the presentation a series of questions that had been sent to participants prior to the workshop were discussed. The responses are summarised below.

Question 1:

How would you rate the extent of musculoskeletal injuries arising from manual tasks at your workplace?

- *Don't know*
- *Insignificant*
- *Moderately significant*
- *Significant*
- *Highly significant*

Participants' ratings predominated from significant to highly significant. One participant suggested manual task injuries are the company's biggest block to productivity.

Question 2:

What major manual task issues/problems have you identified at your workplace?

- Access/egress, seats (design and wearing out) and pre-start checks for mobile plant operators
- Vibration in large equipment
- Levers and ratchets above shoulder height
- Valve operation – Pipeline design issues like location, access for maintenance
 - Lack of consultation at design stage: Commissioning identifies issues and the retrofits are expensive and present own hazards.
- Ore loading – train load-out: Accountants remove essential safety features without consultation with operators and maintenance crews.
- Workshop workers - fitters/boilermakers.

- Process tasks
- Process plant operators working cold to sort out problems in emergency situations, particularly night shift workers.
- Loading into utes without dropping tailgates
- The current labour-market requires acceptance of staff who exhibit mediocre safety culture. Many companies feel like they are training up good people who then move up north to the big money.
- Doing the job properly/well should incorporate thinking how to do it safely so that it can be done continually without injury, stoppage or losses.
- Risk has and continues to be contracted out in many organisations.
- One on one consultation with workshop operators to recognise how best to do the job has been found useful.
- Injuries to hand, shoulder trauma (RSI), backs and knees/ankles are frequent.

Question 3

Have you implemented any programme aimed at reducing manual task injuries?

- One company uses a specialist ergonomist to consult with individual work-teams in the workshop and process plant to identify solutions to specific hazardous manual tasks.
- One company undertakes mandatory manual handling training every two years. This company has found that using a consultative process with individual teams about the work they do and where the work is done is more productive than running through a slideshow of methods that are not related to the workers' real work. They ask the workers to "pick a task that you think is an issue!" They then get two people from different work areas to observe tasks, with questioning of techniques to identify solutions to minimise hazardous manual tasks. They ask questions about such things as pinch points, whether there any shoulder/wrist issues with the task, or if it is done repetitively.
- Warm up for work/prestart fitness programs are used at a few sites.
- Hazard identification/risk assessment is used at a newer site to prioritise focus for providing solutions to most hazardous tasks. Focus includes:
 - Valve types
 - Manually operated workplaces
 - Coaching individuals to identify hazards/assess and then eliminate the risks.
- Job fitness was considered important to the group. Problems associated with females working with weights beyond what is safe, the bullet proof youth and older workers just wanting to get the job done.

The working group briefly discussed how to change the corporate culture to incorporate controls into everyday work. For example knee pads are provided, but not used. Incorporating a sense of ownership into doing the job safely and efficiently is the desire.

Question 4

Do you have a systematic OSH risk management program in place? (Hazard identification, risk assessment and control)

- Two companies do, yet they aren't convinced they are doing it as well as they could be and would like to find out if there are better ways.
- Risk registers created from asking the people who do the job what the issues are, and then asking them "How can you/we do it better?"
- Assigning actions to specific people (assigning responsibility) is essential when a hazard report is raised. If money is required to complete actions, a specific person must be allocated the task of following it up, otherwise the loop does not get closed.
- Following an investigation of an incident, the group recommend that the investigators should include a follow-up step to ensure closure happens. For example, if a hazardous manual task is identified in a JSA, and a solution is found, then this solution must be incorporated into the safe work procedure. Preferably this information is conveyed by supervisors to everyone doing that work.

Question 5

A. *Have you developed and implemented any successful solutions?*

- It is widely accepted that paperwork doesn't help workers to manage hazardous manual tasks. However, the group suggested simple one-page information sheets for workers with adequately trained supervisors teaching workers how to do their job properly (without taking unnecessary risks) does work better.
- A systematic, consultative approach with people who know the job (supervisors, workers and workshop personnel) was supported.

B. *Would you be prepared to share these solutions?*

- The sharing of solutions was very strongly supported.

C. *Would you value a shared solution base?*

- Yes, very strongly supported.

D. *If this was administered by Resources Safety, do you see value in an ongoing working party to assist in the development of this solution base? How do you think your organisation may be able to contribute?*

- Identify common issues with specific advice on ways of doing the tasks with less risk.
- Publish (all) costs associated with lost time injuries and disabling injuries.
- Contribute collaboratively to an ongoing working group to develop material and help the "Mining Industry" as a whole.

Question 6

A. *Are you aware of any guidance materials to assist you in manual task risk management? If so, what are you using?*

- National Standard for Manual Tasks (Australian Safety and Compensation Council)

- National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work (ASCC)

B. If not, what is needed?

- Employee buy-in through consultation
- Posters
 - Risk Assessment for Hazardous Manual Tasks
 - Solutions information for specific occupations/tasks, for example solution sheets on how to do risk assessment for valve operation, hammering, climbing up/down stairs with loads, repetitive strains, cramped working conditions, conveyors, workshops, etc.
- Toolbox information about for example:
 - Carpel tunnel syndrome
 - Pistol grips for laboratories
- Mentoring programs for safety people on how to tackle the issues
- A more proactive rather than a reactive response to dealing with hazards could be developed by up-streaming legislative activities by acting on responsibilities of:
 - Designers
 - Manufacturers
 - Suppliers
 - Importers
 - *E.g. buying quiet has proven harder than previously thought*
 - Linking to other Government Departments to increase the pool of information
- Templates showing a uniform approach across companies, so that workers all have nearly a uniform training experience as they are so migratory. Company standards and methods are so different, that significant training goes into each employee even if they have lots of experience.

Question 7

What drivers would influence more mining companies to implement preventative strategies?

- Costs of injuries versus productivity benefits
 - It was suggested that benefits need to be forecasted into accounts as preventative/proactive benefits of minimising musculoskeletal injuries from hazardous manual tasks will affect the bottom line.
 - It was estimated that the costs are almost four times of workers' compensation costs and include rehabilitation, re-employment, retraining new and injured worker and retrofitting solution to prevent further accidents etc.
- Injury rates used at site safety meetings.
- Workers compensation claims:
- Lost time injuries and cost to business
- Prosecution is not seen as an effective driver, yet legislative input is essential for the more reactive companies.

- Good standing as a good employer and good community citizen (due diligence) for heightened reputation and credibility
- Consulting with safety EARLY.

Question 8

Is there anything else that we need to know?

- Information on how to follow up on manufacturer responsibilities:
- Purchasing specifications are sometimes faulty and experience has shown that testing specifications before purchase appears necessary.
- Contracts ensuring that designs do not impose hazardous situations, including hazardous noise and manual tasks for operating plant and machinery.

2. Summary of Workshop: RSD Inspectors

A presentation outlining the terminology, statistics and available resources to assist the Mining Industry to manage hazardous manual tasks in their workplaces was given. Following the presentation, a series of questions that had been sent to participants prior to the workshop were discussed. The responses are summarised below.

Question 1

How would you rate the extent of musculoskeletal injuries arising from manual tasks at mine sites you have inspected?

- *Don't know*
- *Insignificant*
- *Moderately significant*
- *Significant*
- *Highly significant*

Inspectors' ratings ranged from moderately significant to significant.

Question 2

What major manual task issues/problems have you identified at mine sites you have inspected?

- Cleaning around and under conveyors
- Valves above shoulder height
- Access/egress to/from machinery/plant
- Lifting
- Repetitive movements during sample collection.
- Poor plant design
- Hand-held power tools, in particular hand-arm vibration
- Tyre handling in particular 4WD and truck drivers changing tyres unassisted
- Whole body vibration
- Poor design of machinery
- No limits are set for work time. Workers can spend up to 12 hours doing the same repetitive task.

- Catering and hospitality staff get overlooked for inclusion in training about hazardous manual tasks.
- Shutdowns are the most hazardous issues as risk is contracted out, not properly supervised, or given adequate training. It was noted that very few lessons appear to be learned from incidents that occur during shutdowns.

Over-riding concerns and preconceptions

- Working cold is a major issue. There was an opinion that warm-up for work programs are effective, but Australians don't get involved
- Injuries arise primarily because individuals are not following safe procedures.

Question 3

Are you aware of any programmes aimed at reducing manual task injuries run by mining companies? Can you give any examples where a systematic OSH risk management program has been implemented at mine sites you have inspected? (Hazard identification, risk assessment and control). How is that applied to manual tasks? How is that working?

Most sites have some sort of programme like *JHAs* or *Take 5* if not Standard Work Procedures. The programmes may not be specific to manual tasks.

Question 4

Are you aware of any guidance materials to assist in manual task risk management? If so, what examples have you seen being used? If not, what do you think is needed?

One Inspector was aware of the work being done at the University of Queensland and utilises their resources. There was some knowledge of the *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work* (ASCC). The discussion followed into what type of solutions would be most useful and the best way to develop/implement the solutions. A summary of the discussion is below.

- Solutions for specific hazardous manual tasks, for example, hazard - lifting tyres during tyre changes; solution - forklift trolley to assist lifting/handling tyres during tyre changes.
- Tie-in with solutions in already in existence for example, monorails/counter-rails for managing heavy sample bags in laboratories.
- Develop a solutions database in a well ordered way that can be cross-referenced (perhaps like MIRMgate).
- Develop a *High Impact Function Audit* on Manual Tasks
 - For RSD homepage for industry and Inspectors
 - Send to poorly performing companies
 - Needs to come after guidance material is available

It was noted that Inspectors would need training in application of audit tool.

- It was noted that very few lessons appear to be learned from incidents that occur during shutdowns. These lessons could be incorporated into an audit tool.
- Link risk assessment tools for manual tasks with RSD badge and guidelines.

- Plagiarise other useful tools and badge with RSD. Would be useful to develop national uniformity.
- RSD promote Initiative Awards to promote good practice to industry.
- Strong support for RSD role in education and establishing the standards for industry to minimise their manual task hazards.
- Employ a Specialist Inspector to follow up on sprains and strains reported to AXTAT.

Question 5

Do you see value in an ongoing tripartite working party to assist in the development of a solution base?

There was general support for a manual task solution database developed by a tripartite working party.

Question 6

What drivers would influence more mining companies to implement preventative strategies?

- Prosecutory actions would initiate change according to some District Inspectors.
- Take away bonuses for productivity and low reporting of injuries
- Remove benefits associated with injuries.
- Bottom line is the main driver for companies.

Question 7

What role do you think Inspectors should take in driving for change?

- Publish information from AXTAT that shows net risk for use in risk analysis
- Build outrage in community by publishing “bad” statistics
- Identify the worst performers in terms of manual task injuries and distribute to District Inspectors so they can prioritise visits and follow-up with inspections.
- Administer High Impact Audit Tool for Manual Tasks
- Auditing supported, enforcement not widely supported.

The discussion then included what barriers there are to enforcement. These included:

- Resources
- District inspectors are the main inspectors involved with prosecution
- District Investigators rotate and rarely hand-over with histories of performance of sites they gain responsibility for.

MINESAFE ARTICLE

Reducing musculoskeletal disorders from performing manual tasks in the WA mining industry

Can you help?

The Health Management Branch at Resources Safety wants to hear about hazardous manual tasks you have identified in your workplace and any innovative solutions you have implemented that have made manual tasks less hazardous.

Overexertion or strenuous movements have consistently been the most common type of accident in the WA mining industry, representing almost one third of all accidents. These types of accidents predominately occur from employees undertaking hazardous manual tasks. Most of the injuries resulting from these accidents are musculoskeletal disorders (MSD) of the trunk or back, arms and legs.

The Australian Safety and Compensation Council (ASCC) reported between July 1997 and June 2003, workplace injuries related to manual tasks resulted in 437,852 compensation claims in Australia. This figure represents 41.6 % of all compensation claims for that period. The direct cost, not counting indirect impacts (including long-term impacts on the quality of life of the injured worker) was \$11.965 billion.

Resources Safety, in collaboration with NSW and Queensland occupational health and safety regulatory agencies, are currently undertaking separate projects aimed at reducing MSD from performing manual tasks within the mining industry. The first stage of this project is to identify hazardous manual tasks that result in injury to mining industry employees. Once hazardous manual tasks are identified, the aim is to identify and publicise solutions to reduce the risk of MSDs.

As part of the identification process an analysis of the accident and injury data is currently underway. Consultation with mining industry stakeholders will add to the findings of the statistical review. Hence we want to hear from you. Have you identified hazardous manual handling tasks in your workplace or been involved in the design, construction, commissioning or maintenance of any equipment, plant, work surfaces, work practice or systems that have made manual tasks less hazardous? Please contact Lindy Nield by email (lnield@docep.wa.gov.au) or phone (9358 8088). Your contribution will help to reduce the incidence and severity of disabling and lost time injuries.

Please share your knowledge and innovation with us.