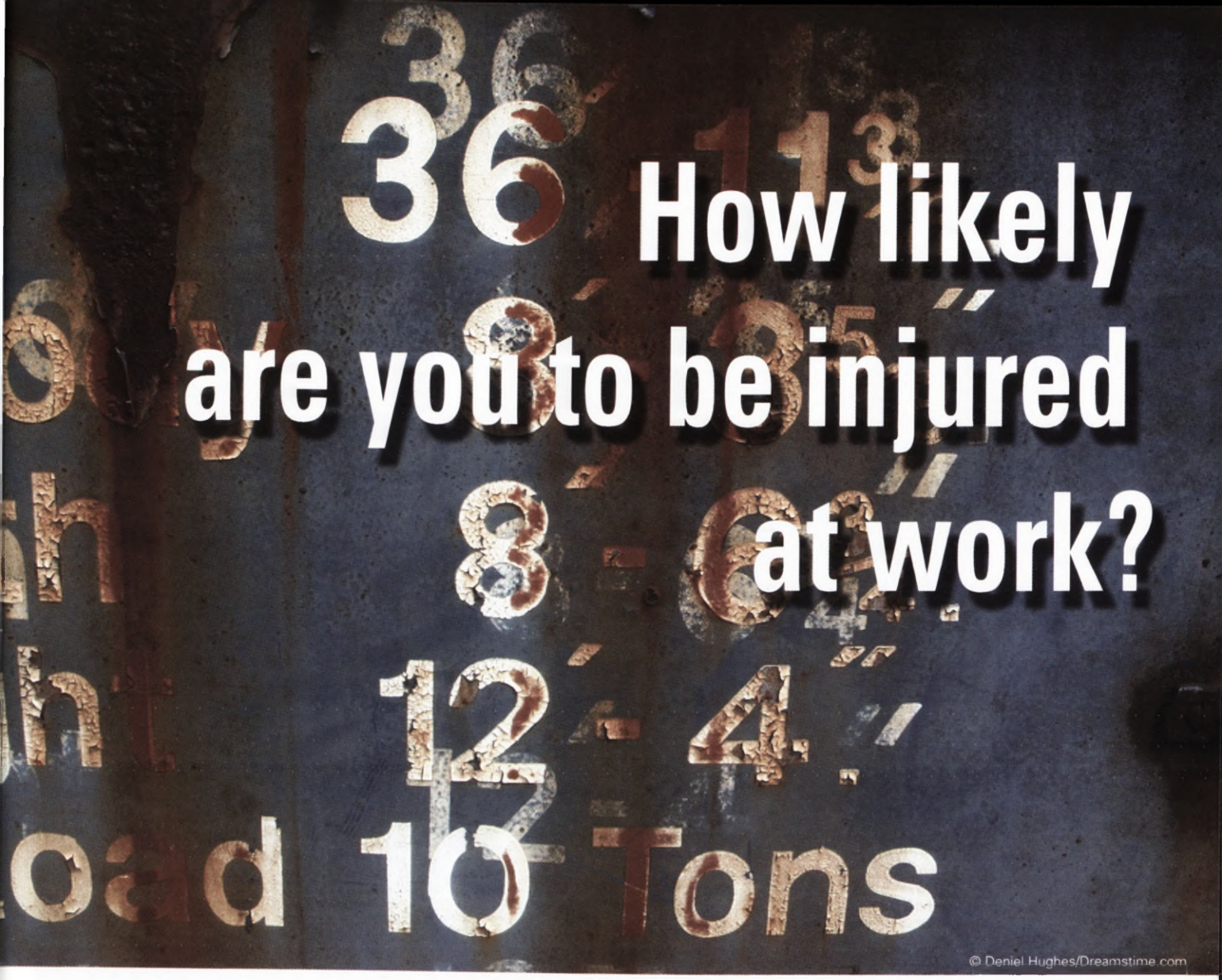


How likely are you to be injured at work?

By Justin Ludcke

Although the estimated number of workplace injuries throughout Australia has decreased from 619,100 in 1992-93 to 480,222 in 2000-01, the estimated cost of these work-related injuries has escalated from $20 billion to $34.3 billion – excluding those costs attributed to pain, suffering and early death. Of those injured, 134 people are *permanently disabled* from work in Australia every day of the year. Of the 49,000 people permanently disabled each year, 27,000 do not work again and 22,000 work on reduced hours/pay, or with reduced skill.

Because 11% of occurrences generate 92% of the total cost of workplace injuries (permanent damage), significant financial cost-benefits can be achieved by focusing resources allocated to safety on reducing these permanent damage occurrences.

Over the past ten years, Australian state legislation relating to workplace injuries has changed significantly. It is assumed that these changes have been made either to:

- reduce the financial burden that injured workers place on the community; or
- reduce the number of serious injuries in workplaces.

In fact, neither of these two objectives is being achieved in Australian workplaces. >>

SIZE OF THE PROBLEM

Damage to people can usefully be categorised as:

- fatality;
- non-fatal permanent disability;
- temporary damage; and
- minor damage.

Permanent damage alters the future of an individual permanently and includes quadriplegia, paraplegia, amputation, impaired back, disfigurements and psychological disturbance. Permanent damage results in the injured worker either not being able to return to work or returning to work only on reduced duties/pay.

Temporary damage includes such things as fractures, muscular strain and sprain, and lacerations requiring sutures and contusions. A person is expected to fully recover from such temporary damage.

Minor damage does no more than inconvenience the person – for example, minor cuts and bruises. This damage causes discomfort, but allows the person to quickly resume normal duties.

Statistics provided by the Industry Commission[1, 2] for 1992-93 data showed that there were a total of 619,100 occurrences or injuries costing an estimated $20 billion for Australian work-related injuries and disease. Productivity Commission data[3] for 2000-01 indicated that occurrences had reduced to 480,222, but that the estimated cost had escalated to a staggering $34.3 billion (excluding costs attributed to pain and suffering). The cost of pain, suffering and early death could conservatively add a further $48.5 billion to the total cost figure, leading to a total cost estimate of $82.8 billion.

To put this injury cost of $34.3 billion into context, in 2001-02 the entire value of Australian coal exports was $13.4 billion, iron ore $5.2 billion, and wheat 4.5 billion. In other words, the cost of damage caused by workplace injuries was greater than the contribution to the gross domestic product (GDP) of the mining industry or the combined agricultural, forestry and fishery industries, five times the cost of injurious and fatal car crashes, twice defence expenditure and more than any state government budget. This is a considerable problem crippling our people and economy.

A breakdown of the different levels of personal damage for these injury occurrences and costs is provided in Table 1 for the 1992-93 data and Table 2 for the 2000-01 data.

FREQUENCY OF THE PROBLEM

The data shows that the Pareto Principle (80/20) applies, whereby 92% of the total cost came from 11% of occurrences (permanent damage) and inversely 8% of the total cost came from 89% of the occurrences (Figure 1). Hence, focusing on reducing permanent work-related injury is arguably the best way to address the overall cost increase. The total number of injury/occurrences is relatively small, but the financial cost-saving is significant.

TABLE 1 – NUMBER OF CASES & COST OF DAMAGE (AUSTRALIA 1992-93)

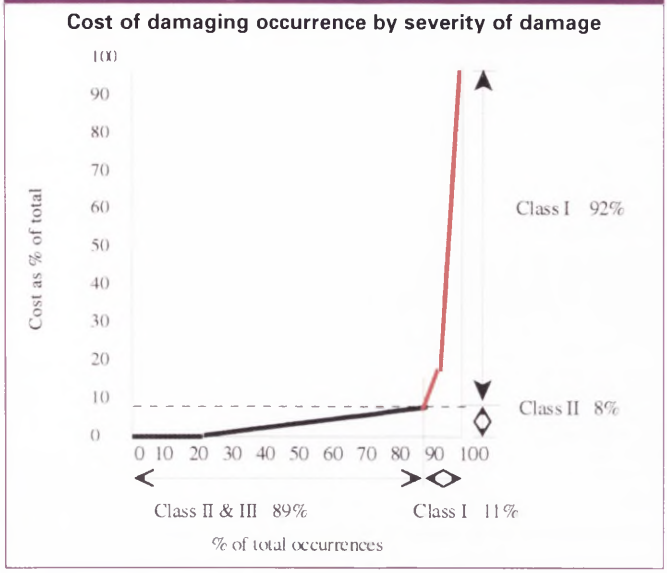
	Minor	< 5 days, full duties	> 5 days, full duties	Permanent reduced duties/income	Permanent no return to work	Fatal (excluding disease)
No. of occurrences	229,067	137,521	201,788	30,736	19,295	693
% of occurrences	37.0%	22.2%	32.6%	5.0%	3.1%	0.01%
	37.0%	54.8%		8.1%		
Cost of occurrences ($bn)	.0	0.1	3.5	4.6	11.5	0.3
% of cost	.0%	0.5%	17.5%	23.0%	57.5%	1.5%
	.0%	18.0%		82.0%		
	MINOR	TEMPORARY		PERMANENT		

TABLE 2 – NUMBER OF CASES & COST OF DAMAGE (AUSTRALIA 2000-01)

	Minor	< 5 days, full duties	> 5 days, full duties	Permanent reduced duties/income	Permanent no return to work	Fatal (excluding disease)
No. of occurrences	127,400	186,400	114,900	22,000	26,900	2620
% of occurrences	26.5%	38.9%	23.9%	4.6%	5.6%	0.5%
	26.5%	62.7%		10.7%		
Cost of occurrences ($bn)	.0	0.4	2.3	4.9	25.6	1.1
% of cost	.0%	1.1%	6.7%	14.3%	74.6%	3.3%
	.0%	7.8%		92.2%		
	MINOR	TEMPORARY		PERMANENT		

11% of occurrences generate 92% of the total cost of workplace injuries.

Figure 1 – Cost of damaging occurrence by severity of damage (Australia)



The risk posed by a workplace injury can be defined as the likelihood of a particular sequence of events producing a particular consequence.

RISK = LIKELIHOOD x CONSEQUENCE

Likelihood is expressed as events per unit time (for example, one incident in 20 years) and consequence is expressed as the loss per event (for example, permanent back damage). Looking again at the equation for risk, if we are concerned only with permanent damage as the consequence (that is, consequence being a constant), then risk becomes directly proportional to likelihood (that is, doubling the likelihood doubles the risk).

The total number of Australian workers is estimated at 10.5 million people. Therefore, each worker has a one in 214 chance of becoming permanently injured at work each year. In other words, for a company employing 214 people, one worker (on average) will become permanently injured each year at that company. Conversely, on average a company of only 10 people would not see a permanently damaging injury for approximately 21 years of operation, engendering a false sense of 'safeness' within that company. The risk obviously varies across industries (for example, in the construction industry it is 1 in 100) but represents the all-industry average. The likelihood of winning Division 1 Gold Lotto on any particular Saturday night is 1 in 113 million. So a person is 528,000 times more likely to become permanently injured at work than to win the 'big one' on Saturday night.

Table 3 indicates calculated values of the likelihood of permanent disability and a person being off work for more than six months in NSW WorkCover data over approximately ten years. This data uses actual recorded incidents from workers covered under the WorkCover scheme. It shows that a WorkCover worker was twice as likely to suffer a permanent disability in 1998-99 than in 1991-92.

TABLE 3 – LIKELIHOOD OF PERMANENT DISABILITY FOR 6+ MONTHS FOR NSW – WORKPLACE INJURIES

Year	Likelihood*
1992-93	1:257
1993-94	1:270
1994-95	1:208
1995-96	1:208
1996-97	1:196
1997-98	1:185
1998-99	1:192
1999-00	1:196
2000-01	1:194

* 1 case per 'X years of work' or 'worker years'
Note: Does not include travel / commuting, or disease

Changes to legislation, workplace reform and other methods used to limit the number of injury occurrences and cost of injuries therefore do not seem to be working. The cost of injuries has escalated and, while the total number of injuries has reduced somewhat in the national figures (primarily due to minor injuries), the likelihood of a NSW WorkCover worker being permanently disabled has increased by 32%. This may well be due to the fact that, in general, workers and employers do not understand where their high-risk scenarios are in the workplace. In this context it is important to understand the nature of the problem.

NATURE OF THE PROBLEM

Expressed in thermodynamic terms, injuries occur when individuals' tolerable limits for energy exchange are exceeded. Injuries can be grouped according to the type of energy exchange that causes them. The more powerful or violent the energy exchange, the more serious the injury. Figure 2 breaks down the energy types primarily responsible for each classification of personal damage in the mining industry. Clearly the energy exchanges that tend to produce multiple fatalities are not the same as those causing non-fatal, permanent injuries.

Similarly, in the construction industry, 47% of all permanently disabling injuries occur as a result of human energy (that is, heavy lifting, pushing, pulling, carrying, etc) and a further 36% of all permanently disabling injuries occur as a result of gravitational energy (that is, falls from height, falls to the same level, falls of objects).

Understanding the energy types that lead to specific injuries can help an organisation to focus its limited resources on the specific areas that work best to reduce injury occurrences and costs.

WHAT GOES WRONG?

Analysing workplace and injury records, consulting employees and directly observing or inspecting work areas (audits) can identify and prioritise risks in a workplace, as suggested in AS 1470:[4]

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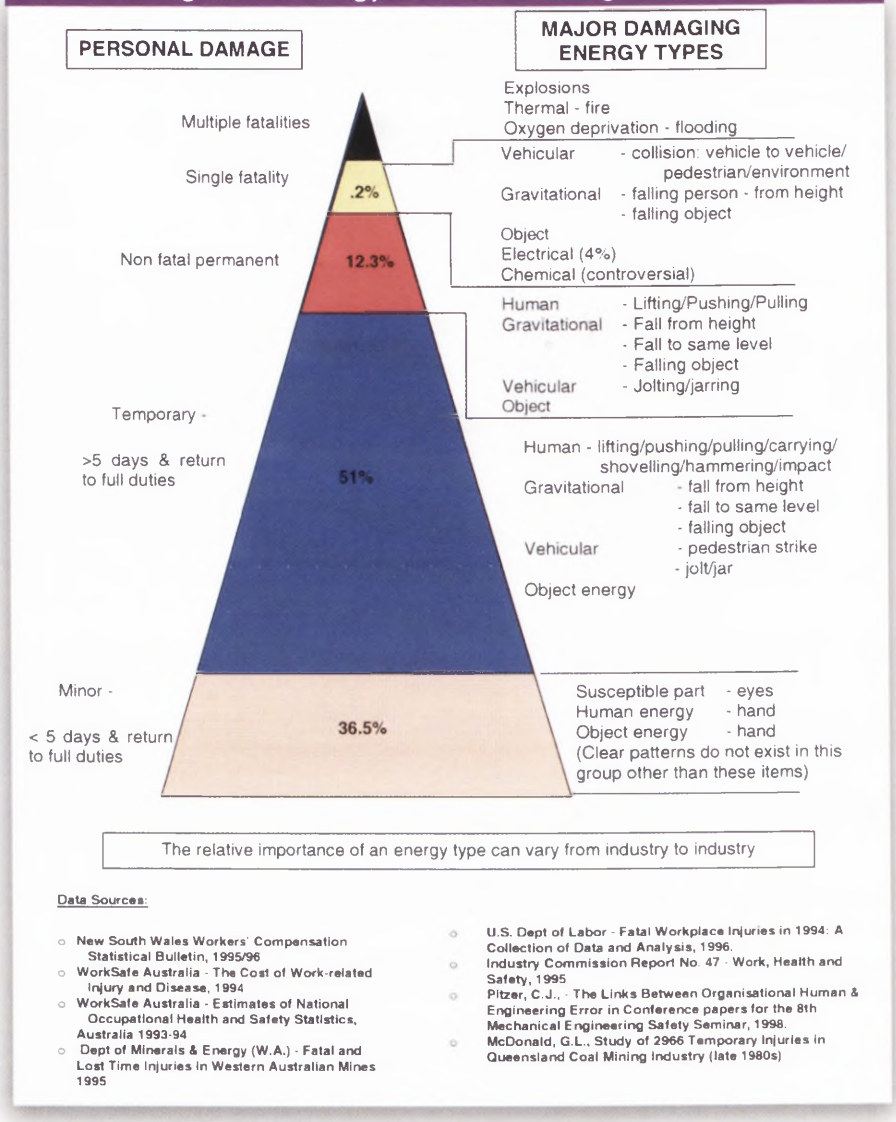
Figure 2 – 'Energy' in focus – mining industry



2000-01 data showed a total of 480,222 injuries costing an estimated $34.3 billion.

'The history and experience of one enterprise will rarely provide enough data for adequate prediction. Therefore, data from other enterprises and from the industry and occupation as a whole may be required for comparative and predictive purposes … Generally, prediction of future damage involves analysis of historical data and evaluation against current knowledge, experience and the existing work environment.'

Too many organisations rely solely on the knowledge and experience within the organisation to manage their risk of personal injury.

Perception of risk is affected by the immediacy of the consequences. For example, change the latency period for the risk of contracting cancer from smoking from 30 years to one week, or to one hour, and watch the change in behaviour!

Risk perception can also be affected by social norms. Table 4 shows how three different groups of people ranked different activities and their perception of the risk involved. The highest risk activity was ranked as a 1.

TABLE 4 – RISK: HOW PEOPLE SEE IT[5]

	Activity and deaths per year (est.)	League of women voters	College students	Business and professional club members
1	Smoking (150,000)	4	3	4
2	Alcoholic beverages (100,000)	6	7	5
3	Motor vehicles (50,000)	2	5	3
4	Hand guns (17,000)	3	2	1
5	Electric power (14,000)	18	19	19
9	X-rays (2,300)	22	17	24
20	Nuclear power (100)	1	1	8
28	Pesticides (N/A) 4	9	4	15

*Note: The lower the number, the higher the perception of risk. Production rewards can lower the perception of risk. Risk can be transferred to others – for example, contractors.

With respect to incident records, it is important to realise that organisational databases essentially document temporary and minor damage and are unlikely to yield insight into future permanent damage. Therefore, other strategies must be deployed.

Similarly, if employees are not given the knowledge of where/how they are most likely to sustain permanent damage while at work, their inbuilt perception of risk will not be sufficient to safeguard them. Table 5 is taken from an analysis of the incident database of an open-cut coalmine. It shows the ratio of personal damage incidents to all recorded incidents for the dominant energy types that permanently damage people.

TABLE 5 – RATIO OF ACTUAL VS RECORDED (ACTUAL AND NEAR MISS) INCIDENTS

Potential risk	Personal	All recorded damage incidents	Ratio incidents
Mobile equipment	54	366	1:7
Gravitational energy (fall of people, fall of objects)	106	235	1:2
Human energy	336	389	1:1

The apparent sensitisation to vehicle-related incidents but significant desensitisation to human energy and gravitational energy incidents happen for many reasons. With respect to human energy, for example, people often do not report a lifting/pushing/pulling incident unless it generates pain.

These are just some of the reasons why personal damage in the workplace is being poorly managed and controlled across all states and across all industries.

CONCLUSIONS

Even with significant legislative change relating to workplace injuries throughout Australia, the estimated cost of work-related injuries and disease has escalated from $20 billion in 1992-93 to a staggering $34.3 billion in 2000-01. Meanwhile, the total number of occurrences has decreased from 619,100 to 480,222 over the same time period.

Traditionally, the quantification of risk to manage the injury problem is generally based on a person or organisation's experience. So limited previous experiences, particularly surrounding recent incidents, can introduce bias to risk.

Fortunately, a systematic approach can reduce the significant cost of injury by applying the Pareto Principle (80/20) to focus on the types of energy exchanges (for example, human and gravitational energy) that typically result in permanent damage to people at work. 'Judgements' of risk are therefore based on the 'likelihood' of a particular major incident in the context of the industry 'story' of permanently damaging incidents. This approach can help to prioritise the work efforts and reduce the massive financial load on the community. ■

Notes: **1** Industry Commission, 'Work Health & Safety, An Inquiry Into Occupational Health & Safety', Volume 1: Report, Report No. 47, Industry Commission, Australia, September 1995. **2** Industry Commission, 'Work, Health And Safety, Inquiry into Occupational Health & Safety', Volume 2: Appendices, Report No. 47, Industry Commission, Australia September 1995. **3** National Occupational Health & Safety Commission, *The Cost of Work-Related Injury and Illness for Australian Employers, Workers and the Community*, August 2004, Canberra. **4** Australian Standard 1470-1986, *Health and Safety at Work – Principles and Practices*, Standards Association of Australia. **5** CRA Ltd, *The Process Safety Institute Presents: Hazard Evaluation Studies – Qualitative Methods for CRA Ltd*, Process Safety Institute, Course Notes, USA, 1993. **6** National Occupational Health & Safety Commission, *The Cost of Work-Related Injury and Illness for Australian Employers, Workers and the Community*, August 2004, Canberra.

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