P. S. Clark *B.Sc. B. Econ. Grad Dip Erg MAusIMM*
Workplace Safety and Health Management Vic
Economic Cost-Benefit Analysis and Planning

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Workers' Compensation and OHS
Productivity Commission
PO Box 80
BELCONNEN ACT 2616

Dear Commissioners,

INQUIRY INTO NATIONAL WORKERS' COMPENSATION AND OH&S FRAMEWORKS

The appended document with attachments is my second submission to your review of this legislation. Thank you for the opportunity of making this further submission.

Yours faithfully,

P. S. Clark

Attachments:
file *indir96d.rtf*
file *GunRT.rtf (conf)*

OH&S MEASURES

The Commission's Terms of Reference include *inter alia* at 7. `A *key goal of any new model would be to facilitate improved workplace safely...'* It is unfortunate that the proposed key goal of *`to facilitate improved'* lacks substance and measurement criteria, which the Commission may seek to remedy.

But how should `improved workplace health and safety' be *measured?* By `compliance with legislated process' or by estimated valuation of the overall social and economic impact on individuals and the community - as was done in the 1995 Industry Commission report? The Interim Report mentions *`a total economic cost in excess of $30 billion annually'* as an estimated valuation. While the provenance of the *`in excess of $30 billion'* estimate lacks credibility as it was derived from erroneous assumptions, use of an estimated valuation to measure the [adverse] impact of workplace health and safety is commended.

The *National OHS Strategy 2002-2012* establishes initial minimum performance targets to reduce the national incidence of occupational injuries by 40% (20% by 2007) and occupational deaths by 20% (10% by 2007). While the `incidence' of occupational deaths is a relevant and valid target, the same cannot be said for the `incidence' of occupational injuries. The following comments on the *Comparative Performance Monitoring - Third Report* identify some of the deficiencies in using `incidence' as an OH&S performance measure.

COMPARATIVE PERFORMANCE MONITORING - Third Report
ANZ OH&S and Workers' Compensation schemes

IS `INCIDENCE' A USEFUL PERFORMANCE MEASURE?

**`Incidence'** of injury is measured as the number of injuries per year per 100 employees. `Incidence' measures usually fail to standardise the reported data for full-time and part-time employees, or for overtime worked. Variants such as `frequency' of injury measure the number of injuries per year per (approximately) 500 employees, standardised on hours worked, e.g. 1,000,000 hours worked. Inclusion of `frequency' and `incidence' definitions in Australian Standard AS 1885 is a historical artifact which does not *per se* make them relevant workplace injury performance measures in the contemporary social environment. The number of injuries is a compilation of data ranging from barely relevant minor cuts to total and permanent impairment injuries. `Incidence' assumes that a minor cut ranks equally in social and economic importance with permanent impairment and death.

`Incidence' measures are popular among regulatory and academic commentators, because *any* reduction in injury *numbers*, irrespective of the social or economic significance of the injury reduction, provides scope for reporting positive injury reduction performances. As an example, the CPM Third Report applauds the reported 20% reduction in workplace injury incidence as `a significant reduction', without any analysis of its real significance.

As `Incidence' of injury does not correlate with any relevant social or economic measures of injury impact, it is an irrelevant measure of health and safety performance.

DO PREMIUM RATES MEASURE HEALTH & SAFETY PERFORMANCE?

Workers' compensation premium rate structures and average premium rates in all jurisdictions are very significantly dependent upon Government policies and legislation. It is apparent that a number of Government policies are inconsistent with rational management of an insurance business or of workplace injury impact. Examples include funding shortfalls, caps on premium rates, cross-subsidised premiums, deficient improvement incentives, and self-insurance limitations. Arguably the most significant deficiency is over-management of minor claims, which should be more effectively and efficiently managed by employers. The Pareto estimate of spending 85% of resources managing 15% of total claim costs *(not* numbers of claims) probably applies for most if

not all Australian compensation schemes. This view is supported by the `deductibles' estimates on page 46 of the CPM Third Report. It is also perceived as consistent with the 1995 Industry Commission *`Work, Health & Safety'* report No.47 where *83%* of total Australian workplace-related death, injury and illness costs were estimated to be associated with the 13% number of deaths and permanent disability injury claims.

The significant impact of unrelated-agenda Government policies on workers' compensation premium rates implies that premium rates are not a valid or useful measure of workplace injury impact in Australia. The CPM Third Report's claim that its performance indicators cover all aspects of the operation of workers compensation schemes does not comprehend the proposition that a prudently-managed scheme should (a) limit the scope of its activities to management of claims that cannot be better handled by others - in particular, minor claims - and (b) include effective incentives for reducing the social and economic impact of workplace injuries.

COST OF WORKERS' COMPENSATION CLAIMS A BETTER MEASURE

The total cost of workers' compensation claims in any jurisdiction is significantly dependent upon Government-legislated compensation benefit and support structures, including payments for maims and common law actions. Notwithstanding these variations and in the absence of any agreed measure for the social impact of workplace injury, it is advocated that the total cost of workers' compensation claims is the most relevant single measure of deficient workplace safety in Australia.

The total cost of workers' compensation claims for any period can be measured in a number of ways, in particular either as actual claim payments made or as estimates of incurred costs for claims received. With the exception of common law and maim payments referring to prior-period injuries, the total incurred cost of workers' compensation claims for any period (economic measure) correlates significantly with the total workdays lost due to injury for that period (social measure).

HAS THE NUMBER OF WORKERS' COMP CLAIMS DECLINED?

The Interim Report claim that *`overall the number of workers compensation claims has declined'* was challenged by Ms Grace of the ACTU with the comment [p.1017] that *`the only reason why claims have ceased is because of changes to legislation - be it definition of "worker", be it definition of "injury" , the two major drivers, or be it other definition or barriers that come into workers comp to enable people to enter. That is the only reason why claims are declining. There is no evidence in those numbers to suggest that it is because of better occupational health and safety performance.'*

Two aspects of these comments deserve closer scrutiny. Firstly, is the *number* of claims a relevant statistic for injuries to people ranging from a scratch to death? It is submitted that a more appropriate statistic is the gross incurred cost of all workplace-related injuries. While it might be argued that this number may underestimate the social and economic impact of fatalities for instance, gross incurred cost estimates are immediately available as they are required for determining actuarial scheme funding.

Secondly, *has* the number of workers' compensation claims declined overall in fact, or is the reported decline an artifact associated with reporting cut-off dates and specific legislative changes affecting or potentially affecting benefits available to injured employees? Ms Grace's comment that `the only reason why ... is because of changes to legislation' is appropriate for Victoria as well, where the annual *number* of compensation claims has been substantially constant for 18 years except for reporting artifacts associated with particular changes in workers' compensation legislation. Serious evaluation of the outcomes if any associated with changes in OH&S and workers' compensation legislation requires analysis of injury claims data and related statistics such as effective full-time employment numbers over the past 20 years or more. Such analyses clearly identify the significant but temporary aberrations associated with particular 'benefit-changing' legislative changes in individual jurisdictions *and* the continuing constant underlying claim numbers.

Australian workers' compensation and OH&S authorities tend to select a legislation-affected (high claim numbers) year as the base year to enable reporting optimistic claim number `improvements' associated with their activities and legislation, rather than longer period studies of claim number changes which might show little if any positive impacts.

WORK-RELATED FATALITY NUMBERS - FACT OR FICTION?

A number of Australian OH&S authorities and 'OH&S industry' members have claimed that workplace-related deaths are grossly understated by available workers' compensation claim data. Their claim is that deaths due to long-duration diseases, in particular associated with exposure to asbestos and a range of hazardous chemicals are not accepted as valid compensation claims and are therefore not included in the records. A number of estimates have been quoted over the years, starting from `1000 a year due to hazardous chemicals' [Winder 1991], subsequently revised to a 2239 `best estimate' in the so-called Kerr report. NOHSC has reported an annual workplace-related death rate of 3000 after adding reported traumatic workplace deaths and an estimate [500] for asbestos-related deaths to the Kerr report estimate. The ACTU [p.995] report that *`3000 people die as a result of their work every year'* adding their perception that this estimate is conservative. Adding [p.1002] that *`Access Economics say it's more like 4800',* [p.995] that *`the ILO gave a paper at* [a recent NOHSC] *conference where they said that 7000 Australians die every year as a result of their work',* and [p.998] that *`even the most conservative estimate here, made by the employer community, is that thousands of people are dying every year',* the ACTU claim [p.999] that *`thousands ... people are dying as a result of occupational cancer.'*

These claims raise a number of issues, the first of which is *'work-relatedness',* noted at p.1002. Let us consider a hypothetical coke oven employee with a long term cigarette smoking addiction who is diagnosed with lung cancer. If the treating doctor considers that his or her patient's cancer may be due to his employment as a coke oven worker, the resulting workers' compensation claim implies 100 percent work-relatedness. On the other hand, if the treating doctor considers that the cancer may be a result of his smoking habit, smoking becomes the reported 100 percent cause. There is no scope for the shared causation suggested at p.1002 line 30, which would require superhuman diagnostic skills. As discussed elsewhere in this submission, it is perceived that a diagnosis of 'work-related' is more probable for a number of reasons, including the doctor's primary duty of care for his or her patient, limited knowledge of the patient's work environment, and the priority care and benefits available to compensation claimants. As medical professionals are well aware of the potential adverse consequences of exposure to hazardous materials whether in workplaces or elsewhere, the proposition that large numbers of Australians are dying due to workplace chemical exposures without diagnostic professionals identifying those exposures as an issue of concern, can only be described as ludicrous and an insult to Australian medical professionals.

The Australian smoking-related fatality toll (19,000 per year) provides a large and convenient source of `numbers' for `attribution' to alternative causation issues. It is submitted that the NOHSC-mandated `proportionate attributable risk' approach used to develop the Kerr report estimates predictably resulted in the notional re-assignment of a significant number of smoking-related deaths into an ill-defined category of `deaths due to exposure to workplace chemicals.'

A second issue is the validity of the `best estimate' numbers reported in the 1996 Kerr report. Those estimates resulted from a NOHSC-mandated `proportionate attributable risk' approach from dated and limited overseas sources. Mandated use of the `proportionate attributable risk' approach is perceived to have significantly predetermined the estimates reported, necessitated incorporation of inappropriate assumptions and prevented consideration of the available range of Australian statistics. As a result, the major Kerr report estimates were developed from two initial assumptions - that 15% of male lung cancer deaths and 1% of cardiovascular deaths were attributable to workplace chemical exposures. These assumptions derived from two overseas reports - a 1981 summary of cancer studies over the previous 40+ years, and a study of deaths in New York State published in 1986. The data sources for both reports were developed from unknown Northern hemisphere exposures with no significant relationship or relevance to contemporary Australian

workplaces, industrial activities, hygiene standards or exposure measurement techniques. Nevertheless, the Kerr report attributed the whole of its `best estimate' numbers to unspecified levels of workplace chemical exposures without correction for the significant health effects of smoking.

The Kerr report death estimates were: 28 poisonings, 875 non-cancer deaths predominantly cardiovascular events and 1291 cancer deaths predominantly 748 lung cancer and 168 other respiratory cancer deaths. Comparison with contemporary Australian data by competent professionals working in the field did not identify any significant correlations between the Kerr report estimates and reality. In a paper to the 1996 Australian Institute of Occupational Hygienists (AIOH) Annual Conference, Dr Allen Christophers, former (1957-80) Chief of the Industrial Hygiene Division of the Victorian Health Dept and occupational hygienist Manny Zammit studied the Kerr report estimates for deaths due to cardiovascular disease (771) and poisonings (28) and concluded that *less than 2* and *7,* respectively, were more probable estimates.

In a second (1997) AIOH paper, Christophers and Zammit examined *inter alia* the validity of the Kerr report assumption that 15% of male lung cancers were due to occupational chemical exposures and compared the report's estimates with available Australian evidence on occupationally-related lung cancers. The 1981 source for that assumption included 5% due to asbestos and 10% due to other exposures, whereas contemporary Australian evidence indicated 0.3% attributable to non-asbestos causes. Christophers and Zammit estimated that occupationally-related lung cancers could be in range 187 to 430 per year, but noted that their estimate was "predominantly based on past exposure to asbestos, which is now closely controlled."

Christophers and Zammit's AIOH papers pose serious concerns about the validity of the continuing NOHSC claim of 3000 deaths *every* year *due to* workplace chemicals, described by NOHSC commentators as `conservative.' NOHSC has vigorously defended the Kerr report, stating that it was not aimed at calculating future mortality or morbidity from current exposures to hazardous substances. Despite this claim, NOHSC continues to publicise and promote the `3000 deaths *every* year' as valid and factual, rather than an estimate critically dependent upon a very small number of dubious assumptions. It is significant that these assumptions were queried - but without response - by peer reviewer Australian Institute of Health & Welfare.

The perception is that the 1978 US Occupational Safety & Health Administration (OSHA) Bridbord et al. report has resurfaced. That report claimed 38% of all cancers were attributable to occupational exposures to six hazardous substances, a claim refuted by acknowledged experts Doll and Peto with the comment that "these estimates of total risk were so grossly in error that no arguments based even loosely on them should be taken seriously", adding that "it seems likely that whoever wrote the OSHA paper ... did so for political rather than scientific purposes, and it will undoubtedly continue in the future as in the past to be used for political purposes by those who wish to emphasize the importance of occupational factors." The public fear of cancer was combined with claims of occupational exposure risks to promote the political aims of statutory bodies competing for public attention and government funds.

The ACTU [p.1002] statements that *`Access Economics say it's more like 4800',* [p.995] that *`the ILO gave a paper at* [a recent NOHSC] *conference where they said that 7000 Australians die every year as a result of their work',* and [p.998] that ***`even the most conservative estimate here, made by the employer community, is that thousands of people are dying every year'*** can only be described as industrially-motivated claims. The Australian Chamber of Commerce and Industry has advised that no such `employer community' estimate has been made. As the supposed Access Economics statement and ILO paper are not public documents, the relevance of the numbers quoted is speculative at best.

It is submitted that NOHSC has *not* demonstrated that its `3000 deaths every year due to workplace chemical exposures' claim is valid with respect to numbers, workplace-relatedness, contemporary Australian workplaces and exposures or `every' year. The claim is perceived as aimed more at influencing public opinion and support for enhanced NOHSC power and funding, than providing a

credible demonstration of a major public policy need. NOHSC has significant funding and effective powers to attract `appropriate' research outcomes, to publicise its preferred `conventional wisdoms' and to silence professionals querying the validity of NOHSC publications.

Until there is substantial evidence for significant mortality and morbidity associated with workplace exposure to hazardous substances other than asbestos, it is submitted that OH&S preventive activity should focus on the *known* realities of Australian workplace-related deaths and injuries recorded by available workers' compensation statistics.

INDUSTRIAL SAFETY THRESHOLD ISSUES

The ACTU [p.998] expressed concern about employees' rights not to work in an unsafe workplace if their employer fails to meet its legal obligations. `Unsafe workplaces' address only one aspect of the range of workplace health and safety obligations facing employers and employees each day. An arguably more relevant obligation is `safe methods of work' - how employers require employees to perform their assigned tasks and how employees actually do perform those tasks. If an employee fails to meet his or her legal obligations, is the ACTU also advocating that employers should exercise an implicit right to remove the employee from the workplace? There is a perceived need for improved balance, definition and awareness of workplace rights and responsibilities, particularly with respect to workplace health and safety issues.

The consequent question is how and by whom is the threshold to be determined for the exercise of any such `rights' for each of the many statutory workplace health and safety obligations and for combinations thereof? While resolution of that question presumes the cooperation, common sense and goodwill which exists in most workplaces, there is scope for the imposition of unrelated industrial agendas noted in the recent Cole report. It is submitted that the optimal answer appears to lie in simplifying the number and complexity of legal obligations rather than the `comprehensive' legislation approach favoured by Australian legislators and OH&S authorities.

JURISDICTION `TAKE UP' OF NOHSC STANDARDS

A number of submissions have expressed concern that the OH&S standards developed by NOHSC have not been sufficiently taken up by the jurisdictions. It is submitted that while the take-up by jurisdictions of NOHSC standards may not have been word-for-word identical, their legislation is sufficiently similar to sink the claim of `not enough take-up.' If this claim was valid, there should be identifiable injury outcome performance differences between jurisdictions for that reason. A similar claim is made by jurisdictions who assign blame to employers for lack of `take-up' when legislation fails to deliver `promised' injury reductions. The questions of whether *any* NOHSC standards are likely to deliver their advocated injury reductions - and whether they have *ever* delivered in any jurisdiction -have never been seriously considered. (see appended *GunRT.doc* review of the effectiveness of 'Robens' style OH&S legislation.)

One reason for avoiding outcome studies is that advocated death and injury reductions have not been realised. A second reason is that `fudged' benefit outcome estimates have been employed to `justify' the adoption and implementation of most if not all NOHSC standards by Australian jurisdictions. The most obvious benefit `fudge' example is inflation of proposed death and injury improvement rates by hypothetical `indirect cost' ratio multipliers. Despite advising the 1995 Industry Commission inquiry that it used a 1:1 multiplier, NOHSC has employed 4:1 and 6:1 multipliers to enable development of the illusion that its standards are benefit-cost positive. These multipliers are also typically quoted as `indirect employer costs.' The 1995 Industry Commission report estimated employer indirect costs as 0.35:1 and total employer, employee and community indirect costs at 1.8:1. (see appended *indir96d. rtf* file for details)

It is submitted that `jurisdiction take-up' is a red herring issue, and that Australian OH&S death and injury performance will continue to be deficient until we refocus from `comprehensive legislative process compliance' toward timely and effective achievement of significant improvements in the social and economic impact of workplace-related death and injury.

WHO SHOULD SET THE OH&S AGENDA?

The Interim Report suggests that 'OHS uniformity should be driven by a reformed national body appointed on the basis of merit, which consults with employer and employee representatives and reports to all jurisdictions through the Workplace Relations Ministers' Council.' It is submitted that 'OHS uniformity' is not the most significant issue when none of the supposed variants is demonstrating effective injury outcome improvement performance, and a significant number of the 'non-uniformity' issues result from administrative differences.

The Interim Report proposition implying that `industrial relations industry' members might have a diminished role and power on the proposed `reformed national body' has predictably raised objections from that sector. If the Interim Report proposal enables refocus of the national OH&S agenda toward timely achievement of improved workplace safety outcomes, it will be a significant improvement over the present perception of `lots of wheels in motion but no progress' and industrial relations maneuvering.

DO SELF INSURERS ADVERSELY AFFECT POOL FUNDING?

A number of submissions have expressed concern about adverse effects on workers' compensation scheme funding and administration costs potentially associated with self-insurance. Some have advocated against self-insurance to maximise the compulsory risk pooling.

It is submitted that a competently managed scheme should be able to handle any responsible level of transfer to self-insurance without adverse impacts on its funding or administration. Workers' compensation schemes are not perceived to be significantly different from any other large business operation in respect to effective management of business level impacts.

Concerns that better performing self-insurers leaving the pool will somehow increase the risk of the residual pool members is perceived to be a `red herring' issue. If the residual members are poorer performers and hence higher risk, they should attract appropriate premiums and not be cross-subsidised by better performers.

It is further submitted that the `risk pooling' approach is not *per se* in the best interest of providing incentives for improving injury outcome performance. The ideological position of `one in, all in' has minimal merit *if* an overall objective of the scheme is to reduce the number of individuals needing compensation *and* the necessary costs of their compensation *rather than* passively compensating injury outcomes as they occur. While the great majority of insured employers perceive only the latter objective, it is submitted that the former objective should be the only acceptable public policy position. There is little evidence that Australian workers' compensation schemes have made more than token injury prevention efforts. And what has been done has not achieved significant performance outcomes.

WHO BEARS THE COST OF WORKPLACE DEATH AND INJURY?

Returning to our hypothetical coke oven employee with a long term, heavy cigarette smoking addiction who is diagnosed with lung cancer. If the treating doctor considers that his patient's cancer may be due to his employment as a coke oven worker, the resulting workers' compensation claim implies 100 percent work-relatedness. The claim will be an expense to his employer and the relevant compensation scheme. On the other hand, if the treating doctor considers that the cancer may be a result of his smoking habit, smoking becomes the reported 100 percent cause and the employee and community (Medicare and social security) bear the resulting expense. The distribution of resulting expenses between the employer (including the relevant compensation scheme), the employee and the community is significantly dependent on the initial professional opinion of the treating medical officer, with only the advice of his or her patient, to assign 'work-related' or not. The present system makes significant assumptions about doctors' diagnostic skills and poses unanswered ethical questions. If the doctor's first priority is for his patient, rather than

the community at large, it is perceived that a diagnosis of 'work-related' might be more probable, due to the priority care and benefits available to compensation claimants.

However, the majority of workers' compensation claims are for 'over-exertion strain' type injuries, where assignment of 'work-relatedness' is much less a black or white decision. Here again, the treating medical officer's diagnosis appears constrained by the advice of his or her patient on the issue, and the doctor's perception of his or her ethical duty toward the patient.

The allocation of total annual expense between employers, employees and the community resulting from all potentially workplace-related death and injury cases is the gross outcome of the many such individual medical diagnostic decisions. In part for the reasons noted above, the perception is that the allocation favours the community rather than employers and workers' compensation schemes.

P S. Clark *B.Sc., B. Econ., Grad Dip Erg*

Attachment

Workplace Safety and Health Management
Economic Cost-Benefit Analysis and Planning

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INDIRECT COSTS FOR WORKPLACE HEALTH & SAFETY ISSUES

Background

Australian laws and human courtesy require employers to comply with duty of care obligations for the safety of employees and other people affected by activities under the employer's control. The required safety-related activities pose costs to the business. So also will safety management *failures* - for injury claims, claims administration, fines. Progressive employers integrate their safety costs into mainstream performance measures and business controls, and assign accountability for effective management.

Most managers can identify total dollar values for significant cost items associated with safety activities, failures and proposals, such as induction and training, medical and first aid services, workers' compensation premium and claim costs, and workplace or equipment upgrading projects. But few managers are able to value the short and long term controllable variable costs associated with workplace safety. Valuation of the *uninsured* or *indirect costs* of safety has challenged managers for many years. This note summarises published information on indirect costs associated with health and safety issues.

Summary

The results of contemporary reports using valid approaches and data indicate that:

Indirect Injury Cost has a semi-variable but linear ratio to Direct Injury Cost.

If consistent definitions are used, the most-likely Indirect Injury Cost for any value of Direct Injury Cost can be calculated by adding estimated fixed cost and variable cost portions.

The US *Simonds & Grimaldi* incident classes provide some guidance on the ***fixed cost*** portion:

	($US 1982)	
Lost time injury cases	465	*(includes variable "days lost" cost)*
"Doctors"' cases	*115*	
"First Aid only" cases	*25*	
No injury (property damage) cases	850	

The *Gareau* study ***variable cost (incremental)*** Indirect to Direct cost ratio of 0.42:1, and the *Industry Commission OH&S* Inquiry 0.35:1 indirect to direct cost ratio estimate *for employers* are within the range (0.05 to 0.63:1) reported by valid contemporary studies. An estimate of employer's cost per injury is:

$$\textbf{\textit{Indirect}}\ \textit{Cost (per injury)} = \textit{Fixed Cost (for injury class)} + 0.35 \times \textit{(Direct Cost)}$$

Some definitions

"Direct costs" are the total amount of benefits paid by the insurer - such as weekly benefit payments, medical, hospital, medication, rehabilitation, transport, legal and lump sum payments. The scope of items included as direct costs is significantly affected by the workers' compensation arrangements in the jurisdiction. For examples, the duration of lost worktime compensation, the level of compensation paid, the extent of coverage for common law and registered motor vehicle injuries.

"Indirect costs", "Hidden costs" or ***"Uninsured costs"*** are the variable expenditures associated with injuries that are absorbed by the business - such as first aid treatment, work time and productivity lost by the injured and co-workers, replace worker recruitment, training and work-up costs. These are not normally reported in the mainstream business accounts. Some studies also include unrecoverable property damage costs associated with personal injury, others include all unrecoverable property, business interruption and like costs.

"Insured costs" There are several interpretations of this cost. One corresponds with *"Direct costs."* The second (Grimaldi) version reports workers' compensation premium payments as a component of *"Total costs."* This version includes the insurer's general administrative expenses and profit, together with payments made for publicity, publications, research and grants. Others (HSE) include property, interruption and other premium costs.

"Total cost" has several interpretations, corresponding with the variations noted above. Some businesses include their *fixed* costs e.g. for total operation of a medical centre, with the aim of reporting *"Total cost of Safety"*, but this aggregative approach lacks focus on controllable cost items.

Some significant study data have been incorrectly quoted in OH&S Authority and other publications in Australia.

Identified errors have been corrected in this note. **The**

pioneer studies

Heinrich (1931) examined 5000 insurance case files for US firms beginning from 1926. He reported overall indirect costs as linearly related to and four times the direct costs. In other words, the average ratio of indirect to direct costs was of the order of 4:1. This ratio was graphically depicted as an iceberg, showing a small (1) area of "visible, direct costs" above water with a larger (4) submerged area of "invisible, indirect costs." Although the 4:1 ratio varied significantly between industries and was developed from the modest compensation benefit schemes of the day, this ratio was widely adopted as a "magic number" into safety textbooks, with Worksafe Australia and the Victorian WorkCover Authority Health & Safety Division still advocating a 4:1 indirect cost ratio.

Simonds (1950) and **Simonds** & **Grimaldi** (1956), backed by the US National Safety Council, developed a new approach in 1947. Noting that Heinrich's study had *"no precise frame of costs"*, offered *"extremely tenuous"* evidence for the 4:1 ratio, and the necessary linear relation between direct and indirect injury costs was not apparent, Simonds introduced the principle *"total costs* equals *insured costs plus uninsured costs."* Although uninsured costs were identical with Heinrich's indirect costs, they were now identified as quasi-"fixed" rather than variable costs. Four accident classifications were introduced, with each having a specific average uninsured cost. Using abbreviated descriptions, the uninsured cost estimates were:

	($US 1982)
Lost time injury cases	465
"Doctors'" cases	115
"First Aid only" cases	25
No injury (property damage) cases	850

Simonds suggests an average 1:1 indirect to direct cost ratio, where specific injury details are unavailable.

Soderqvist, Rundmo, Aaltonen (1990) proposed three alternative injury costing models, adding the concept of "spare capacity" to the mainstream "accounting" and the widely-used "market pricing" models. They noted that the traditional accounting approach inadequately evaluated true injury costs, with substantial uninsured costs absorbed both within the business and borne by other than the company. The accounting model may overlook production losses arising from injury, unless these cause significant revenue loss. The market pricing model uses average wage rates, and ignores the premium costs of overtime or casual labour employed to recoup lost production. They advocate use of the spare capacity model where no revenue is lost due to injury, whether due to pre-existing inventory levels or availability of supernumerary labour *(Note: or overtime working)* to cope with injury, sickness or other absences. An appropriate variable cost of these resources must be included in the total injury cost, together with any actual concurrent revenue loss to the business.

Rundmo & **Soderqvist** (1994) compared the market pricing and spare capacity models when studying 1988 injuries in 39 furniture manufacturing firms, reporting that the spare capacity model gave a more realistic reflection of true costs, also that a substantial proportion of total costs were borne by other than the employers. Spare capacity model costs were in the range of 2 to 5 times those calculated using the market pricing model. *(Note: Nordic workers' compensation systems significantly affect their outcomes)*

Those who followed

Frank Bird (1974) included the "Iceberg" graphic in his popular textbook, with "insured costs" revised to only include medical and compensation costs. Bird claimed $1-3 per $1 direct costs, for uninsured miscellaneous costs, such as makeup pay, overtime, decreased output, recruitment & training of replace employees, investigation, etc. and a further $5-50 per $1 direct costs, for uninsured property damage, production delays and interruptions.

The Business Roundtable (1982) study of 49 US construction injuries enables development of a rather uncertain indirect to direct cost ratio of 1.42:1.

Andreoni (1986) summarised thirteen prior occupational injury cost studies, identifying four alternative ratio types:

- Indirect to direct costs, (two reports at 0.093 and 0.63:1)
- uninsured to insured costs,
- individualised to common costs, (four reports at 0.14,0.24,0.34,0.45:1)
- variable to fixed costs (five reports at 0.05, 0.2, 0.41, 0.42, 0.62:1)

Laufer (1987) used the Simonds approach to estimate uninsured costs on 50 medium-sized Israeli construction sites, and concluded that *"the assumption that uninsured accident costs are high was totally disproved."* While no linear ratio was established, the uninsured to insured cost ratio was 0.2:1, with 2/3rd of the indirect cost being lost labour time and 1/4 property damage. Laufer developed a new "controllable cost" approach, based on identifying *"expenses that can be influenced by management involvement."*

Leopold & **Leonard** (1987) studied 2100 UK construction injuries and found indirect costs ranging from £216 (fatal), £106 (severe injury- skull fracture, sight loss, hand amputation) to £28 (more than 3 days lost time), corresponding with indirect to direct cost ratios of 0.34, 0.19, 0.25 respectively (overall average 0.25).

Klen (1989) identified significant actual indirect costs to employees and the government in a study of Finnish timber harvesting injuries. Indirect costs to the businesses were *"surprisingly low"* at 17% of total costs, equivalent to an indirect to direct cost ratio of 0.2. *(Note:* Klen's *conclusions in part reflect the workers' compensation system in Finland, and in part the piece work employment in this industry).*

Brody and co-workers (1990) studied indirect costs in North American, particularly Canadian industry. They noted that the "traditional" Heinrich 4:1 ratio was based on the very modest medical coverage indemnities then (USA 1920's) paid to employees, and included "no lost time" injuries with negligible direct costs but with significant material damage indirect costs. Brody also noted that insurer profit, administration and other cost items which are not related to specific injury claims must be deducted from workers' compensation premiums to arrive at a consistent direct costs estimate. They reported average indirect costs for injuries in twelve industry sectors averaged $Can 1157 and ranged from $Can 318 for the wood/furniture industry to $Can 2233 for mining. Overall indirect to direct cost ratio was 0.83:1, ranging from 0.59:1 for transportation equipment manufacture to 1.30 for the rubber and plastic industry. Nearly half (46.5% $C 537.52) the indirect cost was continuing fringe benefits payments during absence.

A later study **(Gareau** 1994) showed $C 1400 average indirect costs, with fringe benefits at $C 318 (22.7%) and catch • overtime at $C 540 (38.5%) resulting in an average 1.06:1 ratio, with average Indirect injury Cost = $C 850 + 0.42 x (Direct injury Cost), giving an *incremental indirect cost ratio* of 0.42:1. Gareau also demonstrated the significance of work absence days as the determinant of indirect cost dollars, with average Indirect injury Cost = $C 793 + 52.7 x (days lost). This method also appears to address the key *"spare capacity"* injury cost model issues.

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Oxenburgh and Guldberg (1993) enquired into the "hidden" costs due to injury, during their 1987 study on the costs and benefits of compliance with the draft 1986 Worksafe Manual Handling Code. 99 NSW managers (of the 224 asked) were able to respond, giving a range of nil to 3'h times the compensation cost (median of 1.75). *"That is, the hidden costs added 75% to the compensation costs"* or an indirect to direct cost ratio of 0.75:1 (which is usually misquoted as 1.75:1)

The UK **Health and Safety Executive** (1992) *"The costs of accidents at work"* report extends *"accident"* to include all accidental losses considered to be preventable by a rational business. Five 13-week studies were made in 1990-91: a supermarket construction project, an operating creamery, a transport firm, a North Sea oil production platform during winter and a public hospital. The study estimated:

- *Opportunity costs* for labour paid and energy used during idle periods resulting from accident,
- *Insured costs* as the total premiums for workers' compensation, public liability, property damage, vehicle damage, business interruption and product liability insurances,
- *Uninsured costs* as sick pay, repairs, product loss or damage, investigation costs, hiring and training costs for replacement staff, loss of goodwill or corporate image.

The construction project had no serious and 56 minor injuries, with 3570 property damage items. An insured to uninsured costs ratio of 1:11 was estimated ***for the main contractor only.*** Opportunity costs were *"mainly wages during periods of no production."*

The creamery reported six >3 day injuries, 31 first-aid only and 889 non-injury and property damage events, with insured to uninsured costs ratio estimated at 1:36, most significantly due to lack of repair tradesmen during critical start-up periods and partly to the firm's insurance arrangements.

The transport company had no personal injuries at all, but uninsured losses were eight times higher than the insurance premiums paid during the period of the study.

The oil platform had two >3 day lost time injuries, 8 first-aid only, 252 non-injury accidents and 37 events judged *"unpreventable",* with many incidents resulting in lost oil production calculated at the company oil valuation. Insured to uninsured costs ratio was estimated at 1:11

The hospital reported six >2 days lost time injuries, 58 minor injuries (staff 25, patients 38, visitor 1) and 1168 non-injury accidents, but a costs ratio could not be calculated as the hospital was self-insured.

Despite the unrepresentative mix of businesses studied, the HSE report adds their cost estimates to develop an "average" cost dominated (at >84% of total) by the mid-winter oil platform costs.

(Comment: The HSE document cannot be described as a valid or balanced analysis of the economic outcomes arising from preventable workplace injuries and property damage events. The report has no relevance for indirect to direct cost

or uninsured to insured cost ratios associated with Australian workplace injuries, for three principal reasons:

- *unspecified mix or period coverage of injury and unrelated loss insurance premium costs,*
- *unspecified injury and damage insurance deductible levels, and*
- *costs dominated by property loss and business interruptions, with minimal personal injury costs.)*

Ore (1992) studied NSW construction deaths and injuries exceeding two days work absence. The study population included building, road, bridge, and other construction trades but excluded self-employers and a number of government agency employees. This study has a number of validity problems, perhaps the most significant being the assumption that production losses should be valued at *twice* the time lost at average earnings. Valuation of disease cases, predominantly (60%) hearing loss but averaging 29.4 weeks absence, poses a second validity question mark. S. Denis calculated a 1.42:1 indirect to direct cost ratio from Ore's paper.

Mangan (1993) developed a 7:1 indirect to direct cost ratio for the Queensland DEVETIR Division of Workplace Health and Safety (1993, 1994) from actual Queensland injury data by a hypothetical multiplication process, with significant double-counting errors. This involved a chain of assumed multipliers for production (value added) losses and annual wage losses, material damage costs (15-25%), "flow-on production losses" (50%), "non-wage losses" (25%) and "employer additional costs" (equal to their total WC premiums). The final step involves adding the QWCBoard operating expenses and federal OH&S services to develop a total of $1.04 to $1.17 billion annual "indirect costs" for occupational accidents in Queensland. Taking the QWCB compensation payments for 1987-88 of $168 million as "direct costs" gives an indirect to direct ratio estimate of 6.1 to 6.9, depending on the "flow-on losses" assumption used. While the estimates are reported as *"conservative"* and *"match up well with some overseas results"*, it is relevant to note that Mangan's claims that it *"is close to the ratio of 7:1 used by the National Safety Council of the US"* and that *"since the 1970's the US Bureau of Labour Statistics have worked on a ratio of 7:1 between direct costs (principally compensation payouts) and indirect costs"* have been denied by those organisations. The US National Safety Council states that it *"does not recommend the use of an arbitrary, fixed ratio to estimate uninsured costs from insured costs. There is no support in the research literature for a 7:1 ratio."* The US Bureau of Labour Statistics *"is unable to find any record of the Bureau having compared the direct costs of a work injury to its indirect costs."*

While **Worksafe Australia** (1994) has used a number of higher indirect cost ratios in the past, *"a conservative ratio of 1:1 (indirect to direct costs) has been used in Worksafe Australia documents"* since its submission to the Industry Commission Inquiry into Workers' Compensation in Australia. But the Foreword reports *"the total cost of work-related injury and disease at, at least, $15 billion annually and perhaps as high as $37 billion"*, implying ratios of at least 1:1 and as high as 4:1 And people associated with Worksafe such as **Emmett** (1995) and **Foley, Gale** & **Gavenlock** (1995) have continued to advocate 4:1 as a more likely ratio than *"the most conservative overall measure of 1:1"* adding that *"some authorities have estimated the overall indirect to direct cost ratio at 7:1 and higher."*

The Industry Commission (1994, 1995) reports on *"Workers' Compensation in Australia"* and *"Work, Health and Safety"* have highlighted the key role of indirect costs in measurement of the economic magnitude and distribution of the effects of workplace safety management failures within the national economy. Using South Australian benefit scales, the $20 billion total estimate for 1992-93 included $2.3 billion employer indirect costs at an indirect to direct cost ratio of 0.35:1 for employers, which is in the range of published study numbers. The national indirect to direct cost estimate of 1.8:1 includes computed employee and community cost estimates.

Prof. Jean Cross (Univ of NSW) reported to the 1996 "Futuresafe" conference on NSW studies using the UK Health and Safety Executive (1992) method. The three study sites showed uninsured to insured (premium) costs less than 1:1, well below the UK ratios and mainly consisting of minor injury costs.

Sandra Denis (1996) reviewed some of the key indirect to direct injury cost ratio literature in her recent Master's research paper. Denis' study did not evaluate the existence of a linear indirect to direct cost relationship, and concluded *"that a ratio of between 1:1 (Andreoni, Brody et al., Klen) to 3:1 (IC, 1995) is not unreasonable. In the alternative, a 2:1 ratio might be used as an acceptable 'average' ratio"*, which incorporates the computed indirect injury cost impacts on injured people and the community.

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