

# **Fatal Facts: Using work related fatalities to target prevention in Victoria (1993/94 to 1996/97)**

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## **INTRODUCTION**

The Victorian WorkCover Authority (WorkCover) and the Victorian State Coroner's Office (Coroner's Office) are involved in a joint project collecting Victorian work related fatality data. WorkCover and VIOSH Australia at the University of Ballarat, are using this data to target preventative programs in selected areas. The aim of this paper is to introduce the work of the "Work Related Fatalities Project", and to generate discussion on the preventative interventions currently being developed to reduce deaths and injuries.

WorkCover funded both the initial twelve-month project, and the current three year extended project. The Coroner's Office contributed office space, facilities, and access to resources. VIOSH Australia joined the project after the completion of the first stage to provide expertise in prevention program development and implementation. It is believed that this was the first research position specifically attached to a Coroner's Office in Australia.

The first stage of the project began in August 1997 and ended in August 1998. This stage involved the extraction, merging and analysis of data from WorkCover and the Coroner's Office to determine three priority areas. The current stage of the project involves the development of targeted intervention programs for the three priority areas. The following report details results from both stages, and outlines the planned interventions.

## **DATA SOURCES**

The Work Related Fatalities Project brought together information from the major sources of data available in Victoria to study work related death :

1) **The Coroner's Office** collects information on all 'unexpected', 'unnatural' or 'violent' deaths which occur in Victoria (or to Victorian residents) which includes work related fatalities<sup>2</sup>. These fatalities are investigated to determine a cause of death, and the factors which may have contributed to the death. Under the Coroner's Act, a Coroner may also make recommendations on public health and safety or the administration of justice.

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<sup>2</sup> The Coroner's Office collates information provided by police, health and safety inspectors/field officers, other relevant investigation bodies (eg. fire or transport organisations), as well as detailed medical and forensic information from the Victorian Institute of Forensic Medicine (an organisation which shares the Coroner's Office Complex).

2) **WorkCover** collects:

- data from all investigations into work related deaths and injuries in Victoria (stored on the 'Incident database').
- details on all claims made by Victorian workers for work related injuries and deaths (stored on the 'Claims database').

Each of these data sources contains information gained for different purposes. For example, self-employed persons may not have a WorkCover insurance policy and therefore deaths of the self-employed may not be found on the WorkCover claims database, whereas they may be found on the coroner's database or the WorkCover incident database. Likewise, few work related diseases are reported to the coroner's office, whereas more information on these deaths may be found on the WorkCover claims database.

It is only in recent years that the need for a consolidated data set has become apparent. This has resulted from a heightened awareness of the role that past fatalities have in preventing future work related fatalities and injuries. The linking of WorkCover, the Coroner's Office, and VIOSH Australia is facilitating the **use** of such information for prevention purposes.

## **DATA COLLECTION**

Data from the 1993/94 financial year was used in a pilot study, before all work related data from the 1993/94 – 1996/97 financial years was extracted. Cases were selected on the basis of significant 'work-relatedness', defined as follows :

**Any person who suffers a work related death from injury or disease:-**

- a) which occurred while the person was either a bystander or was working for payment, profit or payment in kind (including purposes of work experience); and**
- b) which occurred within the State of Victoria, to a Victorian resident, or which involved a contributory factor related to work in the State of Victoria.**<sup>3</sup>

This definition includes workers and 'bystanders to work'. This includes employees, employers, the self-employed, contractors and subcontractors, those working 'off the books', those persons working for friends/family, family members working on a farm, as well as bystanders, students or the like who are killed as a result of a work practice or work event.

Data was initially selected on date of incident – that is, that the date of the accident resulting in the death was within the study period. Disease deaths were determined on date of death. Files for each case were individually assessed to determine whether it met the criteria for inclusion as 'work related'. Data were merged into a single database. This process was automated as much as possible, so that the database could become easily updated.

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<sup>3</sup> Each term is further defined in terms of inclusions and exclusions elsewhere. There is insufficient space in the current paper to allow full publication.

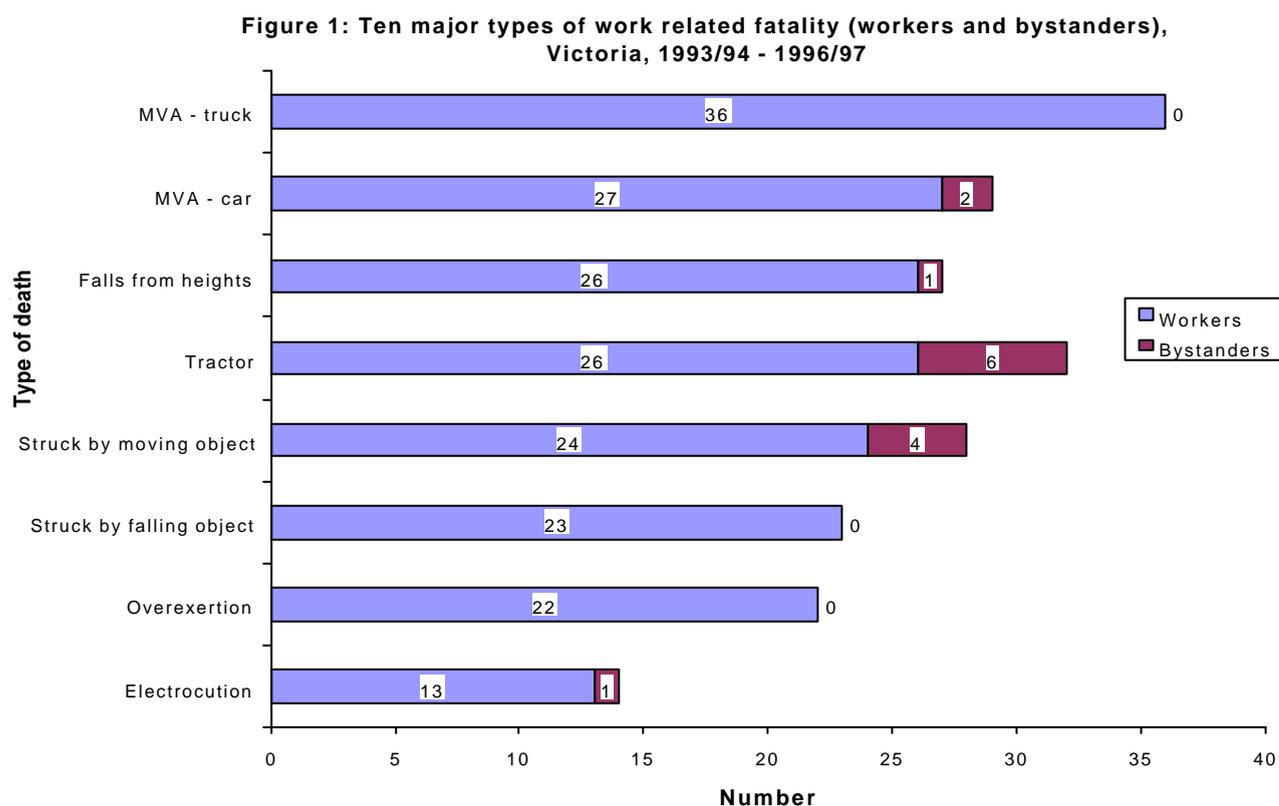
## RESULTS

The following is a small sub-set of the results available from the 1993/94 – 1996/97 work related fatalities data. A number of both quantitative and qualitative analyses were performed in order to determine and investigate patterns and trends in work related fatalities as an aid to developing prevention strategies.

There is a total of 332 work related deaths in the current database from 1993/94 to 1996/97 financial years. These cases have all been manually perused and confirmed as being work related within the meaning of the project's definition. There are a further 89 cases yet to be classified. More recent fatalities make up the bulk of those cases still requiring classification.

Males account for 296 work related fatalities (89%). The average age of persons dying in work related fatal incidents was 42, with a standard deviation of 18.0, a minimum age of 4, and a maximum age of 91.

Figure 1 shows the ten major types of fatalities found within the current project. Category types are based on WorkCover classifications and modified to reflect broad classifications for further study. Figure 1 shows types of fatalities by workers and bystanders<sup>4</sup>.



<sup>4</sup> Figure 1 excludes 31 cases ascribed to 'suicide' that are to be further investigated to determine if they are 'work related' within the definition of the current project. Similarly, Figure 1 excludes 12 cases ascribed to 'heart-related death' that are also to be further investigated. The cases marked 'overexertion' are heart and heart/lung related deaths which the current study has found to have been compensated deaths within the WorkCover database.

The current data indicate that the most frequent types of fatalities include

- Motor vehicle accident – truck and car (36 cases, or 11%, and 27 cases, or 9% respectively)
- Falls from heights (26 cases, or 9%)
- Tractor incidents (26 cases, or 8%)
- Struck by moving object (24 cases, or 7%)
- Struck by falling object (23 cases, or 6%)

'Bystanders to work' were killed most frequently in tractor related incidents (accounting for 6 bystander deaths). All of these tractor deaths occurred to children under the age of 16. The above rankings in terms of most frequent types of fatalities is not changed by the removal of bystander deaths from the total fatalities.

Figure 2 shows the ten major occupations of fatally injured workers in Victoria, 1993/94 to 1996/97 financial years. Occupation is coded according to Australian Standard Classification of Occupation (ASCO) (ASCO, 1997) codes to be comparable with Australian Bureau of Statistics (ABS) codes. Bystanders are excluded from figure 2.

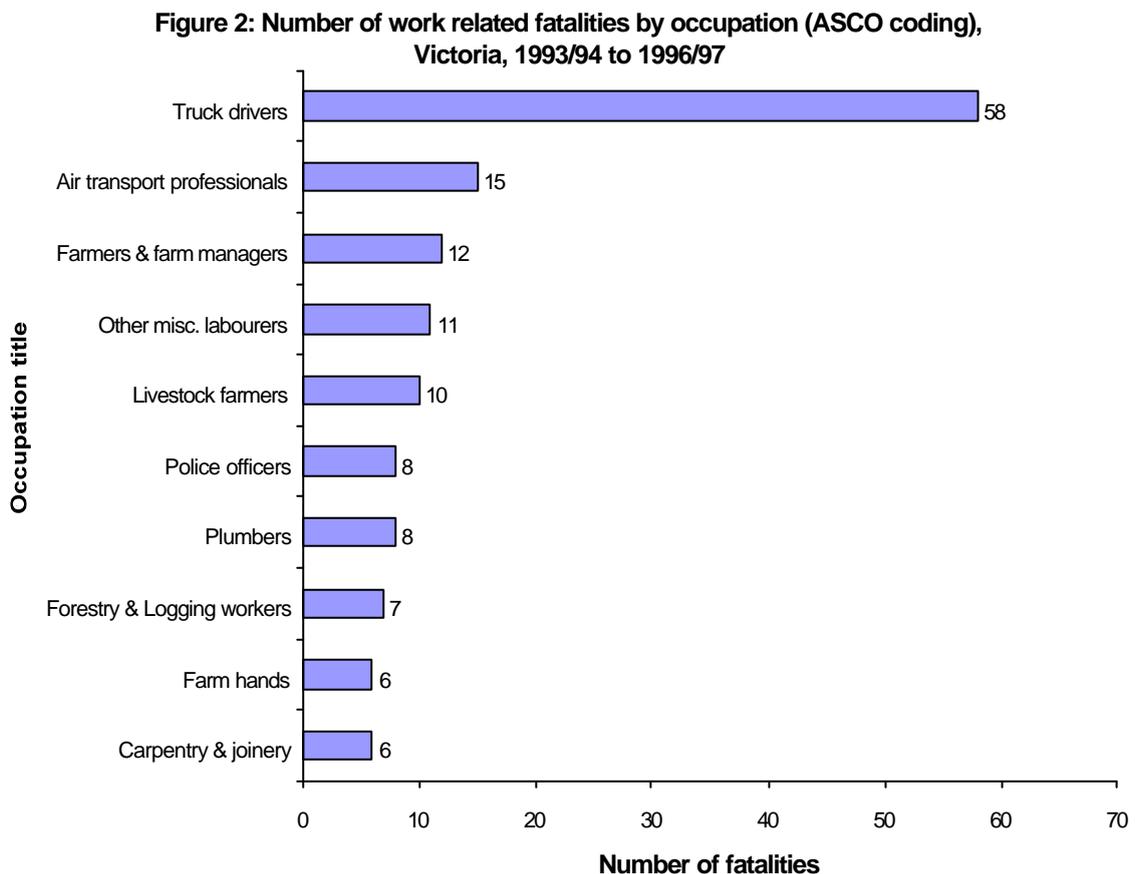
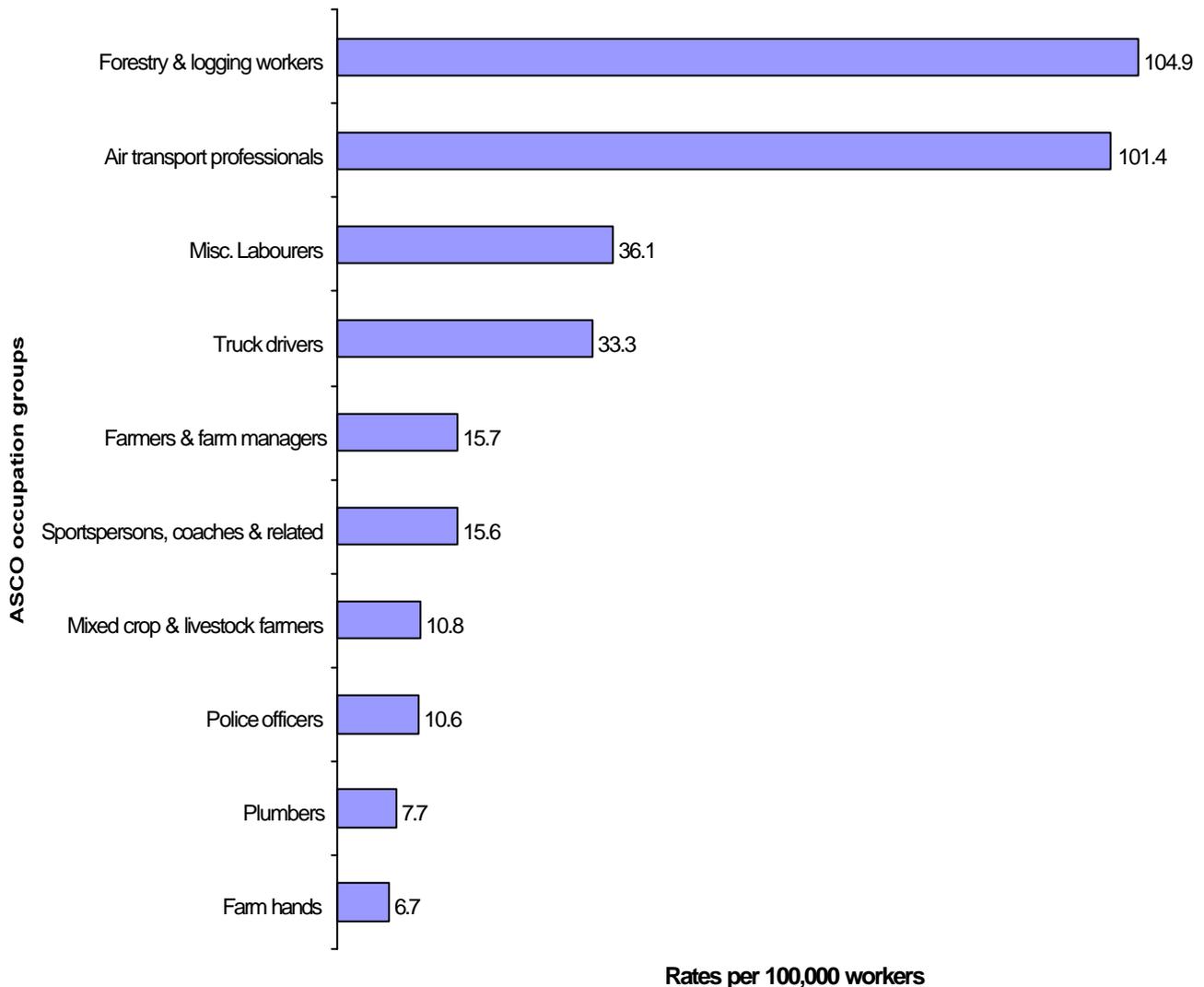


Figure 2 demonstrates that in terms of absolute numbers, the most common occupations of workers involved in work related fatalities are 'Truck driver' (58 cases, or 17.5%), 'Air transport professionals' (15 cases, or 4.5%), and 'Farmers & farm managers' (12 cases, or 4%) respectively. Other less frequently occurring occupations include: 'Livestock farmers' (10 cases, or 3.5%), 'Police officers' (8 cases, or 3%), and 'Plumbers' (8 cases, or 2%).

Figure 3 shows estimates of the incidence of frequency rates by occupation (work related fatalities per 100,000 workers). ABS data from the 1996 census was used as a base-rate for numbers employed in each occupation (ABS, 1997). The following figure shows the ten major occupations after standardisation.<sup>5</sup>

**Figure 3: Work related fatalities by occupation (Standardised by employment numbers),  
Victoria, 1993/94 - 1996/97**



Frequency rates were only calculated for ASCO occupation codes (ASCO, 1997) where more than 5 fatalities had been recorded in Victoria for the period 1993/94 – 1996/97. Once adjusted for exposure, figure 3 demonstrates that occupations such as ‘Forestry & logging workers’ had a high frequency rate, as did ‘Air transport professionals’. ‘Truck drivers’ and ‘Farmers & farm managers’ also had high exposure rates. Frequency rates give us a clearer picture of where interventions might be appropriately targeted.

<sup>5</sup>Population rates from the 1996 census were assumed for each year represented in Figure 3.  
Page 5 of 13

Figure 4 shows the status of workers involved in work related fatalities in Victoria, 1993/94 to 1996/97 financial years. Work status categories were developed in order to classify the types of workers most at risk.<sup>6</sup>

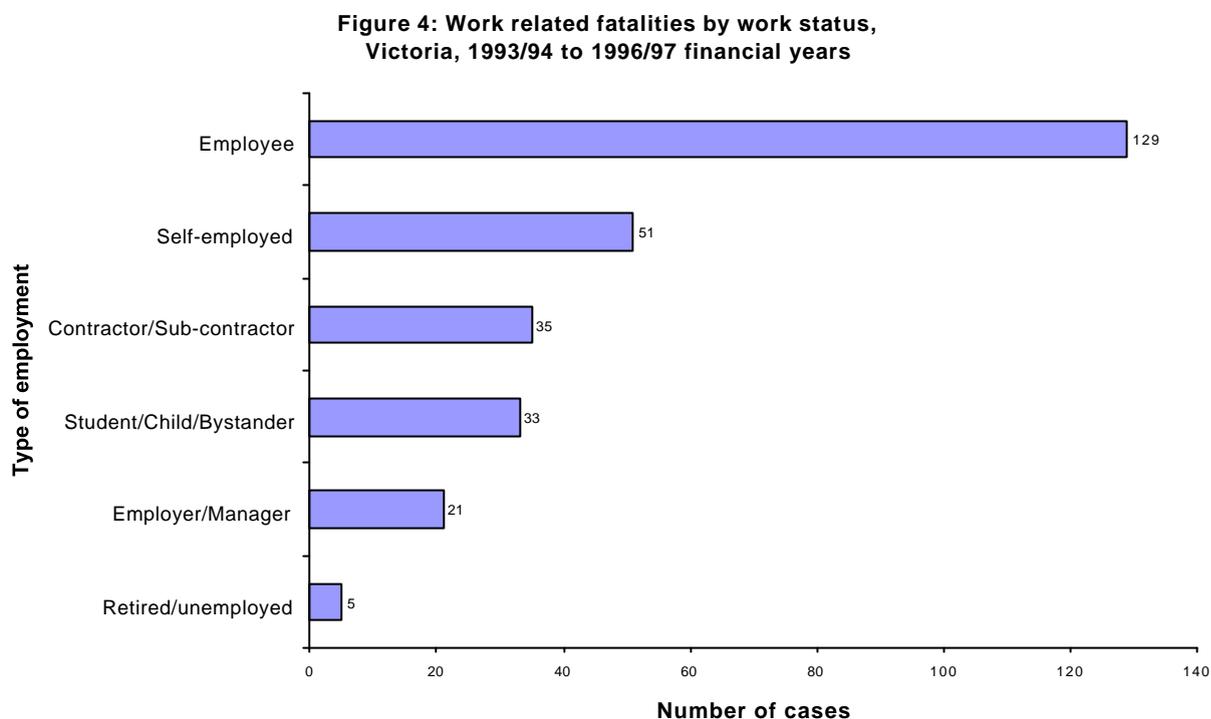


Figure 4 demonstrates, as expected, that the highest number of fatalities occurred in the 'employee' category (129 fatalities, or 39%), followed by 'self-employed' (51 fatalities, or 15%) and 'contractor/sub-contractor' (35 fatalities, or 10.5%).

Using ABS 1996 census figures (ABS, 1996), the incidence of fatalities for the working population of Victoria was calculated. The employee, self-employed, contractor /sub-contractor, and employer /manager categories in Figure 4 were combined to determine the number of fatalities amongst employed persons. The incidence of work related fatalities in Victoria was just under 2 fatalities per 100,000 workers employed during the study period.

Recent research by the National Occupational Health and Safety Commission (NOHSC) into work related fatalities produced a figure of 4.5 deaths per 100,000 Victorian workers per year (NOHSC, 1998 "Work related traumatic fatalities in Australia, 1989 to 1992"). The reasons for this discrepancy are unknown. Work needs to be done to ascertain why different figures were reached by the two studies.

<sup>6</sup> Figure 4 excludes a further 58 cases classified as 'Other'.

## **CRITERIA FOR SELECTING PREVENTION AREAS**

Priority areas for work related prevention strategies were identified based on the following criteria:

- The issue contributed to one or more deaths in the period of study
- The underlying contributory factors/issues were clear or well known and could be broken down into reasonably discrete sections
- That there did not seem to be too many impediments to achieving some form of reduction in work related deaths/ injuries in the area
- That the area was not being addressed by any other internal or external major project.

## **THREE PRIORITY PREVENTION AREAS**

Using the above criteria, a decision was made to focus on the prevention of fatalities related to three problem areas:

- falls from heights
- tree felling fatalities (struck by falling objects)
- hydraulics related fatalities

Other areas that were already being addressed by other programs have been excluded. It has been decided that they will be supported through the provision of data to those agencies involved, to assist them in developing interventions, or to highlight specific problems. Two specific cases of this are electrocutions and aircraft related fatalities, which are explained in more detail below.

## **1. PROGRESS ON PRIORITY PREVENTION AREAS**

### **Falls from heights**

The following cases are typical examples of fatalities involving falls from heights:

- The deceased, a sub-contractor asbestos removalist and roofing plumber, fell 8m through an asbestos sheet roof and landed on concrete floor. Not provided with fall protection.
- The deceased, an electrician, was working from a ladder, fitting down-lights to a ceiling when he fell 10m to concrete floor. Not wearing fall protection. Ladder was not secured.

Fatal falls from heights occurred in a variety of industries, including building and construction, manufacturing and agriculture. There was a high variance in the types of objects or places that workers fell from. Most of the fatalities in this category occurred whilst the worker was not wearing fall protection.

There are a number of falls projects that have recently been commenced in Victoria. The 'Foundations for Safety' project, involving the Monash University Accident Research Centre (MUARC), the Victorian WorkCover Authority, and other relevant industry organisations aims to identify blackspots in the construction industry, determine the underlying causal factors and develop and implement suitable counter-measures. Falls from heights has been identified as a key issue for the construction industry, and work has begun on a Code of Practice.

WorkCover is also funding a Falls Prevention Project, aimed at reduction and prevention of fall injury in small business. Two municipalities - Hume City Council and LaTrobe Shire – are participating in local community-based programs.

WorkCover has also recently run a series of advertisements with the first in the series portraying a worker falling through a roof. Subsequent advertisements depict the consequences of that fall for work-mates and family members.

Discussions are being held with representatives of these projects and other agencies to determine the feasibility of sharing resources and working together to increase the impact on reduction of fatalities and injuries from falls from heights.

### **Tree Felling (Struck by falling object)**

The following cases are typical examples of fatal tree felling incidents where the deceased was struck by a falling object:

- The deceased, a forestry worker, was felling a Messmate tree. As it fell, the Messmate tree brought down a rotten Peppermint tree that it was entangled with, striking the deceased fatally.
- The deceased, a tree feller, felled a tree that struck other trees on the way down. Fifteen to twenty minutes later, he started stripping the fallen tree when a branch that had been hung up fell, hitting him in the head.

Sixty percent of “struck by falling object” fatalities involved a falling tree or part of a tree (ie log or branch). Other types of falling objects found in the current study were more varied and included walls, concrete panels, steel structures, hay bales, truck and van bodies and other suspended loads. This high frequency rate (104 per 100,000 workers) in the industry has prompted the current study to focus on the issue of falling timber.

Both the forestry and arboricultural industries were invited to become involved, and support has been overwhelming. Focus groups were conducted, to investigate more closely the issues surrounding the hazards of tree felling from the perspectives of representatives of both the forestry and arboricultural Industries. These focus groups were held in October/November 1998 and identified several issues that are contributing to deaths not only in the arboricultural and forestry industry but also among home-handy persons. As a consequence of this focus group activity, a group called the “Tree Felling Safety Group” (TFSG) has formed. This group is made up of representatives from a broad range of industries including forestry workers, arboriculture related workers and trainers, ‘urban tree workers’, local government workers, and union and WorkCover representatives.

The aim of the TFSG is “to develop workable solutions / intervention strategies for tree felling hazards and assist in implementing and monitoring interventions”. That is, the group was developed to prioritise the issues identified by the focus groups and then draw on it members’ industry experience to determine ‘workable’ solutions and intervention strategies. Meetings of the TFSG commenced in early February 1999, and have been held regularly since then.

The TFSG made a decision to focus attention on workers in the arboriculture and forestry industry where exposure to risk is high. Prevention strategies for workers such as farmers and home handy-persons who represent a group whose exposure to risk is lower, are to be investigated later.

The TFSG is in the process of drafting its recommendations. These draft recommendations will be presented for public discussion at seminars around rural Victoria where forestry/arboricultural/urban tree workers and other interested parties are expected to attend. It is anticipated that a number of recommendations may be adopted and implemented in the later half of 1999.

## **Hydraulic safety**

The following cases are typical examples of fatalities involving hydraulics:

- The deceased, a mechanic, was working on a tilt-cabin truck (fully tilted). He was crushed between the engine and cabin when the hydraulic mechanism responsible for supporting the tilted cabin failed due to lack of maintenance and manufacture problems.
- The deceased was repositioning a jack under a front-end loader when it collapsed, crushing him. Incorrect jack used, no secondary support, working alone.

Failure of hydraulically operated machinery directly resulted in a relatively low number of deaths. However, hydraulic failures have contributed indirectly to a number of other deaths, that is, as one of many systems failures. Hydraulic failures occur in a variety of different industries, but in a limited number of ways, therefore there is scope for some concise, targeted interventions. The issue of hydraulics has also not been well covered by other programs.

The prevention activities planned for hydraulic related fatalities are yet to be finalised. Potential areas of investigation include, but are not limited to, three areas of interest: safe rams, safe jacks and the issue of controlled descent devices for hydraulic hoists.

### *Safe rams*

Several of the fatalities studies investigated involved the failure of a ram or piston. For example, the ram was missing, or damaged (overextension being the usual form of damage), or not being used according to manufacturer's specifications. Another related problem appears to be that mechanics working on hydraulic systems have insufficient knowledge of the system operation. It appears that 'secondary support' of machinery is under used and that there is over reliance on the integrity of the hydraulic systems alone.

As part of this project, engineers are examining the feasibility of developing a 'safe ram' – that is, one that will not overextend, or perhaps one that cannot be removed from a hydraulic system. It is envisaged that there will be consultation with interested groups to determine the most efficient ways of implementing solutions.

### *Safe jacks*

Many of the hydraulic related fatalities involved jacks – that is, trolley jacks and the like used predominantly by mechanics in car-repair and other machinery repair. Most of the problems surrounding jacks were associated with the issue of 'secondary support' – that is, no supporting 'chocs' were placed under the vehicle once raised, the item raised was beyond the capabilities of the jack, or an inappropriate type of jack was used.

As part of this project, a group of Melbourne University post-graduate engineering students is designing a test to assess the stability of jacks when used on various inclines and road surfaces.

### *Controlled descent devices for hydraulic hoists*

Several fatalities under investigation involved the rapid collapse of a tip-truck body due to failure or inappropriate use of the hydraulic hoist mechanism. The possibility of such a collapse has been well documented in OHS literature from the USA, particularly in near-fatal and fatal cases where hydraulic hoses have burst. The OSHA (USA) agency has made some form of 'controlled descent device' mandatory for the majority of tip truck plant.

As part of this project, an investigation may be conducted into the feasibility of making some form of 'controlled descent device' mandatory for tip truck hoisting equipment in Victoria. Other suggested prevention activities include making tip truck body builders aware of the need to incorporate safety devices into hoist systems. Another possibility is encouraging hydraulic hoist manufacturers (both in Australia and overseas) to look at manufacturing safety systems that are integrated with the hoist at point of manufacture. These suggested prevention activities are currently being investigated further to determine their feasibility.

## **2. HIGH FREQUENCY TYPES OF FATALITIES BEING ADDRESSED BY OTHER PROGRAMS**

### **Motor Vehicle Safety**

Motor vehicle fatalities involving trucks included predominantly truck drivers and delivery persons. More than half of all truck fatalities were 'single vehicle accidents'. WorkCover is involved in both the Transport Industry Safety Group, and the TruckSafe Program, as well as awareness raising campaigns including television commercials specifically addressing vehicle hazards.

The Transport Industry Safety Group was set up following a Coronial inquest into a fatality involving a young boy, who, as a pedestrian, was hit and killed by a truck. This group consists of representatives of the Transport Workers Union, the Victorian Road Transport Association (VRTA), the Bus Association of Victoria, WorkCover, MUARC, VicRoads, and the Victorian Police.

This group developed a 'Guide to meeting the OHS Duty of Care' package during 1997. Following the successful launch of this document, the VRTA has developed an OHS program called TransCare which is an integrated OHS process addressing prevention and safety issues by providing a safety audit tool to benchmark transport industry performance.

TruckSafe was a joint initiative of the Victorian WorkCover Authority and the transport industry itself. Transport operators were involved in the development of a TruckSafe kit, which contains, among other things, material that show-cases the procedures used by the industry's best practice operators to prevent injuries, manage claims and return injured workers to work. TruckSafe has been widely accepted by the Road Transport Industry and its ideas and practices are being incorporated into training and accreditation programs. Over 1200 kits have been distributed to date.

Motor vehicle fatalities involving cars included predominantly taxi drivers and couriers/salespersons (known as 'professional drivers'). The contributory factors involved in these deaths (predominantly, fatigue) seemed to be similar to truck drivers. WorkCover has not specifically targeted Professional car drivers in the past. The industries involved in professional driving are also very diverse, making this a difficult area to target.

## **Tractor Safety**

Tractor fatalities typically involved roll overs and run overs. Roll over tractor fatalities appear to have decreased over the four year study period. This may be an artefact of the recording lag experienced by the study and will need to be examined further.

WorkCover, with the support of the Victorian Farmers Federation and the Farm Safety Alliance group, started a campaign to encourage the fitting of roll over protection (ROPS) devices, with the first stage being the paying of a \$150 subsidy to every farmer who had the protective device fitted. One million dollars was allocated early in 1997, which provided subsidies for almost 7,000 farmers. A further one million dollars was allocated in October 1997. This stage has been supported by an extensive promotional campaign, and by regulatory review. New plant regulations, as they apply to ROPS on tractors, have been introduced recently, requiring pre-1981 tractors to be fitted with ROPS unless impractical. WorkCover has also been involved in recent dissemination of information on the hazards of power take-off equipment on tractors, the next most common area of tractor deaths.

## **Struck by moving object**

“Struck by moving object” included a variety of objects, predominantly vehicular in nature. It is likely that information will be referred to the Transport Industry Safety Group with relevant recommendations for future preventative action. WorkCover has addressed the issue of trucks and pedestrian interaction in past advertising. The issue of reversing vehicles and pedestrian interaction has been addressed as part of WorkCover’s “Safety - think it, talk it, work it” television commercials and other advertising.

WorkCover was singled out forklift related fatalities for more intensive prevention work in the near future. In 1990, the Victorian Occupational Health Commission funded a study by MUARC, and a report on their findings “Forklift Trucks and Severe Injuries : Priorities for Prevention” was tabled in August 1992. They identified that approximately 50% of fatalities involving forklifts occur when a vehicle or the load being carried strikes pedestrians. They were unable to find any standards worldwide which addressed the issue of pedestrian safety through traffic management. WorkCover is in the process of developing a range of interventions.

## **Electrocutions**

Electronic instrument trades workers were discovered to have a high fatality rate: approximately 167 work related fatalities per 100,000 workers. The predominant type of fatality that occurred to this population was electrocution, typically in commercial maintenance situations.

The Work Related Fatalities Project did not select electrocution as a priority area, as there are already a number of campaigns being run by the Victorian Office of the Chief Electrical Inspector in the area of electrical safety. A decision has been made however, to provide information to these projects as required, and some statistical information on electrocution deaths from 1993/94 to 1996/97 has already been provided.

## **Aircraft-related fatalities**

Aircraft pilots died in 14 separate work related incidents from 1993/94 to 1996/97. Further, after standardisation with ABS 1996 census data, it was found that the fatality rate for these workers was approximately 100 deaths per 100,000 Victorian workers.

The Work Related Fatalities Project will provide information on these deaths to appropriate agencies with responsibilities for this area.

## **SUMMARY**

The Work Related Fatalities Project extracted data from the Coronial database, the Victorian WorkCover Authority's Compensation database, and the Victorian WorkCover Authority's Inspections database for the four years from 1993/94 to 1996/97.

A total of 332 'work related' deaths were found, with the top five types of work related fatalities including:

- Motor vehicle accident
- Falls from heights
- Tractor incidents
- Struck by moving object
- Struck by falling object

The occupations most frequently involved in work related fatalities were 'Truck drivers', 'Air transport professionals' and 'Farmers & farm managers'. Subsequent standardisation of these figures with ABS data demonstrated that 'Forestry & logging workers' and 'Air transport professionals', have a high rate of work related fatalities.

A set of criteria was used to determine the three priority areas that would be the focus of the project's prevention activity. The three areas chosen were:

- Falls from heights
- Struck by falling objects (trees)
- Hydraulics related fatalities

There are a number of falls from height projects being initiated by WorkCover and other Victorian agencies. The current project will collaborate with these projects where possible in order to share resources and knowledge in order to reduce fall injuries.

Work is progressing on tree felling related fatalities. Focus groups assessed issues in late 1998 - subsequently, the 'Tree Felling Safety Group' (TFSG) was formed to develop recommendations for prevention activities. The TFSG is currently organising a series of regional seminars to further develop prevention strategies.

With regard to hydraulics, three areas are currently being investigated: safe rams, safe jacks, and controlled descent devices for hydraulic hoists. These issues will be investigated further during the coming months.

Future directions for the project:

- further development and implementation of interventions in three areas identified to reduce injury and death
- review of data and methods to combine work related fatalities data from various sources
- improved liaison with other research agencies
- greater dissemination of information to other agencies who can use it to prevent injury and death.

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