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Accident experience of Commonwealth Government employees in Western Australia : 1 June 1993 to 2 December 1995

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ACCIDENT EXPERIENCE OF COMMONWEALTH GOVERNMENT EMPLOYEES IN WESTERN AUSTRALIA 1 JUNE 1993 TO 2 DECEMBER 1995.

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USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

ABSTRACT

ACCIDENT EXPERIENCE OF COMMONWEALTH GOVERNMENT EMPLOYEES IN WESTERN AUSTRALIA JUNE 1993 TO DECEMBER 1995.

This quantitative study documents, analyses and discusses the accident experience of Commonwealth employees in Western Australia from 1 July 1993 to 2 December 1995 as recorded on 1663 accident report forms.

The research addresses the problem of lack of knowledge of accidents in the Commonwealth sector of the Western Australian work force. Its purpose is to identify possible areas of health and safety improvement and highlight where accident frequency may be reduced.

Risk management is adopted as a conceptual framework to explore categories of accident related data, including month of year, time of day, day of the week of accidents, number of years of job experience, age and gender of the worker, accident frequency and severity.

Where applicable accident related data was subjected to Chi-square statistical tests. Important findings, amongst others, include the identification of the month of August as having a higher frequency of accidents, inexperienced Commonwealth workers incurring 80.5% of accidents, and 64% of accidents involving men.

Such findings are of importance to the Commonwealth so that prevention strategies targeted at these areas can be developed.

Additional research utilising national data is recommended.

DECLARATION

" I certify that this thesis does not incorporate, without acknowledgment, any material previously submitted for a degree or diploma in any institution of higher education and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text ".

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Chapter I INTRODUCTION

1.1 *General background*

Over many years the health and safety community has speculated on the interrelationships between, and effect of, the many and diverse variables that contribute to industrial accidents. Importantly, participants in employment sectors within society have examined and questioned their own accident experience in an endeavour to reduce work related accidents.

To assist industry in understanding accident experience Australian state and territory health and safety regulatory bodies collect and publish accident statistics. However, similar information documenting the Commonwealth sector's accident experience for Western Australia has not been produced even though the accident reports that contain information to illustrate the Commonwealth sectors accident experience do exist. These reports form the basis of this study.

Accident reports for the Commonwealth have been collected since 29 July 1993, by Comcare Australia. Comcare Australia is a national Commonwealth organisation that administers the Occupational Health and Safety (Commonwealth Employment) Act 1991 and the Safety Rehabilitation and Compensation Act of 1988 on behalf of the Safety, Rehabilitation and Compensation Commission [SRCC] and the Australian Federal Government.

The information contained in the accident reports collected by Comcare Australia includes a description of the accident, its severity and type, the time and date of the accident, the age, work experience and gender of the person/s injured.

This information is the main body of data recording the Commonwealth's accident experience.

1.2 *Statement of the problem*

The problem identified, and being addressed by this study, is that no analysis of Commonwealth accident reports, and their related variables, for Western Australia has been undertaken.

There is an urgent need to analyse the Commonwealth sector's health and safety accident related data for two primary reasons. Firstly, so that accident prevention strategies, that are based upon the Commonwealth's contemporary accident experience, can be developed. Secondly, so that members of the Commonwealth sector are informed of their recent accident experience. This information may then be used by Commonwealth agencies to refine their in-house health and safety programs.

Documentation, analysis and discussion of the Commonwealth's accident experience would also encourage debate and improve awareness of the health and safety performance of the Commonwealth.

1.3 *Statement of purpose of the study*

The purpose of this study is to record the current occupational health and safety experience of the Commonwealth in Western Australia; and

(1) conduct an analysis of the recent accident experience of Commonwealth employees in Western Australia with the aim of identifying areas where health and safety may be improved.

(2) Inform Commonwealth agencies of the results of the study with a view to highlighting possible areas where consideration may be given to reducing accident frequency.

1.4 *Problem questions*

The Commonwealth accident experience data includes a wide range of information. This study will focus on four specific questions. They are :

(1) What are the patterns of accident frequency and severity with respect to time of the day, day of the week and month of the year ?

(2) Is there an association between the frequency of accidents and the age of the person ?

(3) Is there an association between the frequency of accidents and the job experience of the person ?

(4) Is there an association between the frequency of accidents and the gender of the person ?

In addition, some preliminary analysis will also be undertaken to explore the nature, breakdown, mechanism, agency and bodily location of the injury(ies) associated with accidents.

1.5 *Significance of the study*

This study is significant as it will :

a) document, analyse and discuss Commonwealth accident experience. This will enable development of accident prevention strategies formulated upon actual experience.

b) consolidate Commonwealth accident information.

c) communicate areas where poor safety performance may be highlighted. This may prompt action to reduce accident frequency.

d) assist Comcare Australia with communication of the Commonwealth's accident experience with members of the Commonwealth sector.

An anticipated outcome of this study will be the identification of areas of poor occupational health and safety performance. This information may then be utilised to effect change to avert the personal, organisational and societal costs associated with workplace accidents.

Chapter II REVIEW OF THE LITERATURE

2.1 *Introduction*

The purpose of a literature review is to " ... generate a picture of what is known and not known about a particular situation " (Burns & Grove, 1993). As this research investigates categories of work related accident information as detailed on accident reports, it is logical to conduct and structure the literature review by those categories of information found on the accident reports which will be analysed in this study. Consequently, the literature review examines :

- time of day and accidents.
- worker age and accidents.
- work experience and accidents.
- the day of the week and month of the year and accidents.
- gender and accidents.

The logical separation into these subsections greatly assists in clarifying and ordering the enormous quantity of accident related information found in health and safety literature.

2.2 *The time of the day and accidents*

It is widely accepted in the health and safety community that irregular working hours, in particular night work, adversely affects

workers' performance largely because of negative effects on a person's circadian rhythm (Akerstedt, 1990; Andlauer, 1975; Commonwealth Clearing House, 1988; Duchon, 1994; Gold, Rogacv, Bock, Tosteson, Baum, Speizer & Czeisler, 1992; Mastromatteo, 1994; National Health and Medical Research Council, 1981). Disruption of the circadian rhythm reduces sleep, resulting in increased fatigue and reduced performance (Akerstedt, 1990; Grandjean, 1988; Wagner, 1986).

Levin, Oler and Whiteside (1984) postulated that it was logical to conclude that shift workers are adversely and continuously affected by the disruption of the circadian rhythm and would therefore be subject to more stress, resulting in diminished alertness and efficiency. This could be expected to increase the probability of accidents. Gold et al. (1992) noted that sleep deprivation and circadian phase misalignment, as experienced during rotating shift work, were associated with lapses of attention and greater reaction times, which led to increased error rates.

However, surprisingly, published literature addressing the time of day and the number and types of accidents is inconsistent with the expectation that more accidents should occur during shift work because of the adverse effect on the circadian rhythm.

Interestingly, a number of published studies (Leigh, Mulder, Want, Farnsworth & Morgan, 1990; Lauridsen & Tonnesen, 1990; Pokorny, Blom & van Leeuwen, 1987) found that day workers exhibited higher accident rates than night workers. This was contrary to the reported adverse effects that shift work had on the circadian rhythm, and the resultant reduction in performance and efficiency.

Andlauer (1975) suggested some years ago that the view that accidents simply derive from a drop in a worker's capacity needed to be

revisited. Novak and Smolenski, (1988) noted that no consistent linkage between impaired performance and injuries had been established.

Some years ago Adams, Barlow and Hiddlestone (1981) in a study of almost 10 000 injuries in the metal industry conducted over 5 years, concisely summarised the contradiction between circadian rhythm and accident experience as :

> " It seems that day shift is producing about 50% more injuries proportionally than it ought to (or that afternoon and evening shift are about 30% less than might be expected). In either case these results, ... contradict an expectation based on other findings and other industries that night shift should produce relatively more injuries or more serious injuries " (p. 77).

The contradiction and confusion about what effect time of the day has on accidents persists. This has been illustrated by Hardman, Wise and Greenwood (1991) who studied nursing shifts. They found that although accident and injury rates were highest in day and lowest during night shifts, no significant difference was shown when the accident rates were adjusted for staff numbers working on shifts.

However, Pokorny, Blom, van Leeuwen and van Nooten (1987) found that bus drivers in the morning shift showed a higher accident rate than late shifts. Leigh, Mulder, Want, Farnsworth and Morgan (1990) and Lauridsen and Tonnesen (1990) found similar results in their studies of the New South Wales coal industry and off-shore oil rig drillers. Lauridsen and Tonnesen (1990) concluded that increased incidents during the day were due to increased activity during day time.

Another dimension was suggested by Monk and Wagner (1989) who found that Sunday night shifts had a higher incidence of accidents in the mining industry. Monk and Wagner suggested the reason for higher incident rates was the social disruption experienced by the shift worker on weekends.

Novak and Smolensky (1988) in an analysis of injuries in a chemical manufacturing plant found no correlation between late clock hour and increased injury incident rates. Interestingly, research by Laundry and Lees (1991) who investigated the accident experience of eight and twelve hour shift systems showed that the introduction of a 12 hour shift system in a large textile company did not increase the number of accidents.

This finding is also supported by Mastromatteo (1994) who noted that studies to date have not demonstrated any increased risk of occupational injuries or diseases with 12 hour shifts. Mastromatteo further suggests that the link between decreased performance and increased accidents for shifts greater than 8 hours as suggested by Waterhouse, Folkard and Minor (1992) has yet to be established.

Close examination of extended shifts and their effect on accidents is currently a contentious issue in Australia. Possible adverse health effects and negative effects on performance are postulated (Mathen, 1995; Williamson, 1995; Gregory, 1995). A cautious approach to the introduction of extended hours of work has been advocated by Wallace (1994) so that any negative effect attributed to long work hours may be minimised.

Clearly, there is little consensus amongst research findings on the effect of time of day on accident rates. To illustrate such variance, the

following table summarises published articles that have examined, amongst other things, the effect of the time of the day on accidents and accident rates. The table is not intended to be an exhaustive literature summation.

Table 1 Summary of findings of literature examining the effect of the time of the day and accidents.

Year	*Author(s)*	*Key findings*
1975	Andlauer	Negative effect of circadian rhythm.
1981	National Heart and Medical Research Council	Negative effect of circadian rhythm.
	Adams, Barlow and Hiddlestone	Day shift produced about 50% more injuries.
1984	Levin, Oler and Whiteside	Negative effect of circadian rhythm.
1986	Wagner	Negative effect of circadian rhythm.
1987	Pokorny	Day workers exhibited higher accident rates than night workers.
1988	Grandjean	Negative effect of circadian rhythm.
	Commonwea .. Clearing House	Negative effect of circadian rhythm.
	Novak and Smolenski	No consistent linkage between impaired performance and injuries.
1989	Monk and Wagner	Sunday night shifts had the highest accident rates.
1990	Akerstedt	Negative effect of circadian rhythm.
	Leigh et al	Day workers exhibited higher accident rates than night workers.
	Lauridsen and Tonnesen	Day workers exhibited higher accident rates than night workers.

1991	Hardman, Wise and Greenwood	No difference between day, afternoon or night shifts.
	Laundry and Lees	12 hour shifts didn't affect accident frequencies.
1992	Gold et al.	Negative affect of circadian rhythm.
	Waterhouse, Folkard and Minors	Shifts greater than 8 hours result in decreased performance and increased accidents.
1994	Duchon	Negative effect of circadian rhythm.
	Mastromatteo	For shifts greater than 8 hours the link between decreased performance and increased accidents has yet to be established.
	Wallace	Use caution when introducing extended hours of work to minimise any negative effects.

2.3 *Age and accidents*

Statistical evidence provided by Worksafe Australia (Araneda, M. 1994; Worksafe Australia, 1993) showed that occupational injuries to workers under 25 years of age were high in the trades, process and labouring occupations. In a study of all accidents at a large metal manufacturing plant, Webb, Redman and Sanson-Fisher (1992) found that young workers, aged less than 20 years, were more likely to have injuries than older workers. Similarly, Broberg (1984) in a study of Swedish census data, found that the youngest group (up to 24 years) had the highest accident frequency rates.

In a report on the grocery industry the Department of Occupational Health, Safety and Welfare of Western Australia (1989) asserted that the exuberance of young workers (including those in

supermarkets) was a factor believed to contribute to high injury rates in the group aged less than 25 years old.

In addition, Wooden (1990), who analysed data collected in the 1983 Australian Health Survey, found the probability of work accidents was high among younger workers and low among older workers.

Whilst most research suggest youth as a contributing factor in accidents, inconsistent relationships between age and accidents exist. Pratt, Marvel, Darrow, Stallones, May and Jenkins (1992) in a study of dairy farming accidents found that age specific injury rates were highest in the 31-40 and 50-60 age groups. Cellier, Eyrolle and Bertrand (1995) in a paper reporting the effects of age and the level of work experience on occurrence of accidents, found that the accident frequency and seriousness rates were significantly higher among the eldest and youngest workers. Gun and Ryan (1994), who conducted a case-control study of possible risk factors in the causation of occupational injury in South Australia, found that the risk of injury was unrelated to both the age and experience of the operator.

Although the majority of findings indicate that younger workers incur more accidents, contrary findings clearly exist. The interrelationship between accidents and age requires further research.

2.4 *Experience and accidents*

Research findings consistently suggest that worker inexperience is a contributory factor in accidents. Some time ago, Faverge (1975) identified lack of job experience as an accident risk factor. More recently Lin and Pearse (1990) examined factors that contributed to accidents

that involved Australian immigrants and showed that job experience was a causal factor. Webb, Redman and Sanson-Fisher (1992) found that workers with less than three years experience were significantly more likely to have injuries than other workers.

As recently as 1995, Cellier, Eyrolle and Bertrand (1995) affirmed that low work experience correlated with high accident frequencies. They went on to suggest a possible explanation, viz, work experience increases knowledge of risks. As a person acquires more work experience they become more aware of associated work related risk factors, thereby resulting in less accidents.

The Department of Occupational Health, Safety and Welfare of Western Australia (1989) noted that inexperienced workers were also likely to be younger workers. To overcome dual problems of worker inexperience and young workers, the Western Australian government in April 1995 launched a multimedia safety program targeted at reducing injury to both younger and inexperienced workers (Department of Occupational Health, Safety and Welfare of Western Australia & Workers' Compensation and Rehabilitation Commission, 1995). A similar print and television media campaign entitled " Don't let their first day be their worst day ", targeting young and inexperienced workers was launched nationally by Worksafe Australia in January 1996.

2.5 *Day of the week and month of the year and accidents*

Western Australian data that examined weekday of occurrence of occupational injuries in 1992/93 showed that the percentage of lost time injuries was highest on Monday (20%) decreasing to 15% on Friday,

with a marked reduction on Saturday (5%) and Sunday (3%) (White, 1994). Similarly, Webb, Redman and Sanson-Fisher (1992), after examining data from 1,740 injuries in an Australian metal manufacturing plant, found that injuries were more likely to occur on Monday. Interestingly, when the percentage of injuries by day of the week were calculated, similar results to the Western Australian data were obtained. Mondays represented 20.8% of total injuries, which gradually decreased to 18.4% for Fridays, 3.2% for Saturday and 1.2% for Sunday.

However, Adams, Barlow and Hiddlestone (1981) in an analysis of almost 10 000 injuries in the Australian metal industry over 5 years, found that, apart from the weekend, Monday produced the lowest number of injuries and injuries peaked on Wednesdays. However, Pratt, Marvel, Darrow, Stallones, May and Jenkins (1992) who examined the injury experience of 600 dairy workers over two years did not find any significant difference between any one day of the week and any other.

White (1994) also reported occupational injuries by the month of the year for Western Australia, which revealed that between 1992 and 1993 injuries tended to peak in March and trough in June. This differed from Webb, Redman and Sanson-Fisher's (1992) results where January had higher than average numbers of injury, and April and July had lower than expected numbers of injuries.

Pratt et al. (1992) also reported when accidents occurred during the year by reporting them as seasons associated with farming. The results showed that injuries were most common during the growing seasons, in particular the fall (September, October, November in the United States of America).

Further research to clarify accident experience patterns by day of the week and month of the year is warranted.

2.6 *Gender and accidents*

Analysis of information on the relationships between accidents and gender have also produced mixed results. In a comparative study of Western Australian public and private sectors, the Department of Occupational Health Safety and Welfare (1992) found that although male workers had a higher risk of injury than female workers (77 % higher), female workers made a disproportionately large contribution to the total number of working days lost (duration rates of 39 to 21 days respectively). Similarly, Australian Bureau of Statistics data from New South Wales industries showed the average duration of time lost from work was almost double for women compared with men in the metals and machinery manufacturing industries (cited in Worksafe, 1990). Furthermore, female labourers, trades and production workers had more than twice the incident rates of men (39 per 1000 workers compared to 17 per 1000 workers).

In a large study of Swedish census and occupational accident data, Broberg (1984) found that males had higher incident rates than females. Salminen, Saari, Saarela and Rasanen (1992), in a study of risk factors for women in serious occupational accidents utilising data from 16 studies, found that the risk of men experiencing a work related accident was approximately three times greater than that for women.

In contrast, Wooden (1990) in an multivariate statistical analysis of data from the 1983 Australian Health Survey produced by the

Australian Bureau of Statistics, found that females did not appear to suffer significantly fewer accidents.

Such findings raise questions of the role of gender in workplace accidents.

2.7 *Conclusion*

This review of the literature provides valuable insights that assist in the planning, execution and analysis of this research. The following findings are noteworthy :

(1) Day shift appears to results in higher numbers of accidents. This contradicts the expected negative effects (fatigue and reduced performance) of night shift and long working hours.

(2) Generally speaking young and inexperienced workers exhibit higher frequencies of accidents.

(3) The effects of the day of the week and the month of the year are unclear with little research to suggest what patterns may exist.

(4) The effect of gender on accidents is mixed, although most research suggests a tendency towards males having higher accident frequencies.

Chapter III CONCEPTUAL FRAMEWORK

3.1 *Development of a framework*

Contemporary health and safety enquiry into the prevention of occupational accidents has, amongst other things, focused on the study and management of the accident phenomenon (Viner, 1994).

Many accident models seek to eliminate accidents through a process of rigorous examination of all the circumstances and factors surrounding an accident. Examples of accident analysis models utilising this approach include Management Oversight Risk Tree (Johnson, 1975) and operability studies (Lawley, 1974). A key outcome of this technique has been the emergence of risk as an important element in accident phenomenon. Consequently, risk (and its measurement) has emerged as a contemporary conceptual construct to encompass accident phenomenon. Risk as a concept is not limited to health and safety applications. Risk is also applicable to such disciplines as loss control; property and asset management; insurance; public, professional and product liability; economics; politics; security; marketing (Management Advisory Board and its Management Improvement Advisory Council, 1995; Joy, 1994).

Risk is defined as the chance of something happening that will have an impact upon objectives (Australian and New Zealand Standard 4360:1995).

The process of determining the magnitude of risk factors is termed risk assessment. Ruckelshaus explains risk management as :

> " Scientists assess a risk to find out what the problems are. The process of deciding what to do about the problems is risk

management " (Ruckelshaus cited in Cothern, Mehlman & Marcus, 1988, p.2).

Risk management is a tool which supports decision making.

The Australian and New Zealand standard on risk management (Australian and New Zealand Standard 4360:1995) discusses risk management as an iterative process consisting of defined steps which, taken in sequence, support better decision making by contributing to greater insight into risks and their impact.

Interestingly, Burlando (1994) draws a parallel between risk management and the emerging science of chaos theory. In particular he notes that :

> " Risk managers must awaken themselves to the inescapable link between small, seemingly innocuous events and large catastrophic results " (p.57).

These seemingly innocuous events evident in accidents are commonly known as risk factors (Garrick & Gekler, 1991; Viner, 1987; Clewell, 1992). Examples of risk factors include training, knowledge, environment, hazards and time of the day (Ridley, 1990), and an individual's personal factors, their supervision / management, their work practices methods and procedures, the machinery or equipment in use and the physical environment (Viner, 1994).

The concepts of risk, risk assessment and risk management readily adapt to this study to provide a conceptual framework for identifying risk factors contributing to accidents.

Importantly, Comcare Australia records a number of risk factors. Namely :

- Time of day of the accident.
- Day of the week of the accident.

- Month of year of the accident.
- Age of the injured person in the accident.
- Gender of the injured person/s in the accident.
- Length of work experience of the injured person at the time of the accident.

An important acknowledgment to be made in the context of risk as a conceptual framework in this study is the inability to establish a known population at risk of having an accident. This problem arises because of an inability to establish the number of Commonwealth employees between 1 July 1993 and 2 December 1995 and the hours worked by those employees. This in turn prohibits the calculation of total person hours at risk of having an accident thereby limiting any comparisons between populations at risk.

In addition, Comcare separates the consequence (i.e. outcome) of accidents into four categories that broadly describe a range of injury severity. They are death, serious personal injury, incapacity from work of greater than or equal to five working days and dangerous occurrences. These categories will be defined further later in this thesis.

3.2 *Formulation of objectives and questions*

Greater utilisation of the information concerning risk factors found in Commonwealth accident records is needed. The under utilisation of the Commonwealth's accident experience in Western Australia represents a gap in the overall risk management of the Western Australian accident experience. Consequently, the objective of the

research is to begin to analyse the current occupational health and safety experience of Commonwealth employees in Western Australia.

As noted in section 1.4 four important questions arise from this objective. They are :

(1) What are the patterns of accident frequency and severity with respect to time of the day, day of the week and month of the year ?

(2) Is there an association between the frequency of accidents and the age of the injured person ?

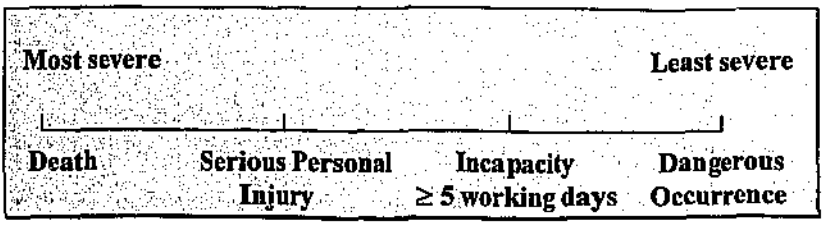
(3) Is there an association between the frequency of accidents and the job experience of the injured person ?

(4) Is there an association between the frequency of accidents and the gender of the injured person ?

3.3 *Definition of research variables*

The accident reports submitted to Comcare Australia constitute the research data of this study. Accident severity is categorised into four variables that describe a range of injury severity. They are death, serious personal injury, incapacity of 5 or more working days and dangerous occurrences. This range is represented below :

Figure A : Range of injury severity.



Death is defined as the loss of life of any person that has arisen out of the undertaking of the employer. That is, the accident was in some way related or connected to work (Occupational Health and Safety (Commonwealth Employment) Regulations, 1991).

A serious personal injury is defined as : an injury to, or disease in, a person that is caused in the course of work, and for which the person is given,

(i) emergency treatment by a registered medical practitioner,
(ii) treated in hospital as a casualty without being admitted, or
(iii) admitted to hospital.

(Occupational Health and Safety (Commonwealth Employment) Regulations, 1991).

An incapacity of five (5) or more working days is defined as :

an accident that causes an employee who performs work in connection with the undertaking to be incapacitated from performing work for a period of 5 or more successive working days.

(Occupational Health and Safety (Commonwealth Employment) Regulations, 1991).

A dangerous occurrence is defined as :

an occurrence that resulted from operations that arose from the undertaking conducted by an employer; and could have caused
(i) the death of, or serious personal injury to, any person; or
(ii) the incapacity of an employee for a duration of 5 or more successive working days or shifts;

but as a result of which death, serious personal injury or incapacity of 5 or more working days did not occur.

A dangerous occurrence is often referred to as a "near miss" or "near thing", where something dangerous happened but didn't result in a death, serious personal injury or incapacity. Examples of dangerous occurrences include :

(a) damage to, or malfunction of, conveyors, cranes, escalators, hoists, lifts, scaffolding, winding machinery, and as a result of the malfunction or damage the workplace was inoperative for 24 hours or longer.

(b) uncontrolled explosions, fires, release of dangerous substances (either gaseous, liquid or solid form) and as a result, the workplace was inoperative for 24 hours or longer.

(c) electrical short circuits and as a result the workplace was inoperative for 24 hours or longer.

(d) collapse or partial collapse of an excavation greater than 1.5 metres deep, or partial failure of shoring of that kind.

(e) a malfunction of self contained breathing apparatus which resulted in the person being deprived of oxygen or exposed to an atmospheric contaminant to a health threatening degree.

(Occupational Health and Safety (Commonwealth Employment) Regulations, 1991)

The variables for this study are :

(a) time of the day;

(b) day of the week;

(c) month or the year;

(d) age;

(e) gender;

(f) length of work experience;

(g) nature of injury;

(h) bodily location;

(i) breakdown agency;

(j) mechanism; and

(k) agency of injury.

The variable "time of the day" is defined as the actual time of the accident recorded on the accident report submitted to Comcare Australia. For analytical purposes the variable "time of the day" is categorised as the time of the accident adjusted to the next whole hour.

For example, if an accident occurred at 0937 hours, it is categorised as 1000 hours. The process of reaching this categorisation is :

Conversion to whole hours : 0937 hours falls between 0901 and 1000 hours. 1000 hours is used for all cases occurring from 0901 to 1000.

The variables "day of the week" and "month of the year" are defined as the day and month of the accident as recorded on accident reports submitted to Comcare Australia.

The variable "age" is defined as the number of years and months since the birth date of the injured person at the date of the accident. Age has been calculated from the date of birth supplied to Comcare Australia on the accident report. The number of years and months reflected in the age category, have been calculated into decimal equivalents. For

example, for a person aged 21 years and 6 months at the date of the accident, age would be defined as 21.5 years.

The variable "gender" is defined as a class of sexes, either male or female.

The variable "amount of work experience" is defined as the number of years and months work experience in the primary task at hand at the time of the accident. Work experience is also calculated into decimal equivalents.

The following definitions are consistent with the national classification of injuries and diseases established by Worksafe Australia :

The variable "nature of injury" is defined as the most serious injury or disease sustained or suffered by the worker.

The variable "bodily location" is defined as the part of the body affected by the most serious injury or disease.

The variable "breakdown agency" is defined as the object, substance or circumstance involved in the first event leading to the most serious injury or disease.

The variable "mechanism" is defined as the action, exposure or event which was the direct cause of the most serious injury or disease.

The variable "agency of injury" is defined as the object, substance or circumstance directly involved in inflicting the injury or disease.

(Worksafe Australia, 1990).

3.4 ***Definition of relevant terms***

The following terms are used throughout the study.

Accident - An accident is defined as any unplanned event that causes a negative outcome.

Comcare Australia - Comcare Australia means the body corporate established by section 68 of the Commonwealth Employees' Rehabilitation and Compensation Act 1988. Comcare's health and safety objectives are :

(a) to secure the health, safety and welfare at work of employees of the Commonwealth and of Commonwealth authorities; and

(b) to protect persons at or near workplaces from risks to health and safety arising out of the activities of such employees at work; and

(c) to ensure that expert advice is available on occupational health and safety matters affecting employers, employees and contractors; and

(d) to promote an occupational environment for such employees at work that is adapted to their needs relating to health and safety; and

(e) to foster a co-operative consultative relationship between employers and employees on the health, safety and welfare of such employees at work.

Commonwealth sector - The Commonwealth sector is defined as all Commonwealth employers, employees, their associations and unions, and contractors employed by the Commonwealth.

Disease - all employment injuries which result from repeated or long term exposure to an agent(s) or event(s) and employment injuries which

are a result of a single traumatic event where there was a long term latency period following a single exposure to the infection.

Government Business Enterprise - A government business enterprise means a body corporate established for a public purpose, by or under a law of the Commonwealth or a law of a Territory (other than the Australian Capital Territory, the Northern Territory or Norfolk Island), that is specified in the schedule contained in the Occupational Health and Safety (Commonwealth Employment) Act 1991; or a body corporate :

(i) that is incorporated under a law of the Commonwealth or a state or Territory; and

(ii) in which the Commonwealth, or a body Corporate referred to above, has a controlling interest; and

(iii) that is not a body corporate that the Minister, by notice published in the *Gazette,* has declared not to be a Commonwealth authority; or a body corporate

  (i) that is incorporated under a law of the Commonwealth or a State or Territory; and

  (ii) in which the Commonwealth has a substantial interest; and

  (iii) that is a body corporate that the Minister by notice published in the *Gazette,* has declared to be a Commonwealth authority.

Government business enterprises (GBE's) are enterprises that, typically, have been established from commercialised and / or privatised government services. GBE's are important to this study as they are subject to the requirements of the Occupational Health and Safety (Commonwealth Employment) Act 1991. GBE accident experience is included in the data.

Injury - all employment injuries which are a result of a single traumatic event occurring while a person is on duty or during a recess period and where there was a short or non-existent latency period. This includes injuries which are a result of a single exposure to an agent(s) causing an acute toxic effect.

National Data Set (NDS) - The national data set (NDS) is a standard set of data items, concepts and definitions for use in workers' compensation collections. NDS for compensation based statistics were approved by the National Occupational Health and Safety Commission in 1987 (Worksafe, 1994).

Risk factors - Risk factors are those circumstances that surround the situation which contributed to the probability of an accident.

3.5 *Identification of assumptions*

As the study utilises accident reports submitted to Comcare Australia three important assumptions about the data derived from the reports need to be noted. They are :

(1) The accidents reported have arisen out of the undertaking of the employer. That is, they are connected with work. For example, if an accident occurs during a lunch break, whilst an employee is shopping or eating, then the accident is not reportable. However, if an accident occurs whilst an employee is delivering mail on behalf of the company during lunch time, then the accident would be reported. The key factor is whether the activity was connected or associated with work when the accident occurred.

(2) The literature widely recognises that the number of accidents reported will be subject to under reporting bias. That is, that there is a strong potential for employers not to report their accident experience.

(3) As significant differences exist between Commonwealth work practices and conditions and other employment sectors caution must be exercised when extrapolating the results of this study.

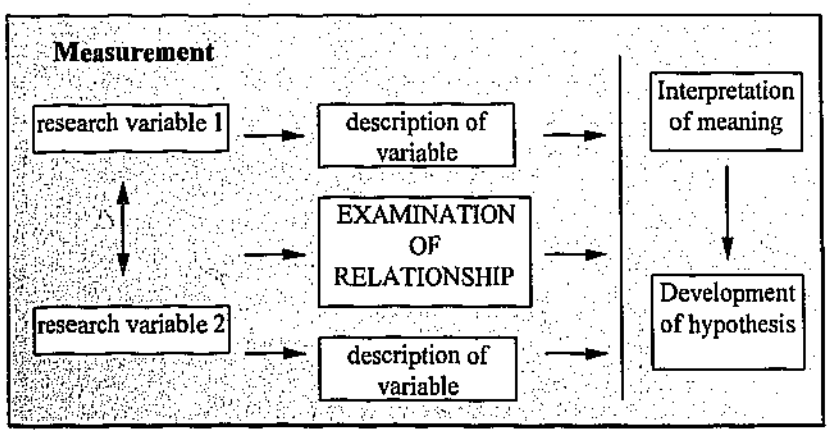
Chapter IV METHODS AND PROCEDURES

4.1 *Identification of the research design*

As this study seeks to examine associations between variables, descriptive correlational design was selected as the research design. Burns and Grove (1993), Rowntree (1985) and Spector (1993) note that correlation concerns the strength of the relationship between the values of two variables.

In addition, Burns and Grove (1993) remark that the use of descriptive correlational designs facilitates the identification of interrelationships in a situation where there is no attempt to manipulate or control the situation, and may also be used to assist with the development of hypotheses. Burns and Grove (1993) portrait descriptive correlational studies as shown below :

Figure B : Descriptive correlational design



4.2 *Description of the sample*

The sample for this study has been taken from Comcare Australia's accident records gathered between the 1st of July 1993 and the 2nd of December 1995. This period records 2 years, 5 months and 2 days accident experience since the commencement of the Occupational Health and Safety (Commonwealth Employment) accident reporting regulations. One thousand six hundred and sixty three (1663) accident reports were submitted to Comcare Australia in Western Australia by Commonwealth departments, statutory authorities and government business enterprises that were represented in Western Australia during this period. A list of the Commonwealth agencies represented in Western Australia during this time can be found in Appendix 1.

Categories of data contained in the sample are : a range of injury severity (four sub categories : death, serious personal injury, incapacity of greater than 5 working days, dangerous occurrences); time of the day; day of week; month; year; age; gender; and work experience.

In addition, five additional categories of accident related information were made available by Comcare Australia. They were the nature of injury, bodily location, breakdown agency, agency of injury and mechanism of injury. This additional information was available for each of the 1663 accident reports that constitute the sample size.

It must be noted however, that the sample is not homogeneous. In some cases, persons completing the original accident reports did not complete all questions asked. Consequently, incomplete information exists and some data is missing. Where missing categorical data exists within a record, it is not included in the sample size for that category of information. However, missing data does not alter the total sample of

1663 accident reports submitted to Comcare between 1 July 1993 and 2 December 1995. The outcome of missing data is that, in some cases, sample size for certain categorical analysis is reduced.

Requirements of the Occupational Health and Safety (Commonwealth Employment) regulations also directly affect the sample. In particular, for less severe accidents (the class of accidents defined as dangerous occurrences) personal identifying details of those involved with the dangerous occurrence are not reported. This includes age, gender, date of birth and the number of years of work experience. This information is therefore missing from the data thereby reducing the sample size in some areas of analysis. However, the remaining variables associated with the dangerous occurrence are recorded. This includes time of day, day of the week, month, year.

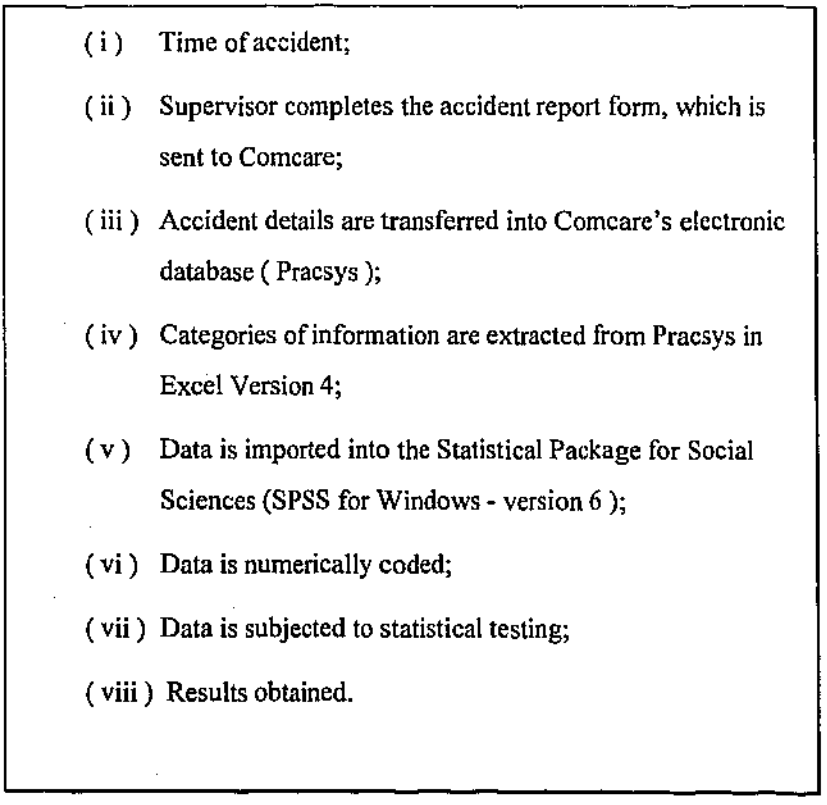
Importantly, the sample for this study is composed of two data types. They are nominal and numeric data. Nominal data (Latin *nominalis* = of a name) denotes data that has a name for the different forms it may take. For example, gender - Male or Female, ethnicity - Caucasian or Negro (Rowntree, 1985). Dawson-Saunders and Trapp (1994) explains numeric data as data for "which the differences between numbers have meaning on a numeric scale"(p. 22) and cite age as an example of a continuous numeric scale.

Some time ago Adams et al. (1981) reported an important advantage of utilising data from original accident reports as categorisation at the primary input level. That is, categorisation occurs whilst the affected person completes the accident report. By doing so, misinterpretation, ambiguity and consequent reduction of validity are minimised.

4.3 *Description of data collection process*

The data collection process for this study followed a number of steps that commenced from the time of an accident. These steps are illustrated below :

Figure C : Data collection and analysis process.



The steps were as follows :

(1) The time of accident and completion of the accident report by the supervisor -

The injured or affected person discusses the accident with his or her supervisor. The supervisor completes an accident report (Appendix 2) and forwards it to Comcare Australia.

(2) Data transfer into Pracsys -

Accident report is received by Comcare Australia. Hand written information contained on the report is keyed into Comcare's electronic recording system (Prevention and Compensation System [PRACSYS]) by Comcare personnel.

(3) Categories of information extracted from PRACSYS -

Categorical data for the period 01.7.93 to 02.12.95 was extracted from PRACSYS. An Excel version 4 spreadsheet which details categorical data as described in the sample is generated.

(4) Transfer of data to the Statistical Package for Social Sciences.

Data from PRACSYS is transferred into the computer package Statistical Package for Social Sciences (SPSS for Windows - version 6). Coding of data using SPSS facilities is completed to enable statistical manipulation.

The following coding procedures were executed on original data obtained from Comcare :

4.3.1 Accident severity - The accident types were coded, using the SPSS labelling function, as :

severity category 1 = death;
severity category 2 = serious personal injury;

severity category 3 = incapacity > 5 days; and

severity category 4 = dangerous occurrence.

4.3.2 The category "Time of the day" of accidents were coded as :

1 = accident occurred between 00:00-00:59hours;

2 = accident occurred between 01:00-01:59 hours;

etcetera, for each hour of the day.

Full coding details are shown in Appendix 3.

4.3.3 The day of the week of the accident was similarly coded. That is,

1 = Sunday;

2 = Monday, etcetera.

Full coding details are shown in Appendix 3.

4.3.4 The month of the year of accidents were coded as :

1 = January;

2 = February, etcetera.

Full coding details are shown in Appendix 3.

4.3.5 The age of the affected person at the time of the accident was coded into age groups of five years as :

1 = from 18 to 24 years;

2 = from 25 to 29 years , etcetera.

Full coding details are shown in Appendix 3.

4.3.6 The number of years work experience at the time of the accident were coded as :

1 = < 1 years work experience;

2 = greater than 1 but less than 2 years work experience;

3 = greater than 2 but less than 5 years work experience;

4 = greater than 5 but less than 10 years work experience;

5 = greater than 10 but less than 20 years work experience; and

6 = greater than 20 years work experience.

4.3.7 The nature of injury (NOI) was coded utilising national workers compensation based data criteria established by Worksafe Australia. Examples of this coding are shown below. A full description of the coding undertaken is shown in Appendix 3.

1 = injury and poisoning;

2 = diseases of the nervous system and sense organs, etcetera.

4.3.8 The bodily location of the injury was coded as :

1 = head;

2 = neck, etcetera.

4.3.9 The mechanism of injury was coded as :

1 = falls, trips and slips of a person;

2 = hitting object with a part of the body, etcetera.

4.3.10 The agency of injury was coded as :

1 = machinery and (mainly) fixed plant;

2 = mobile plant and transport, etcetera.

4.3.11 The breakdown agency was coded as :

1 = machinery and (mainly) fixed plant;

2 = mobile plant and transport, etcetera.

4.4 *Description of the statistical testing procedure*

The data for the study was tested using statistical techniques available in SPSS for Windows computer package. Simple frequency counts of all variables were completed. This information has been presented in graphical and tabular form and is shown in the results.

To assist with identification of the strength of association between variables Chi-square tests of independence were calculated for a number of variables. Chi-square is a statistical test designed to test for differences in frequencies of observed data and frequencies that could be expected to occur if the data categories were independent of each other (Burns & Grove, 1993).

Chi-square statistic is calculated using the following formula :

$$\chi^2 = \Sigma \frac{(O - E)^2}{E}$$

where :

O = observed frequency

E = expected frequency

The degrees of freedom must be calculated to determine the significance of the value of the statistic. Degrees of freedom is the sample size minus one, represented as :

$$df = N - 1$$

Chi-squared statistics have been calculated for the associations between accident frequency and month of the year, age and gender.

The procedures for establishing appropriate information to determine the above mentioned Chi square statistics are described below in sections 4.4.1, 4.4.2 and 4.4.3 :

4.4.1 Chi-squared for month of the year.

A frequency count of the number of accidents per month from 1.7.93 to 2.12.95 was calculated through SPSS. Like months over the two and one half year period were grouped and the accident frequency totalled. This figure was then averaged using the number of like months over the period as the denominator generating an average observed accident frequency per month. An illustration of this process is shown below :

Month	*Observed accident frequency*
July 93	12
July 94	48
July 95	47
Total	107

$$\frac{\text{Total observed accident frequency}}{\text{Number of July's from 1.7.93-2.12.95}} = \frac{107}{3} = 35.7$$

The average observed accident frequency for July is 35.7. This process was repeated for the remaining calendar months.

The number of possible working days in each month were determined by subtracting public holidays (Appendix 4) from the total number of working days.

Expected accident frequencies for each month from July 1993 to December 1995 were then calculated using the following formula :

$$\text{Expected value} = \frac{\text{number of working days in the month during the period x sample}}{\text{total number of working days in a year}}$$

The expected accident frequencies by month statistics were then averaged by the like months over the data collection period. This established an averaged expected accident frequency.

For the purpose of Chi squared analysis it was assumed that all other factors being equal an accident was equally likely to occur in any calendar month of the year.

4.4.2 Chi-squared for age.

The number of accidents experienced by workers within various age groups was readily obtained using SPSS facilities. However, it was difficult to establish a reliable value for the expected number of accidents by age in the Commonwealth.

The closest published data that may be utilised for this purpose is "Age group by location and gender" from the Department of Finance (DoF) (1994). The data is reliable as it is derived from payroll records held and maintained by the Department of Finance and summarises the size and composition of those persons employed under the Public Service Act. However, it must be noted that this data does not include all Commonwealth employers (e.g Government Business Enterprises such as Telstra and members of the Australian Defence Force are not included). A consequence is that DoF data will not account for the

employment of young Australians as recruits to the Defence Forces.

Notwithstanding, this data may be used to extrapolate ratios of ages within the Commonwealth public sector in Western Australia. The Department of Finance reported the following distribution of Commonwealth employees in Western Australia in 1994 :

Under 20	0.9%
20-24	7.3%
25-29	13.1%
30-34	16.0%
35-39	17.8%
40-44	17.25%
45-49	14.6%
50-54	7.8%
55-59	3.8%
60&over	1.2%

If this data is multiplied by the known sample size where age information was reported on the accident report (1156) an expected value is generated as shown below.

Under 20	0.9% x 1156	= 104.4
20-24	7.3% x 1156	= 84.4
25-29	13.1% x 1156	= 151.4
30-34	16.0% x 1156	= 184.9
35-39	17.8% x 1156	= 205.8
40-44	17.25%x 1156	= 199.41
45-49	14.6% x 1156	= 168.8
50-54	7.8% x 1156	= 90.2
55-59	3.8% x 1156	= 43.9
60&over	1.2% x 1156	= 13.9

Consequently with a known observed accident frequency and an extrapolated expected frequency Chi squared can be calculated. It was

assumed that all other things being equal age would have no bearing on accidents.

4.4.3 Chi-squared and gender

The number of observed accidents between 1.7.93 and 2.12.95 for men and women were calculated using SPSS count facilities. An expected accident value for each gender was calculated by establishing the gender proportions (see below) between 1.7.93 and 2.12.95. It was assumed that if equal accident circumstances were presented to both genders then the frequency of accidents would be distributed according to the proportion of males and females in the workforce.

Australian Bureau of Statistics seasonally adjusted civilian labour force statistics for males and females in Western Australia (ABS, 1993-1995) were accessed to determine a percentage gender split for each month from 1.7.93 to 31.12.95 (see Appendix 5). An average gender mix percentage for the Western Australian workforce was calculated for this period, that is males represented 58.11% and females 41.88% of the civilian labour force.

This information was compared to gender mix in the national workforce at the commencement of 1993 where males represented 57.95% and females 42.05% (ABS, 1993- 1995). These results show consistency between the gender split of the Western Australian and national workforce.

Expected values for gender related Chi-squared analysis were calculated from the known sample of 1296 accident reports containing gender information using an estimate of 58 % males and 42 % females.

A number of Chi-squared tests were not completed. This was due to the lack of reliable information on which to base expected values of categories of data for the Commonwealth sector in Western Australia. Without reliable expected values the Chi-squared can not be done. The following Chi-squared tests have not been completed :

Accident frequency by day of the week;

Accident severity by any variable;

Work experience by any variable.

An explanation of reasons for exclusion are given below in sub-sections 4.4.4, 4.4.5 and 4.4.6.

4.4.4 Chi square for day of the week.

Although the number of accidents for each weekday was available through the SPSS simple frequency count establishing an "observed frequency" for Chi -squared test, it was not possible generate reliable data to determine an "expected frequency" for a number of reasons.

These included :

a) the number of shift workers who worked weekends was not known;

b) the number of shift workers not working during the week was not known;

c) the number of employees using weekdays as accrued days off was not known;

4.4.5 Chi-squared for accident severity.

An expected number of deaths, serious personal injuries, incapacities of greater than 5 days or dangerous occurrences could not be calculated. The available data is very recent and no established accident experience patterns are available prohibiting the calculation of expected values for these categories. However, over time, trend information concerning the proportions of the classes of accident severity should become available which may assist in generating expected values for Chi squared analysis.

One of the most widely applied accident severity ratios [1 : 10 : 30 : 600] established by Bird in 1969 (cited in Ridley, 1990) and depicted in triangular form (see below) is not readily transferable to the Commonwealth sector. Bird's accident severity classifications are not readily transposed to the categories death, serious personal injury, incapacity of greater than 5 working days, or dangerous occurrence.

Figure D : Bird's accident ratio's

Moreover, accident severity percentages for Commonwealth employees in Western Australia (as recorded on the 1663 accident reports and as calculated using SPSS facilities) do not align to Bird's ratios noted above. These results are shown in table two.

Table Two : Accident severity percentages for Commonwealth employees from 1 July 1993 to 2 December 1995.

Incident type	*Frequency*	*Percentage*
Death	**8**	**0.5%**
Serious Personal Injury	**466**	**28%**
Incapacity > 5 days	**823**	**49.5%**
Dangerous Occurrence	**366**	**22%**

n = 1663

Notwithstanding, analysis of severity ratios may be examined in the future to establish whether any trends are emerging.

4.4.6 Chi-squared for work experience.

It was also not possible to confidently establish the number of workers with differing levels of work experience within the Commonwealth. Consequently, Chi-squared can not be calculated.

4.4.7 Frequency counts for standard accident classification criteria.

Accident frequency counts for standardised accident classification criteria as established by Worksafe Australia (1990) are shown later in this thesis. These graphs depict accident frequency and bodily location, nature, mechanism, agency and breakdown agencies of injury.

4.4.8 Accident frequencies for Western Australian government employees.

Comparative accident frequency data for Western Australian government employees was sought and provided by WorkSafe WA (Appendix 8). This information enabled simple comparative analysis by data categories to be undertaken.

4.5 ***Presentation of ethical considerations***

Approval to conduct this research was obtained from Comcare Australia and the researcher has entered into an undertaking covering ethical issues in the conduct of research with Comcare Australia (see Appendix 6). In addition, the researcher has entered into a standard agreement concerning intellectual property with Comcare Australia. The form of this agreement is shown in Appendix 7.

Importantly, the data collected from Comcare's national database does not contain any information that could be used to identify a person or particular organisation.

The proposal to conduct this research was also reviewed and approved by Edith Cowan University Committee for the Conduct of Ethical Research.

Data will be stored, locked away and secured for a minimum period of five years. At the completion of the storage period the data will be destroyed.

Chapter V RESULTS

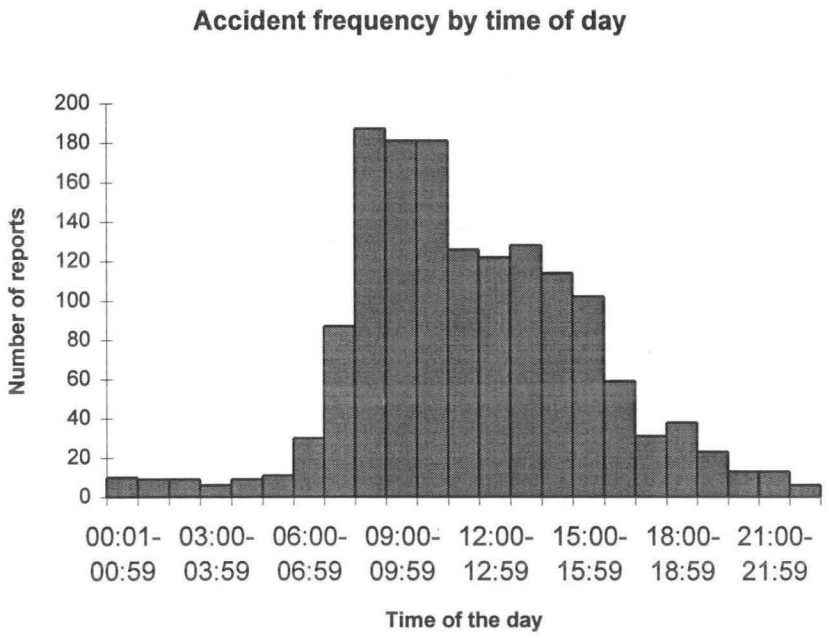
5.1 *Presentation of results*

To facilitate clear and easily understood results, the research questions are repeated and subsequent results presented directly thereafter. The results of all frequency and severity counts obtained are represented as tables and graphs. Results obtained from various Chi squared tests relevant to the research question are also reported.

Research question number 1 *What are the patterns of accident frequency and severity with respect to time of the day, day of the week and month of the year ?*

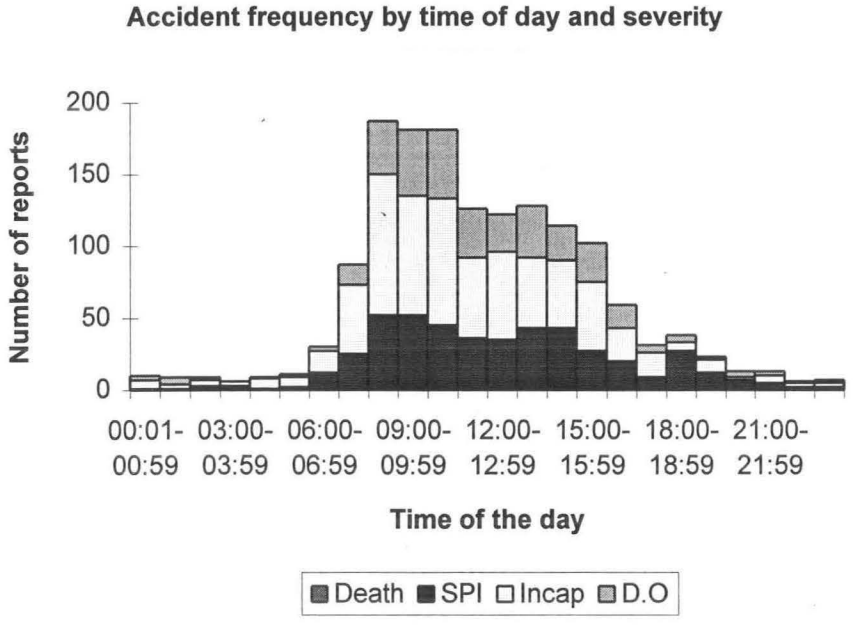
The results of analysis of accident frequency and severity are illustrated in graphical form in Figures 1 through to 6.

Figure 1 Accident frequency by time of day.



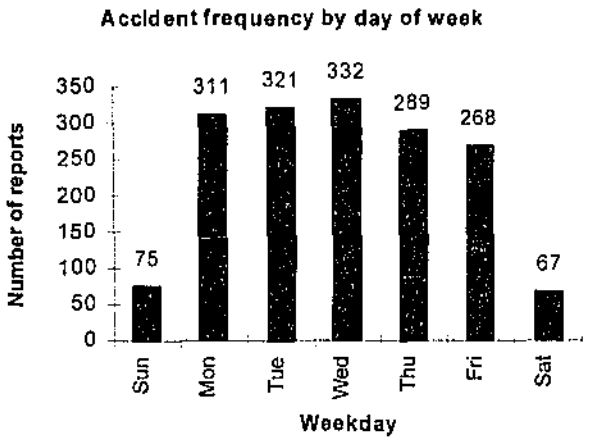
n = 1502

Figure 2 Accident frequency by time of the day and severity.



n = 1502

Figure 3 Accident frequency by day of week.



n = 1663

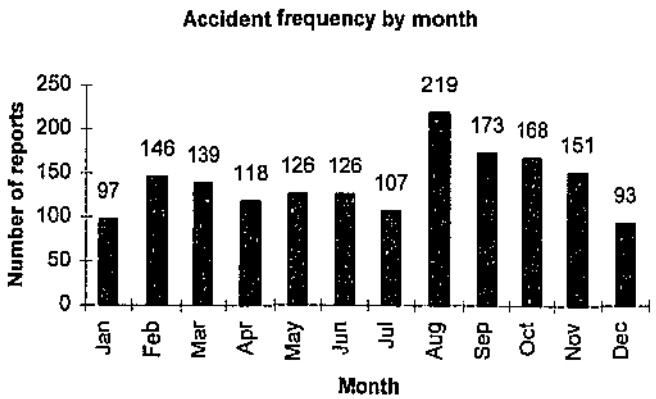
Note : Chi squared test was not conducted due to an inability to determine an expected number of accidents for each week day as the data concerning annual leave, rostered days off, days taken under flexible working conditions awards (flexi-days) and shift rosters for Commonwealth employees was not available.

Table 3 Accident frequency by day of week and severity.

	Death	Serious Personal Injury	Incapacity of > 5 days	Dangerous Occurrence
Sunday	1	23	36	15
Monday	0	69	165	77
Tuesday	0	95	159	67
Wednesday	1	105	165	61
Thursday	2	77	134	76
Friday	2	77	131	58
Saturday	2	20	33	12

n = 1663

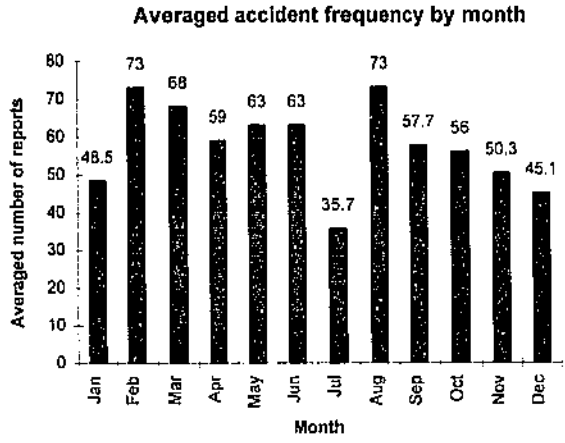
Figure 4 Accident frequency by month.



n = 1663

The data collection period covers 2 years, 5 months and 2 days (1.7.93 to 2.12.95). Figure 5 overleaf illustrates the average accident frequency by month.

Figure 5 Averaged accident frequency by month



n = 1663

Table 4 Accident frequency by month and severity.

	Death	Serious Personal Injury	Incapacity of > 5 days	Dangerous Occurrence
January	1	19	62	15
February	0	42	73	31
March	1	35	72	31
April	2	39	51	26
May	0	30	64	32
June	0	36	60	30
July	0	25	52	30
August	2	82	88	47
September	0	51	89	33
October	2	47	86	33
November	0	36	75	40
December	0	24	51	18

n = 1663

The averaged accident frequency by month and severity is shown in Table 5.

Table 5 Averaged accident frequency by month and severity

	Death	Serious Personal Injury	Incapacity of > 5 days	Dangerous Occurrence
January	0.5	9.5	31	7.5
February	0	21	36.5	15.5
March	0.5	17.5	36	15.5
April	1	19.5	25.5	13
May	0	15	32	16
June	0	18	30	15
July	0	8.3	16.6	10
August	1.5	27.3	29.3	15.6
September	0	17	29.6	11
October	1	15.6	28.6	11
November	0	12	25	13.3
December	0	8	17	6

n = 1663

Chi squared test for accident frequency by month of the year

Table 6 : Chi-squared results for accident frequency by month of the year (One way Chi squared with 12 categories).

Month	Observed accidents		Expected accidents		Calculation
	Accident frequency	Average no. per month	Expected frequency	Average no. per month	Chi Squared
Jan	97	48.5	136.23	68.1	5.64
Feb	146	73	131.53	70.5	0.09
Mar	136	68	140.93	70.5	0.09
Apr	118	59	126.83	63.42	0.30
May	126	63	145.63	72.8	1.32
Jun	126	63	136.23	68.1	0.38
Jul	107	35.7	145.63	48.5	3.37
Aug	219	73	145.63	48.5	12.38
Sep	173	57.7	140.93	46.9	2.49
Oct	168	56	140.93	46.9	1.76
Nov	151	50.3	140.93	46.9	0.25
Dec	93	45.1	131.53	43.8	0.04

Chi squared = 28.11

d.f = 11 At P = 95 Critical value = 19.68

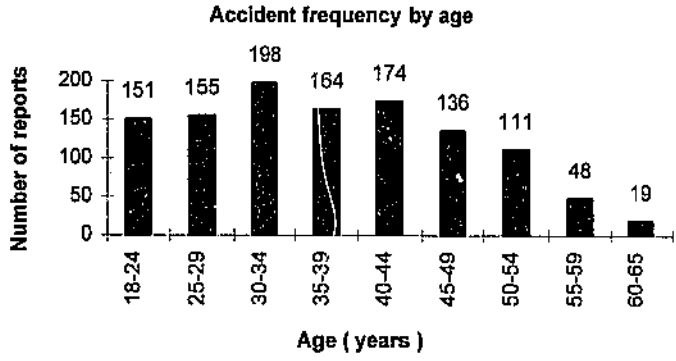
Chi squared is calculated on the basis of averaged observed and averaged expected values.

Chi-squared test shows that the proportion of accidents are not equally distributed according to months. It is noteworthy that August does show a high average accident frequency.

Research question number 2 *Is there any association between the frequency of accidents and the age of the person ?*

Figure 6 shows the pattern of accidents in relation to injured employee age.

Figure 6 Accident frequency by age.



n = 1156

Results of the Chi-squared test of accident frequency and age

Using Department of Finance (1994) information an estimate of age distribution in the Commonwealth sector in Western Australia between 1.7.93 and 2.12.95 was obtained. Chi square results were as follows in table 7 :

Table 7 : One way Chi-squared results for age related accidents with 9 age categories.

Age	Observed	Expected	Calculation
18 - 24	151	84.4	52.5
25 - 29	155	151.4	0.08
30 - 34	198	184.9	0.93
35 - 39	164	205.8	8.49
40 - 44	174	199.41	3.24
45 - 49	136	168.8	6.37
50 - 54	111	90.2	4.79
55 - 59	48	43.9	0.38
60 & over	19	13.9	1.87

Chi squared =78.65

d.f = 8 At P = 99 Critical value = 20.09

The Chi squared result is significant indicating that the proportion of accidents are not equally distributed according to age.

Mean, mode and median age of persons incurring accidents were also calculated as shown below :

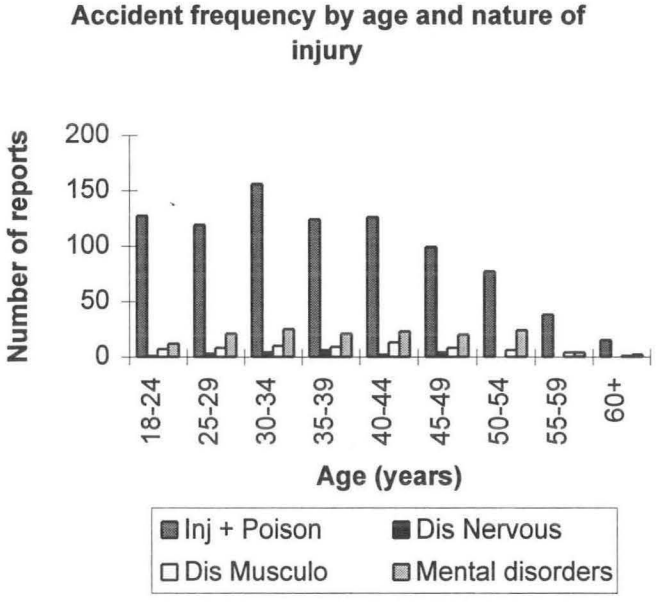
Table 8 : Mean, Mode and Median accident age

Mean	**37.8 years**
Mode	**31.5 years**
Median	**37.0 years**

n = 1156

Figure 7 illustrates accident frequency categorised by age and the nature of the four most frequently occurring types of injuries.

Figure 7 Accident frequency by age and nature of injury.

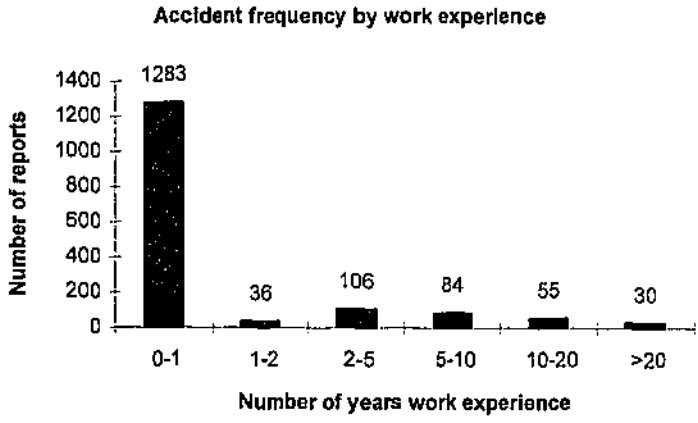


n = 1119

Research question number 3 *Is there an association between the frequency of accidents and the job experience of the injured person ?*

Figure 8 illustrates the accident frequency analysis by work experience.

Figure 8 Accident frequency by work experience.



n = 1594

Note : Chi squared test was not conducted due to an inability to determine an expected number of accidents for those Commonwealth employees with 0 to 1 years work experience, 1 to 2 years work experience and so on. This problem prohibited the generation of denominator data to enable Chi squared tests to be completed.

Table 9 illustrates the accident frequency categorised by work experience and the four most frequently occurring types of injuries.

Table 9 Accident frequency by work experience and nature of injury.

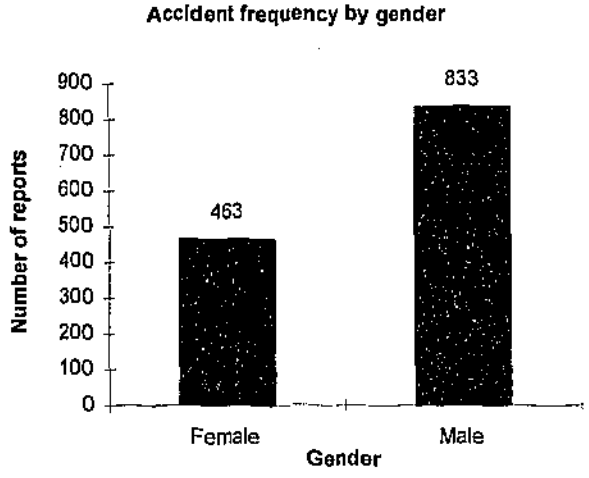
		Injury & Poison	Dis Nervous	Dis Musculo	Mental disorders
Work Experience (yrs)	0< 1	683	17	50	133
	1< 2	25	0	3	7
	2< 5	80	1	8	14
	5< 10	69	2	3	7
	10< 20	47	0	5	2
	> 20	26	0	2	1

n = 1185

Research question 4 *Is there an association between the frequency of accidents and the gender of the injured person ?*

Figure 9 illustrates the frequency of accidents by gender.

Figure 9 Accident frequency by gender.



n = 1296

About two thirds of accidents (64.3%) involved males and one third (35.7%) involved females. Statistical information published by the Australian Bureau of Statistics (ABS) indicates an Australian wide workforce gender mix of 57.95 % male and 42.05 % female (ABS, 1993 - 1995).

The adoption of the gender mix reported by the Australian Bureaus of Statistics was regarded as the best estimate available to complete a Chi-squared test. The reasons for this were Australian

Bureau of Statistics data was inclusive of Government Business Enterprise and Australia Defence Force employees, and, was drawn from the whole Australian community. The results of the Chi squared analysis are shown in Table 10 :

Table 10 : One way Chi-squared results for male vs female.

Gender	Observed number in the sample	Expected (based on applying the proportion of males and females in the population)	Calculation
Male	833	751.03	8.94
Female	463	544.96	12.33

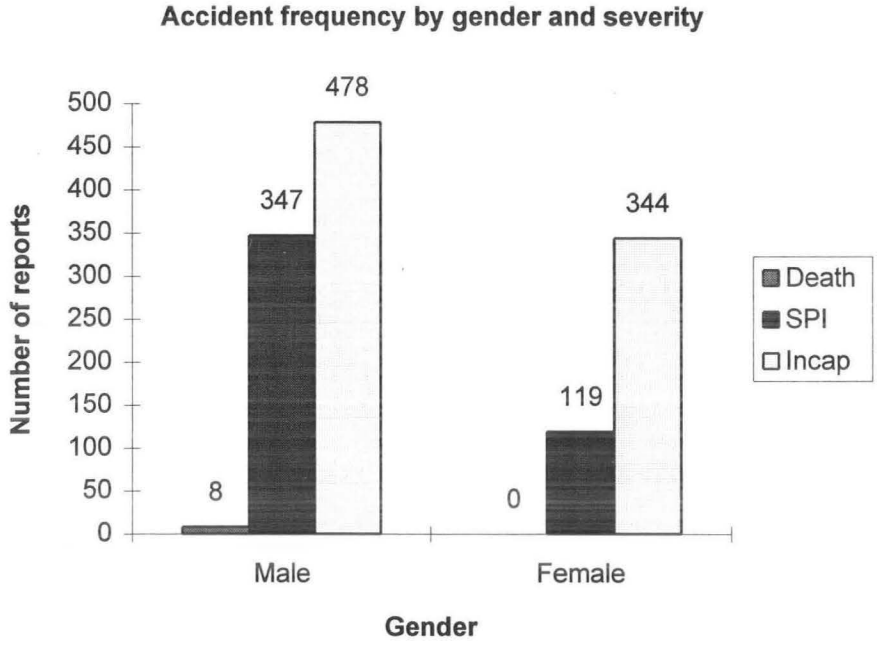
Chi squared = 21.27

d.f = 1 At P=99 Critical value = 6.63

The Chi-squared results show that accidents are not distributed equally as per the gender proportion in the workforce. It appears that reported accidents among males are higher and females are lower than expected.

A graph illustrating gender breakdown and accident severity is shown in Figure 10.

Figure 10 Accident frequency by gender and severity.



n = 1296

Note : 8 deaths occurred between 1 July 1993 and 2 December 1995. All involved males.

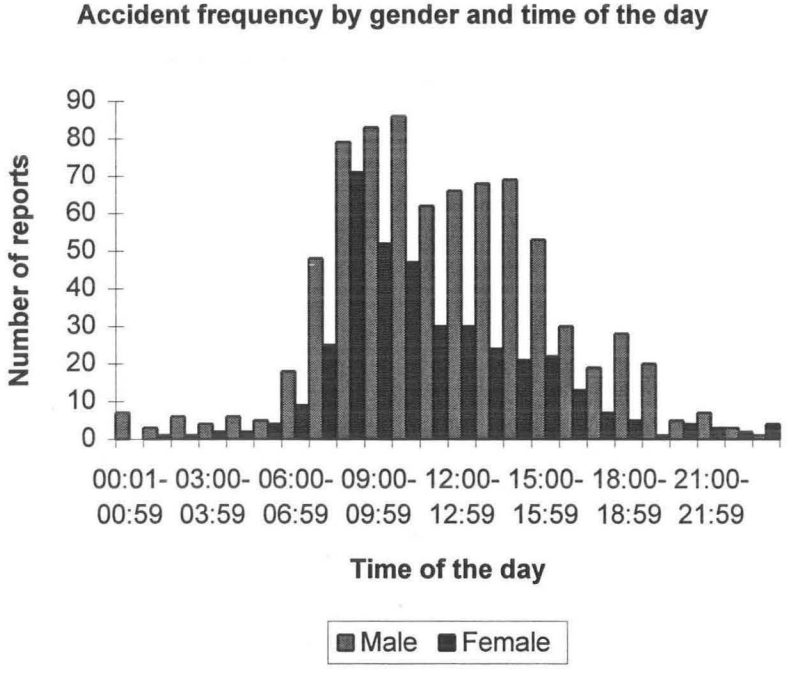
Table 11 below illustrates the percentage of accidents by gender and severity.

Table 11 : Percentage of accidents by gender and severity.

Gender	*Severity*		
	Death	**Serious Personal injury**	**Incapacity**
Male	1 %	41.6 %	57.4 %
Female	0 %	25.7 %	74.3 %

An additional graph showing accident frequency, gender and the time of the day of accidents was generated. This is shown in Figure 11.

Figure 11 Accident frequency by gender and time of day.

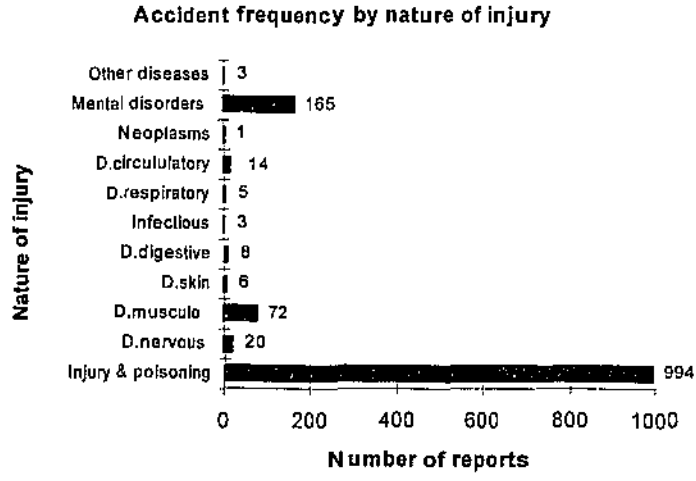


n = 1296

Nature of injury, bodily location of injury, mechanism of injury , agency of injury and breakdown agency.

To complete the results arising from this study, graphs showing the preliminary analysis of elements of the national classification of work place injuries as established by Worksafe Australia (1990) are shown in figures 12,13,14,15 and 16. These graphs illustrate the nature, bodily location, mechanism, and agency of injury, and breakdown agency.

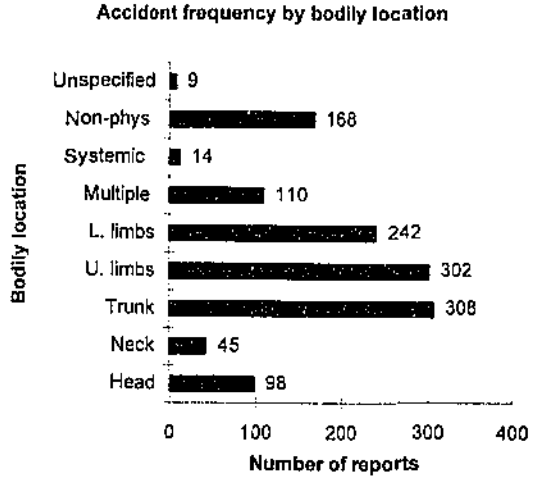
Figure 12 Accident frequency by nature of injury.



n = 1291

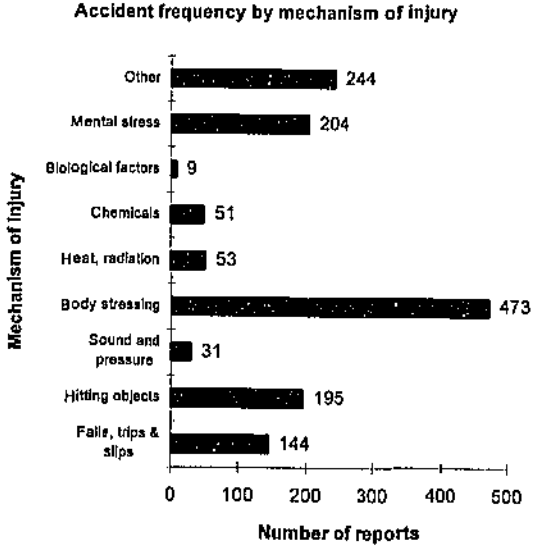
Further analysis of the category of injury and poisoning was not completed as the original data for this study was not sub-categorised below this level.

Figure 13 Accident frequency by bodily location.



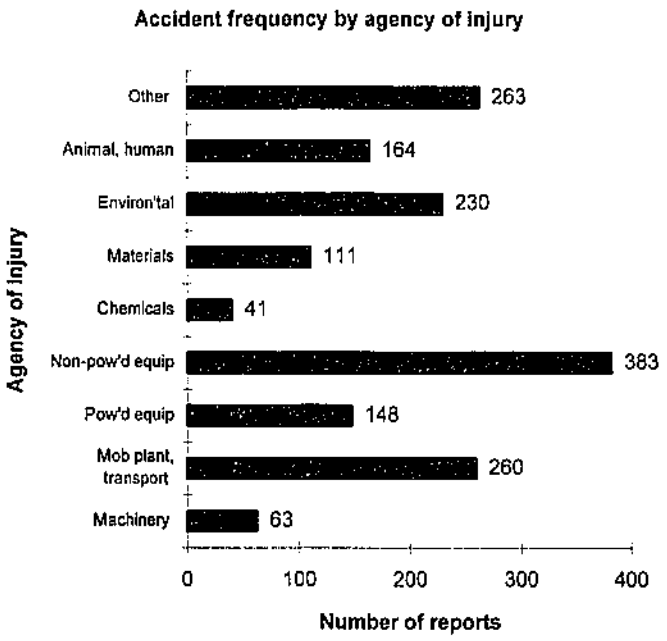
n = 1296

Figure 14 Accident frequency by mechanism of injury.



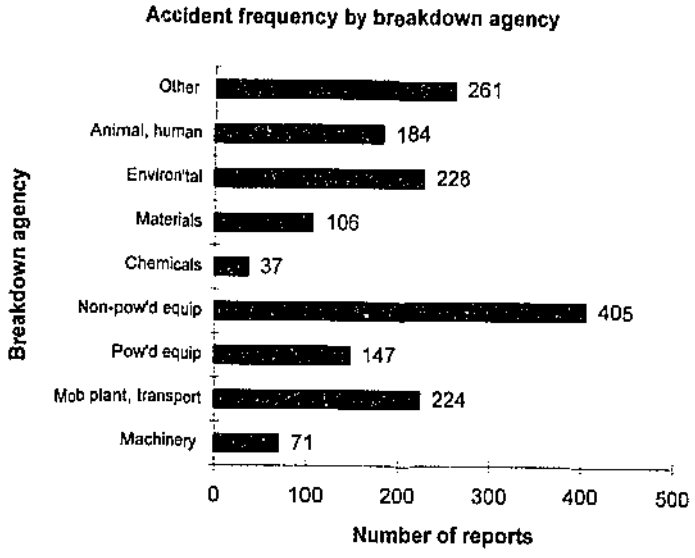
n = 1404

Figure 15 Accident frequency by agency of injury.



n = 1663

Figure 16 Accident frequency by breakdown agency.



n = 1663

Chapter VI DISCUSSION

6.1 *Presentation of major findings*

6.1.1 Time of the day and accidents

Figure 1 shows the Commonwealth accident frequency pattern over a 24 hour time continuum. There is a rapid rise between 7am and 9am, a plateau at this level until 11am. There is a decrease at midday, which plateaus to 2pm. After 2pm accident frequency decreases to 4pm with a steady decrease thereafter until 11pm, whereafter it maintains an overnight low until 6am. The general bell shaped curve of the Commonwealth's accident experience by time of the day is similar to unpublished Western Australian government data (WorkSafe WA, 1997)(see Appendix 8).

These accident patterns over a 24 hour period for the Commonwealth sector are similar to other patterns derived from other industries that have been recorded in the literature (Pokorny, Blom & van Leeuwen, 1987; Hardiman, Wise & Greenwood, 1991). Pokorny, Blom and van Leeuwin (1987) found that bus drivers accident rates also followed a general bell shape but with a peak at 3pm. Hardiman, Wise and Greenwood (1991) in a study of injury rates for nurses showed a rapid rise in accidents at 9am peaking at 10am. There was an additional high level of accidents at 6pm. However, no specific reason for this result was noted.

The literature also reveals accidents patterns that are not bell shaped. Akerstedt (1990) cites Bjerner, Holm and Swensson (1955) who showed that errors in meter readings in gas works had a pronounced peak on night shift (peaking at 3am). The error pattern resembled a

shallow letter "w" with an increase in errors at 3pm. Levin, Oler and Whiteside (1984) in an analysis of 1700 reported injuries involving paint production and associated employees averaged over a 10 year period showed that accidents peaked at 10am. Moreover, there was no distinguishable pattern of accident frequencies produced in this study.

The decrease in accident frequency at midday shown in Figure 1 may be attributed to reduced work, and therefore reduced exposure, during and following lunch breaks. A similar decrease in accident frequency at midday and other meal break times was reported by Adams, Barlow and Hiddlestone (1981). Although Adams, Barlow and Hiddlestone (1981) do not attribute the decrease in accidents directly to the meal break the inference that employees are exposed to decreased risk during these periods can be drawn. A similar decrease in accident frequency at lunch time was also reported by Webb, Redman and Sanson Fisher (1992). However, if the presumption of decreased exposure to risk decreases accident frequency is applied to the evening meal period in this research, it does not explain the slight increase in accident frequency between 6 and 7pm (also shown in Figure 1). The literature does not provide guidance on the reasons for this phenomenon, however it is noteworthy that those accident that have occurred have been predominantly serious personal injuries. The reasons for the predominance of serious personal injuries between 6 and 7pm are noteworthy and are discussed later in this sub-section.

The pattern of accident severity (Figure 2) is similar to that of accident frequency. Interestingly, Wagner (1982) in a study of mine workers suggested that night shift (2300 - 0700 hours) incurred less frequent but more severe accidents.

It is important to acknowledge that the frequency of the most severe accidents (fatalities) recorded in the Commonwealth sector is very low. Statistical analysis of these accidents was not conducted due to the small sample size of eight. Quantitative analysis with such a small sample threatens the validity and reliability of any analysis. However, it may be possible to examine these occurrences utilising qualitative research methodologies and elicit valuable health and safety information. This analysis is outside the research questions posed in this thesis.

The remaining classifications of accident severity [serious personal injury, incapacity and dangerous occurrences] follow the general pattern for the total accident experience during the 24 hour period, except for one point. There is a small increase (or spike) in the frequency of serious personal injuries (SPI's) between 6 and 7pm. A similar phenomenon (at 6pm) was reported by Hardman, Wise and Greenwood (1991) in a study of nursing staff in a hospital but no explanation was offered. However, no similar increase at this time was found in the literature. There is no obvious explanation for this increase, and it is contrary to the general decrease in accident frequency over the late afternoon / evening period shown in Figure 2. An examination of gender and time of the day of accidents shows that males largely contribute to the small spike between 6 and 7pm. This will be further discussed within the gender sub-section.

The increase in accident frequency between 6 and 7pm warrants further investigation to determine possible causes. Three potential hypotheses for this phenomenon present themselves. Firstly, accidents may be occurring in and around meal (dinner) breaks. That is, increased accident frequency (between 6 and 7pm) might be attributed to decreases in human performance associated with diminished mental and

physical performance because of depleted physical and psychological reserves near meal times (Grandjean, 1988): this could be expected to produce increased errors manifesting as accidents. Secondly, the increase in accident frequency between 6 and 7pm could be attributable to motor vehicle accidents (which often incur serious injury) as employees commute in the evening. If such accidents occur in motor vehicles operated and/or owned by the employer, they are included in the data. However, statistical information on road crashes by hour of the day for metropolitan and country accidents (Main Roads Department of Western Australia, 1997) does not strongly support this hypothesis. Peak times for road crashes were 9am and between 4 and 6pm, with a decrease in accidents at 7pm. Thirdly, the pattern of increased accidents shortly after commencing work (as shown at 9am for day workers with commencement at 8.30 am) may also be occurring between 6 and 7pm. The increase between 6 and 7pm may reflect this phenomenon acting on a smaller population working a 6pm to 6am night shift. A hypothesis that accident frequency may be associated with the length of time lapsed since the commencement of work has been raised in the literature (Lauridsen & Tonnensen, 1990; Pokorny et al, 1987). However no consistent conclusion has been determined.

Exploring these hypotheses requires further research.

6.1.2 Day of the week and accidents

Not surprisingly, results show that Saturday and Sunday have markedly fewer accidents than weekdays (Figure 3). This result is consistent with risk as a function of probability and consequence (AS/NZS 4360, 1995): i.e as less work occurs, the lower the chance of

mishaps or accidents. Adams, Barlow and Hiddlestone (1981), in a five year analysis of approximately 10 000 accidents, showed decreased frequency of injuries over the weekend. Similar results were reported by Webb, Redman and Sanson-Fisher (1992) who noted that as the number of employees who worked weekends was small, it was not surprising that few injuries occurred on Saturdays and Sundays.

The accident frequency pattern during weekdays (Figure 3) shows the total number of accidents rising gradually to a peak on Wednesday and decreasing rather more quickly to Friday. Serious personal injuries and incapacities of greater than five working days follow similar patterns (Table 3). However, dangerous occurrences are more evenly distributed across Monday to Friday. Western Australian accident data also records higher accident frequencies in the first half of the week (White, 1994). In addition, Adams, Barlow and Hiddlestone (1981) reported a slight peak in the frequency of injuries occurring on Wednesday. However, caution in interpreting this pattern is required due to an inability to determine an expected number of accidents for each week day. Although the number of public holidays can be calculated other planned and unplanned absences from work are not available to accurately calculate Chi square expected values. It is important to note that it is likely that planned absences would not fall randomly throughout week days. Planned absences by their very nature of being planned implies an employees choice of day to have away from work. For example, an employee may choose to take Monday off work (as a flexi day or rostered day off) to maximise leisure time.

Monk and Wagner (1989) suggested that Sunday and Monday had high frequencies of accidents due to sleep debts being built up over

weekends. However, other explanations are possible. The results here require further investigation and analysis to examine :

- the possibility of managers or supervisors reporting Fridays' accidents on the first whole day of continuous absence, that is, on Monday;
- whether work related accidents occurring on Saturday or Sunday are being reported as occurring on Monday;
- a disproportionate number of non work related Monday absences being reported as, or attributed to, workplace accidents.
- injury symptoms presenting over the weekend, with supervisors / managers not becoming aware until Monday eg - an employee strains their back late on Friday. Back pain increases during Saturday. Medical treatment is required on Sunday.

Similar to the overall accident frequency experience, as shown in Figure 3, the frequency of more serious accidents (serious personal injury) peaked mid week (Table 3). Of the eight deaths reported, four occurred in the latter half (Thursday and Friday) of the standard Monday to Friday working week, (two on Thursday and Friday (Table 3). One death occurred midweek (Wednesday). The other deaths occurred at the weekend (two on Saturday and one of Sunday). The absence of fatalities on Monday and Tuesday is intriguing.

However, dissimilar fatality information can be extrapolated from Western Australian work related fatality data for the period 1 July 1993 to 30 June 1994 (White, 1994). During that period 24 fatalities were recorded with 22 occurring during the standard working week (4 occurring on Monday, 3 on Tuesday, 7 on Wednesday, 4 on Thursday and 4 on Friday). Western Australia fatalities data indicated that fatalities peaked midweek (Wednesday). This contrasts to the

Commonwealth data showing 50% of fatalities in the latter half (Thursday and Friday) of the working week.

Additional research to explore possible relationships between the day of the week and fatalities is warranted.

6.1.3 Month of the year and accidents

The cumulated accident frequency data as shown in Figure 4 shows the frequency of accidents peaking in August. Figure 5 illustrates monthly accident data averaged over the period 1 July 1995 to 2 December 1995.

Averaged accident frequencies increase from January to a peak in February. There is a decrease during March and April, with a slight rise in May and June and a rapid decrease in July. However this is followed by an even more rapid increase in August, establishing a second peak equivalent to that experienced in February. During the months September, October, November and December accident frequencies gradually decrease until they reach similar levels to January.

The Chi-squared test for averaged accident frequency and month (Table 6) shows that the proportion of accidents are not equally distributed according to month.

To explore possible causes of accident patterns by month the researcher sought information concerning the general level of economic activity by month between July 93 and December 95. Australian Bureau of Statistics data showing seasonally adjusted monthly retail trade turnover trend estimates (ABS, 1993 - 1995) was selected to illustrate

general economic activity. This indicator was chosen in preference to many other indicators (eg consumer price index, balance of payments, national account, home constructions) as it reflects seasonally adjusted changes in consumer purchasing behaviours and activity of which employees may be considered a significant group of consumers.

Retail monthly turnover was steady from August to October 1993. Activity increased from November 1993 through to March 1994. In April 1994 turnover decreased to August 1993 levels. In May 1994 turnover returned to January 1994 levels, then slowly but steadily increased until September 1994. From October 1994 until April 1995 a plateau was maintained. From May to July 1995 there was a steady increase in turnover. In August 1995 there was a more rapid increase which continued until December 1995.

This information was then compared to accident frequency data disaggregated by monthly periods to determine if the majority of the increase could be attributed to one particular month or group of months. The result of this analysis is illustrated in Table 12 overleaf.

Table 12 : Accident frequency by month and economic activity.

Month	Accident frequency	Seasonally adjusted monthly retail turnover for W.A. ($ millions)
Jul-93	12	not available
Aug	72	882.8
Sep	58	887.1
Oct	70	876.4
Nov	66	897.8
Dec	52	906.1
Jan-94	48	909.6
Feb	80	925.8
Mar	80	937.7
Apr	78	886.0
May	74	921.0
Jun	79	919.6
Jul-94	48	931.0
Aug	76	932.1
Sep	66	935.2
Oct	52	952.7
Nov	60	951.8
Dec	39	950.1
Jan-95	49	952.4
Feb	66	945.7
Mar	59	949.2
Apr	70	953.1
May	52	966.1
Jun	47	974.2
Jul-95	47	984.8
Aug	71	1026.8
Sep	49	1006.7
Oct	46	1034.0
Nov	25	1015.6
Dec	2	1041.8

n = 1663

It is noteworthy that July 1993 and December 1995 was a period of general economic growth. During this period accident frequency generally trended down except during the period February and June 1994. However, it is important not to assume that increased economic activity directly results in decreased occupational accidents.

Interestingly, industry wide health and safety data for Western Australia published by WorkSafe WA (1994) also indicated that February and March displayed higher accident frequencies in 1994. However, accident frequency data specific to the government sector obtained from WorkSafe WA (WorkSafe WA, 1997) (Appendix 8) shows the frequency of accidents for 1994 peaking in November.

Understanding the cause of increased averaged accidents in February and August requires additional research.

6.1.4 Age and accidents

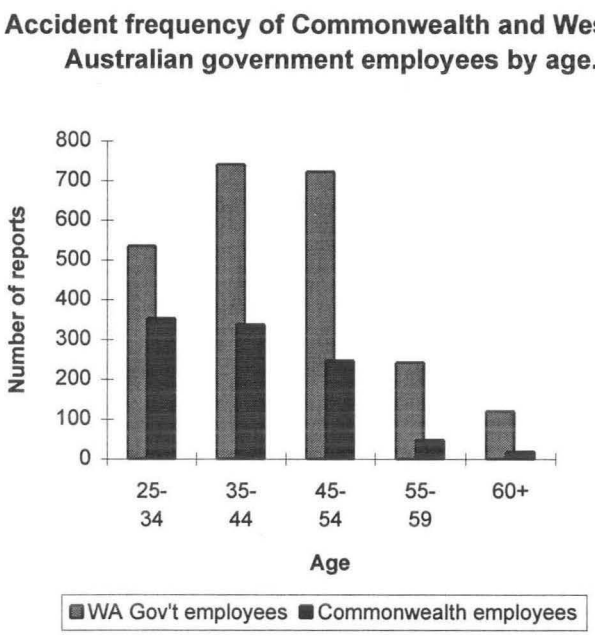
Calculation of accident frequencies and age indicate that 30 to 34 year old Commonwealth workers experienced the highest frequency of accidents (see Figure 6). This result is similar to injury profiles for Canadian construction workers reported by Kumar (1991) who showed that the highest accident frequency occurred in people between the ages 25 to 34 years. However, Shannon et al. (1993) in a study of accidental occupational fatalities in Ontario, Canada, reported that fatality incident rates increased with age.

Age data from payroll records published by the Department of Finance (1994) was used to calculate age classifications for Commonwealth employees. The results of the Chi squared test for accident experience and age are shown in Table 7. The Chi squared showed that the proportion of accidents are not equally distributed

according to age. However, no obvious explanation for this finding is apparent and further research into this area is warranted.

Figure 17 below illustrates the comparison between Commonwealth and Western Australian reported accidents. Unpublished Western Australian government sector data shows the highest incidence of accidents for 35-44 year olds (WorkSafe WA, 1997)(Appendix 8). The Western Australian data indicates a continuous increase in accident frequency from 15-24 years to 35-44 and then a plateau until 45-54 years followed by a rapid decline to 60 years. Accidents with Commonwealth employees peak earlier at 25-34 years then decline steadily to 60+ years (Figure 17). Comparison of accident frequency below 25 years could not be undertaken as Commonwealth age data is from 18-24 years whereas the Western Australian age data is 15-24.

Figure 17 Accident frequency of Commonwealth and Western Australian government employees by age.



Examination of accident frequency and age and the nature of the four most frequently reported injuries are shown in Figure 7. 30-34 year olds experienced the highest number of injuries and poisoning. Injuries and poisoning decrease steadily after 44 years. Interestingly, Gun and Ryan (1994) who examined 98 South Australian worksites utilising case control research methodology, amongst other things reported age and accident frequency data. They reported that the risk of injury was unrelated to age.

6.1.5 Work experience and accidents.

Examination of accident frequency and work experience confirm the expectation that inexperienced workers incur many more accidents than experienced employees (Figure 8). Over eighty percent (80.48 %) of accidents involve persons with less than one years work experience. This result is consistent with the literature (Lin & Pearse, 1990; Webb, Redman & Sanson-Fisher, 1992; Cellier, Eyrolle & Bertrand, 1995; Gunn & Ryan, 1994).

Examination of the data revealed a small increase in accident frequency for employees with 2 to 5 years work experience.

Analysis of accident frequency, the nature of injuries and worker experience was undertaken (Table 9). The four most frequently occurring types of accidents are shown, i.e, injuries and poisoning, diseases of the nervous system and sense organs, diseases of the musculoskeletal system and connective tissue, and mental disorders. Amongst persons with less than one years experience injuries and poisoning were the most common type of accident and mental disorders

were the second most prevalent type of report. Injury and poisoning decreased very markedly in more experienced workers.

Accident mitigation measures targeted at reducing the frequency of accidents involving inexperienced workers is clearly a priority to reduce the personal, organisational and societal costs associated with injury to inexperienced workers.

6.1.6 Gender and accidents.

Figure 9 shows that 64.3 % of accidents involved men and 35.7% involved women. The Chi-squared test (Table 10) showed that accidents were not distributed equally as per the gender proportion of the workforce. This is an important area for further research.

Figure 10 and Table 11 illustrates the results of the examination of gender and accident severity. Disaggregated data associated with incapacities of greater than 5 working days and gender reveals higher proportions of incapacities for females. Similar results have been recorded by the Department of Occupational Health, Safety and Welfare (1992), who found that female public sector workers have a substantially higher proportion of long duration workers compensation claims than their male counterparts. Similar results are also discussed by Quinlan (1996) in a paper that examined women and occupational health and safety.

Table 11 shows a high proportion of serious personal injuries for males compared to females. All deaths involved men. Interestingly Salminen, Saari, Saarela and Rasanen (1992) in a small study of serious

occupational accidents in Finland found greater risk taking tendencies in males.

An examination of gender and the time of day of accidents is shown in Figure 11. Accident patterns for males and females are similar until 9am. After 9am accidents involving males continue to increase until 11am whereas accidents involving females decrease. After 11 am accidents involving males decrease by approximately one quarter at 12 noon. There is a gradual increase in accidents involving males from noon to 3pm then a rapid decrease until 6pm. A small rise in accidents occurs at 7pm then decreases at 8pm. The downward trend continues to 9pm. Between 9pm and 6 am an overnight low level is maintained.

For females, accidents peak at 9am. There is a rapid decrease in accidents over the short period between 9am and noon. A small plateau exists from noon to 1pm. A downward trend continues until 3pm where another small plateau is encountered until 4pm. From 4pm, a steady downward trend occurs until 7pm. From 7pm until 6am very low accident levels for females are recorded.

The finding that between 6 and 7pm peak in accidents is entirely due to males is noteworthy. This phenomenon was discussed earlier (Section 6.1.1) where three possible explanations were offered : physical depletion due to failure to take meal breaks, commuting accidents as workers go home, and commencement accidents for 12 hour shift workers. It is not immediately apparent that these explanations are gender specific. This intriguing phenomenon deserves further examination.

These patterns of daily variation in accident frequencies are of particular interest as prevention measures may require gender specific tailoring to mitigate against accidents at different times of the day.

6.1.7 National Data Set categories and accidents

6.1.7.1 Nature of injury and accidents

Figure 17 illustrates that injuries and poisoning's are the predominant "nature of injury" within the Commonwealth sector. Similar results were achieved in estimates of national occupational health and safety statistics for 1993-94 compiled by Worksafe Australia (Worksafe Australia, 1995).

The next most frequent category of reports is mental disorders. Toohey (1993) associated these accidents with the emergence of work related stress as a safety and health issue in the Commonwealth sector, and the large number of stress cases under the Commonwealth workers compensation scheme. Occupational stress has been acknowledged by Comcare (Toohey, 1993) and strategies to reduce the cost and frequency of work related stress have been developed (Comcare, 1993).

Unpublished statistics for Western Australian government employees (WorkSafe WA, 1997)(Appendix 8) do not show the same degree of increase for mental disorders. Reasons for this phenomenon are unknown but may be associated with differing workers compensation schemes, structures and entitlements.

6.1.7.2 Bodily location and accidents

Figure 13 indicates the trunk and upper limbs, and to a lesser degree, lower limbs, as the most affected bodily location in accidents. This is consistent with similar statistics generated by Worksafe Australia (1995), WorkSafe WA (1997)(Appendix 8) and Finnish data presented by Salminen (1994) where hand injuries represented 43% of injuries.

Results shown in Figure 13 also record a high frequency of accidents attributed to non physical locations on/in the body. A plausible reason for this pattern is work related stress being recorded as a non physical location.

The number of incidents recorded as unspecified is very low (0.69%) which may reflect thorough data entry coding of accident information.

6.1.7.3 Mechanism of injury and accidents

Mechanism of injury is the action, exposure or event which was the most direct cause of the most serious injury or disease. Figure 14 illustrates body stressing as the most frequently occurring mechanism of injury. Body stressing includes injuries as a result of muscular stress or loading whilst carrying, putting down or handling objects. It also includes muscular injuries of a repetitive nature. Examples include overuse and repetitive strain injuries.

Mental stress is an important mechanism, substantiating comments made earlier about stress claims.

The classification "other and unspecified" mechanism of injury also ranks highly in Figure 14. This coding category may be used when no mechanism of injury classification is immediately distinguishable by the employee coding the original accident report data.

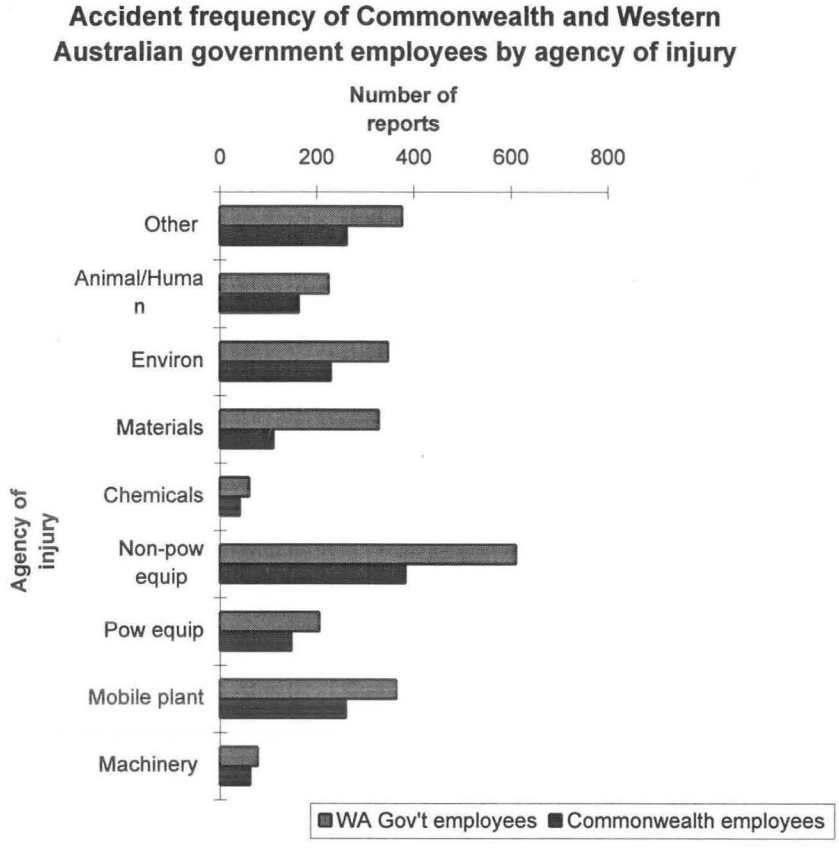
6.1.7.4 Agency of injury and accidents

Non powered hand tools represent 23 percent (383/1663) of the accidents reported to Comcare Australia (Figure 15). Salminen (1994) reported a similar result where the most frequent types of accidents were hand injuries caused by an object being held. Measures to address hand tool use, including instruction, work practices and systems of work, may assist Comcare reduce the impact of injury to Commonwealth employees. Other important agents of injury are mobile plant and transport, and environmental agencies which include indoor environments (eg - steps, stairways, wet oily surfaces, internal traffic areas), outdoor environments (eg - weather, sun, traffic areas, vegetation, buildings, external traffic areas) and underground environments (eg - roof tunnel/face, shafts, underground water, underground fire).

Similar patterns have been recorded by WorkSafe WA (1997) (Appendix 8). Figure 18 overleaf illustrates this comparison.

These findings provide valuable data for targeting accident prevention programmes.

Figure 18 Accident frequency of Commonwealth and Western Australian government employees by agency of injury.



6.1.7.5 Breakdown agency and accidents

Non powered equipment feature as the major category that breaks down in accidents as shown in Figure 16. This highlights the need for safety programs addressing non powered equipment in the Commonwealth sector. Mobile plant and transport also feature, indicating that safety interventions are warranted. The Commonwealth government are addressing this concern by providing regulations governing plant, which entered Commonwealth law in July 1996.

6.2 *Limitations of this study.*

The results of this research are limited to the Commonwealth sector. As the nature of Commonwealth employment differs in some ways from the general work force, the application of results can not be translated directly to the general workplace.

The research draws accident data directly from accident reports so the results will be subject to a well recognised under reporting bias. Documented reasons for under reporting of accidents include fear of reporting and/or peer pressure not to report (Quinlan & Bohle, 1991).

Quinlan and Bohle (1991) go further to identify limitations associated with workers' compensation records, that are comparable to data from accident reports. These limitations include :

a. The type of data recorded is dependent on the reporting requirements of the particular regulatory body. In this study, minor accidents will be excluded. Therefore, not all accidents involving Commonwealth employees are recorded; only more serious accidents are included.

b. Data in this study is limited to Commonwealth government employees only.

c. The data does not cover the self employed.

d. The accident reporting process calls for a person to make a value judgement when deciding whether an accident is reportable based upon their interpretations of : an emergency, 5 or more work days or shifts lost, or the likelihood of an incident causing

death, serious personal injury or an extended incapacity. Variations will occur from one reporter and another.

e. Not all accidents are reported and under reporting bias is well recognised. Reasons for not reporting include fear of reporting, peer pressure not to report, and perceived adverse consequences for reporting such as investigation or disciplinary action.

Even with such limitations Quinlan and Bohle (1991) acknowledge that such data can be valuable and contribute to understanding accident experience. Moreover, in many cases accident reports or workers compensation data may be the only data, or the only substantial body of data in existence. Foley (1997) in a recent paper examining the scope, coverage, benefits and uses of national workers compensation based data drew a similar conclusion. That is :

> " there is unlikely to be one data source which will, on its own, fully satisfy all the requirements of occupational health and safety surveillance. National data set based compensation data are a sound starting point for further occupational health and safety data driven research "(p. 284).

Another important research limitation is the application of results to the self employed.

The lack of valid and reliable statistical information concerning the composition of the Commonwealth public sector (which includes those enterprises owned by Government) is noteworthy. This prevents the generation of reliable expected values for Chi-squared tests of association and severely limited this research. More generally, it limits

the ability to interpret Commonwealth public sector data and apply it in a health and safety setting.

An important limitation of this research is the inability to establish the number of hours worked by Commonwealth employees between 1 July 1993 and 2 December 1995. This prohibits the calculation of person hours at risk of having an accident, and, establishing a population at risk. Due to this limitation care in over interpreting accident patterns reported in this study and comparison to other should be taken.

However, the research does assist in understanding accident patterns across an important part of the work force, at least to some extent. Reporting of the Commonwealth accident experience has been sparse and this research contributes to the wider body of knowledge examining accident patterns across Australian industry. The findings augment previous workers compensation related research conducted by Comcare on Commonwealth employees (Toohey, 1993).

6.3 *Conclusions.*

The following conclusions are drawn from the results :

(1) Although the Commonwealth sector is predominantly made up of office work, it displays similar accident frequency patterns across the 24 hour time period to other industries.

(2) Accidents are high on Monday and Tuesday, peaking on Wednesday. Weekends have lower accident frequencies.

(3) Accidents peak in February and August. March to June also reflect above average accident frequencies.

(4) The mean age of Commonwealth employees in Western Australia having accidents is 37.8 years.

(5) Inexperienced workers, those with less that one years work experience, have a very high accident frequency, and account for 80.5 % of reportable accidents.

(6) 64.3 % of Commonwealth accidents involved men and 35.7% involved women although men are approximately 58 % and women 42 % of the Commonwealth workforce. However, females show a disproportionate number of accidents involving greater than 5 days incapacity from work.

(7) Injury and poisoning, which includes sprain and strain injury, represent 59.8 % of reported accidents.

(8) Large numbers of accidents to Commonwealth employees involve injuries to the trunk and upper and lower limbs (18.5 %, 18.2 % and 14.6 % respectively). Injuries classified to non physical bodily locations, which includes mental disorders and workplace stress account for 10.1 % of recorded accidents.

(9) 28.4 % of accidents are attributable to body stressing.

(10) 38.6 % of injuries are attributable to non-powered hand tools . 24.4 % of Commonwealth accident reports attribute non-powered hand tools as the primary breakdown agency in causing accidents.

(11) The use of Commonwealth data for statistical purposes except frequency counts is severely limited as a result of an inability to generate reliable expected values.

6.4 *Implications for occupational health and safety in the Commonwealth sector*

The results of this research may impact on occupational health and safety in the Commonwealth sector in four significant ways.

Firstly, the information presented may be used by Commonwealth agencies to refine their internal and external health and safety policies and practices. Agencies may modify or align safety interventions, such as training or safety awareness campaigns, to areas with the greatest frequency of accidents. For example, resources may be allocated to address the 'August phenomenon', accidents involving inexperienced workers and the use of non-powered hand tools.

Secondly, the findings of the research may be used by Comcare Australia to target specific areas that may impact upon the safety performance of the entire Commonwealth sector. For example, Comcare may strategically target workplace incapacities of greater than 5 days sustained by female workers.

Thirdly, this research may assist Comcare in identifying where enforcement activity or interventions may be allocated. Targeting of specific enforcement activities, such as legislative investigations of Commonwealth organisations' strategies to prevent occupational injury, may be refined. For example, February and August might be targeted for increased enforcement to mitigate against accidents occurring in these months.

Comcare may also utilise the research data to inform the Commonwealth sector in Western Australia of its accident experience. Communicating these findings to the sector may encourage inquiry into

safety experiences within organisations thereby increasing the profile of safety performance in Commonwealth organisations.

Finally, this research reveals difficulty in generating valid and reliable health and safety statistical information for the Commonwealth primarily arising from incomplete information concerning the number of Commonwealth employees, and, to a lesser degree, the lack of adequate categorised information such as age, work experience and shift workers. These difficulties will need to be examined closely against the requirements of statistical methods, to overcome this problem. Improved data collection by the Commonwealth will increase the likelihood of attracting more rigorous statistical analysis. Only then will more meaningful and valuable health and safety statistics for this employment sector be produced.

6.5 *Recommendations for further research*

This research aimed to explore accident patterns evident in available accident data between July 1993 and December 1995. As the available data increases, further research based on a larger data set is warranted. This will add to the statistical power of tests used to measure associations or relationships between variables.

Further research that builds upon the general findings contained in this research is recommended. In particular, additional research examining national data should prove valuable in either verifying or refuting the findings of this research. The strength of national analysis will be derived from a larger sample size, and an examination of Commonwealth employers from all Australian States and Territories. In

addition, similarity or variance between Australian states may be explored.

This research has highlighted foci for further research. In particular, further exploration of the relationship between accident frequency and gender, time of day, month of year, age and work experience is warranted.

This research will require substantiation and validation through repeat analysis. It is recommended that this quantitative research, where applicable, be supplemented by qualitative research into the Commonwealth accident experience so that a balanced and complete picture of the Commonwealth sector becomes known. Specifically, the area of fatalities, where only eight were recorded, may be further understood by qualitative methodology.

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APPENDICES

Appendix 1 Commonwealth government departments, agencies, authorities and business enterprises in Western Australian between 01 July 1993 and 02 December 1995.

Aboriginal and Torres Strait Islanders Commission
Aboriginal Development Commission
Aboriginal Hostels Ltd
Administrative Appeals Tribunal
ANL Limited
Attorney's General Department
Auscript
Austel
Australian Air Express
Australian Bureau of Statistics
Australian Broadcasting Corporation
Australian Customs Service
Australian Defence Industries
Australian Electoral Commission
Australian Federal Police
Australian Government Health Service
Australian Hearing Service
Australian Government Solicitor (including Insolvency Trust Services Australia)
Australian Hearing Services
Australian Industrial Registry
Australian International Development Assistance Bureau
Australian Maritime Safety Authority
Australian National Audit Office
Australian National Rail
Australian Nature Conservation Agency
Australian Nuclear Science and Technology Organisation
Australian Overseas Telecommunications Corporation
Australia Post
Australian Protective Services
Australian Quarantine and Inspection Service
Australian Securities Commission
Australian Sports Commission
Australian Taxation Office
Australian Trade Commission
Austrade
Bureau of Meteorology
Civil Aviation Authority

Comcare Australia
Commonwealth and Defence Force Ombudsman
Commonwealth Bank of Australia
Commonwealth Director of Public Prosecutions
Commonwealth Rehabilitation Service
Commonwealth Scientific and Industrial Research Organisation
Defence Housing Authority
Department of Administrative Services (including Australian Archives, Asset Services, Australian Estate Management, Australian Government Analytical Laboratories, Australian Government Publishing Service, Australian Property Group, Australian, Survey and Land Information Office, Australian Valuation Office, Construction Service, Comcar)
Department of Defence (including Army , Navy, Airforce)
Department of Employment, Education and Training
Department of Environment, Sport and Territories
Department of Finance
Department of Foreign Affairs and Trade
Department of Human Services and Health
Department of Immigration and Ethnic Affairs
Department of Industrial Relations
Department of Industry Technology and Commerce
Department of Primary Industries and Energy
Department of Social Security
Department of Transport and Communication
Department of Treasury
Department of Veterans Affairs
Export Finance and Insurance Corporation
Federal Airports Corporation
Federal Court of Australia
Health Insurance Commission - (including Medicare Offices)
High Court of Australia
Housing Loans Insurance Corporation
Law Reform Commission
Merit Protection and Review Agency
National Acoustics Laboratories
National Crime Authority
National Rail Corporation
Qantas

Registrar of Births, Deaths and Marriages
Repatriation General Hospital - Hollywood
Spectrum Management Agency
Telstra Corporation Ltd
The Reserve Bank of Australia
The Christmas Island Administration
The Cocos Island Administration
Trade Practices Commission
Trade Union Training Authority

Appendix 2 Accident report form.

comcare
AUSTRALIA

Occupational Health & Safety

Incident Report

When to use this form. *(Note: This is not a compensation form)*

Your employer must, under sections 68 and 69 of the Occupational Health and Safety (Commonwealth Employment) Act 1991, record and report to Comcare Australia serious accidents and dangerous occurrences. By using this Incident Report form and the Additional Information form you can also satisfy the requirements of the Australian Standard for Workplace Injury and Disease Recording (AS1885.1)

Reporting and Recording Incidents under the OH&S(CE) Act 1991:

1 Report to Comcare Australia any work-related incident which results in:
- death,
- emergency treatment by a doctor or admission to hospital (serious personal injury),
- 5 or more consecutive days or shifts off work, or
- a dangerous occurrence—that is, an event in which no one was hurt but one of the above *could* have happened.

2 Complete this form and the Additional Information form.

3 Retain a photocopy of the Incident Report form and the original Additional Information form for your records.

4 Within 28 days of the incident, send the original Incident report form to: The OH&S Manager,
Comcare Australia
GPO Box 9905
(in the relevant State/Territory)

Recording other incidents for your employer:

To record other incidents in accordance with the Australian Standard for Workplace Injury and Disease Recording (AS1885.1).

1 Complete this form and the Additional Information form.

2 Retain both forms in accordance with your employer's instructions.

How this information is used.

The Safety Rehabilitation and Compensation Commission and Comcare Australia will use the information you provide to:

- develop strategies to identify and reduce work-related injury and disease,
- carry out its functions under the Occupational Health and Safety (Commonwealth Employment) Act 1991 and the Safety, Rehabilitation & Compensation Act 1988.

Personal information is safeguarded by the Privacy Act 1988.

To be completed by your Personnel Office

Cost Centre Code & Title
If the person was injured or killed, enter the code for the area responsible for that person. Otherwise enter the code for the area responsible for the "dangerous occurrence".

Agency's Region Name *(if not applicable, write N/A)*
If the person was injured or killed, enter the region responsible for that person. Otherwise enter the region responsible for the "dangerous occurrence".

ASCO Code for the affected person's job

Comcare Use Only

Comcare Office

Comcare Reference

Entered by

Date / /

1 What is the full name of your organisation or Government Department?

2 Your organisation's internal reference number or code for this incident.
If not applicable, write 'N/A'.

3 When did the incident happen?
Time

am / pm

Date *(Day / Month / Year)*

4 Did you see the incident happen?
No ▶ *Go to* 5
Yes ▶ *Go to* 6

5 Did anyone else see the incident happen?
No ▶ *Go to* 6
Yes ▶ Please complete the details below:
Witness's name

Witness's home or work address

Witness's home or work phone number
( )

6 Did the incident result in injury, disease or death?
No ▶ *Go to* 21
Yes ▶ *Go to* 7

7 Which of the following happened to the person?

Serious personal injury *(had emergency treatement by a doctor or went to hospital)*	
Had 5 or more consecutive working days or shifts off work	
Death	
None of the above	▶ This incident does not have to be reported to Comcare

8 What is the full name of the injured or affected person?
Given Names

Surname

9 Is the affected person male or female?
Male
Female

10 What is the date of birth of the affected person?
Day / Month / Year

11 Was the affected person an employee of YOUR organisation?
Yes ▶ *Go to* 13
No ▶ Name and address of the affected person's employer
(If the person was not employed, enter N/A — not applicable)

Postcode

12 In what capacity was the affected person on the premises?

As a commercial contractor	▶ *Go to* 13
As a Commonwealth contractor	▶ *Go to* 13
As a Commonwealth employee from another organisation	▶ *Go to* 13
Other	▶ *Go to* 18

13 Did the affected person have an Australian Government Serv (AGS) Number, a Service Number or Employee Number?
No ▶ *Go to* 14
Yes ▶ Enter the appropriate number below
AGS Number

Service Number

Employee Number

14 What was the job classification or job title of the affected person at the time of the incident?
If there is no job title, please describe the job. Include the designation or classification, if known, for example ASO 5 or TO 1.

15 What were the affected person's official hours of duty on the day of the incident?

From _____ am / pm To _____ am / pm

16 What are the main tasks performed by the affected person?

17 What was the affected person's work status at the time of the incident?

Permanent full-time

Permanent part-time

Temporary full-time

Temporary part-time

Casual full-time

Casual part-time

Graduated return to work

Other

18 What was the affected person doing at the time of the incident?

19 How many years experience did the affected person have in doing the task being carried out at the time of the incident?

Years / Months *(if not applicable, write 'N/A')*

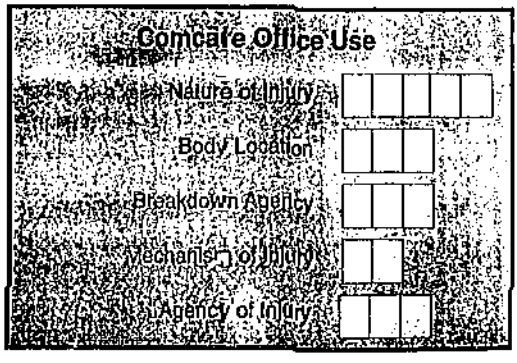
20 Describe the injury or illness, including the parts of the body that were affected.

21 Describe how the incident happened.

We need to know

- What ***started*** the sequence of events
- The ***sequence*** of events
- The ***final thing*** that happened
- The name of any particular chemical, product, process or equipment that was involved

Please continue on the next page



22 What is the address where the incident happened?

Postcode

23 What is the exact location within the above address where the incident happened?
(e.g. employee's desk, machine shop, fire stairs)

24 Was the incident on your employer's premises?

No ▶ *Go to* 25

Yes ▶ *Go to* 26

25 What was the normal workplace, depot or base?

Postcode

26 Have you or your employer *already taken* or do you *propose to take* any of the following actions to prevent similar incidents?

	Already taken	Propose to take	No action
Change to induction training			
Change to on-going training			
Modify equipment			
Change to work procedures			
Change to work environment			
Equipment maintenance			
Other job redesign			
Other, *specify below*			

27 Your name.

28 Your classification or designation.
If you don't have a classification, describe the duties you perform.

29 Your work phone number.

( )

30 Signature and date

/ /

For further help please contact your Comcare Australia State OH&S Manager

ACT
Phone: (06) 276 0333
Fax: (06) 247 2136

New South Wales
Phone: (02) 289 9511
Fax: (02) 281 7909

Victoria
Phone: (03) 9652 355[illegible]
Fax: (03) 9650 2996

Queensland
Phone: (07) 3233 1311
Fax: (07) 3233 1390

Western Australia
Phone: (09) 480 1444
Fax: (09) 322 7080

Tasmania
Phone (002) 23 1366
Fax: (002) 34 5685

South Australia or Northern Territory
Phone: (08) 224 1600
or (008) 888 468
Fax: (08) 223 3721

Appendix 3 Data coding details

Accident severity

severity category 1	=	death
severity category 2	=	serious personal injury
severity category 3	=	incapacity > 5 days
severity category 4	=	dangerous occurrence

Time of the day

1	=	accident occurred between 0000-0059 hours;
2	=	accident occurred between 0100-0159 hours
3	=	accident occurred between 0200-0259 hours
4	=	accident occurred between 0300-0359 hours
5	=	accident occurred between 0400-0459 hours
6	=	accident occurred between 0500-0559 hours
7	=	accident occurred between 0600-0659 hours
8	=	accident occurred between 0700-0759 hours
9	=	accident occurred between 0800-0859 hours
10	=	accident occurred between 0900-0959 hours
11	=	accident occurred between 1000-1059 hours
12	=	accident occurred between 1100-1159 hours
13	=	accident occurred between 1200-1259 hours
14	=	accident occurred between 1300-1359 hours
15	=	accident occurred between 1400-1459 hours
16	=	accident occurred between 1500-1559 hours
17	=	accident occurred between 1600-1659 hours
18	=	accident occurred between 1700-1759 hours
19	=	accident occurred between 1800-1859 hours
20	=	accident occurred between 1900-1959 hours
21	=	accident occurred between 2000-2059 hours

22	=	accident occurred between 2100-2159 hours
23	=	accident occurred between 2200-2259 hours
24	=	accident occurred between 2300-2359 hours

Day of the week

1	=	Sunday
2	=	Monday
3	=	Tuesday
4	=	Wednesday
5	=	Thursday
6	=	Friday
7	=	Saturday

Month of the year

1	=	January
2	=	February
3	=	March
4	=	April
5	=	May
6	=	June
7	=	July
8	=	August
9	=	September
10	=	October
11	=	November
12	=	December

Age of the affected person at the time of the accident

1	=	between 18 and 24 years
2	=	between 25 and 29 years
3	=	between 30 and 34 years
4	=	between 35 and 39 years
5	=	between 40 and 44 years
6	=	between 45 and 49 years
7	=	between 50 and 54 years
8	=	between 55 and 59 years
9	=	between 60 and 64 years
10	=	greater than 65 years

Number of years work experience at the time of the accident

1 = < 1 years work experience

2 = greater than 1 but less than 2 years work experience

3 = greater than 2 but less than 5 years work experience

4 = greater than 5 but less than 10 years work experience

5 = greater than 10 but less than 20 years work experience

6 = greater than 20 years work experience

Nature of injury (NOI)

1 = injury and poisoning

2 = diseases of the nervous system and sense organs

3 = diseases of the musculoskeletal system and connective tissue

4 = diseases of the skin and subcutaneous tissue

5 = diseases of the digestive system

6 = infectious and parasitic diseases

7 = diseases of the respiratory system

8 = diseases of the circulatory system

9 = neoplasms (cancers and benign tumours)

10 = mental disorders

11 = other diseases

Bodily location of the injury

1 = head

2 = neck

3 = trunk

4 = upper limbs

5 = lower limbs

6 = multiple locations

7 = systemic locations

8 = non-physical locations

9 = unspecified locations

Mechanism of injury -

1	=	falls, trips and slips of a person
2	=	hitting object with a part of the body
3	=	being hit by moving objects
4	=	sound and pressure
5	=	body stressing
6	=	heat, radiation and electricity
7	=	chemicals and other substances
8	=	biological factors
9	=	mental stress
10	=	other and unspecified mechanisms of injury

Agency of injury

1	=	machinery and (mainly) fixed plant
2	=	mobile plant and transport
3	=	powered equipment, tools and appliances
4	=	non-powered hand tools, appliances and equipment
5	=	chemicals and chemical products
6	=	materials and substances
7	=	environmental agencies
8	=	animal, human and biological agencies
9	=	other and unspecified agencies

Breakdown agency

1	=	machinery and (mainly) fixed plant
2	=	mobile plant and transport
3	=	powered equipment, tools and appliances

4	=	non-powered hand tools, appliances and equipment
5	=	chemicals and chemical products
6	=	materials and substances
7	=	environmental agencies
8	=	animal, human and biological agencies
9	=	other and unspecified agencies

Appendix 4 Public holidays between 1 July 1993 and 02 December 1995

04.10.93	Queen's birthday
27.12.93	Christmas day public holiday
28.12.93	Boxing day
29.12.93	Additional public holiday
03.01.94	New Year's day
26.01.94	Australia day
07.03.94	Labour day
01.04.94	Good Friday (Easter)
04.04.94	Easter Monday
25.04.94	Anzac day
06.06.94	Foundation day
03.10.94	Queen's birthday
26.12.94	Christmas public holiday
27.12.94	Boxing day public holiday
28.12.94	Additional public holiday
02.01.95	New year's day
26.01.95	Australia day
06.03.95	Labour day
14.04.95	Good Friday (Easter)
17.04.95	Easter Monday
25.04.95	Anzac day
05.06.95	Foundation day
02.10.95	Queen's birthday
25.12.95	Christmas day
26.12.95	Boxing day
27.12.95	Additional public holiday

Appendix 5 Gender split between 1 July 1993 and 02 December 1995

TABLE 8. CIVILIAN LABOUR FORCE, STATES: SEASONALLY ADJUSTED SERIES—*continued*

Month	Males						Females						Persons					
	Employed		Unemployed	Labour force	Unemployment rate	Participation rate	Employed		Unemployed	Labour force	Unemployment rate	Participation rate	Employed		Unemployed	Labour force	Unemployment rate	Participation rate
	Full-time workers	Total	'000		per cent		Full-time workers	Total	'000		per cent		Full-time workers	Total	'000		per cent	
WESTERN AUSTRALIA																		
1993 —																		
June	404.2	449.6	44.0	493.6	8.9	76.7	170.2	315.8	32.7	348.5	9.4	53.7	574.4	765.4	76.7	842.1	9.1	65.2
July	403.0	450.9	44.6	495.5	9.0	76.9	169.2	315.5	32.0	347.5	9.2	53.5	572.3	766.4	76.6	843.0	9.1	65.2
August	405.9	451.9	45.5	497.5	9.2	77.2	168.6	314.1	32.2	346.3	9.3	53.2	574.5	766.0	77.8	843.8	9.2	65.1
September	407.6	454.0	45.1	499.1	9.0	77.3	168.6	317.1	31.2	348.3	9.0	53.5	576.2	771.2	76.3	847.5	9.0	65.4
October	405.3	452.9	45.3	498.2	9.1	77.1	174.4	320.1	31.7	351.8	9.0	53.9	579.7	773.0	77.0	850.0	9.1	65.5
November	406.2	455.3	46.6	501.8	9.3	77.5	171.0	321.0	32.7	353.7	9.2	54.2	577.2	776.3	79.2	855.5	9.3	65.8
December	409.0	453.5	47.1	500.7	9.4	77.3	173.1	320.3	31.8	352.1	9.0	53.9	582.1	773.9	78.9	852.8	9.3	65.5
1994 —																		
January	407.7	455.1	45.5	500.6	9.1	77.1	174.4	328.9	31.8	360.7	8.8	55.1	582.1	784.0	77.4	861.3	9.0	66.1
February	414.3	457.9	43.5	501.5	8.7	77.2	173.4	323.9	33.1	357.1	9.3	54.4	587.7	781.9	76.7	858.5	8.9	65.8
March	411.9	459.8	42.5	502.3	8.5	77.2	175.3	323.8	28.3	352.1	8.0	53.6	587.2	783.6	70.8	854.5	8.3	65.3
April	411.1	459.5	40.0	499.5	8.0	76.6	176.8	329.0	29.5	358.5	8.2	54.5	587.9	788.5	69.5	858.0	8.1	65.5
May	411.2	460.3	39.9	500.3	8.0	76.6	179.7	325.1	31.8	357.0	8.9	54.2	590.9	785.5	71.8	857.2	8.4	65.4
June	410.5	457.5	42.6	500.1	8.5	76.5	178.3	327.1	33.7	360.8	9.3	54.7	588.8	784.7	76.2	860.9	8.9	65.6
July	417.0	465.2	41.8	507.0	8.2	77.4	180.3	337.1	29.1	366.2	8.0	55.4	597.2	802.3	70.9	873.2	8.1	66.4
August	417.1	463.1	40.8	503.9	8.1	76.8	179.8	335.2	28.3	363.5	7.8	54.9	596.9	798.3	69.1	867.5	8.0	65.8
TASMANIA																		
1993 —																		
June	98.6	109.9	17.7	127.5	13.9	71.3	44.2	84.3	10.3	94.5	10.9	51.0	142.9	194.1	27.9	222.1	12.6	61.0
July	98.5	109.8	18.1	127.9	14.1	71.5	43.5	82.3	9.8	92.1	10.7	49.7	142.1	192.1	27.9	220.0	12.7	60.4
August	98.2	109.0	18.2	127.2	14.3	71.0	42.7	81.6	10.8	92.3	11.7	49.8	140.8	190.6	28.9	219.5	13.2	60.2
September	98.9	109.8	16.6	126.4	13.2	70.6	43.0	81.3	10.9	92.2	11.8	49.7	141.9	191.1	27.5	218.6	12.6	60.0
October	98.5	110.1	18.0	128.1	14.1	71.5	41.5	79.3	10.5	89.8	11.7	48.4	139.9	189.3	28.6	217.9	13.1	59.7
November	98.0	109.0	17.8	126.8	14.1	70.7	42.5	82.2	9.9	92.2	10.8	49.6	140.6	191.2	27.8	219.0	12.7	60.0
December	101.7	113.4	16.6	130.1	12.8	72.4	43.3	83.4	9.4	92.8	10.1	49.9	145.0	196.8	26.0	222.8	11.7	61.0
1994 —																		
January	99.3	112.3	16.9	129.2	13.1	71.9	42.7	83.0	9.0	92.0	9.8	49.5	142.0	195.3	25.9	221.3	11.7	60.5
February	100.5	113.3	17.9	131.2	13.6	73.0	43.2	84.2	9.1	93.3	9.8	50.2	143.7	197.5	27.0	224.5	12.0	61.4
March	98.7	112.2	18.0	130.2	13.9	72.4	42.0	82.4	8.4	90.8	9.2	48.8	140.7	194.6	26.4	221.0	11.9	60.4
April	99.9	111.2	16.8	127.9	13.1	71.2	40.4	81.5	8.7	90.1	9.6	48.4	140.3	192.6	25.4	218.1	11.7	59.6
May	99.8	112.4	16.0	128.4	12.5	71.4	42.4	83.8	9.2	93.1	9.9	50.0	142.2	196.3	25.2	221.5	11.4	60.5
June	101.4	112.5	14.1	126.6	11.1	70.4	40.1	84.1	7.5	91.6	8.2	49.2	141.5	196.6	21.6	218.2	9.9	59.6
July	101.0	112.6	14.5	127.1	11.4	70.7	41.3	83.4	9.4	92.8	10.1	49.9	142.3	196.1	23.9	220.0	10.9	60.1
August	99.1	112.0	14.3	126.3	11.3	70.2	40.5	80.6	7.8	88.4	8.8	47.5	139.7	192.6	22.1	214.7	10.3	58.6

TABLE 8. CIVILIAN LABOUR FORCE, STATES: SEASONALLY ADJUSTED SERIES—*continued*

Month	Males						Females						Persons					
	Employed		Unemployed	Labour force	Unemployment rate	Participation rate	Employed		Unemployed	Labour force	Unemployment rate	Participation rate	Employed		Unemployed	Labour force	Unemployment rate	Participation rate
	Full-time workers	Total					Full-time workers	Total					Full-time workers	Total				
	'000				per cent		'000				per cent		'000				per cent	
WESTERN AUSTRALIA																		
1994 —																		
April	411.1	459.5	41.8	501.2	8.3	76.9	177.1	328.2	30.4	358.7	8.5	54.5	588.2	787.7	72.2	859.9	8.4	65.7
May	411.3	460.0	40.8	500.8	8.2	76.7	178.4	325.4	31.7	357.1	8.9	54.2	589.7	785.4	72.5	857.9	8.5	65.4
June	411.2	458.3	42.5	500.8	8.5	76.6	178.2	327.3	33.8	361.1	9.4	54.7	589.3	785.6	76.2	861.9	8.8	65.6
July	416.0	463.8	41.8	505.5	8.3	77.2	180.0	336.9	29.2	366.0	8.0	55.4	596.1	800.6	70.9	871.6	8.1	66.3
August	416.2	462.6	40.5	503.1	8.0	76.7	180.2	335.3	28.3	363.5	7.8	54.9	596.5	797.9	68.7	866.6	7.9	65.8
September	416.1	464.1	39.8	503.9	7.9	76.7	180.8	333.4	31.0	364.5	8.5	55.0	596.9	797.5	70.9	868.4	8.2	65.8
October	410.4	463.9	38.1	502.0	7.6	76.3	184.3	341.4	27.8	369.2	7.5	55.6	594.7	805.3	65.9	871.2	7.6	65.9
November	412.0	468.3	40.1	508.4	7.9	77.1	186.2	340.2	28.4	368.5	7.7	55.4	598.2	808.5	68.5	877.0	7.8	66.2
December	415.8	471.0	37.6	508.6	7.4	77.0	185.5	345.7	26.3	372.0	7.1	55.8	601.3	816.7	63.9	880.5	7.3	66.4
1995 —																		
January	416.8	472.5	39.9	512.5	7.8	77.5	183.2	344.4	26.4	370.8	7.1	55.6	600.0	816.9	66.4	883.3	7.5	66.5
February	417.1	466.6	46.0	512.6	9.0	77.4	192.1	349.2	26.0	375.2	6.9	56.1	609.2	815.8	72.0	887.8	8.1	66.7
March	423.2	476.4	37.3	513.8	7.3	77.4	188.3	350.3	26.9	377.2	7.1	56.3	611.5	826.7	64.2	890.9	7.2	66.8
April	426.1	479.3	41.2	520.6	7.9	78.3	196.7	359.0	24.8	383.8	6.5	57.2	622.8	838.3	66.1	904.4	7.3	67.7
May	426.3	476.6	38.7	515.3	7.5	77.3	194.8	358.5	27.7	386.2	7.2	57.5	621.0	835.1	66.4	901.5	7.4	67.4
June	430.3	477.8	36.1	513.9	7.0	77.0	186.0	351.2	29.2	380.4	7.7	56.5	616.3	829.0	65.3	894.3	7.3	66.7
TASMANIA																		
1994 —																		
April	100.2	112.4	16.8	129.2	13.0	71.8	40.7	82.2	8.8	91.0	9.6	48.9	140.9	194.6	25.6	220.2	11.6	60.2
May	100.1	112.5	16.2	128.7	12.6	71.6	42.1	83.4	9.1	92.5	9.8	49.7	142.2	195.9	25.3	221.2	11.4	60.4
June	101.5	112.4	14.2	126.7	11.2	70.4	40.6	83.2	7.5	90.7	8.2	48.7	142.1	195.7	21.7	217.4	10.0	59.6
July	100.7	112.5	14.7	127.2	11.5	70.7	41.2	82.9	9.2	92.0	10.0	49.4	141.8	195.4	23.8	219.2	10.9	59.9
August	99.5	112.4	14.5	126.9	11.4	70.5	40.6	80.9	7.9	88.7	8.9	47.7	140.0	193.3	22.3	215.6	10.4	58.9
September	99.3	112.9	15.0	127.9	11.7	71.0	41.6	82.2	8.8	91.0	9.7	48.9	141.0	195.1	23.8	218.9	10.9	59.5
October	99.6	115.3	14.2	129.6	11.0	72.0	41.0	80.3	9.3	89.5	10.3	48.1	140.6	195.6	23.5	219.1	10.7	59.6
November	100.5	113.5	15.0	128.5	11.7	71.4	43.8	81.4	9.6	91.0	10.6	48.9	144.4	194.9	24.6	219.6	11.2	59.9
December	100.7	114.6	14.9	129.5	11.5	71.9	43.2	80.7	9.2	89.9	10.2	48.2	143.9	195.3	24.1	219.4	11.0	59.9
1995 —																		
January	100.6	113.8	15.4	129.1	11.9	71.6	44.2	83.5	10.3	93.8	11.0	50.3	144.7	197.2	25.7	222.9	11.5	60.5
February	99.0	112.2	16.3	128.5	12.7	71.3	43.9	82.5	9.4	91.9	10.2	49.3	142.9	194.7	25.7	220.4	11.7	60.1
March	100.8	114.2	14.0	128.3	10.9	71.1	45.6	85.0	8.8	93.8	9.4	50.2	146.3	199.2	22.8	222.0	10.3	60.5
April	99.4	114.5	14.9	129.4	11.5	71.7	46.4	88.3	7.5	95.8	7.8	51.4	145.8	202.8	22.4	225.2	9.9	61.4
May	99.6	114.1	15.0	129.1	11.6	71.6	44.4	86.6	8.4	94.9	8.8	50.9	144.0	200.7	23.4	224.1	10.4	61.0
June	100.2	113.4	14.3	127.7	11.2	70.8	46.1	85.8	6.4	92.2	6.9	49.4	146.3	199.2	20.7	219.9	9.4	59.9

Appendix 6 Ethical undertaking by researcher with Comcare.

UNDERTAKING

I David Wright hereby undertake that:

In accordance with the requirements of the *Privacy Act 1988* and the obligation placed upon me not to disclose material I have had access to in the course of my employment with the Commonwealth, I will only utilise information, made available by Comcare, in such a way that will not involve a breach of confidence or contravention of the Privacy Act 1988 or prejudice the commercial operations of Comcare Australia.

I further undertake to use and publish information provided to me by Comcare in such a manner that will not enable the identification of a person or persons or the correlation of incidents with individuals and that the information will be used only for the purpose of preparing my Master Thesis in Health Sciences with Edith Cowan University. Any data supplied to me by Comcare will be stored in a secure manner for a period of five years and destroyed at the end of that period.

I further undertake to provide Comcare with a written copy of the completed Masters Thesis or written summary or recommendations thereof as required by Comcare management.

Dated this eighth day of August 1995.

D Wright
(signature)
DAVID WRIGHT

Appendix 7 Intellectual property agreement between Comcare and the researcher

This DEED is made eighth day of August 1995

between

COMCARE AUSTRALIA

and

DAVID WRIGHT

WHEREAS:

A - David Wright has requested to use the data recorded on the Prevention, Rehabilitation and Compensation System (PRACSYS);

B - to undertake a course of study using the data recorded on the PRACSYS;

C - Comcare has agreed that David Wright may use PRACSYS subject to the following terms and conditions; and,

D - David Wright has accepted these terms and conditions.

Now this DEED witnesses as follows:

1. INTERPRETATION

Definitions:

'Comcare Material' means any Material provided by Comcare to David Wright for the purposes of the course of study described in Item A of Schedule 1 or which is copied or derived from Material so provided.

'Confidential Information' means information that:

(a) is by its nature confidential;

(b) is designated by Comcare as confidential; or

(c) that David Wright knows or ought to know is confidential;

but does not include information which:

(d) is or becomes public knowledge other than by breach of this Deed;

(e) has been independently developed or acquired by David Wright.

'Course of study' means the course leading to the degree of Master of Health Sciences at Edith Cowan University as described in Item A of Schedule 1 and any work associated with that course that is related to any Deed Material.

'Deed Material' means all Material:

(a) brought into existence for the purpose of performing the course of study described in Item A of Schedule 1;

(b) incorporated in, supplied or required to be supplied along with the Material referred to in paragraph (a); or

(c) copied or derived from Material referred to in paragraphs (a) or (b).

'Intellectual Property' includes all copyright and neighbouring rights, all rights in relation to inventions (including patent rights), plant varieties, registered and unregistered trademarks (including service marks), registered designs, Confidential Information (including trade secrets and know how) and circuit layouts, and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields.

'Material' includes documents, equipment, software, goods, information and data stored by any means.

'Project Officer' means the person defined in Item A of Schedule 2 employed by Comcare as the person to act as the contact person on behalf of Comcare at the addresses listed in Item B of Schedule 2.

2. COURSE OF STUDY

David Wright proposes to perform the course of study described in Item A of Schedule 1.

3 ENTIRE AGREEMENT AND VARIATION

3.1 This Deed constitutes the entire agreement between the parties and supersedes all communications, negotiations, arrangements and agreements, whether oral or written, between the parties with respect to the subject matter of this Deed.

3.2 No agreement or understanding varying or extending this Deed including in particular the scope of the course of study described in Schedule 1 shall be legally binding upon either party unless in writing and signed by both parties.

4. COMMENCEMENT

This Deed commences on the date of signing.

5. DEED MATERIAL

5.1 Ownership of all Deed Material shall vest in Comcare upon creation.

5.2 Upon the expiration or earlier termination of this Deed David Wright shall deliver to Comcare all Deed Material remaining in his possession.

5.3 The preceding sub-clauses of this clause apply subject to any stipulation to the contrary in Item B 1 of Schedule 1.

5.4 Where Deed Material is published in any form, Comcare will be acknowledged and copies or reports of the publication shall be provided to the Project Officer.

6. COMCARE MATERIAL

6.1 Ownership of all Comcare Material remains vested at all times in Comcare.

6.2 Upon the expiration or earlier termination of this Deed, David Wright shall return to Comcare all Comcare Material remaining in his possession.

6.3 The preceding sub-clauses of this clause apply subject to any stipulation to the contrary in Item B2 of Schedule 1.

6.4 David Wright shall ensure that Comcare Material is used, copied, supplied or reproduced only for the purposes of this Deed.

6.5 David Wright shall use Comcare Material strictly in accordance with any conditions or restrictions set out in Item B3 of Schedule 1, or notified from time to time in writing by Comcare.

6.6 Where Comcare Material is included in a publication in any form, Comcare will be acknowledged and copies or reports of the publication shall be provided to the Project Officer.

7. INTELLECTUAL PROPERTY RIGHTS

7.1 Subject to this clause, Intellectual Property in all Deed Material vests immediately in Comcare.

7.2 Sub-clause 7.1 does not affect the ownership of Intellectual Property in any existing Deed Material which is specified in Item B4 of Schedule 1. However, David Wright grants to Comcare a permanent, irrevocable royalty-free, non-exclusive licence (including a right of sub-licence) to use, reproduce, adapt and exploit the Material anywhere in the world. Notwithstanding Part VII of the Copyright Act 1968, publication of the Material in accordance with this licence shall not affect such ownership.

7.3 If requested by Comcare to do so, David Wright shall bring into existence, sign, execute or otherwise deal with any document which may be necessary or desirable to give effect to sub-clause 7.2.

7.4 David Wright warrants that he is entitled, or will be entitled or will procure that he is entitled at the relevant time, to deal with the Intellectual Property in any Deed Material in the manner provided for in this clause.

7.5 David Wright shall at all times indemnify and hold harmless the Commonwealth and Comcare, and their officers, employees and agents (in this clause referred to as 'those indemnified') from and against any loss (including legal costs and expenses on a solicitor/own client basis) or liability incurred or suffered by any of those indemnified arising from any claim, suit, demand, action or proceeding by any person in respect of any infringement of Intellectual Property rights by David Wright, his supervisors, colleagues, officers, employees, agents or delegates in the course of, or incidental to, performing the course of study or the use by Comcare of the Deed Material.

7.6 The indemnity referred to in clause 7. 5 shall survive the expiration or termination of this Deed.

8. DISCLOSURE OF INFORMATION

8.1 David Wright shall not, without the prior written approval of Comcare, disclose to any person other than Comcare, any Confidential Information contained in Comcare

Material or Deed Material. In giving written approval Comcare may impose such terms and conditions as it thinks fit.

8.2 Comcare may at any time require David Wright to give and to arrange for his supervisors, colleagues, officers, employees, agents or delegates engaged in the performance of the course of study to give written undertakings, in a form required by Comcare, relating to the non-disclosure of such confidential information. David Wright shall promptly arrange for all such undertakings to be given.

8.3 The obligation on David Wright under this clause shall not be taken to have been breached where the information referred to is legally required to be disclosed.

8.4 This clause shall survive the expiration or termination of this Deed.

9. PRIVACY ACT 1988 (Commonwealth)

David Wright agrees :

(a) to comply with the Information Privacy Principles set out in section 14 of the Privacy 1988 ('the Act') which concern the security, use and disclosure of personal information to the extent that the content of those principles apply to the types of activities David Wright is undertaking under this Deed;

(b) to co-operate with any reasonable demands or inquiries made by the Privacy Commissioner;

(c) to ensure that any person who has an access level which would enable that person to obtain access to any personal information (as defined in the Act) is made aware of, and undertakes in writing, to observe the Information Privacy Principles referred to in paragraph(a) above;

(d) to comply in so far as is practicable with any policy guidelines laid down or issued by the Privacy Commissioner from time to time relating to the handling of personal information;

(e) to comply as far as practicable with any reasonable direction of the Project Officer to observe any recommendation of the Privacy Commissioner relating to any acts or practices of David Wright that the Privacy Commissioner considers breach the obligation in paragraph (a) above; and

(f) to indemnify Comcare in respect of any loss, liability or expense suffered or incurred by Comcare arising out of or in connection with a breach of the obligations of David Wright under this clause or any misuse of personal information by David Wright or any disclosure by David Wright in breach of an obligation of confidence whether arising under the Act or otherwise.

10. USE OF COMCARE'S PREMISES AND FACILITIES

David Wright must, when using Comcare's premises or facilities, comply with all reasonable directions and procedures relating to occupational health, safety and security in effect at those premises or in regard to those facilities, as notified by Comcare or as might reasonably be inferred from the use to which the premises or facilities are being put.

11. INDEMNITY

11.1 Subject to the provisions of this Deed, David Wright shall at all times indemnify and hold harmless the Commonwealth and Comcare, its officers, employees and agents (in

this clause referred to as "those indemnified") from and against any loss (including legal costs and expenses on a solicitor/own client basis), or liability, reasonably incurred or suffered by any of those indemnified arising from any claim, suit, demand, action or proceeding by any person against any of those indemnified where such loss or liability was caused by any wilful, unlawful or negligent act or omission of David Wright, his supervisors, colleagues, officers, employees, agents or delegates in connection with this Deed.

11.2 David Wright's liability to indemnify the Commonwealth and Comcare under clause 11.1 shall be reduced proportionally to the extent that any act or omission of Comcare or its officers, employees or agents contributed to the loss or liability.

11.3 The indemnity referred to in clause 11.1 shall survive the expiration or termination of this Deed.

12. CONFLICT OF INTEREST

12.1 David Wright warrants that, to the best of his knowledge after making diligent inquiry, at the date of signing this Deed no conflict of interest exists or is likely to arise in the performance of its obligations under this Deed by himself or by any of his supervisors, colleagues, officers, employees, agents or delegates.

12.2 If during the term of this Deed a conflict of interest arises, or appears likely to arise, David Wright undertakes to notify Comcare immediately in writing and to take such steps as Comcare may reasonably require to resolve or otherwise deal with the conflict. If David Wright fails to notify Comcare or is unable or unwilling to resolve or deal with the conflict as required, Comcare may terminate this Deed in accordance with the provisions of clause 13.

12.3 David Wright shall not, and shall ensure that any supervisors, colleagues, officers, employees, agents or delegates of David Wright does not, engage in any activity or obtain any interest during the course of this course of study that is likely to conflict with or restrict David Wright in providing the results of the course of study to Comcare fairly and independently.

13. TERMINATION

Comcare may, at any time by written notice, terminate this Deed, in whole or in part.

14. COMPLIANCE WITH LAW

David Wright shall in carrying out this Deed comply with the provisions of any relevant statutes, regulations, by-laws, and requirements of any Commonwealth, State, Territory or local authority.

15. APPLICABLE LAW

This Deed shall be governed by and construed in accordance with the laws of the Australian Capital Territory and the parties agree, subject to the Deed that the Courts of that Australian Capital Territory shall have jurisdiction to entertain any action in respect of, or arising out of, this Deed.

16. NOTICES

16.1 Any notice, request or other communication to be given or served pursuant to this Deed shall be in writing and dealt with as follows:

(a) if given by David Wright to Comcare - addressed and forwarded to the Project Officer at Comcare at the address indicated in Item B of Schedule 2.

(b) if given by Comcare to David Wright - signed by the Project Officer and forwarded to David Wright at the address indicated in Item A of Schedule 1.

16.2 Any such notice, request or other communication shall be delivered by hand or sent by pre-paid security post, facsimile or telex, to the address of the party to which it is sent.

16.3 Any notice, request or other communication will be deemed to be received:

(a) if delivered personally, on the date of delivery;

(b) if sent by pre-paid security post, on the day that the acknowledgment of delivery is completed by the recipient;

(c) if sent by facsimile, on the business day next following the day of dispatch providing that the sender receives an 'OK' code in respect of the transmission or other code indicating successful transmission and is not notified by the recipient by close of business of the next business day following the day of dispatch that the transmission was illegible; and,

16.4 Electronic mail in any form is not a sufficient notice, request or other communication for the purposes of this Deed.

SCHEDULE 1

PROJECT PROPOSAL (see clause 2)

A. 'Course of Study' (see sub-clauses 1.1 and clause 2)

Title of the course of study	Master of Health Sciences (Occupational Health)
Name of the institution	Edith Cowan University
Name of School	Health Sciences
Name of primary supervisor	Dr David Biggins
Address for the institution	Edith Cowan University Joondalup Drive JOONDALUP WA 6027 Telephone (09) 405 5555 Facsimile (09) 300 1257

Statement of work to be undertaken - see attached research proposal

B. 'Deed Material'

Master's Thesis entitled " Recent accident experience of Commonwealth employees in Western Australia."

B1 (see sub-clause 5.3)

David Wright may retain 6 copies of the final published Thesis".

B2 (see sub-clause 6.3)

David Wright is entitled to retain Pracsys data for a period of 5 years, whereupon it will be destroyed as per ethical considerations outlined in the research proposal.

B3 (see sub-clause 6.5 and note sub-clause 8.1)

David Wright is to be given data contained in Pracsys which has been extracted from original health and saftey reports submitted to Comcare Australia WA Office between 01.07.94 and 30.06.95.

B4 (see sub-clause 7.2)

Thesis literature review.

C. Time-frame (see clause 2)

The completion date for the proposed research is April 1996. A proposed timetable is outlined in the attached research proposal.

SCHEDULE 2

COMCARE'S PROJECT OFFICER AND CONTACT ADDRESSES

A. Project Officer' (see clause 1 and clause 16)

The Project Officer is : Ms Trish Ray.
Designation : OHS Manager (WA).

B 'Comcare's Address' (see clause 16)

Comcare Australia
West Australian Office
GPO Box 9905
PERTH WA 6001

Facsimile: (09) 322 7080
Telephone : (09) 480 1444

Comcare Australia
West Australian Office
1 Havelock Street
WEST PERTH WA 6005

IN WITNESS WHEREOF David Wright has executed this Deed.

SIGNED and DELIVERED by)
David Wright)
(David Wright))
in the presence of,)
)
(Witnesses name)

Address of witness _____

6/40 Matheson Rd

APPLECROSS 6153

Appendix 8 Comparative accident frequency data for Western Australian government employees

WorkSafe Western Australia

Government of Western Australia

David Wright
26A Knox Crs
MELVILLE WA 6156

Your Ref:
Our Ref: 002001v07
Enquiries: I Samnakay
Date: 10 June, 1997

Dear David

OCCUPATIONAL SAFETY AND HEALTH DATA

I refer to your letter of 30 May requesting information on WA Government sector statistics for the 1993/94 -1995/96 financial years.

The data provided covers the Australian and New Zealand Standard Industrial Classification of Government Administration. As discussed over the telephone the data on day of the week could not be extracted with ease, and if required, this information can be provided to you at a later date.

The above information is based on work related injuries and diseases involving one day (or shift) or more time lost from work for which workers' compensation claims were lodged within 1994/95 and 1995/96.

If you require any further information in relation to these statistics please contact me on 9327 8671.

Yours sincerely

Iqbal Samnakay
Senior Policy and Research Officer

WESTCENTRE 1260 Hay Street West Perth.
Postal Address: P.O. Box 294 West Perth Western Australia 6872. **Telephone:** (09) 327 8777. **Facsimile:** (09) 321 8973.
Internet Address: http://www.wt.com.au/safetyline **Email Address:** safety@worksafe.wa.gov.au **TTY:** (09) 327 8838

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Memory allows for 11,915 cells with 2 dimensions for general CROSSTABS.

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	0	800	986	808	2594
		30.8	38.0	31.1	100.0
		100.0	100.0	100.0	
	Column Total	800	986	808	2594
		30.8	38.0	31.1	100.0

Number of Missing Observations: 0

NACCMONT NACCMONTH by NYEAR

NACCMONT	Count / Row Pct / Col Pct	NYEAR 9394	9495	9596	Row Total
	1	48	86	27	161
		29.8	53.4	16.8	6.2
		6.0	8.7	3.3	
	2	99	82	32	213
		46.5	38.5	15.0	8.2
		12.4	8.3	4.0	
	3	79	109	20	208
		38.0	52.4	9.6	8.0
		9.9	11.1	2.5	
	4	71	69	27	167
		42.5	41.3	16.2	6.4
		8.9	7.0	3.3	
	5	68	113	18	199
		34.2	56.8	9.0	7.7
		8.5	11.5	2.2	
	6	90	128	7	225
		40.0	56.9	3.1	8.7
		11.3	13.0	.9	
	7	61	61	99	221
		27.6	27.6	44.8	8.5
		7.6	6.2	12.3	
	8	64	74	76	214
		29.9	34.6	35.5	8.2
		8.0	7.5	9.4	
	9	56	63	106	225
		24.9	28.0	47.1	8.7
		7.0	6.4	13.1	
	10	43	63	154	260
		16.5	24.2	59.2	10.0
		5.4	6.4	19.1	
	11	65	69	175	309
		21.0	22.3	56.6	11.9
		8.1	7.0	21.7	
	12	56	69	67	192

	29.2	35.9	34.9	7.4
	7.0	7.0	8.3	
Column	800	986	808	2594
Total	30.8	38.0	31.1	100.0

Number of Missing Observations: 0

NACCTIME by NYEAR

NACCTIME	Count / Row Pct / Col Pct	NYEAR 9394	9495	9596	Row Total
	0	17	9	10	36
		47.2	25.0	27.8	1.4
		2.1	.9	1.2	
	1	3	6	7	16
		18.8	37.5	43.8	.6
		.4	.6	.9	
	2	5	9	11	25
		20.0	36.0	44.0	1.0
		.6	.9	1.4	
	3	2	4	3	9
300-359		22.2	44.4	33.3	.3
		.3	.4	.4	
	4	1	2		3
400-459		33.3	66.7		.1
		.1	.2		
	5	5	8	6	19
500-559		26.3	42.1	31.6	.7
		.6	.8	.7	
	6	15	28	19	62
600-659		24.2	45.2	30.6	2.4
		1.9	2.8	2.4	
	7	47	74	57	178
700-759		26.4	41.6	32.0	6.9
		5.9	7.5	7.1	
	8	79	117	80	276
800-859		28.6	42.4	29.0	10.6
		9.9	11.9	9.9	
	9	97	118	110	325
900-959		29.8	36.3	33.8	12.5
		12.1	12.0	13.6	
	10	96	120	103	319
1000-1059		30.1	37.6	32.3	12.3
		12.0	12.2	12.7	
	11	104	98	89	291
1100-1159		35.7	33.7	30.6	11.2
		13.0	9.9	11.0	
	12	70	72	81	223
1200-1259		31.4	32.3	36.3	8.6
		8.8	7.3	10.0	
	13	49	61	50	160
1300-1359		30.6	38.1	31.3	6.2
		6.1	6.2	6.2	
	Column	800	986	808	2594
(Continued)	Total	30.8	38.0	31.1	100.0

NACCTIME by NYEAR

	Count	NYEAR

NACCTIME	Row Pct / Col Pct	9394	9495	9596	Row Total
1400-1459	14	75 31.8 9.4	98 41.5 9.9	63 26.7 7.8	236 9.1
1500-1559	15	66 36.1 8.3	75 41.0 7.6	42 23.0 5.2	183 7.1
1600-1659	16	34 30.6 4.3	48 43.2 4.9	29 26.1 3.6	111 4.3
1700-1759	17	19 36.5 2.4	14 26.9 1.4	19 36.5 2.4	52 2.0
1800-1859	18	7 25.9 .9	10 37.0 1.0	10 37.0 1.2	27 1.0
1900-1959	19	3 23.1 .4	7 53.8 .7	3 23.1 .4	13 .5
2000-2059	20	2 18.2 .3	1 9.1 .1	8 72.7 1.0	11 .4
2100-2159	21	1 11.1 .1	4 44.4 .4	4 44.4 .5	9 .3
2200-2259	22	2 40.0 .3		3 60.0 .4	5 .2
2300-2359	23	1 20.0 .1	3 60.0 .3	1 20.0 .1	5 .2
	Column Total	800 30.8	986 38.0	808 31.1	2594 100.0

Number of Missing Observations: 0

NAGE by NYEAR

NAGE	Count / Row Pct / Col Pct	9394	9495	9596	Row Total
15 - 19	1	21 39.6 2.6	20 37.7 2.0	12 22.6 1.5	53 2.0
20 - 24	2	48 27.9 6.0	67 39.0 6.8	57 33.1 7.1	172 6.6
25 - 34	3	160 29.9 20.0	199 37.2 20.2	176 32.9 21.8	535 20.6
35 - 44	4	247 33.3 30.9	263 35.5 26.7	231 31.2 28.6	741 28.6
45 - 54	5	218 30.2 27.3	276 38.2 28.0	228 31.6 28.2	722 27.8
55 - 59	6	71 29.3 8.9	102 42.1 10.3	69 28.5 8.5	242 9.3

60 - 64	7	30 25.2 3.8	55 46.2 5.6	34 28.6 4.2	119 4.6
65+	8			1 100.0 .1	1 .0
Unknown	9	5 55.6 .6	4 44.4 .4		9 .3
	Column Total	800 30.8	986 38.0	808 31.1	2594 100.0

Number of Missing Observations: 0

NAGENCY by NYEAR

	NYEAR			Page 1 of 1
Count Row Pct Col Pct	9394	9495	9596	Row Total
NAGENCY				
1 Machinery	34 43.6 4.3	29 37.2 2.9	15 19.2 1.9	78 3.0
2 Mobile Plant & T	127 34.9 15.9	145 39.8 14.7	92 25.3 11.4	364 14.0
3 Powered Equip.To	72 35.1 9.0	71 34.6 7.2	62 30.2 7.7	205 7.9
4 Not-Powered Hand	207 33.9 25.9	224 36.7 22.7	179 29.3 22.2	610 23.5
5 Chemicals/Chem.	19 31.1 2.4	26 42.6 2.6	16 26.2 2.0	61 2.4
6 Material/Substan	123 37.5 15.4	123 37.5 12.5	82 25.0 10.1	328 12.6
7 Environmental	99 28.5 12.4	139 40.1 14.1	109 31.4 13.5	347 13.4
8 Animal,Human & B	66 29.3 8.3	55 24.4 5.6	104 46.2 12.9	225 8.7
9 Others & Unspeci	53 14.1 6.6	174 46.3 17.6	149 39.6 18.4	376 14.5
Column Total	800 30.8	986 38.0	808 31.1	2594 100.0

Number of Missing Observations: 0

NANZSIC by NYEAR

	NYEAR			Page 1 of 1
Count Row Pct Col Pct	9394	9495	9596	Row Total
NANZSIC				
12 Government Admin	800 30.8 100.0	986 38.0 100.0	808 31.1 100.0	2594 100.0

Column Total	800 30.8	986 38.0	808 31.1	2594 100.0

Number of Missing Observations: 0

NASCO by NYEAR

NASCO	NYEAR 9394	9495	9596	Row Total
1 MANAGER & ADMINI	20 38.5 2.5	15 28.8 1.5	17 32.7 2.1	52 2.0
2 PROFESSIONAL	40 25.8 5.0	63 40.6 6.4	52 33.5 6.4	155 6.0
3 PARA-PROFESSIONA	107 32.6 13.4	104 31.7 10.5	117 35.7 14.5	328 12.6
4 TRADESPERSONS	97 21.7 12.1	188 42.2 19.1	161 36.1 19.9	446 17.2
5 CLERKS	125 34.8 15.6	116 32.3 11.8	118 32.9 14.6	359 13.8
6 SALESPERSONS	22 31.0 2.8	21 29.6 2.1	28 39.4 3.5	71 2.7
7 PLANT & MACHINE	231 47.5 28.9	159 32.7 16.1	96 19.8 11.9	486 18.7
8 LABOURERS AND RE	158 22.7 19.8	320 45.9 32.5	219 31.4 27.1	697 26.9
Column Total	800 30.8	986 38.0	808 31.1	2594 100.0

Number of Missing Observations: 0

NLOCATIO NLOCATION by NYEAR

NLOCATIO	NYEAR 9394	9495	9596	Row Total
1 Head	65 37.8 8.1	55 32.0 5.6	52 30.2 6.4	172 6.6
2 Neck	49 45.8 6.1	37 34.6 3.8	21 19.6 2.6	107 4.1
3 Trunk	255 30.4 31.9	329 39.2 33.4	255 30.4 31.6	839 32.3
4 Upper limbs	199 30.1 24.9	251 38.0 25.5	211 31.9 26.1	661 25.5
5 Lower limbs	160 31.2 20.0	210 40.9 21.3	143 27.9 17.7	513 19.8
6	48	69	72	189

Multiple	25.4	36.5	38.1	7.3
	6.0	7.0	8.9	
7	4	1	5	12
Systemic	33.3	25.0	41.7	.5
	.5	.3	.6	
8	18	30	49	97
Non-physical	18.6	30.9	50.5	3.7
	2.3	1.0	6.1	
9	2	2		4
Unspc	50.0	50.0		.2
	.3	.2		
Column Total	800 30.8	986 38.0	808 31.1	2594 100.0

Number of Missing Observations: 0

NMECHANI NMECHANISM by NYEAR

Page 1 of 1

NMECHANI	NYEAR 9394	9495	9596	Row Total
0	132	195	128	455
FALLS, TRIP & SL	29.0	42.9	28.1	17.5
	16.5	19.8	15.8	
1	83	78	65	226
HITTING OBJ	36.7	34.5	28.8	8.7
	10.4	7.9	8.0	
2	134	149	149	432
BEING HIT	31.0	34.5	34.5	16.7
	16.8	15.1	18.4	
4	348	452	345	1145
BODY STRESSING	30.4	39.5	30.1	44.1
	43.5	45.8	42.7	
5	15	13	12	40
HEAT, RADIATION	37.5	32.5	30.0	1.5
	1.9	1.3	1.5	
6	32	33	21	86
CHEMICAL, SUBST.	37.2	38.4	24.4	3.3
	4.0	3.3	2.6	
7	2	5	3	10
BIO FACTORS	20.0	50.0	30.0	.4
	.3	.5	.4	
8	18	34	50	102
MENTAL STRESS	17.6	33.3	49.0	3.9
	2.3	3.4	6.2	
9	36	27	35	98
OTHER & UNSPESIF	36.7	27.6	35.7	3.8
	4.5	2.7	4.3	
Column Total	800 30.8	986 38.0	808 31.1	2594 100.0

Number of Missing Observations: 0

NNATURE by NYEAR

Page 1 of 1

NNATURE	NYEAR 9394	9495	9596	Row Total
1	23	37	35	95
Fractures	24.2	38.9	36.8	3.7

	2.9	3.8	4.3	
4	468	580	457	1505
Sprain \strain	31.1	38.5	30.4	58.0
	58.5	58.8	56.6	
8	64	83	65	212
Open wound	30.2	39.2	30.7	8.2
	8.0	8.4	8.0	
9	30	33	25	88
Superficial inju	34.1	37.5	28.4	3.4
	3.8	3.3	3.1	
10	74	86	88	248
Contusion & crus	29.8	34.7	35.5	9.6
	9.3	8.7	10.9	
11	27	19	13	59
Foreign body	45.8	32.2	22.0	2.3
	3.4	1.9	1.6	
12	15	11	10	36
Burns	41.7	30.6	27.8	1.4
	1.9	1.1	1.2	
16	5	4		9
Multiple injurie	55.6	44.4		.3
	.6	.4		
19	33	23	22	78
Others injuries	42.3	29.5	28.2	3.0
	4.1	2.3	2.7	
30	21	39	25	85
Dis. of the musc	24.7	45.9	29.4	3.3
	2.6	4.0	3.1	
40	4	11	5	20
Dis. of the skin	20.0	55.0	25.0	.8
	.5	1.1	.6	
45	6	15	8	29
Hernia	20.7	51.7	27.6	1.1
	.8	1.5	1.0	
91	19	34	49	102
Mental disorders	18.6	33.3	48.0	3.9
	2.4	3.4	6.1	
99	11	11	6	28
Other Diseases	39.3	39.3	21.4	1.1
	1.4	1.1	.7	
Column Total	800 30.8	986 38.0	808 31.1	2594 100.0

Number of Missing Observations: 0

NSEX by NYEAR

Page 1 of 1

NSEX	Count / Row Pct / Col Pct	NYEAR 9394	9495	9596	Row Total
MALE	1	576	648	533	1757
		32.8	36.9	30.3	67.7
		72.0	65.7	66.0	
FEMALE	2	224	338	275	837
		26.8	40.4	32.9	32.3
		28.0	34.3	34.0	
Column Total		800 30.8	986 38.0	808 31.1	2594 100.0

Number of Missing Observations: 0