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The University of the Witswatersrand

School of Public Health

Master of Public Health: Occupational Hygiene

Occupational Injuries at a Paper Enterprise, Mpumalanga, between 2000 – 2004

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Candidate's Declaration

I hereby declare that this research report (dissertation) is my own work written under the supervision of Professor S. Naidoo. It is submitted in partial fulfilment of the requirement for the Degree in Master of Public Health: Occupational Hygiene at the University of the Witwatersrand. It has not been previously submitted, for any degree or examination at any Institution. All quotes are indicated and acknowledged by means of a comprehensive list of reference.

_____ _____

Thembinkosi John Dlamini **Date**

Dedication

This report is dedicated to my wife, Xolile, my children Lwazi, Monde, Deneo and also all my relatives for their support and motivation. To all these people, thank you for believing in me, I have no doubt that, without you, this project would have not been possible.

Abstract

Occupational injury data forms part of the essential information needed for the overall accident prevention strategy for any workplace. It is one of the important tools that is normally used to measure safety performance, as well as to identify the most frequently occurring accidents within a workplace, with the aim of enhancing safety improvement strategies.

Lack of accurate information regarding the type, nature and extent of occupational injuries within this Paper Enterprise has resulted in poor prioritisation of safety services. This study was, therefore, aimed at investigating the types and causes of occupational accidents that occurred in a Paper Mill during 2000 - 2004, thus helping the institution to focus its services accordingly. In achieving this, the following objectives were set:

- To describe the types, nature and extent or severity of occupational injuries within the Paper Mill, between the years 2000 - 2004;
- To identify the most common type of occupational injuries within the Paper Mill, between the years 2000 -2004; and

A retrospective review of all occupational injuries that occurred between the years 2000 and 2004, within the Paper Enterprise was carried out. Three hundred and forty one incidents of injury data were recorded from the Mill's Safety Incident Register and transposed into an occupational Injury Data Sheet, specifically designed for this study. During their transfer the Health and Safety Executive's method of classifying occupational accidents was used, where injuries were classified according to the type of

injury, severity of the injury, part of the body injured and occupation of the employee.). Injuries were counted per incident irrespective of whether an employee has been injured more than once. In determining the rates the Injury Frequency Rate was used (see definition of terms) which uses the man - hours worked, as denominator value, as opposed to the number of employees.

The data was then entered into an Excel spreadsheet, after which it was statistically analysed using Epi - Info. Basic descriptive statistics were used to summarise the data, identifying the most common types of accidents.

The most striking points of the study were that wounds (41.6%) and eye injuries (26.7%) were the most frequently occurring injuries, sustained through slipping and falling (18.2%), poor handling practices (13.8%), as well as wind related (24.0%). Of the total, 65.7% was sustained by the enterprise's own employees, with a Total Incident Rate of 17.0% per 100 employees, which was the highest in all employee categories. Moreover, artisans (38.8%), assistant workers (35.7%), supervisors (22.1%), as well as students and employees with less than one year of employment were the occupations with most injuries.

Encouraging, though, was the steady decline in the Total Injury Frequency Rate (TIFR) on yearly basis, from 17.3 in 2000 to 9.2 in 2004. Especially the First Aid Cases (FAC), which accounted for 89.1% of the total. Contrary to these positive results were Medical Treated Cases (MTC), which showed a sharp increase of 18% in 2004, while the

number of Lost Time Injuries (LTI) remained constant throughout the study period with an average of 2 cases per year.

However, the findings of the study must be considered in light of the fact that the completeness of the incident reporting within the Mill could not be verified. However, the accessibility and ready availability of the clinic facility might have motivated the relatively complete reporting of incidents. Also to be noted is the change in clinical staff, during the period of the study, which might have also had an effect on the consistency of injury assessment, subsequently, affecting the overall classification of injuries within the Mill. The absence of certain denominator data of employees' i.e. total employees within shift, age and certain employment categories has made the calculation of rates impossible, hence comparing changes were difficult.

Besides these possible limitations, this study was able to recommend areas for improvement, especially with regards to equipment and material handling practices, as well as to identify specific incidents associated with slipping and falling. A particular concern that was identified, though, was the high number of injuries sustained by supervisors, reflecting unsatisfactory application of leadership in the areas of safety results, especially with respect to cultural transformation. Therefore, the study recommended a continuous safety awareness and developmental programme for this group (supervisors) including artisans and operators that will address cultural change specifically amongst the new and inexperienced employees, as well as the old and complacent employees within the Mill for the purpose of creating and sustaining an injury free workplace.

The study must, however, be regarded as a preliminary evaluation of the causes of injury, as it is based solely on information derived from the incident register, hence the current findings may provide baseline information. Therefore, further investigations should perhaps be done to determine the contribution of specific conditions, behaviours and work practices to injury occurrences.

Acknowledgement

So many people have contributed in different ways towards ensuring that this research project becomes a success. Their wonderful ideas, support, guidance and encouragement have not gone unnoticed and have undoubtedly enriched the quality of this report. My appreciation goes to the following individuals:

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Definition of Terms

Occupational Injury / Accident

According to the United States Bureau of Statistics (2003:8) an occupational injury is regarded as an injury such as a cut, fracture, bruise, sprain, or an amputation, which results from a work-related event or from a single instantaneous exposure in the work environment. An occupational accident, as often referred to in South African ‘s Compensation for Occupational Injuries and Diseases Act of 1993:8, is defined as an accident that results in personal injury, which arises out of an employee’s employment.

First Aid Case (FAC)

The Health and Safety Executive - Work Safe, Health and Safety Centre defines a First Aid Case (FAC) as a minor work injury that can be treated on the job without any days lost. In certain circumstances, the victim might treat himself / herself or seek treatment from the medical personnel, with no follow up treatment or observation.

Medical Treated Case (MTC)

This is a term used to identify injury claims for “medical aid only”, where the injury is not severe enough to warrant more than one day or full working shift off work, but where the injured person would receive treatment from a doctor, chiropractor, physiotherapist, dentist or any medical professional paid for through the compensation system (The Health and Safety Executive 2002:2)

Lost Time Injury (LTI)

According to the National Institute of Occupational Safety and Health (NIOSH) standards, a Lost Time Injury (LTI) is defined “as any work injury that results in permanent disability or time lost exceeding part of one normal shift”. The following conditions are necessary in defining a Lost Time Injury:

- Time from a workplace is more than a full shift lost, even if the injured worker is able to return to work on the next shift following the incident.
- Any incident incurring one or more lost days (aggregated) is counted as one lost time event.
- Employees who cannot return to work on their next shift, following the incident are also counted as having accrued a Lost Time Injury (LTI).
- However, employees returning on alternative (light) duties are regarded as working (no lost time accrued).

Lost Time Injury Frequency Rate (LTIFR)

This is a measure of injuries that result in lost time (exceeding a full shift) from the workplace. Lost Time Injury Frequency Rate (LTIFR) is calculated as number of lost time injury events per 200 000 man-hours worked.

Formula

Lost Time Injury Frequency Rate (LTIFR) $= \frac{\textbf{Number of Lost Time Injuries X 200 000}}{\textbf{Total number of man-hours worked}}$

Lost Time Injury Severity Rate (LTISR)

This is a measure of how serious the incidents are, based on the number of days lost. It is calculated as the total number of days lost following Lost Time Injury (LTI) events per 100 employees. The issues listed below are important when determining a Lost Time Injury Severity Rate (LTISR).

- Working days lost as a result of the incident that occurred subsequent to the initial return to work should also be counted.
- Part-time worker's lost time is calculated the same way as that of the full time workers, irrespective of the number of hours they work. For instance an employee, who works four hours a day and is off for five days, is recorded as having five days lost time.
- Incidents that result in permanent disability or death accrue 12 months lost time (Australian Safety Standards 1985.1).

Generally, severity rates provide a better picture of the seriousness or extent of the injury. For instance, one workplace might have a lower frequency of injury than another but, because more working days were lost as a result, the injuries were more severe.

Formula;

$$\text{Lost Time Injury Severity Rate (LTISR)} = \frac{\textbf{Number of days Lost} \times \textbf{200 000}}{\textbf{Total man – hours worked (exposure)}}$$

Total Injury Incident Rate (TIIR)

This is a percentage, describing how many workers per 100 employees suffer an injury in that particular workplace. Incidents for a workplace are measured against the number of workers exposed (employees); hence it makes no allowance for variations in part-time employment or overtime worked (Health and Safety Executive, 2002:3)

The Health and Safety Executive (HSE) formula for calculating an Annual Injury Incident rate is:

$$\frac{\text{Number of reportable injuries in financial year} \quad X \quad 100}{\text{Average number employed during the year}}$$

Injury Frequency Rate (IFR)

According to the Health and Safety Executive an Injury Frequency Rate describes how often an injury happens per 100 employees over time. Injuries that keep an employee off work for one or two days carry the same weight as permanently disabling injuries. Frequency injury rates are normally applied to Lost Time Injuries (LTI), Medical Aid Cases (MTC) and First Aid Cases (FAC) or combination of all three. They are useful in measuring safety performance of a workplace making allowances for variation in population and overtime worked, since it uses man – hours worked as opposed to number of employees.

The Health and Safety Executive (HSE) formula for calculating an Injury Incident Frequency Rate is:

$$\frac{\textbf{Number of Injuries in the period X 200 000}}{\textbf{Total hours worked during the period}}$$

NOTE: 200,000 hours in the formula represents 100 employees working 40 hours per week and 50 weeks per year.

Both incidence and frequency rates are valuable simple indicators as to whether the safety performance of a firm (or a department in it) is improving or deteriorating.

Fatality

This refers to death resulting from a work – related injury (Health and Safety Executive, 2002:4).

Fatality Rate

This is a rate that measures the number of fatalities for a given number of workers at risk per 100 employees. While frequency and severity rates may be applied to individual workplaces or employers, fatality rates are normally calculated for entire sectors, such as mining, construction and manufacturing.

Formula

$$\textbf{Fatality Rate} = \frac{\textbf{Number of Fatalities in the period X 200 000}}{\textbf{Number of man-hours worked}}$$

NOTE: 200,000 hours in the formula represents 100 employees working 40 hours per week and 50 weeks per year.

Chapter One: Introduction and literature review, aims and objectives

1.1 Introduction

Over the years paper has been an extensively used commercial product. It has continued to be used for packaging, communication and record keeping purposes. Even though the world as a whole is moving towards a paperless environment, and South Africa has a highly developed electronic communication system, paper has proven to be an essential product both locally and abroad, especially in schools, offices and homes. This demand continues to increase worldwide and in particular in the developing world, thus compelling Paper Manufacturing companies to increase their output even further (Mbendi, *2001:1).*

Such a demand has also necessitated an increase in the growing of pine trees, which is paper's raw material. These trees are first dried into logs and are then chopped into wood chips. The latter are cooked with chemicals to produce pulp, which is eventually dried and pressed to produce paper, cardboard and a range of other products. In reality, this process is complex and workers are often exposed to a wide range of health and safety hazards, which are also associated with the industry's paper making machines that are inherently dangerous, with many rotating parts (Mondi, 2000:2)

Based on the above definitions of occupational injury and occupational accident, it is, therefore, apparent that an occupational injury must result in *personal injury,* and such injury must have been sustained as a result of an accident that has occurred *out of or within the course of the employee's employment*. These two conditions are therefore

fundamental in defining an occupational injury in a workplace. In many instances the term “injury on duty” is used to replace the expression occupational injury.

1.2. Occupational Injuries in the Paper Industry

1.2.1. Internationally

Globally, the European Union has reported poor safety performance figures within the pulp and paper industry. In its November 2002 Health and Safety report, the European Union revealed a 3.4 fatality rate per 100, 000 persons in employment. While in the United Kingdom, researches revealed that this sector had an average accident rate of 2.5 times higher than the manufacturing industries in general, with an accident rate that was similar to the construction industry. (Pulp and Paper International Journal, 2002:1).

Poor safety performance trends within this sector were also reported by the Health and Safety Executive, through its Health and Safety Centre, identifying that the paper industry’s injury rate has remained above the injury rate for all industries combined throughout the years. Over a five-year period (1999 – 2003), the rate of serious injuries within the industry has averaged approximately three times higher than the rate of other industries combined (Work Safe, Health and Safety Centre, 2004:1-3).

Internationally, the Pulp and Paper Magazine has reported major variation regarding safety performance from one mill to the other, for instance in the United Kingdom the worst performing mill was 25 times poor than the best.

When analysing the 1999 – 2003 occupational injuries within this sector (United Kingdom) overextension (23%) and struck by object (17%) were the two leading type of

injuries, resulting in sprains (35%) and cuts injuries. The analyses also revealed that most injuries were sustained on the fingers (21%) and back (21%), where Paper and Pulp Machine Operators (41%) and general Labourers in processing (16%) were the highly injured occupational groups.

As a result of these consistently poor safety performances, the British Paper and Board Industry Advisory Council (PABIAC), a body comprising representatives from the Health and Safety Executive, took robust steps, aimed at reducing the accident rate within the sector by 50% within the three years, from 2003 to 2005 (Pulp and Paper International Journal, 2002:2).

1.2.2. South Africa

In South Africa, there is no published information on occupational accident statistics involving this sector. The only published safety statistics on occupational injuries is found in the Compensation Commissioner's annual report, as required by the Compensation for Occupational Injuries and Diseases Act (COIDA), of 1993 (15 – 16). These are mainly injuries reported to the Commissioner for claim purposes following either, total disablement (loss of salary) or permanent disablement or claims by dependent in cases where a worker was fatally injured. Therefore they exclude non - disabling injuries like First Aid Cases.

According to the Commissioner's 2004 annual report, there are 217 680 occupational injuries reported for claims for the year 2003 / 04. These figures show a decline of 1.4% (3073) when compared with the 1999 / 00 injuries reported. However the reason for this decline cannot be explained from the report. Of the total injuries reported to the

commissioner (in 1999), 29% were from the manufacturing industry, under which the pulp and paper industry falls. According to this report, this was the second highest percentage in the country, following the transport industry (Annual Report of the Compensation Fund, 2004: 13 - 14).

1.2.3. The Paper Enterprise

The Paper Enterprise of interest is called Paper Mill X. It is one of the biggest and oldest paper mills in South Africa and is located in the South of Mpumalanga Province. This Paper Enterprise has also shown similar poor trends in terms of its safety performances, although there are indications of gradual improvements. This is supported by its 2004, Annual Safety Report. According to this report the average number of occupational injuries over the five years from 2000 - 2004 has slightly decreased by 3%. The report however showed a sharp increase of 19 % in medically treated injuries during this same period, which are minor injuries, where the person injured would receive a medical treatment within the workplace and thereafter continue with his/her work. Slip and fall (35%), as well as the handling activities (18%) were the leading causes, affecting both the Operators (42%) and the maintenance personnel (23%). These injuries generally reflect a workplace that has not yet achieved a strong safety culture within its operations; hence, there is a need for a sustained safety performance programme (Paper Mill X, 2004: 1-2).

1.3. Classification of Occupational Injuries

1.3.1. Internationally

When an injury occurs within a workplace, it is often classified according to the severity of that injury. The classification of injuries within workplaces varies according to national guidelines set, however, in most instances it is in line with the country's Occupational Injury Compensation System. Internationally, it is determined by the International Labour Organisation (ILO), which has adopted a generic system of classifying occupational injuries. In its 16th Conference of Labour Statistics, the International Labour Organisation agreed on a method that specified the classification of occupational injuries according to the type, part of the body injured and the size of the enterprise or establishment where an injury occurred (International Labour Organisation, 2000: 1).

In the United Kingdom, the Health and Safety Executives, through its Health and Safety Centre, has used this format to record its occupational injury claim registers for industries. Using this method of classification, all occupational injuries and fatality rates for industries have been calculated. According to this method, occupational injuries were classified in terms of the: *Type of Accident* e.g. overextension, caught in, by or compressed by equipment or object; the *Nature of injury type* e.g. cuts, sprains bruises; *Body parts injured e.g.* finger (s), leg (s), wrist (s); *Occupation* e.g. labourers in processing, machine operators and related workers in pulp and paper production and wood Processing; *Age Category e.g.* 16 - 26 years, 27 – 37 years and so on; and *Gender,* e.g. female and male (Work Safe, Health and Safety Centre, 2004:6-7).

1.3.2. South Africa

In South Africa, there is no formal method of classifying occupational injuries. Each enterprise has its own method of classification. However, there is a national trend, as the different methods used generally adhere to the Compensation for Occupational Injuries and Diseases Act (COIDA) (1993:28) and the Occupational Health and Safety Act (1993: section 24). The general methods used, as specified by the two acts, puts emphasis on the severity of the injury, the part of the body injured and the cause of the injury. Prominent, when assessing the severity of an injury is whether an injury resulted in partial or permanent disability (often classified as Medical Treated Cases and Lost Time Cases) or even fatality. As a result of this, there is a generally reduced focus on less severe injuries (First Aid Cases), subsequently creating a situation where there is a great variation regarding their classification and monitoring in almost all South African industries in general.

1.3.3. The Paper Enterprise

This Paper Enterprise has a policy that guides the general management of occupational injuries and incidents within its workplace. The policy encompasses the classification of injuries, which is done by the Risk Control Department, and it is the same department that is responsible for maintaining the general safety system within the Mill. This policy has been developed in such a way that it remains compliant with the country's Occupational Health and Safety Act, 1993

The policy of the Paper Enterprise also specifies the procedure to be followed when an occupational injury has occurred within the Mill. According to this procedure, every accident or incident occurring within the workplace is to be reported to the sectional supervisor, within 8 hours. Following that report, the supervisor is expected to notify the Risk Control Department formally, by completing the appropriate accident notification form. On this form, the supervisor with the help of witnesses provides the necessary details explaining how the accident occurred and the part of the body injured (Paper Mill X, 2000: 1-2).

The injured person will immediately be sent to the institution's clinic for medical attention. After the examination, the clinic (Nurse) is expected to issue its medical report, which will determine the extent of the injury and subsequently the classification and capturing of the injury on the Incident Safety Register by the Assistant Risk Control Assistant. Other information captured from the medical reports, as well interviewing the injured person includes; the description of the injury, time it occurred, part of the body injured, department and section of the injured person. However, minor injuries where the injured employee did not go to the clinic for medical examination are less likely to be reported and captured into the register hence the study is only covering recorded injuries.

As per this policy (2000: 2 – 3), occupational injuries are classified according to Fatality, Lost Time Injury (LTI), Medical Treated Cases (MTC) and First Aid Cases (FAC).

1.4. Aim of the Study

This study's aim was to investigate the types and causes of accidents, by reviewing pre - existing database of accidents that occurred in a selected Paper Mill in South Africa for the period 2000 to 2004.

1.5. Objectives of the Study

These are:

- To describe the type, and extent or severity of occupational injuries within the Paper Mill, for the years 2000 to 2004;
- To identify the most common type of occupational injuries within the Paper Mill, for the years 2000 to 2004;

Chapter Two: Materials and Methods

2.1. Study design and rationale for this study design

The study design was a retrospective review of all the data related to occupational injuries over the past five years (2000 – 2004) within the Paper Enterprise. The rationale, as explained above, was to examine the trends, severity and determinants if possible from a readily available record set. Data was collected and analysed at one point in time, with no follow-ups made. Several descriptors and determinants (part of the body injured, type or nature, severity of the injury, as well as the age, shift and occupation of the injured person) were studied and compared.

2.2. Study Site Selection

The Paper Enterprise of interest is called Paper Mill X. It is one of the biggest and oldest paper mills in South Africa, and is located in the South of Mpumalanga Province. This enterprise is part of the Anglo American Industrial Corporation group of companies within the paper and packaging sector. The enterprise has been chosen not only because of its convenience for the researcher, but as it is the oldest Paper Mill in South Africa and the researcher will be able to accurately measure and compare the injury trends and the effects of variables studied over a period of years.

2.3. Population

The study population was all employees (total population) within the Paper Enterprise over the five - year study period. The sample population was all employees i.e. enterprise employees, permanent and temporal contractors, (see description on table 1) who have suffered occupational injury that have been captured or recorded in the Mill's

Safety Incident Register during the years 2000 to 2004. This was the only recorded occupational injury data available within the enterprise, and was kept by the Risk Control Department. However, minor injuries where the injured employee does not go to the clinic for medical examination are less likely to be reported and captured into the register, hence the study is only covering recorded injuries. There were 341 injuries recorded from 2000 to 2004.

2.4. Methods

The Health and Safety Executives, through the Work Safe, Health and Safety Centre's method of classifying and analysing occupational injury statistics for industries in the United Kingdom was used (2000: 5 – 6). This method is also in line with the International Labour Organisation's adopted method of classifying occupational injuries for industries (International Labour Organisation, 2000:1).

Firstly, the Enterprise's Safety Incident Register that has data for all occupational injuries for the period 2000 – 2004 was used for the study. All recorded information of all occupational injuries was transposed into an occupational injury data - capturing sheet (see Annexure 1). Injuries were counted per incident irrespective of whether an employee has been injured more than once. In determining the rates the Injury Frequency Rate was used (see definition of terms) which uses the man - hours worked, as denominator value, as opposed to the number of employees.

All information was double-checked during its transfer to ensure that each injury was accurately registered and classified. The classification of accident data was done

according to the Work Safe, Health and Safety Centre's method of classifying occupational incidents. Hence the occupational injuries were classified according to the list below:

a. ***Severity of the injury*** *e.g*. Fatality, Lost Time Injury, Medical Treated case, First Aid Case;
b. ***Type of injury*** *e.g. fractures, wounds,* sprains, burns, electrical shock, crush;
c. ***Nature / Cause of the injury*** e.g. fall, struck by, struck against, caught by, electricity, handling related cause, burnt by, slipping related cause, and so on;
d. ***Part of the Body Injured*** e.g. fingers and / thumbs, head and / face, and so on;
e. ***Occupation of the Injured Person*** e.g. artisans, operators, general worker, assistant worker, supervisors, and students and < 1 year employees;
f. ***Age Category*** e.g. less than 21 years, 21 – 30 years, 31 – 40 years, and so on;
g. ***Shift Category*** e.g. morning shift, afternoon shift, night shift; and
h. ***Employee Category*** i.e. Contractor or not a contractor (enterprise employee).

2. 5. Data Analysis

Once all the 341 injuries had been transferred into Data Capturing Sheets (see Annexure 1) the data was then entered into an Excel spread sheet, after which it was statistically analysed using Epi – Info. Tables, histograms, and pie charts indicating frequencies of factors identified were used in presenting the results. Basic descriptive statistics were used to interpret the data.

2.6 Relevance / Impact

The study was able to identify clearly the most common occupational injuries, as well as to describe the type, nature and severity of injuries within the workplace. This data was essential for the enterprise to enable it to focus its safety services, appropriately.

2.7. Ethics

Special measures were taken to protect and respect the rights of the employees, as well as the identity of the Paper Enterprise involved in the study. The names of the employees mentioned on the Incident Safety Register were treated confidentially and only anonymised data was captured. To ensure that all ethical requirements for research were met, the measures listed below were taken.

- Written permission to carry out the study was obtained from the most senior responsible executive of the enterprise.
- The names of the employees mentioned on the Incident Safety Register were kept confidential and anonymous. Each accident captured into a data sheet was allocated a unique reference number known as the “Injury Survey Number”. This number was unique for every accident; hence there was no

linkage to either the name or an individual's reference number on the Safety Incident Register.

- The results of the study will be published in appropriate journals, reported to the management and staff of the enterprise and will further be used to enhance its accident preventative strategy.
- All reports will be confidential and anonymous; meaning that in the report there will be no mention of company name involved nor the names of individuals. Only group data will be presented.

The study was approved by the Human Research Ethics Committee of the University of Witwatersrand, and the approval number is R 14 / 49 Dlamini.

Chapter Three: Results

The analysis of 341 occupational Injuries for the Paper Enterprise revealed a steady decline on the Total Injury Frequency Rate (TIFR) per 100 employees from 17.3 in 2000 to 9.2 in 2004, showing an overall reduction of 46.8% for the period. Significant reductions were seen in 2003, declining to 6.8.

Table 1 below is used to summarise the severity of occupational injuries by employee category for the period 2000 – 2004. Employees were arranged according to five employer categories, where each category was compared in terms of the injury severity levels i.e. First Aid Cases, Medical Treated Cases and Lost Time Injuries.

Table 1: Severity of the Injury by Employer Category (2000 – 2004)

Employee Category		Severity of the Injury						
		First Aid Cases	Medical Treated Cases	Lost Time Cases	Total Cases	Total Population / employee category	TIIR over the 5 year study period
Enterprise Employees	Number	200	17	7	224	263	17.0%
	% within Severity of the Injury	65.8%	63.0%	70.0%	65.7%	-	-
Permanent Contractor: Engineering	Number	26	5	2	33	90	7.3%
	% within Severity of the Injury	8.6%	18.5%	20.0%	9.7%	-	
Permanent Contractor: Other	Number	5	0	0	5	50	2%
	% within Severity of the Injury	1.6%	0%	0%	1.5%	-	-
Permanent Contractor: Technical	Number	56	5		61	215	5.6%
	% within Severity of the Injury	18.4%	18.5%	0%	17.9%	-	-
Temporary Contractor: Engineering	Number	17	0	1	18	Unknown	Unknown
	% within Severity of the Injury	5.6%	0%	10.0%	5.3%	Unknown	Unknown
Total	Number	304	27	10	341	618	-
	% within Severity of the Injury	100%	100%	100%	100%	100%	-

Unknown – for a category whose population size is unstable
TIIR – Total Injury Incident Rate
Enterprise employee Includes all employees day and shift employees employed the enterprise for all departments.
Permanent Contractor: Engineering includes non - enterprises who resides on premises offering maintenance services.
Permanent Contractor: Technical includes non – enterprise employees who resides within the premises offering cleaning and other production supportive services.
Permanent Contractor: Other includes non – enterprise employee who resides within the premises offering security and catering services.
Temporary Contractor: Engineering includes non – enterprise employee who does not resides within the enterprise premises offering maintenance services.

According to **Table 1** above, 65.7% (224) of those injured were the employees of the enterprise, showing an average of 44 employees injured in a year. The Injury Frequency Rate for this group (enterprise employees) was 15.3 per 100 employees, which was 8.3 higher than that of all contractors combined. This group (enterprise employee) has also shown the highest percent regarding the three severity levels i.e.

First Aid Cases (65.8%), Medical Treated Cases (63.0%) and Lost Time Injuries (70.0%). The Lost Time Injuries reported by this group were severe enough to result in the loss of 285 calendar days, representing a Lost Time Injury Severity Rate of 19.5 per 100 employees, which were 18.5 higher than that of contractors combined.

The permanent contractor - engineering category had 38.6% (33) of its employees injured, with an Injury Incident Rate of 7.3 per 100 employees. Combined with temporary contractors - engineering these two categories contributed 15% to the overall injuries, which was less than that of permanent contractors -technical. However considerable contribution by the engineering contractor categories were with three (30%) Lost Time Injuries, reported. These injuries compare to a Lost Time Injury Frequency Rate of 0.2 per 100 employees, which is still lower than that of enterprise's employees.

Permanent contractors - technical employees had 28.3% (61) of its employees injured, accounting for 17.9% to the total. The majority (91.8%) of cases were First Aid Cases while the rest were Medical Treated Cases.

Table 2 below presents the distribution of occupational injuries according to their severity levels i.e. First Aid Cases, Medical Treated Cases and Lost Time Injuries from 2000 to 2004.

Table 2: Distribution of Occupational Injuries by severity level (2000 – 2004)

Severity of the Injury			Year					Total
			2000	2001	2002	2003	2004	
	First Aid Cases	Number	95	72	55	39	43	304
		% within Year	93.1%	91.1%	93.2%	86.7%	76.8%	89.1%
	Medical Treated Cases	Number	4	5	2	4	12	27
		% within Year	3.9%	6.3%	3.4%	8.9%	21.4%	7.9%
	Lost Time Cases	Number	3	2	2	2	1	10
		% within Year	2.9%	2.5%	3.4%	4.4%	1.8%	2.9%
Total		Number	102	79	59	45	56	341
		% within Year	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Injury Frequency Rate (% within Year).			17.3%	12.4%	9.3%	6.8%	9.2%	10.9%

Of the total analysed, 89.1% were First Aid Cases (FAC), with the largest number, 95 (31.3%) cases occurring in 2000. This type of injury remained constant in the first three years, with a noticeable decline in 2004. The Total Injury Frequency Rate (TIFR) per 100 employees for First Aid Cases was 9.7, which was slightly (1.2) lower than the Total Injury Rate for all injuries combined throughout the study period.

Medical Treated Cases (MTC) were relatively constant in the first two years (2000 and 2001) and fourth (2003) year of the study period, with a slight drop in 2002. A sharp increase was noticed in 2004, where the cases were more than double those of the previous year. The Total Injury Frequency Rate for Medical Treated Cases per 100 employees was 0.87, which was lower than that of First Aid Cases, yet higher than that of Lost Time Injuries.

Lost Time Injuries (LTI) has remained constant throughout the five-year period, with an average of two cases per year. Seventy percent (7) of the cases occurred amongst

enterprise employees. Lost Time Injuries contributed 2. 9% of the total assessed. The Total Lost Time Injury Frequency Rate (TLTIFR) per 100 employees was 0.32, which was the lowest of the three injury types. However, a total of 301 calendar days (285 days by enterprise employee and 16 days by contractors) were lost as a result of these injuries. This loss relates to a 9.7 Lost Time Injury Severity Rate per 100 employees.

Table 3 below outlines the common type of injuries by employee category, over 2000 - 2004 period.

Table 3: Distribution of Occupational Injury types by employee category (2000 - 2004)

Type of Injury			Employer					Total
			Enterprise Employees	Permanent Contractor: Engineering	Permanent Contractor: Other	Permanent Contractor: Technical	Temporary Contractor: Engineering	
	Burns	Number	31	1	0	5	1	38
		% within Employee	13.8%	3.0%	0%	8.2%	5.6%	11.1%
	Electrical shock	Number	1	0	0	0	0	1
		% within Employee	0.4%	0%	0%	0%	0%	0.3%
	Eye Injury	Number	43	12	3	24	9	91
		% within Employee	19.2%	36.4%	60.0%	39.3%	50.0%	26.7%
	Fracture	Number	3	0	0	0	1	4
		% within Employee	1.3%	0%	0%	0%	5.6%	1.2%
	Wound	Number	100	14	1	21	6	142
		% within Employee	44.6%	42.4%	20.0%	34.4%	33.3%	41.6%
	Sprain	Number	34	3	0	8	1	46
		% within Employee	15.2%	9.1%	0%	13.1%	5.6%	13.5%
	Other	Number	12	3	1	3	0	19
		% within Employee	5.4%	9.1%	20.0%	4.9%	0%	5.6%
Total		Number	224	33	5	61	18	341
		% within Employee	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

According to **Table 3** above, wounds, eye injury, sprain and burns were the leading injury types, accounting for 92.9% to the total. Almost half of the total injuries were

wound injuries such as cuts, lacerations, and bruises with a frequency rate of 4.5 per 100 employees, which was the highest rate of all injury types. The highest percentage was reported in 2000, with 25% to the total. Wounds predominately occurred amongst the enterprise employee and permanent contractors - engineering, with 44.6% and 44.1% respectively being affected.

Eyes injuries were the result of a foreign body being blown into an employee's eyes. Of all injuries, eye injuries were the second frequently reported (26.7%) type, with the majority (52.7%) of cases occurring in contractor employees combined. They were constantly reported throughout the five-year study period, with a significant decrease in 2003.

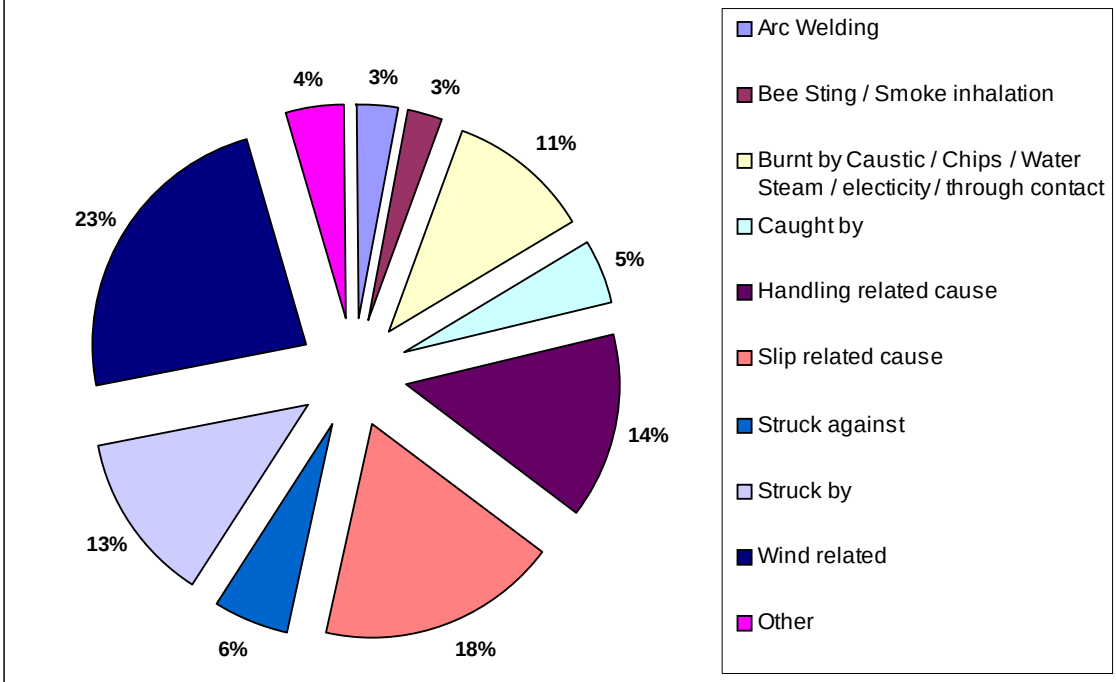
All fractures resulted in Lost Time Injuries and four (80%) of the injured persons were enterprise employees. Of all fractures, 75% occurred within this group and was the second most frequently reported injury type. More than half (223 days) of the total calendar days lost (301, days) were due to this type of injury, making it the most severe type of injury, with a severity rate of 15.2. Moreover, two of fracture injuries resulted in impairment for the injured workers i.e. amputation of toes.

Burns were reported throughout the study period, with the most (18.6%) cases reported in 2002 and the least (11.1%) cases reported in 2003. The highest percentage (81.6%) was reported within the enterprise's own employees. Twenty percent of the burns were severe enough to result in Lost Time Injuries, reported within own employees and permanent engineering contractors.

Sprains were the third most frequently reported injury, after wounds and eye injury, with 26.1% (most cases) occurring in 2000. Of the 46 injuries, 34 (73.91%) were reported within enterprise employees. Supervisors were the most (32.6%) affected occupational group with injuries sustained through slipping and falling.

The major causes of occupational Injuries over the period 2000 - 2004 are summarised in **Figure 1** below.

Figure I : The Causes of Occupational Injuries (2000 - 2004)



The results revealed that wind, slip and handling related causes, struck by and burns from caustic / steam / water or through contact were the principal causes of injuries.

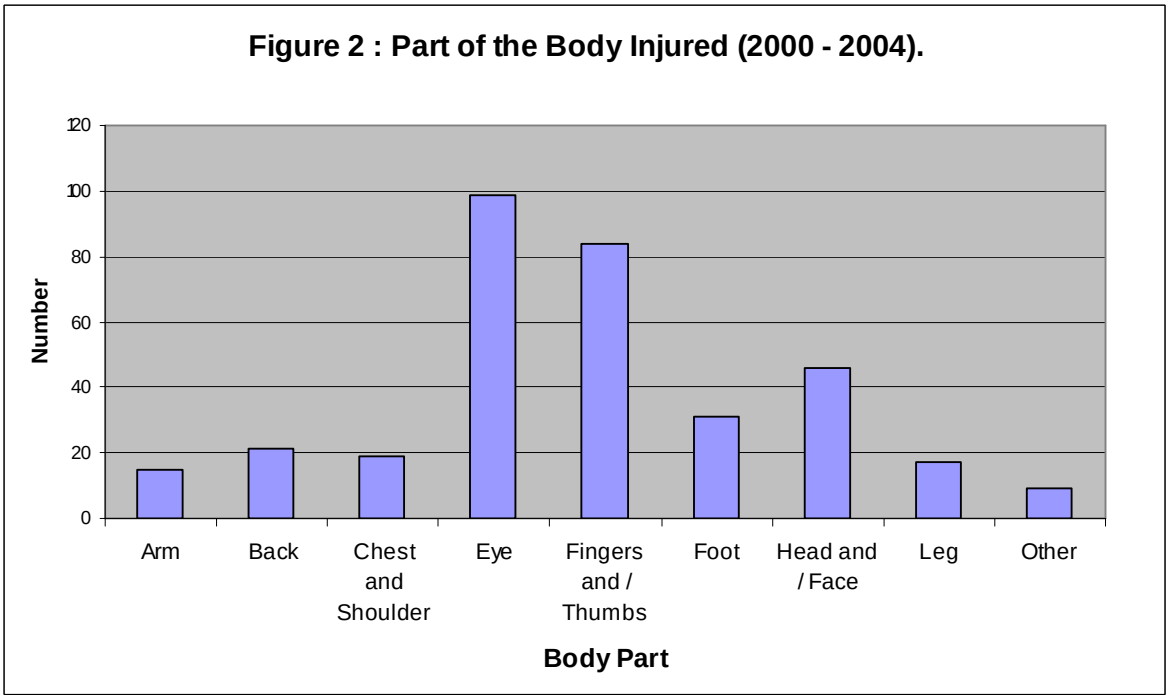
These factors accounted for 79. 5% (271) of the total assessed; 98.8% (81) of eye injuries were of wind related cause, whereby a foreign body was blown into an employee's eye. The remaining eye injuries were due to hot work related activities, like grinding and welding. Wind related eye injuries have generally been high; however significant reductions were seen in 2003. Within the permanent contractor- technical category, all eye injuries were First Aid Cases with almost half (47.3%) of them sustained as a result of a wind related cause.

Slipping was the second most frequent cause of injuries. Of the total injuries 18.1% (62) were due to slipping, where an employee would slip and fall, slip and sustain an injury through contact or even be caught by / in-between machinery / equipment. Half of the sprain injuries were as a result of slipping and falling. Nineteen point three percent (12) of injuries sustained through slipping were classified as Medical Treated Cases, while 3.2% were Lost Time Injuries. Thirteen point eight percent of the injuries were sustained during the handling process, where an employee would be cut, caught by / in between machinery / equipment due to mishandling or other means or even be struck by an equipment he / she was working with. Injuries sustained during the handling process have been uniformly high throughout the study period. Handling contributed 70.2% (33) to wound injuries and 93.6% (44) to First Aid Cases.

Burns were another type of injury that presented serious safety effects, especially amongst the employees of the enterprise. Two Lost Time injuries and four Medical treated cases occurred as a result of burns. Burns were mainly due to caustic, steam,

salt cake, black liquor, hot water and contact with hot equipment, and were sustained mostly on the arm.

Figure 2 below outlines the body part injured over the period 2000 – 2004.



The eye was identified as the most frequently injured body part, with 99 (29.0%) instances; most (38%) of such injuries occurred in 2000. The majority of eye injuries were caused by wind and arc welding flashes during hot work activities like welding and grinding. Fingers and thumbs followed, with 24.6% (84), while equally noted was that half (71) of the wounds involved the finger (s) and thumb(s). Out of the total wounds sustained, 37 (30.3%) of them occurred in occupation categories whose prime job involves the direct engagement of hands (artisan and operators). The highest number of injuries involving fingers and / thumbs were reported in 2003. Head and / face injuries were the third common injuries, with the highest number of cases occurring in 2003.

Half of the sprain injuries were sustained on the feet (34.8%) and back (30.4%); were mainly as a result of slipping. Burns were mainly sustained on the fingers and / thumbs and in some instances on the face, head, arm, chest and shoulders, foot and legs. Also revealed by the assessment was that all the fractures sustained were only on the foot and leg.

Table 4 below shows the age category of the injured person, while **Table 5** indicates the shift category during which the injury occurred for the period 2000 – 2004. However the unavailability of denominator data i.e. total shift and age categories has made the calculation of rates impossible.

Table 4: Age Category of the Injured Employees (2000 - 2004)

Age Category	Number	Percent
Less 21	5	1.5
21 - 30	50	14.7
31 - 40	66	19.4
41 - 50	69	20.2
51 - 60	35	10.3
Unspecified	116	34.0
Total	**341**	**100.0**

Table 5: Shift Category, indicating when an injury occurred (2000 - 2004)

Shift Category	Number	Percent
Morning (06h00 – 14h00)	117	34.3
Afternoon (14h00 – 22h00)	49	14.4
Night (22h00 – 06h00)	29	8.5
Unspecified	146	42.8
Total	**341**	**100.0**

Table 4 shows that the ages of the injured persons ranged from less than 21 to 60 years, with a mean of 44.6. A significant number (34.0%) did not have records specifying the injured person's age. However, from the 225 (66.0%) injuries that had records specifying the age of the injured person, 30.7% (69) were within the 41 – 50

age categories, with 37.7% (26) being supervisors. From the 7 Lost Time Injuries where age was specified, 57.1% (4) of the employees were within the 41 – 60 age categories, while the other 42.9% were within the 21 – 30 categories. The least reflected age category were those who were less than 2, with 2.2%.

Table 5 above outlines the injuries in relation to shift category. Disappointing, was that a noticeable proportion (42.8%) of injuries where the specific times at which they occurred had not been recorded. From the 57.2% (195) injuries with records, 60% (117) occurred during the morning shift (06h00 – 14h00), while 8.8% reflecting the least number of injuries, occurred during the night shift (22h00 – 06h00).

The causes of occupational injuries during 2000 – 2004, arranged according to Occupational Categories are illustrated in **Table 6** below.

Table 6: The Causes of Occupational Injuries by Occupation Category (2000-004)

Cause of injury		Occupation							Total
		Artisan	Assistant Worker	General Labour	Operator	Other	Student and < 1 year	Supervisor	
% Within the total Population		7.8%	2.3%	55.2%	14.7%	4%	6%	9.4%	
Arc welding	Number	8	0	0	0	0	1	1	10
	% within Occupation	8.6%	0%	0%	0%	0%	3.0%	1.6%	2.9%
Bee sting / smoke inhalation	Number	0	2	1	0	0	2	5	10
	% within Occupation	0%	8.0%	1.5%	0%	0%	6.1%	7.8%	2.9%
Burnt by caustic / water, steam, through contact.	Number	13	1	4	8	0	6	5	37
	% within Occupation	14.0%	4.0%	6.1%	15.1%	0%	18.2%	7.8%	10.9%
Caught by	Number	2	2	4	4	0	4	0	16
	% within Occupation	2.2%	8.0%	6.1%	7.5%	0%	12.1%	0%	4.7%
Handling related cause	Number	14	6	9	8	0	5	5	47
	% within Occupation	15.1%	24.0%	13.6%	15.1%	0%	15.2%	7.8%	13.8%
Slip related cause	Number	23	0	6	7	1	4	21	62
	% within Occupation	24.7%	0%	9.1%	13.2%	14.3%	12.1%	32.8%	18.2%
Struck against	Number	8	1	1	6	0	0	3	19
	% within Occupation	8.6%	4.0%	1.5%	11.3%	0%	0%	4.7%	5.6%
Struck by	Number	8	4	7	9	0	6	9	43
	% within Occupation	8.6%	16.0%	10.6%	17.0%	0%	18.2%	14.1%	12.6%
Wind related	Number	15	9	30	10	4	4	10	82
	% within Occupation	16.1%	36.0%	45.5%	18.9%	57.1%	12.1%	15.6%	24.0%
Other	Number	2	0	4	1	2	1	5	15
	% within Occupation	2.2%	0%	6.1%	1.9%	28.6%	3.0%	7.8%	4.4%
Total Injuries		93	25	66	53	7	33	64	341
Total number of employees per Occupation		48	14	341	91	29	37	58	618
Total Incident Injury Rate		38.8	35.7	3.9	11.6	4.8	17.8	22.1	11.0

Artisans includes enterprise and non – enterprise electricians, boilermakers, technicians, fitters and turners, instrumentation.

Operators include any enterprise employee that works under the production department including the laboratory personnel.

Assistant Workers include any employee who is employed to assist an artisan, including both enterprise and contractors employees.

Supervisors include any employee (both enterprise and contractors) who has employee's directly under his/her responsibility, including the sectional supervisors, foremen, superintendents, plant Managers, and head of Departments

General Labourers include all contractor employees, excluding their supervisors and artisans.

Student and < 1 year employees include any employee under training or apprentice and employees less than one year of employment with the enterprise (including contractor employees).

Artisans represented the most frequently injured occupation over the study period, with an incident rate of 38.8 per 100 employees. Within this group, 36.7% (29) of the injuries occurred in 2000. Wounds were the most frequently (46.2%) reported type of injury, with most (24.7%) injuries sustained through slipping. Eyes and fingers and / thumbs were the most commonly injured body part, accounting for 28.0% each. Forty point seven percent of the injuries sustained by this group were Medical Treated Cases. Burns caused by caustic, water, steam; chips, electricity and contact with hot substances were very common within this category at 34.2%.

Assistant Workers were the second most frequently injured group. However this group formed an insignificant proportion (2.3%) of the workforce. Of these injuries, 48.0% and 36% were wounds and eye injuries respectively. Poor handling practices and wind were major contributors to the occurrence of these injuries.

Supervisors formed 9.4% of the enterprise's population. Surprisingly, they were the third most frequently injured group, showing an incident rate of 22.1 per 100 employees. Wound, sprain and eye injuries were the most frequently reported injuries within this group accounting for 79.7% of the total. Head and / face and eye injuries were the most commonly injured body part with most (32.8%) of the injuries being sustained through slipping and falling. In this group, the highest number of injuries was sustained in 2000 with an incident rate of 27.6 per 100 employees. Thirty percent (3) of the injuries resulted in Lost Time Injuries, which was the highest in all occupations and 22.2% (6) in Medical Treated Cases, which was the second highest.

Students and employee with less than one year of employment showed an incidence of 17.8 per 100 employees. However their rate cannot be guaranteed because of the inconsistency in keeping the employment history and or trainee mentorship records of people. Within this group 20.0% were Lost Time Injuries which was the highest of the three (Medical Treated Cases and First Aid Cases). Wounds (51.5%) and burns (18.2%) were the two leading types of injury affecting the group, commonly (33.3%) sustained on fingers and / thumbs. In this group burns were mainly (18.2%) from caustic, water, steam and through contact, while wounds were mainly as result of an employee being struck by equipment.

Operators who constituted the second highest proportion (14.7%) of the whole population, showed an incident rate of 11.6 per 100 employees. Injuries affecting this group were generally distributed with burns, eye injuries, sprain and wounds being the most common types, and the most injuries occurring in 2002. These injuries were mainly caused by wind, handling, slipping, and caustic burns, and by striking or being struck by objects. Fingers and / thumb was the leading body part injured, with eyes, foot, head and / face following. Of the injury severity levels 20.0% were Lost Time Injuries, which were sustained by workers within the 51 – 60 age category.

Chapter Four: Discussion

The aim of the study was to investigate the types and causes of occupational injuries that occurred within the enterprise during the period 2000 – 2004. The study was able to identify wounds, eye injuries, sprains and burns as the most frequently occurring types of injuries. Wounds are common in all occupational groups, with the others appeared to be occurring along certain occupations. The majority of these injuries are as a result of slipping, poor handling practices, wind, as well as burns caused by caustic, steam, water, electricity, and contact with hot substances.

4.1. Identifying the most common types of injuries

Wounds such as lacerations, contusions, bruises and abrasions were the most frequently occurring injuries within the enterprise. For every 100 employees in the workplace five employees sustained a wound injury in a year of employment. This was the highest risk of all injury types. In comparison with the 2004 Work Safe Health and Safety Statistics, the study suggests that the enterprise's wound related injuries may be equal to the total injury of Wood and Paper Industry in the United Kingdom. Wounds predominately occur amongst artisans, supervisors, operators and general workers and students, as well as employees less than one year of service with the enterprise.

Poor equipment and manual handling practices result in the worker being cut by, caught by / in / on and struck by, an object causing wound injuries in the Mill. These factors are major contributors to wound injuries, contributing more than half. Generally, the paper making process and the maintenance of paper machines involve the use of hands, as basic tools. Operators and artisans respectively are generally responsible for these

activities. Therefore, with hands being involved in almost every activity these workers are continuously exposed to a variety of safety risks, which may result in them being injured. This concurs with the findings of the study, indicating that more than half of the injuries involving the fingers and thumbs occurred amongst artisans and operators. These were the leading body parts injured in both groups.

The safety concerns involving operators were also raised in the 1983 “Ohio study” by the National Institute of Safety and Health (NIOSH), suggesting that “Most injuries (70%) occurred in production employees and were as a result of servicing which took place during normal production”, although the study did not indicate whether energy isolation or energy isolation procedures were applied. However, what is more important is that both studies agree about the poor safety performances within this group, hence suggesting improved working practices, as well as hand protection amongst operators.

Besides poor handling process, slipping is another major contributor to injuries, where an employee would slip and fall or slip and strike against a structure or even become caught in-between. These injuries come in different severity levels, from a simple slip resulting in sprains and wounds (First Aid Cases), to serious slips and falls resulting in fractures (Lost Time Injuries). More than half of those injured through slipping are artisans and supervisors. However, the study was unable to identify specific conditions, behaviours or work practices directly contributing to slip and fall incidents within these two groups. Hence, further studies are needed to explore specific contributors (to slip and fall incidents), as well as specific preventative measures to be put in place.

Following wounds, eye injuries are the most frequently occurring injuries, involving foreign bodies being blown into the injured person's eye. These injuries are mainly due to wind, although there are insignificant cases associated with hot work (welding, grinding, etc) tasks done by the artisans. This injury type obviously demonstrate deficiencies in eye protection usage within the Mill, especially in regards to employees working in the Mill yard, Chipper Plant, Power Station and other areas where outdoor work is common and may involve dust disturbances. General workers, artisans and supervisors are the groups most seriously affected. More often eye injuries are minor, and are hence classified as First Aid cases.

Sprain is another type of injury commonly affecting supervisors and artisans. For every 100 supervisors in the workplace, 22 would sustain an injury in a year of employment. Sprain is the second highest injury type after wound within this group. Sprain injuries are mainly sustained because of slipping, where the foot and the back are the mostly affected body parts, with some resulting in a Lost Time Injury.

Burns caused by caustic, water, steam, electricity, and chips and through contact with hot substances are very common, affecting mainly the arm. Artisans and operators, as well as employees less than one year of service are most seriously affected.

4.2 Describing the nature, extend and severity of injuries

Considering the poor safety performance shown by the Pulp and Paper Industries internationally, especially, in respect to fatalities, this South African enterprise has shown good performances, with no fatalities reported. However, poor performances are

reported regarding the injury rate, where for every 100 employees 11 would sustain an injury in a year of employment. This rate is high, and a study by the Work Safe Health and Safety Centre, in 2004, suggests that the enterprise's average injury rate is higher than that of the Wood and Paper industries, in the United Kingdom for the period 1999 - 2003. Nevertheless, there appears to be an overall gradual decline in total injuries within the enterprise on a yearly basis. Major influences on this decline are the reduction in the number of First Aid Cases which constitute the bulk of total injuries, and a reduction in total injuries within the enterprise' employees and permanent contractors - engineering, as well as temporary contractors - engineering.

A significant reduction in eye injuries is linked to wind related causes, especially in 2003 where it had a major impact in annual non-disabling injuries (FAC). This reduction has not only improved the injury rate within the permanent contractors – technical category, but has greatly reduced the enterprise's total injury rate for the year, mainly because eye injuries are the second highest type of injury. On the other hand the study was unable to establish the interventions that could have lead to this decline in this injury type. However, the findings of the study clearly illustrate that by effectively preventing / managing minor cases (First Aid Cases) the Total Injury Frequency Rate of the enterprise may be significantly reduced by more than half.

The same cannot be said about disabling injuries (Lost Time Injuries), as their occurrences have remained constant throughout. These injuries may have the lowest injury rate compared to the other two i.e. First Aid Cases and Medical Treated Cases, but their impact is the greatest. Besides the obvious psychological and physiological

suffering attached to traumatic injuries like fractures and amputation; other losses / cost related factors includes:

- Costs of replacing an injured worker i.e. training replacements, overtime payment;
- Lost time in productivity of the injured employee;
- Losses resulting from full productivity of the injured worker upon return to work;
- Losses due to reductions in productivity of co- workers because of stress or reduced morale;
- Institution's reputation being tainted; and
- Other costs i.e. medical cost, loss of bonuses, time spent on the case.

In view of the severity of these injuries and the impact they have on the worker and the institution at large, this study highlights the need to explore these factors in more detail with the intention of renewing the will to prevent these serious injuries.

The encouraging decline in First Aid Cases is, however, opposed by the sharp increase in Medical Treated Cases, especially in 2004. This result agrees with observations, indicating a general reduction in the overall injury rate and a slight increase in the Medical Treated Cases (MTC) within the enterprise. However the reason for the increase may be linked to the change in experienced clinic staff during that year, where only one junior Occupational Health Nurse remained. This may have had an effect especially in the consistent classification of cases, which is based on medical assessment expertise.

Of particular concern is that, although the overall injury rate is decreasing year after year, the enterprise' own employees remain the exposed to the highest source of risk. Most (85%) of its employees have sustained an injury within five year, and in every 100 own employees 17 will sustain an injury in a year of employment and 15 of those injuries will become First Aid Cases. This is the highest rate in all employer categories. Encouraging though, are the declines in 2003 and 2004, where in every 100 employees two and three employees would sustain an injury in a year of employment. Hence, further studies may be recommended to explore reasons for the prevalence of injuries within this group.

Permanent Contractors - engineering category is exposed to the leading source of risk in all contractor categories. Eyes injuries and wound were the mostly likely type of injury in this group. Encouraging results are seen with permanent contractor – technical category, showing signs of improvement, especially in the reduction of eye injuries by more than half. This group had the second lowest incident rate, yet it is the second largest population group in the Mill.

Of critical concern is the high percentage of injuries sustained by supervisors. This group forms 9.4% of the total population and is the third largest group (after general labourers and operators). Generally supervisors have the greatest influence on the workers' performance (including safety performance), by setting expectations on day - to - day activities. In safety, one way in which they can create meaningful expectations is by showing their commitment to safety, and integrating safety priorities into production needs, but more importantly by not being injured themselves (showing that

working without sustaining an injury is possible). Therefore, in cases where the latter cannot be demonstrated and achieved, creating and sustaining an injury free / safety culture is almost impossible. The study therefore identified areas where leadership in areas of safety results is needed, especially in cultural transformation within the workplace.

It is surprising though that in every 100 student employees, as well as employees with under one year of employment within the enterprise, 18 would sustain an injury in a year of employment. The fact that this group may be unfamiliar with the work environment and possibly with the most hazards within the workplace suggests an even higher safety risks associated with this group. However the study's inability to support these findings conclusively may be related to the inconsistence / and inadequate records pertaining to the employment histories of employees, as well as its failure to explore the mentorship programme within the workplace.

4.3. Limitations of the Study

In considering the findings of this study, it is important to bear in mind the limitations discussed below.

- A noticeable proportion (34.0%) did not have records specifying the age of the injured person, hence the findings of the study on this variable (age) cannot be generalised to the whole population.
- Additionally, 42.8% of the injuries had no specific times at which they occurred. However considering the fact that the most frequently injured occupation categories (artisans and supervisors) work only the morning shift and partly the

afternoon i.e. between 7h00 and 17h00, one would perhaps expect the risk of injuries to be highest during the morning hours.

- The completeness of incident reporting could not be verified. Workers may be motivated to report an accident especially because the clinic facility is readily available, with fulltime nursing staff.
- The change of clinical staff in 2004 might have had an effect in the consistency of injury assessment, subsequently affecting the overall classification of injuries.
- The absence of denominator data of employee i.e. total employees within shift and age category, year after year and others has made the calculation of rates impossible, hence comparing changes were difficult.
- The Incident Safety Register had scant information on the activities preceding the injury hence only provided basic information assessment on the cause of the injury.

Chapter Five: Conclusion and Recommendations

Despite these possible limitations and positive trends regarding the total injury rate, occupational injuries such as wounds, eye injuries, burns and sprains sustained through poor handling practices and work practices, poor personal protective equipment usage (hand and eye protection), as well as slips and falls remain major safety concerns within the workplace. Additionally, enterprise employees, artisans, assistant workers, supervisors, operators and students, as well as employees with under one year of employment are the highest source of safety risks, an indication of a workplace that has not fully inculcated the desired organisational culture" where safety is the deciding factor on how work is performed" (Leading with Safety, 2003:12)

The findings of the study highlight the need for renewed emphasis on Injury Prevention within the Mill. The major recommendations identified, will speed up the process of infusing an injury-free culture within the Mill and they include the points listed below.

a. Study - based Recommendations

- Supervisors needs to set a better example in setting desired day - to - day safety expectation and results within the workplace, and in this instance, this would mean reducing the current occupational injuries sustained by this group (supervisors) to none, demonstrating to shop floor employees that an injury free workplace is possible.

- An integrated continuous safety awareness / promotion programme targeting own employees, supervisors, artisans, assistant workers and operators needs to

be put in place. Within each group, the programme needs to cater for the “new and inexperienced” employees (students and those less than one year), as well as the “old and complacent” employees in changing the mindset and instilling a ‘safety - first culture’.

- A detailed study involving the different enterprise occupational categories (i.e. artisans, supervisors, assistant workers, general workers and safety officials) needs to be undertaken in exploring specific work conditions, workers’ behaviours and work practices that contribute to slip and fall incidents, as well specific preventative measures to be put in place.

- A general awareness and promotion programme regarding improved equipment and manual handling practices especially amongst artisans, supervisors and operators needs to be undertaken and this should also be extended towards assessing specific work practices and conditions that encourage poor equipment and manual handling practices within these groups.

- Further studies that will evaluate the effectiveness of a safety mentorship programme for new employees (students and those with less than one year of employment) within the Mill need to be conducted, including the risk evaluation for this group versus the employees who have been with the enterprise for a longer period.

- The general use and the promotion of eye protective equipment needs to be considered, especially in areas like the Millyard, Chipper Plant, Power Station and other areas where outdoor work may involve dust disturbances and where hot work activities like grinding and welding is involved.

- Occupational Injury data on the Safety Incident Register needs to be improved, and ensure that incident data has pertinent details, including how it occurred, the time it occurred, as well the age of the person injured.

b. General Recommendation - not based on the study

- The contents of this report need to be made available to enterprise management and staff, with the aim of assisting it to focus its injury prevention programme on the identified problem areas e.g. poor handling and work practices, slipping and falling hazards and others.

The study must, however, be regarded as a preliminary evaluation of the causes of injury, as it is based solely on information derived from the incident register, hence the current findings may only provide baseline information with reference to the causes of injuries. Further investigations ought to be done to determine the contribution of specific conditions, behaviours and work practices to the occurrence of injuries.

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Annexure 1: Occupational Injury Capturing Data Sheet **Survey Number** ☐

											Code
Severity of the Injury	**Fatality** 1	**Lost Time Injury** 2	**Medical Treated Case** 3	**First Aid Case** 4	**Unspecified** 5						
Number of days off - work		----------									
Type of the Injury	**Fracture** 1	**Sprain/ Strain** 2	**Wound (Cuts, Bruises, Contusion and Laceration)** 3	**Burns** 4	**Crush** 5	**Electrical Shock** 6	**Concussion** 7	**Other** 8			
Nature/ cause of the Injury	**Fall** 1	**Struck by** 2	**Struck against** 3	**Tripping and Slipping** 4	**Caught by** 5	**Electricity** 6	**Vehicle** 7	**Handling** 8	**Burnt by** 9	**Other** 10	
Part of the body injured	**Arm** 1	**Fingers and/ thumbs** 2	**Head** 3	**Eyes** 4	**Face** 5	**Back** 6	**Chest and Shoulders** 7	**Leg** 8	**Foot** 9	**Other** 10	
Occupation of the Injured Person	**Operator** 1	**Mechanic** 2	**Electrician** 3	**Assistant Worker** 4	**Technician** 5	**Driver** 6	**Supervisor** 7	**General Labour** 8	**Other** 9		
Age Category	**Less 21 Years** 1	**21–30 Years** 2	**31 – 40 Years** 3	**41 – 50 Years** 4	**51 – 60 Years** 5	**Unspecified** 6					
Shift Category	**Morning Shift** 1	**Afternoon Shift** 2	**Night Shift** 3	**Day Shift** 4	**Unspecified** 5						
Employee Category	**Contractor A** 1	**Contractor B** 2	**Contractor C** 3	**Contractor D** 4	**Contractor E** 5	**Contractor F** 6	**Contractor G** 7	**Contractor H** 8	**Not a Contractor I** 9		

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