IFAP

FOREST DEPARTMENT

DIVISIONAL SAFETY COURSES

TRAINING PAPERS

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FORESTRY DEPARTMENT

TWO DAY SAFETY TRAINING PROGRAMME

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3	1400	Accident Ratio Studies and a rationale for the importance of injury reporting.	IFAP
4	1415	A Systematic Approach to Accident/Incident Investigation - Concepts for impacting on accident causes and achieving management control. * Causes of Accidents as seen by attendees. * Traditional industry response and effect on occupational safety. * Examination of own belief structures and effect on safety performance. * Human behaviour and accident causation.	IFAP
5	1530	Afternoon Tea.	
6	1545	Accident V Damage Causation	IFAP
7	1645	Summary.	IFAP
8	0830	Managing Safety within the Division. _ Originating Forms - Procedures - Reports - Analysis of records.	Day 2
9	0930	SAFETY TOOLS - Job Safety Analysis - Development and Use in Forestry Operations	

SERIAL	TIME	CONTENT	REMARKS
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THE RECORDING & MEASURING WORK INJURY EXPERIENCE AS PER ASA 1885 - 1976

The full code is not given to you within this paper, only the pieces which we feel will assist you to have a better understanding of MRD's and others' injury statistics. Hopefully, a better understanding of the terminology used by safety people, will increase your interest in those "pieces of paper with all the figures" which appear on your desk each month!

To avoid misunderstanding (and arguments!) we have photocopied all that follows from the code itself. The number you will see (e.g. 1.3.3, 1.3.4.1 etc.) refer to the code section numbers and not to the numbering system used within this manual.
First let us come to grips with some Definitions.

1.3 DEFINITIONS. For the purpose of this Code, the following definitions apply:

1.3.1 Employee—a person engaged in activities for an employer for which he or she receives direct payment.

NOTE: All staff are included.

1.3.2 Employment. This term includes the following:

(a) All work or activity performed in carrying out an assignment or request by the employer, including incidental and related activities not specifically covered by the assignment or request.

(b) All voluntary work or activity undertaken whilst on duty—

(i) with the intention of benefiting the employer; or

(ii) with the consent or approval of the employer.

1.3.3 Workplace—any place at which a person is required to be or has occasion to go during the course of his or her employment.

1.3.4 Work injury—an injury, occupational disease or work-connected disability which arises out of or in the course of employment and which requires first-aid or medical treatment.

NOTES:

1. For the purpose of recording and measuring, work injuries may be divided into a number of categories including lost-time and medical-treatment injuries. The category selected for use in an organization will depend on many factors and may alter as an accident prevention programme improves in effectiveness.
2. Compensable work injuries received in travelling to or from the place of employment should not be included in the record unless the means of transport is not public transport but is operated by the employer and approval to travel in the vehicle has been granted by the employer.

1.3.4.1 *Lost-time injury*—a work injury which results in death or inability to work for at least one full day or shift any time after the day or shift on which the injury occurred.

1.3.4.2 *Medical-treatment injury*—a work injury requiring treatment by a medical practitioner and which is beyond the scope of normal first-aid including initial treatment given for more serious injuries.

NOTE: First-aid treatment is any one-time treatment, and any follow-up visit for observation, of minor scratches, cuts, burns, splinters and the like which do not normally require medical care. Such treatment is considered to be first-aid even if administered or supervised by a medical practitioner.

1.3.4.3 *Occupational disease*—a disease attributed to or aggravated by the environmental factors of a particular process, trade or occupation which the employee follows.

1.3.4.4 *Work-connected disability*—a disability, suffered by an employee, which has been caused or aggravated by the working conditions or environment. The effects of a work-caused disability are cumulative and any lost time cannot be attributed to a single incident. Examples of work-connected disability are hearing loss, Raynaudism (white finger), voice loss, blood change due to non-fatal carbon-monoxide inhalation, and shock. Work-connected disability shall be regarded as a work injury.

1.3.5 Compensable injury—an injury which results in a payment being made under the terms of the appropriate Workers' Compensation legislation.

1.3.6 Time lost—the number of working days or shifts lost by injured employees as a result of lost-time injuries.

2.1 BASIS OF ASSESSMENT.

2.1.1 General. Thorough investigation of all factors relating to the occurrence of each reported injury is essential. Determination as to whether or not the injury should be considered a work injury under the provisions of this Code shall be based on the evidence developed in investigations.

2.1.2 Evidence. The evidence to be considered in determining whether or not the reported injury should be considered a work injury may include, but not necessarily be limited to, the following:

(a) Facts resulting from investigation of the injured employee's work activities and working environment to which the injury might be related.

(b) Statements (written if possible) of the injured employee, fellow employee, witnesses and supervisors.

(c) Medical reports acceptable to the authority classifying the work injury.

(d) Facts concerning the injured employee's work activity for other employers, and other off-the-job activities, injuries and illnesses.

2.2 ASSESSMENT OF SPECIAL CASES.

2.2.1. General. Before inclusion in the record, special cases should be assessed. Rules 2.2.2 to 2.2.16 are intended to assist in such assessment, but the provisions of these Rules should not be used to exclude a genuine work injury from the record.

2.2.2 Inguinal Hernia. An inguinal hernia shall be considered a work injury only if it is precipitated by an impact, sudden effort, or severe strain, and meets, after investigation, all of the following conditions:

(a) There is clear evidence of an accidental event or an incident, such as a slip, trip or fall, sudden effort or over-exertion.

(b) There was actual pain in the hernial region at the time of the accident or incident.

(c) The immediate pain was so acute that the injured employee was forced to stop work long enough to draw the attention of his foreman or fellow employee, or the attention of a physician was secured within 12 h.

2.2.3 Back Injury. A back injury or strain shall, after investigation, be considered a work injury if—

(a) there is clear evidence of an accidental event or an incident such as a slip, trip or fall, sudden effort or over-exertion, or blow on the back; and

(b) a medical practitioner, authorized to treat the case, is satisfied after a complete review of the circumstances of the accident or incident, that the injury could have arisen out of the accident or incident.

2.2.4 Aggravation of Pre-existing Condition. If aggravation of a pre-existing physical deficiency arises out of or in the course of employment, the resulting disability shall be considered a work injury and shall be classified according to the ultimate extent of the injury, except that if the injury is an inguinal hernia or a back injury the requirements of Rule 2.2.2 or 2.2.3 shall apply.

2.2.5 Disability Arising Solely out of a Physical Deficiency. If a medical practitioner considers that an accident or incident such as a slip, trip or fall arises solely out of a pre-existing physical deficiency, and if a person without such physical deficiency would not have suffered such an accident or incident, any resulting injury shall not be considered a work injury. The placement of employees with physical deficiencies in a suitable work environment should receive special attention.

2.2.6 Aggravation of Minor Injury. If a minor injury is aggravated because of diagnosis or treatment, either professional or non-professional, or if infection or other symptoms develop later, either on the job or off the job, the injury shall be classified according to its ultimate extent.

2.2.8 Miscellaneous. This category includes the following:

(a) *Purposely inflicted injuries.* An injury purposely inflicted by the employee or another person shall be considered a work injury if it arises out of or in the course of employment.

(b) *Skylarking.* An injury inflicted by or arising out of skylarking during employment shall be considered a work injury.

(c) *Athletic or recreational activities.* An injury to an employee resulting from participation in athletic activities, whether or not they are company sponsored, shall be considered a work injury only if the participant was paid by the company to perform these activities.

2.2.9 Other Disabilities. The following are examples of injuries which shall be considered work injuries if they arise out of or in the course of employment:

(i) Animal and insect bites.
(ii) Skin irritations and infections.
(iii) Muscular disability.
(iv) Injuries arising from exposure to extreme temperature (hot or cold).
(v) Loss of hearing, sight, taste, feel or sense of smell.

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2.2.11 Hospitalization or Rest for Observation.

2.2.11.1 *Classification as medical-treatment case.* If after observation of an injured employee in a hospital, or whilst the employee is forced to rest, for a period not to exceed 48 h from the time of an injury or suspected injury known to have a delayed effect, from incidents such as—

(a) a blow to the head, back or abdomen; or

(b) the inhalation of harmful gases, known to have a delayed effect;

the physician determines that the injury was in reality slight, and that the injured employee could have returned to work without any permanent impairment or lost time, the injury shall be classified as a medical-treatment case.

2.2.11.2 *Classification as lost-time injury.* If any treatment or medication is given for the suspected injury referred to in Rule 2.2.11.1 after the first 24 h of observation, the injury shall be classified as a lost-time injury.

2.2.12 Illness from Antitoxin. Illness resulting solely from antitoxin, vaccines, or drugs used in the treatment of a non-lost-time injury shall not cause the injury to be classified as lost time.

2.2.13 Death from Undetermined Origin. In fatal cases where death might have resulted either from an illness or from an accident following the illness, the case shall be considered a work injury only if it is the opinion of the attending physician engaged or authorized by the employer that the illness arose out of, or was aggravated by, the employee's work.

2.2.14 Injuries on Public Transport. The injury or death of an employee travelling as a passenger on public transport as a result of an accident to that public transport is not a work injury within the meaning of this Code.

2.2.15 Doubtful Disabilities. In the case of doubt as to the classification of a work injury, the classification shall be based on the decision of the physician engaged or authorized by the employer.

2.2.16 Committee of Interpretations. When the proper assessment of an injury is in doubt, a copy of the full report of the circumstances of the injury or alleged injury may be submitted to SAA Committee SF/2, Industrial Accident Records, for a decision.

SECTION 6. MEASURES OF WORK INJURY EXPERIENCE

6.1 SCOPE OF PART. This Part of the Code sets out methods of measuring work injury experience.

6.2 PURPOSE. The purpose of this Part is to provide practical and uniform methods of measuring work injury experience.

6.3 MEASUREMENT OF WORK INJURIES. Recommendations are made for the measurement of work injuries under frequency, duration and incidence rates. The measures provide a basis for the evaluation of the effectiveness of a safety programme when compared over successive periods.

It is not necessary for a particular organization to make use of all rates within a category. For example, it is recommended that small organizations use incidence rates rather than frequency rates; a larger organization may find that lost-time injury frequency rate serves its purpose better.

6.4 FREQUENCY RATES.

6.4.1 General. The frequency rate can be used to relate the number of injuries of any type to the exposure to hazard while in the workplace, and is expressed in terms of a million-manhour unit.

The exposure to hazard is expressed in manhours and it is recommended that the figures be obtained from payroll or time-clock records. When this is not practicable, the exposure may be calculated by multiplying the total employee-days worked by the number of hours worked per day. An estimate may be obtained by multiplying the average number of employees per year by 2000 h.

The method used for obtaining manhours exposure should not be altered from period to period.

6.4.2 Work Injury Frequency Rate. This is the number of work injuries in the selected period, related to a million-manhour unit.

6.4.3 Lost-time Injury Frequency Rate. This is the number of lost-time injuries in the selected period, related to a million-manhour unit, as follows:

$$\text{Lost-time injury frequency rate} = \frac{\text{Number of lost-time injuries} \times 1\,000\,000}{\text{Manhours exposure}}$$

6.4.4 Medical-treatment Injury Frequency Rate. This is the number of medical-treatment injuries in the selected period related to a million-manhour unit.

6.4.5 Specific Frequency Rate. This is the number of specific injuries in the selected period related to a million-manhour unit. This frequency rate can be used for any individual classification under Rule 3.4.3. Examples are: Eye-injury frequency rate: Strain-while-manual-handling frequency rate.

"Frequency Rate" is the measure most commonly used to assess safety performance and while we may calculate a frequency rate for any category of injury we are always talking about LOST TIME INJURY Frequency Rate when we use the shortened term "Frequency Rate".

As you can see from 6.4.3 above, the calculation is a simple one. However, to explain to workers what a Frequency Rate means is not so simple.

The following idea should help you. First, let us forget about "a million man-hours" —— that is as meaningless as the dark side of the moon for most people! Calculate how long it will take your division (or your section or your department) to work one million man-hours and express this in weeks, or months or years.

For example, say you have 150 men in your group, all working 40 hours/week.
Thus the group will work (150 x 40) man-hours in one week.

or they will work (150 x 40 x 4) man-hours in one month, providing you have not a 5 week month, of course!

So it will take your group $\left(\frac{1,000,000}{150 \times 40 \times 4}\right)$ months i.e. 41.6, say 42 months, to work a "million man hours".

Now if your group's Frequency Rate is 81 (I have simply pulled this figure out of my head) this means that over the next 42 months your group can expect to have 81 Lost Time Injuries, (or about 2 every month!). This explanation is always easy to understand.

Of course, if your group is very small you will have to talk in "years" instead of "months". We are now ready to start comparing the safety performance of different groups. Here is a simple one to start with!

	GROUP A	GROUP B
No. of L.T.I.'s Last Month	7	5
No. of Employees	253	275
No. of Man-Hours Worked	40480	44000
No. of Days Lost	44	87

Monthly Freq. Rate for Group A = $\frac{7 \times 1,000,000}{40480}$ = 172.9

Monthly Freq. Rate for Group B = $\frac{5 \times 1,000,000}{44000}$ = 113.6

So we could safely say that Group B has the better Frequency Rate, but is it really the safer of the two groups? Look at the "Days Lost" for both groups. What might they tell us?

Simply, that Group B can have a lower Frequency Rate but at the same time have more SEVERE injuries. So to look at Frequency Rate in isolation can be deceiving. We need another measure to take care of the discrepancy we have seen; the Duration Rate gives us this measure.

6.5 DURATION RATE.

6.5.1 General. Duration rate is a method of measuring the time lost in days in relation to the number of injuries. Prolonged cases are to be regarded as closed after one calendar year from the date of first absence.

The figure obtained is an average of the time lost due to injuries.

6.5.2 Calculation. This rate is computed from the number of lost-time injuries and the time lost during the selected period, as follows:

$$\text{Duration rate} = \frac{\text{Time lost}}{\text{Number of lost-time injuries}}$$

Thus

Monthly Duration Rate for Group A = $\frac{44}{7}$ = 6.28

Monthly Duration Rate for Group B = $\frac{87}{5}$ = 17.4

We see that B's Duration Rate is almost 3 times that of Group A! But how would you explain 6.28 or 17.4 to a worker? In "easy to understand" terms we might say:

(1) "In Group A the average time lost per injury is 6.28 days".

(2) "In Group B the average time lost per injury is 17.4 days".

Always remember, this is what costs you money! Duration Rate is most important and should always be viewed together with Frequency Rate.

SPECIAL NOTE: For small groups or very small organisations the Code recommends a measure called Incidence Rate:

6.6 INCIDENCE RATES.

6.6.1 General. Incidence rate is a measure of the number of injuries per employee during the period under review. It may be expressed as a percentage by multiplying by 100.

6.6.2 Lost-time Injury Incidence Rate. This is the number of lost-time injuries per employee during the selected period, as follows:

$$\text{Lost-time injury incidence rate} = \frac{\text{Number of lost-time injuries}}{\text{Number of employees}}$$

6.6.3 Medical-treatment Injury Incidence Rate. This is the number of medical-treatment injuries per employee during the selected period.

6.6.4 Work Injury Incidence Rate. This is the number of work injuries per employee during the selected period.

6.6.5 Compensable Injury Incidence Rate. This is the number of compensable injuries per employee during the selected period.

6.7.3 Incidence Rates. As shown in Rule 6.6, incidence rates may be calculated for any class of injury, and an example based on medical-treatment injuries is given below:

Number of medical-treatment injuries $= 15$

Number of employees $= 25$

$$\text{Medical-treatment injury incidence rate} = \frac{15}{25} = 0{\cdot}6$$

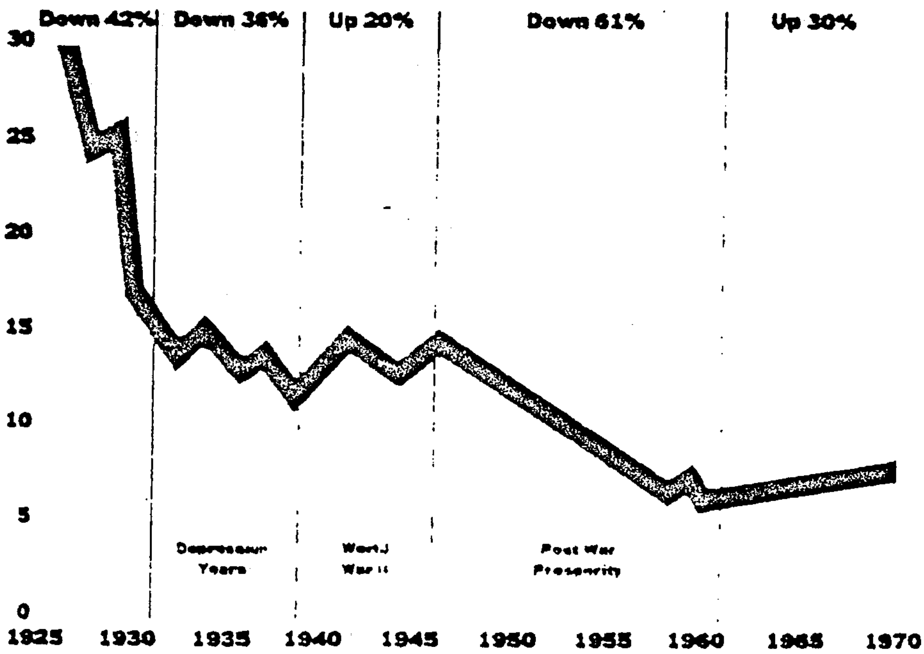
This rate may be expressed as a percentage by multiplying by 100; in the above example 0·6 becomes 60 percent.

Of course, MRD will never have to use this measure, because of it's large workforce.

Now,how do we use Frequency and Duration Rates?

Their chief use is to provide people, at all levels, with information on (1) past and present performance and (2) to help set safety targets. Here are some examples:

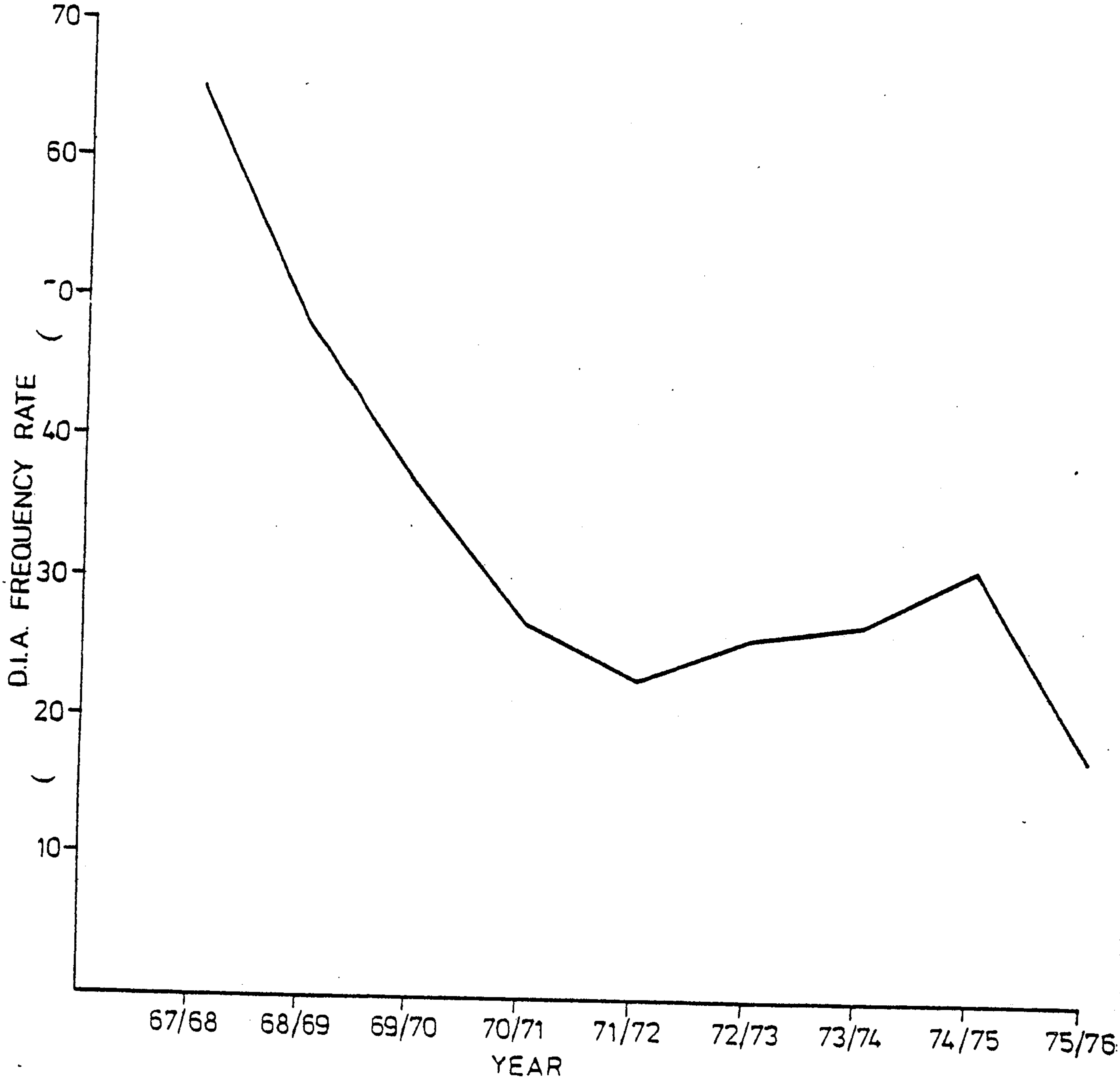
(A)



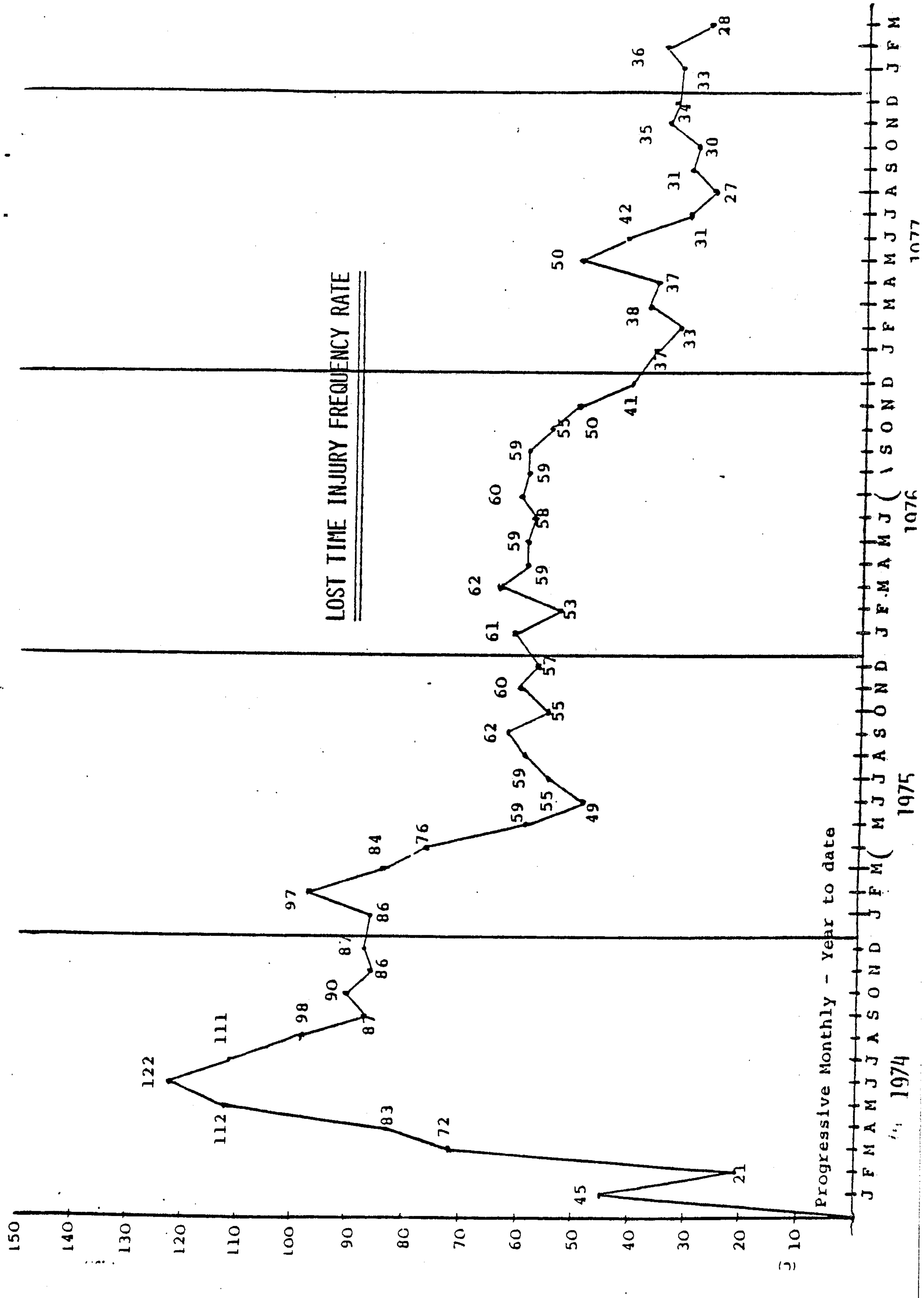
LOST TIME INJURY FREQUENCY RATE: USA : 1925-1970

(Source: National Safety Council, U.S.A. 1976)

(B)



(Source: Forestry Dept. W.A.)


LOST TIME INJURY FREQUENCY RATE
Progressive Monthly - Year to date
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
J F M A M J J A S O N D
1974
1975
1976
1977
45 21 72 83 112 122 111 98 87 90 86 87 86
97 84 76 59 49 55 59 62 55 60 57
61 53 62 59 59 58 60 59 59 55 50 41
37 33 38 37 50 42 31 27 31 30 35 34 33 36 28

CONCLUDING REMARKS ON MEASUREMENT

Some of the biggest arguments in the safety field centre around the use of Frequency Rates, especially when the rates are used in the form of "league tables" —— we shall discuss this in detail during the course.

MRD use the Code we have just examined, to collect injury statistics and the specific breakdown used will be examined in Paper 4.

REFERENCE: Australian Standard 1885-1976, Recording and Measuring Work Injury Experience.

ANALYSIS OF ACCIDENT CAUSES WITHIN THE CONTEXT OF INDUSTRIAL ACCIDENT PREVENTION

1. BACKGROUND TO A PROBLEM

A chiefly mechanistic view of accident causation will favour technical or engineering preventative measures.

Followers of the concept of accident-proneness will emphasize the value of better selection procedures — we shall deal more with this topic in the following paper.

If dangerous behaviour is regarded as the major causal factor, then training will be emphasized as the best preventative action. And if organisational defects or management weaknesses are accepted as causal factors we are likely to see a more ergonomic conception of safety.

Although these different approaches have had their influences on the attitudes of safety people and line management, each supervisor and each safety officer has nevertheless been obliged to form his own concept of accident causation, with special reference to the features of his own "plant", or "work". Safety engineers, with the help of industrial physicians and psychologists have carried out studies on accident causation, and have, as the numerous publications testify, acquired valuable experience. However, there is still the question as to whether empirical knowledge gained from specific cases can be used to draw general and scientifically valid conclusions.

This will become clearer if we consider examples of studies aimed at evaluating the respective significance of technical factors and of human factors in industrial accident causation.

The facts are as follows:

Using safety department statistics, it has been possible to divide accident causes into two groups — (1) those relating to defective conditions in the working environment (TECHNICAL FACTOR) and (2) those relating to psychological and physiological factors (HUMAN FACTOR).

Your have probably made this division yourself when you looked for UNSAFE CONDITIONS (Technical Factor) and UNSAFE ACTS (Human Factor) during accident investigations.

Now, the relative weighting of these two factors has changed considerably since the beginning of the century....initially only the technical factor received attention. It was not until after the first World War that any thought was devoted to the human factor. In 1929, the 12th I.L.O. Conference stated that the experience gained and the studies already undertaken showed that the frequency and severity of accidents depended not only upon the hazards inherent in the type of work, the nature of the plant and the various machines used, but also on physiological and psychological factors, and then went on to recommend the study of these two factors. At that time, general opinion attributed equal responsibility to the two factors.

Since then the share attributed to the human factor has increased steadily:

1950's: U.S.A.: Heinrich produced this breakdown:

Unsafe Acts of persons	88%
Unsafe Mechanical or Physical Conditions	10%
Unpreventage, i.e. "Acts of God"	2%

12,000 cases were taken at random from closed-claim-file insurance records; 63,000 cases were taken from the records of plant owners.

Through analysis of these 75,000 cases, Heinrich suggested that a massive 98% of industrial accidents are of a preventable kind.

1953:	U.S.A.:	National Safety Council Unsafe Acts of Persons	87%
1955:	U.S.A.:	State of Pennsylvania Unsafe Acts of Persons	82.6%
1960:	France:	Barier in Iron and Steel Industry Unsafe Acts of Persons	90%
1961:	Belgium:	Coppee-Bolly in Iron and Steel Industry Unsafe Acts of Persons	98%

During the last 10/15 years there has been a gradual move away from the idea of man being entirely responsible for the accidents which befall him. This is reflected in a 1974 research on road casualties which list the causes of accidents

1974: U.S.A.: Kontarotus Study - University of Indiana

	%
Human Error	51.9
Vehicular	2.3
Environmental	4.2
Human plus Vehicular	6.4
Human plus Environmental	30.1
Environmental plus Vehicular	0.4
Environmental + Vehicular + Human	4.7

This more elaborate breakdown of the "causes" of accident reflect the changed attitudes in scientific circles to accident causation. If one selects the most conservative figures of this study, it can be generalized that human factors are probably involved in either a causal or severity increasing way in not less that 91% of accident cases, that vehicular are probably involved in not less that 14% of accident cases and that environmental factors are probably involved in not less than 34% of accident cases. This modern research study still supports the attitude of those who claim human error is the major cause of accidents.

AN ACCIDENT IS A CONSIDERABLY COMPLEX EVENT IN WHICH MANY FACTORS MUST COMBINE IN CORRECT TIMING TO PRODUCE THE DAMAGING OUTCOME. MANY THINGS ARE ESSENTIAL TO THE FINAL OUTCOME AND ONLY ON AN EMOTIONAL BASIS CAN ONE OR TWO OF THEM BE SELECTED OUT FROM THE OTHERS AS THE "CAUSE" OF THE ACCIDENT.

On the other hand some accident researchers argue (1) that the preponderance of the human factors is attributed to the success of technical preventive measures or (2) that industrial development itself, with mechanisation and automation diminishing the material risk more than the risk inherent in human factors.

However, a critical examination of the methodology used to examine accident causes makes more caution necessary, as we shall see.

2. CRITICAL EXAMINATION OF METHODOLOGY

In the first place, we should object to any general application of such results to all accidents in all workplaces. Surely, the preponderance of the technical and human factors varies, in practice, according to different factors:

e.g. the level of industrialization in a country/state; the amount of automation in a plant or on a project; the type of work being undertaken (laying slabs manually or with a mechanical aid); the particular industry under consideration; whether we examine a severe-accident or a slight-accident group; and so on.

Secondly, we should be concerned about the depth of causal analysis which differs from investigator to investigator; some investigators make only a very superficial study of the circumstances surrounding accidents, the majority take the systematic causality approach (the common "tick the appropriate box" approach) whereas others delve deeper and assume historical causality (tracing back thro' the sequence of events that produce the damaging outcome).

Thirdly, fundamental research on this question, emphasizes the plurality of causal systems interacting to produce an accident, the majority of literature produced by workers in the field considers only one single cause for each accident, this cause being not so much the one that seems to be the most important, as the one which suggests the simplest and most effective means of prevention. Thus, the notions of cause and of remedy, then leads us in a vicious circle: the theoretical model of accident prevention requires that causal analysis should precede and determine the choice of remedy, whereas in practice, the convenience of the remedy determines the choice of the single cause!

3. TRUE SIGNIFICANCE OF SUCH RESULTS

The inferences should now be obvious: accident statistics as we now know them,no longer express a causal analysis, but the attitude of the safety worker towards the technical or human orientations of his measures.

If we look more closely at some of the studies I mentioned earlier we will see how misleading accident statistics can be.

When formulating the doctrine which has obtained a very large following in accident prevention circles, Heinrich, had at his disposal, in the U.S.A., three major statistical studies. The procedure followed by two of them (the N.S.C. and State of Pennsylvania studies) had enabled only TWO causes to be attributed to each accident. His own study recorded only one cause for each accident (remember we had Unsafe Acts accounting for 88% of causes!)

A concrete example will help here ——

——a workman hammering on the head of a chisel which is badly burred; part of it breaks away and injures his eye——

Now, it is certain that the material hazard (the defective chisel) is a cause of the accident. But, from the standpoint of practical safety it is more usual to take the personal causes —— "using dangerous tools" and "not wearing eye protection" as being the more important causes.

Is it not by this kind of reasoning that the majority of industrial accidents are attributed to human failing rather than to the material defect?

The statistical results, being thus determined by subjective attitude of the person conducting the investigation, will be different, and even conflicting, if this attitude varies (as it does!).

Altering our belief to "machine design causes" or "environmental causes" may be short term effective, but, would be long term detrimental, and, in any event, would be dishonest. All such beliefs commit the simplistic sin of a belief in single causation of accidents.

ACCIDENTS ARE COMPLEX INTERACTION EVENTS AND MANY FACTORS ARE ESSENTIAL IF PEOPLE ARE TO BE SUCCESSFULLY INJURED AND PROPERTY EFFECTIVELY DAMAGED.

So far, we have been discussing accident causes on a very broad basis; it is now opportune to examine the state of the art here in Western Australia. Let us see how "accident factor" (i.e. cause of accident) is classified within Industrial Accidents, Series A and B of the Commonwealth Bureau of Census and Statistics. Fig. 1 provides a conceptual framework for the process of compilation.

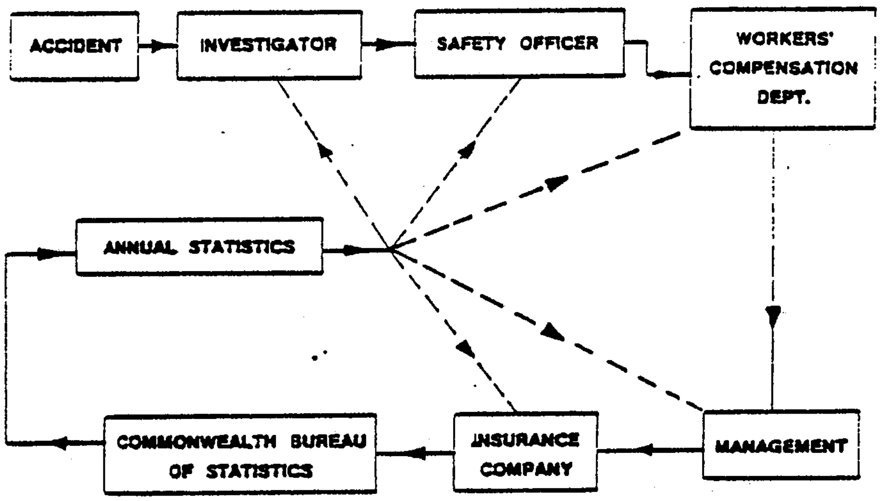


Figure 1: Conceptual framework for the compilation of industrial accident statistics

Over 95% of all industrial accidents in industry are investigated by the injured person's immediate supervisor — the foreman or supervisor — and accident prevention/control consultants and teaching institutions encourage this. The frames of reference, information organisers, design of the investigation form terminology on the form, attitude towards accident victims and amount and type of safety training will all influence the findings of the investigator. One of the greater influences on those findings is the fact that for many years such supervisor/investigators have been taught and exposed to the "fact" that the principal cause of accidents is "human error" usually propounded to be in excess of 80%. All of this combined with the investigation form design which specifically requests that he find the "unsafe act(s)" contributing to the accident points the relatively untrained supervisor/investigator in a biased direction right from the start (i.e. untrained in accident investigation).

On completion, the investigation form may go to a safety officer who generally thinks in terms of remedy rather than a full analysis; he has been trained to, and is frequently pressurised to find a "remedy" fast. Most safety officers have been trained using Heinrich's concepts and his model of accident causation (discussed more fully later). In the majority of work injury incidents the resultant investigation form goes direct to the Workers' Compensation Department with the organisation — safety officers are not employed except in the larger organisations in Australia. Personnel dealing with claim aspects of accidents are not interested in causal analysis per se.

Only in a minority of organisations do senior managers view the investigation information, and, provided the company's work conditions do not appear in an unfavourable light within that information, the report form is signed and passed on to the insurance company. This is very understandable attitude for a manager to take, especially in these days of escalating insurance costs. What manager (in his right mind) would write to tell his insurance company that dangerous conditions (if any) existed on his plant/site/factory?

Thus, accident reports may reach insurance companies in Australia without going through a process of validating the initial data. This data is passed on from all operating insurance companies to the Commonwealth Bureau of Census and Statistics where it is analysed for agency of injury, part of body injured, and type of injury, and finally, accident factor (meaning the prime cause of the accident), but not tested for construct validity (meaning is it the true measure of what it is supposed to measure—an analysis of the true underlying causes of industrial accidents and not the symptoms).

Subsequent to this exercise, the accident statistics are printed and issued back into industry, where they originated in the first instance. Each year, they show, and are interpreted as showing, 70 to 80% of the accident factor as "human error". It is at this point in the sequence that the true significance of the statistics becomes open to some valid questioning.

The following are very direct questions; they are not asked lightly or rashly since they clearly question much of the method in current work. But they are required since we find ourselves increasingly puzzled about the results, or non-results, of our own and others' approaches to control accidents. Let us be explicit in clarifying the basis of our concerns and in tracing the resulting implications from the interpretation of much of the data in accident control literature.

(1) Does management receive the figures and feel it has been given valid ways to approach the accident problem and seize on the importance of <u>controlling</u> human behaviour? Are improvements that might be made through improved machine design, equipment layout, and environment possibly overlooked? Are the figures sometimes held up as evidence <u>against</u> improving work conditions especially in the areas of work-connected disabilities, for example, dust industrial deafness or fumes. Are workers thus deemed responsible for not wearing the protective equipment provided?

(2) Do insurance companies which receive the figures direct their attentions to the problem of controlling human factors?

(3) Do safety officers who receive the figures thus direct their attention to rules and regulations, training courses to motivate workers to work more safely, use the bureau headings as a basis for their annual report to management, use the figures as a basis for lectures during safety courses, look mainly for unsafe acts on investigation reports, and, if management pressure is applied for increased safety performance, are these national (almost sacred) figures sometimes used as evidence of people being careless and committing unsafe acts?

(4) Finally, do the originators of the statistics,the supervisors, receive them back during in-company training courses, job improvement courses, safety courses, and in monthly statistics from the safety officer? They do! the picture is now complete for them. There is no cognitive dissonance to worry about; no inconsistencies with past experience. The figures act as reinforcement and any change would only arouse dissonance. The next accident the supervisor investigates, is he not more convinced than ever before that he should look for that dreadful enemy of accident control - human error?

The statistics, as currently presented, do provide factual information of a quantitative nature; they indicated the number of eye, hand, or trunk injuries, the type of machinery or equipment involved, but the greatest danger lies in the accident factor section, and,in particular, when those accident factors are taken to be predictive of preventive action. Probably one of the best examples of the shortcomings of this cause-effect thinking is the persistent applications of manual handling training to reduce the number of trunk injuries that are statistically attributable to "handling and moving" objects. The effectiveness of this simplistic interpretive approach to remedy is very questionable — the percentage of reported trunk injuries has not decreased in the past ten years; in some instances it has increased, and so, each year, does the vicious circle accelerate a little more on its way to increase the probability of accident causation becoming more aligned to allocation of culpability to abd derogation of the accident victim.

Could we have set up, unconsciously, a Skinnerian-type statistical reinforcement which we apply consistently with each year's issue of figures?

More specifically how have the factors we have mentioned so far influenced causes as reported on your own accident investigation form? The story does not end here as we shall see in future papers.

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A FEW CENTRAL PROBLEMS TO BE OVERCOME

To some people present the idea that an accident is the result of a failure in one or more systems within an organisation may be a little difficult to accept, and particularly after earlier papers where "human error" emerged as the major apparent cause of accidents in W.A.

We also saw the "Plateau" situation we have reached. Surely the newer developments must have had some beneficial effects on accident control performance.

But, if one looks at the history of science and new developments it is, in many ways, the history of new information which has not led directly to the adoption of new ideas. Accident Control is one area where delay in adopting new ideas can be agonisingly slow.

Frequently, the problem is that the receiver of the information cannot fit the new information satisfactorily into his concept of the world. At other times it is because the new information directly challenges important and valuable beliefs.

In history, hindsight enables the factors which delayed the adoption of new ideas to be identified. In contempory cases, it is more difficult to identify the delaying factors.

In accident control programmes of to-day......I feel that some of our efforts should be directed towards identifying these delaying factors.

The central problem of accident control is far removed from the scene of an accident. It is not directly related to the presence or absence of guards, seat belts, bad behaviour or the like. It is whatever determines the behaviour of individuals and groups so that accident damage still occurs. The "concepts" the"frames of reference", and the "information organisers" which people use to help them view and understand the disturbing events called "accidents" are unsatisfactory for accident control.

Risk Taking

It is rare to discuss accidents in a group without the risk taking of those involved in accidents being soundly condemned. Those earnestly doing the condemning would just as earnestly praise the bravery of such greats as Sir Edmund Hilary and Sir Francis Chichester. Both the condemned and the brave have been judged for this risk taking, the one unsuccessful, the other successful. Our society maintains ambivalent attitudes to risk taking. In this area it is socially acceptable to "kick a man when he's down" and indeed often unacceptable to do otherwise.

This seemingly uncharitable behaviour has its origins in our need to take risks and our equally important need to convince ourselves that our risk taking will be successful. Our society at large rewards successful risk taking and so does our physiology.

Sir Francis Chichester and Sir Edmund Hilary were, of course, knighted for successful risk taking. Our financial reward system is also closely related to risk taking. A steady secure job with little risk attached will attract a low wage. As the number of risks a job demands or a person is prepared to take increases, the financial reward increases. Entrepreneurs are very highly rewarded if successful. The risks people take may be financial, emotional, mental, social or physical, etc.

The work of Hans Selye, the Canadian physiologist, which showed that we are physiologically rewarded for risk taking, is important in this context.

Selye studies what happened at a cellular level when people are exposed to threat and identified three distinct stages in what he termed the General Adaption Syndrome. Each of these stages is characterised by the relative activity in the two basic metabolic processes which are ever present in the body. The anaboliprocess is the building up of new cellular materials while the term catabolic process is used to describe the breaking down of cellular material which occurs at different rates in different parts of the body.

The first stage of the General Adaption Syndrome, "alarm reaction", occurs when the person is first confronted with the threatening situation. The anabolic processes slow down while the catabolic processes accelerate. This stage is a preparation for action which can be recognised by every person as that sinking feeling in the stomach and the blood draining from the face. It is normally only a short lived stage and finished when some positive action is takento counter the threat. This second stage, the "stage of resistance" is characterised by the anabolic processes accelerating and the catabolic processes decelerating. The person is literally building up during this stage which lasts as long as he actively and confidently works against the threat. If the threat overwhelms the person and he ceases to be confident of overcoming it, he enters the third stage "the stage of exhaustion". The characteristics of this phase are similar to the alarm reaction phase, anabolism is low and catabolism high. However, this phase can last a long time and a person in this phase for a long time can deteriorate quite considerably. We have all seen people whom we admire for their positive approach "after all they have been through". Their admirable characteristics may well be <u>because of</u>,rather than in spite of adversity, as the adversity may well have supported them in the second phase. Similarly we have all seen people deteriorate quickly under threats that are too large. In this regard, Selye's work highlights what we have already seen, and the similarity to the principles of physical body development is striking. Muscles do not develop by being left alone, but by repeated exposure to loads which work them, but not large enough nor frequent enough to cause permanent damage. Muscular overload can result in severe damage.

Another relevant research area has occurred in education where children's motivation has been studied. Broadly,two strategies have been identified (a) motivated to achieve success and (b) motivated to avoid failure. The first group will pick a level of risk which taxes their ability realistically. The second group will pick a level or risk where failure is virtually impossible or where success is such a remote possibility that the person is beyond reproach if he does not succeed. A group of boys are asked to throw quoits on a peg, where the scoring system includes both the number of quoits on and the distance from which they are thrown. The failure avoidant boys will throw from so close that practically all quoits will go on or from so far away that no quoits will go on. The success oriented boys will pick a distance which gives them a high score. The motivations are argued to be a result of child rearing practices. While these motivational systems must have relevance for accidents it is not clear just how. Both the success oriented and the failure avoidant "taking a long shot", would be involved inaccidents where out and out risk taking is involved. There may be no relevance to accidents where the human contribution are errors of judgement, lapses of concentration etc. The motivational strategy has implications for accident control programmes.

Also if one looks at the evolution of man: we are a generalist animal rather than a specialist. Our species has evolved an ability to adapt to a wide variety of climates, foods and dangers. In the development of the species this generalism is excellent for long term survival, even if it may be more dangerous for individual members of the specialists. Curiosity is a strong characteristic of generalist animals and keeps the individual exposed to risk.

Our society's ambivalent attitude to risk taking, Selye's General Adaption Syndrome, and the success oriented or failure avoidant motivational systems, all serve to high light the important and complex role risk taking plays in our civilisation. The evolutionary considerations show that risk taking has been a positive aspect of human phylogeny (development of the species), and hints at selection pressures in favour of those who take an optimum level of risk.

All this discussion is to make it clear that risk taking is important, necessary and that the type of risks taken are varied as are the motivations underlying risk taking.

THE NECESSITY OF "IT CAN'T HAPPEN TO ME"

One of the most frustrating attitudes which confronts safety practitioners is that of "it can't happen to me". This attitude is seen as unreasonable by many and certainly disinclines the person holding the attitude from taking any positive action to avoid being involved in accidents. The attitude is really, quite reasonable and, indeed, necessary to the well being of many individuals. However, the attitude combines with the belief in "human error" as the "cause" of accidents, to provide the greatest single block to effective accident control in modern industry. Understanding of the reasons for this attitude is most important.

Several years ago, a rather brutal murder occurred one Friday night about half a mile from where the author lived in a city. About two o'clock on Saturday afternoon the hammering started and continued until dark. Just about every house in the neighbourhood had the windows nailed shut and the doors boarded up. Houses remained in this state until the murderer was arrested about three days later. Few, if any, of these people bothered to fit seat belts to their cars or to wear them if they were already fitted. All of them were, of course, much more likely to suffer damage from a car accident than from the murderer. Why the difference in action taken?

To have a murderer at large in your midst, or to drive on roads where thousands are killed and maimed each year is to be under threat. The former was a transient affair where active banging and boarding placed the hammer wielder beneficially in the second stage of the General Adaption Syndrome. Why did not doing up the seat belt have the same effect? For many years people have been confronted with car accidents. For most of this time the accidents have been proclaimed by authority figures as due to human error and believed by the general public to be so. Two things happen to enable people to resolve the conflict of being constantly under threat and open to blame.

Firstly the propaganda makes it clear that those who "caused" accidents inflict suffering on others. This leads to rejection of involvement for each individual by developing a stereotype of the "bad" people who cause accidents. Thus most individuals do not believe that they would cause an accident. They are, however, still at the mercy of the "bad" drivers. To be unable to do anything about this risk is to be in the third phase of the General Adaption Syndrome which is damaging. By convincing himself that "it can't happen to me", the individual is able to rationalise the threat as being not relevant to himself. The most common mechanism of this rationalisation is to develop a belief in one's own superior driving skill. Youths typically spend a lot of time developing and demonstrating their particular kind of driving skill.

It is interesting to speculate on how long the window boarding would last if the murderer was not caught at all.

The widespread "it can't happen to me" belief is therefore beneficial in general health terms by preventing the person from feeling constantly threatened. It is not beneficial in that it inhibits effective accident control measures. An alternative which is equally effective in removing the threat is the only feasible replacement for this belief and obviously the replacement needs to actually remove the threat rather than allow it to be rationalised.

The belief in "human error" as the cause of accidents is absolutely essential to the maintenance of the "it can't happen to me" attitude. By believing that characteristics which he does not possess are important aspects of those involved in accidents and lead them to make errors, the individual believes himself removed from risk.

THE BELIEF IN HUMAN ERROR

Hand in glove with the "it can't happen to me" attitude is the belief that accidents are caused by "human error". This belief has received pseudo-scientific support, has derivations in religious dogma, is firmly entrenched in a large section of the general community and must be countered in industrial communities before effective accident control can occur.

A major point in religious teachings and indeed in philosophy as well, is the extent in which a person's actions are or are not subject to his own control. There is a continuum from the belief that everything is pre-ordained and the individual is powerless to alter events, to the belief that each individual is entirely responsible for his own action and fate. Most people to-day, and in other times, would argue for a position somewhere between the two extremes but often towards one end. Thus, before the reformation, accidents were seen as acts of Gods and consequently outside the realms of human control. Good people humbly accepted what their lot was to be. With the development of the protestant churches came the development of new beliefs which were in time to become known as the White Anglo-Saxon Protestant (WASP) ethic. A strong part of this ethic was that the individual was responsible for himself. The successful were successful because of right living and strenuous effort. The unsuccessful, alas, had not tried hard enough and so obtained their just rewards. Obviously, accidentswere now believed to be a direct result of people's behaviour.

One the the early accident researchers, Heinrich, gave pseudo-scientific support to this ethic when he published the results of a study of the "cause" of a large number of industrial accidents.

88% were due to the human
10% were due to the machine (Remember this?)
2% were due to Acts of God

While Heinrich argued that the most effective method of accident control was to alter machines, his emotionally attractive figure directed attention towards human error and endorsed the then current general public attitude which had, of course, given rise to the figures in the first place. In short, the whole exercise was a circular one in which Heinrich picked out the most obvious (emotionally attractive) "cause" of each accident on the basis of his own attitudes and beliefs which coincides with those of the general community.

THE CONSEQUENCE OF THE BELIEF IN HUMAN ERROR

The major problem with the belief in "human error" as the cause of accidents is that it inhibits the development and adoption of more effective methods of accident control.

Seat belts were compulsory on all aircraft seats in Australia prior to the Second World War. Why did it take so long for their advantage in cars to become obvious? How many lives were lost unnecessarily awaiting their introduction? Just after the Second World War the first Ferguson tractor appeared complete with an interlock to prevent the tractor being started in gear with the starter motor. Twenty years later tractors were still being sold without this interlock while the manufacturing company ran a campaign exhorting drivers to behave better. Roll-over protective frames were compulsory on new tractors in Sweden in 1958. Sixteen years later this extremely effective measure was introduced in New South Wales. The measure is yet to become fully effective throughout Australia.

During the time these effective counter measures were being delayed there was must propaganda on human error and good and capable men worked diligently to help people to control their behaviour — too little, if any avail.

As a result, important information on design defects was suppressed, information about accidents was distorted to fit the stereotype as was information from public lectures, the wrong information was inadvertently transmitted by demonstrations and the promotion programmes for selling safety innovations were misdirected.

Tractor companies have also believed in "human error" causation and as a consequence have ruined sales of safety innovations by their promotion programmes. One of the American Companies which pioneered roll over protective structures in that country, found their frames hard to sell. The film they used to promote it was probably their greatest enemy. The film gave an impressive case of the frame and convincing visual demonstrations of both its effectiveness and the thoroughness of its development. The final segment of the film has a dignified gentleman explaining to the effect that the best insurance against accident is a safe operator but the frame was there for when thingswent bad. His audience interpreted him as saying that conscientious reliable drivers do not need frames but that the reckless and careless do. The low sales figures may indicate the small number of drivers who regard themselves as reckless or careless. It is not possible to tell from the film whether the last segment was in defence of the ego of the company for not having produced frames earlier or whether the temptation to preach in good WASP tradition was just too much!

These few illustrations show some of the mechanisms by which a belief in "human error" causation of accidents works against effective control of accidents. The question is well asked "What should we most usefully believe about accident causation?"

I have attempted to make it clear that the belief in "human error" causation of accidents is undesirable.

We need to understand that accidents usually involve a complex sequence of events and that accidents will be most readily controlled by identifying and controlling the most amenable points in the system.

We have learnt a similar approach to the control of tapeworms, malaria, and many infectious diseases such as smallpox, whooping cough, poliomyelitis, and so on.

We need to scrap the idea of accidents having single causation and to develop a belief in accidents being the consequences of systems failure.

This will be a difficult undertaking because the accident problem is:

1. Not recognised.
2. Incorrectly recognised as a problem peculiar to particular individuals who invite the trouble that befalls them.
3. Motivation for change is very low.
4. Relevant information is not seen as relevant, e.g.(frames).

The perceived relevance of information is now identified as critically important to the adoption of change.

Many people in this room possess a considerable amount of information about accidents. Traditionally this information has been organised about two concepts:-

1. Accidents were caused by human error.
2. That accident prevention is the objective of efforts to control accidents.

The first step in helping people re-organise their information is to identify the objective differently.

The objective can be redefined as DAMAGE MINIMIZATION.....making it clear that this objective has two parts.

1. Reducing to a minimum the number of accidents.
2. Reducing to a minimum the damage in accidents that remain.

The measurement of achievement is the total reduction in accident damage, not the reduction in the number of accidents.

To revert back to the example I chose earlier....the tractor and the roll-over frame:-

When a tractor overturns the usual result is a dead driver and the tractor superficially damaged, usually to the extent of less that $100.00. A roll-over frame will save the driver, but not reduce the damage to the tractor - the frame has not prevented the accident, it has effectively removed the vast majority of the damage (to the man).

Now, under the old objective, the frame is not a right and proper solution, but with the new objective it is a highly effective measure of control.

Altering the objective in this way makes it easier to alter the concept of "human error" causation to a belief in system failure with many factors making essential contributions to each accident.

The relationship between the fitting of the frame and accident control now becomes obvious and thus more acceptable.

The problem is not now seen as how to control the human error to prevent the accident but the prevention of damage by various solutions.

The task of accident control is a large one and in its infancy I have attempted to look past the day to day accident control problems and seek more basic problems which I feel need attention.

The major task identified is to teach (or more correctly, re-educate) people a systems failure concept of accident causation with emphasis on a multi-factorial causation and selection of economical and efficient factors to control.

But, even within our methods of teaching people, more caution is necessary as we shall see in the following paper.

Acknowlegement is given to Geoff McDonald for the philosophy and thoughts contained in this paper.

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TRADITIONAL ACCIDENT PREVENTION MODELS (EXPLANATIONS)

If you work a life time in industry you can expect to have at least one serious injury that will keep you off work one week or more; if you work on construction work this figure will be higher; the risks are even greater for miners.

The typical injury at work usually involves none of the complex hazards we associate with modern industry. It is more likely to be inflicted by some everyday part of the work system that is not as safe as it seems. The injury normally goes down on a form as an "accident". Some people see this word as a "convenient label for industry to put on its long roll call of dead and wounded....it preserves the myth that workplaces are basically safe and that 'accidents' are caused by the carelessness of workers" (Kinnersly 1977). While thoughts like this may appear a little harsh, they do contain a sprinkling of truth, but progress will only be made by enquiry into why such attitudes exist. Before moving into an inquiry, the following examples will help you understand what we are aiming at:

Example 1 - Mobile Cranes

An ergonomic survey of 57 cranes and drivers came up with the following results:

* 5% of drivers had had accidents when leaving the cab.
* 68% of drivers had difficulty getting in and out.
* There were 34 different controller layouts among 57 cranes.
* Only two layouts included 'dead-man' control systems.
* 87% of drivers would like standardized controls.
* 95% of machines could be accidentally set in motion.
* 72% of drivers sometimes forgot that controls were different from previous machines.
* 76% confessed to controller movement error.

Additionally it was found that:

1. Heating systems are dependent upon the engine speed, no ventilating systems exist in cabins and during the winter months the drivers' clothes become damp due to the high humidity of the atmosphere, causing condensation to form on the walls of the cabin.
2. It is significant that one driver met on this survey was over 50 years of age. Older people will not or cannot occupy these jobs because of the arduous conditions. The drivers consider that health and physique are affected, e.g. overweight, stomach ulcers, haemorrhoids and hypertension. 67% of drivers experience stiff necks, cramp in legs, aching back, pains in arms and legs, either after completing a specific task or after the changeover from one crane to another....Headaches are a common occurrence and assumed to be caused by viewing high lifts with the bright sky in the background, also pains in the stomach which, it is reported, although not confirmed, are caused by inhaling carbon monoxide fumes from the exhaust outlet which is often adjacent to the cabin. 67% confessed to getting tired whilst sitting at their controls although this was considerably affected by boredom.

..3/..

3. A noise survey of 37 of the cranes found the following levels:

71 - 80 dBA	2 Machines
81 - 90 dBA	13 Machines
91 - 100 dBA	13 Machines
101 - 110 dBA	8 Machines
111 - 120 dBA	1 Machine

4. A sample of operators aged between 22 - 49 was found to have an average hearing level about 10 dBA higher than a non-exposed control group in the 'speech frequencies' of 500, 1,000 and 2,000 Hz. This means that some of them must have been experiencing real difficulty following conversation.

These mobile workplaces, costing tens of thousands of $'s each, are certainly being designed to do a job without including the operator in the definition of "job".

Example 2 - Machine Tools

The controls of a lathe were evaluated and it was discovered that the ideal operator would have to be 4 ft.6in. tall, 2 ft. across the shoulders and have an 8 ft. arm span.

A walk around the average machine shop is likely to reveal many of the following faults or omissions:

* Controls that are poorly positioned, uncomfortable to use, require excessive force to operate under load or can only be engaged after a long wait for parts to line up.

* Knobs on operating levers retained by circlips, a cheap piece of engineering which leaves the knobs free to rotate in such a way that your hand could slip and be injured.

* Stop switches inaccessible in an emergency.

* Foot stop bars not fitted.

* Emergency braking systems, which inject DC current into the motor windings for almost instantaneous stopping, not fitted.

* No protection for operator (or machine) from swarf and suds.

* Change-speed covers that have to be removed completely to get inside, with the result that the machine, will be left in the wrong speed or the cover will be left off. (There are alternative hinged covers with microswitch cutout devices).

Many devices essential to safe and convenient operation have not been fitted because they are expensive optional extras rather than integral to the design. Under this heading come feed stop with positive and accurate cutout. Some lathes have no cutout device but rely on mechanical arrest of the saddle and operation of the feed shaft overload clutch. Others, without overload clutch, stop when a shear pin fails in the drive.

The examples that have been given may not apply to your workplace, but the principle of built-in accidents applies to nearly all situations.

Yet the average supervisor/engineer rarely questions the myth of human error or carelessness - why? To get some answers let us examine the methods we have been using to teach accident prevention.

Fig. 1 illustrates one of the accident prevention models currently being used by many well-meaning safety trainers in Australia:

FIG. 1 ORDER OF EVENTS MODEL (A.S.N. March-April, 1977)

People who use this model suggest: "this is a simple and most effective formula for understanding the causes of and preventing accidents. Personal factors may include failure by management, supervision, the injured worker or fellow worker. Thoughtlessness, skylarking, inattention, failure to instruct or report an unsafe condition, alcohol or drugs, etc., may also be factors which contribute to the problem.......in describing how accidents happen it is not just good enough to say that they are the result of carelessness on the injured person's part....such negative, meaningless jargon will only inhibit understanding". Most of you will have heard this approach before. However, before accepting the method let us ask ourself some questions:

1. Do the words "personal factors" have too many negative connotative meanings which are generally aligned with failure or error which is then aligned with attribution of blame, thus resulting in high proportions of human error causes?

2. Do the words "unsafe acts" have a high evaluative content of connotative meaning resolving around fault in person: We will see more of this after we have a look at the next method of explaining accident causes!

3. Are "unsafe acts" constantly stressed as being more important than "conditions" while inaccurate statistics are interpreted as supporting evidence?

4. Could the word "accident" imply that the situation or happening could not be controlled; it was just bad luck?

From personal experience in working with this model, I have found it almost impossible to get a meaningful discussion going when the words "failure", "error", and "personal factors" are used. The end result is a fixed focus on human error causation to the total exclusion of other possible non-people causes. We might improve this model educationally, simply by examining the meaningfulness of the terms used in it.

Fig. 1 is the simplest model and on more 'advanced' courses a complex model is put forward, namely, the Accident Sequence Model; this is shown in Fig. 2.

FIG. 2 ACCIDENT SEQUENCE MODEL.

It is obvious that the first model we looked at is extracted from this Accident Sequence Model. People who are exposed to this latter method are told...... "in accident prevention the bull's eye of the target is on the middle of the sequence — unsafe act of a person or a mechanical or physical hazard" (Heinrich, 1969).

Those of you who have had some previous safety training will be familiar with the Domino Concept which goes with Fig. 2; for those people who have not heard of this concept before, I have reproduced it in Fig. 3.

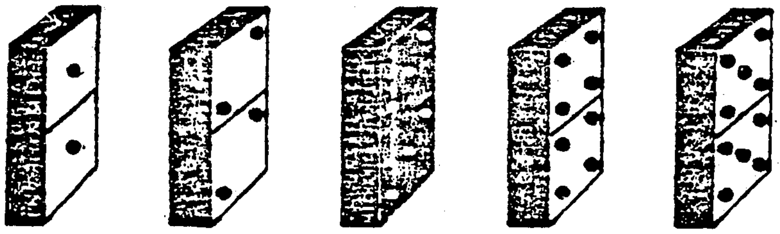

FIG. 3 DOMINO SEQUENCE IN ACCIDENT PREVENTION.

The several factors in the accident occurrence series are given in chronological order in the following list: (as given by Heinrich)

ACCIDENT FACTORS	EXPLANATION OF FACTORS
1. Ancestry and Social Environment	Recklessness, stubbornness, avariciousness, and other undesirable traits of character may be passed along through inheritance. Environment may develop undesirable traits of character or may interfere with education. Both inheritance and environment cause faults of person.
2. Fault of Person	Inherited or acquired faults of person; such as recklessness, violent temper, nervousness, excitability; inconsiderateness, ignorance of safe practices, etc. constitute proximate reasons for committing unsafe acts or for the existence of mechanical or physical hazards.
3. Unsafe Act and/or Mechanical or Physical Hazard.	Unsafe performance of persons, such as standing under suspended loads, starting machinery without warning, horseplay, and removal of safeguards, and mechanical or physical hazards, such as unguarded gears, unguarded point of operation, absence of rail guards, and insufficient light, result directly in accidents.
4. Accident	Events such as falls of persons, striking of persons by flying objects, etc. are typical accidents that cause injury.
5. Injury	Fractures, lacerations, etc., are injuries that result directly from accidents.

The occurrence of a preventable injury is the natural culmination of a series of events or circumstances, which invariably occur in a fixed and logical order. One is dependent on another and one follows because of another, thus constituting a sequence that may be compared with a row of dominoes placed on end and in such alignment in relation to one another than the fall of the first domino precipitates the fall of the entire row. An accident is merely one factor in the sequence.

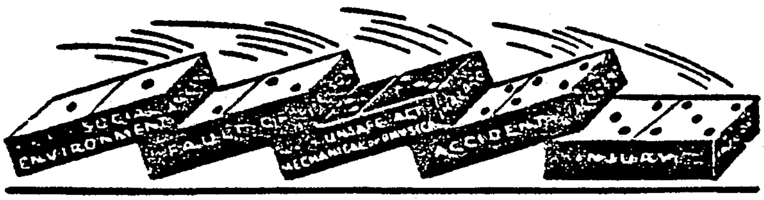

FIG. 4 THE INJURY IS CAUSED BY THE ACTION OF PRECEDING FACTORS

If this series in interrupted by the elimination of even one of the several factors that comprise it, the injury cannot possibly occur. This idea is shown in Fig. 5 and Fig. 6.

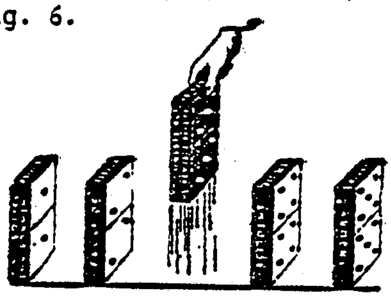

FIG. 5 THE UNSAFE ACT AND MECHANICAL HAZARD CONSTITUTES THE CENTRAL FACTOR IN THE ACCIDENT SEQUENCE

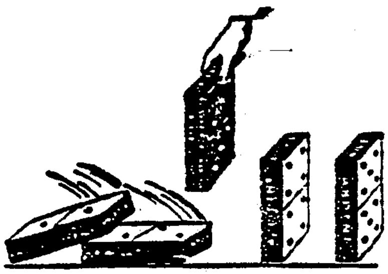

FIG. 6 THE REMOVAL OF THE CENTRAL FACTOR MAKES THE ACTION OF PRECEDING FACTORS INEFFECTIVE

It should be clear from this short discussion of accident causes that one will conceive that there is a central point in practical accident prevention work. While Heinrich (and all people who use this method) argue that mechanical guarding and engineering revision are important factors in preventing most accidents, in the same breath he and they say (and are constantly interpreted as saying) that human failure causes most accidents. He and they state "if one single factor of the entire sequence is to be selected as the most important it would undoubtedly be the one indicated by the unsafe act of the person". But what is an "UNSAFE ACT?" Can we measure it's meaning? Let us try!

Here, we should argue that this model and method of usage restricts preventive activity to a minimum. Additionally, the terminology "fault of person" is heavily loaded towards attribution of responsibility (blame) to the injured person. The earlier papers in this course give sufficient reasons why allocation of blame might take place; to teach people to look for unsafe acts and faults in persons seems only to compound the problem. At this point in time there seems to be little we can do to counteract community attitudes to accident causes (and victims), hence a more common sense approach to help come to grips with the problem would be to assist persons investigating and preventing accidents by offering them a better model of investigation and provide education in the correct usage of this model. It is recognised that awareness of the foregoing issues is in itself contributing to offset the undesirable effects of allocation of culpability being synonymous with accident causation.

There is still much work to be done and simply to explore these questions is to take a step forward, for we need no longer pretend that we seek to get facts. The great danger in studying this problem is to assume neat little relationships exist between things.

It is hoped that this paper will alert you to some of the flaws in the traditional designs used for the study of accident causes. Caution is in order at this time, lest premature conclusions be reached that the increase in sophistication of our methods has indeed led to a better understanding of how and why accidents occur.

As we have more or less "pulled apart" traditional models for understanding accident phenomena, we must replace them with alternative models that should embrace:

1. Careful selection of non-emotive terminology.

2. An emphasis on a full analysis of causes before selection of remedy.

3. Provision of a much broader perspective of preventive action.

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ALTERNATIVE VIEWS OF ACCIDENTS AND THEIR CAUSES

Nowhere is the disaterous result of 'cause-effect'thinking seen more clearly than in the development of accident control where the overwhelming preoccupation has been to determine "the cause".

A brief reading of accident literature soon discovers terms like "the cause", "prime cause", "ultimate cause", "proximate cause","person most responsible" and "immediate cause". Many safety practitioners have cursed the figures of Heinrich for the biased view they have given management of valid ways to approach the accident problem. The claims of such people cannot be justified on any objective, sound, scientific basis; they can only be justified on an emotional and value judgement basis which is the inevitable outcome of "cause-effect"thinking.

People get to believing and even to professing the apparent answers arrived at, suffering mental constrictions by emotionally closing their minds to any of the further and possibly opposite "answers" which might otherwise be unearthed by honest effort—answers, which, if faced realistically, would give rise to a struggle and to a possible rebirth which might place the whole problem in a new and more significant light. What is the alternative to "cause-effect" thinking? "Non-cause-effect" thinking!

"Non-cause-effect" thinking concerns itself primarily not with what should be, or could be, or might be, but rather with what actually "is" — attempting at most to answer the already sufficiently difficult questions WHAT or HOW, instead of WHY.

It is time that accident researchers, safety practitioners and anyone else connected with the task of unravelling the complex interaction of events we label "accidents" threw away the confining shrouds of "cause-effect" thinking and discarded the misleading terminology it entails, to adopt "IS" thinking with the broader, deeper and clearer view it can give to accident phenomena. There is nothing difficult or involved in the analysis procedure used, simply a preoccupation with what "IS" or "WAS". and it is hoped, a total absence of value judgement of the "goodness" or "badness" of people, design, environment (or God). In accident control work, we are not interested in accidents per se, but in the undesirable results of accidents. These undesirable results — injury, damage or loss of production — occur as a climax to a conglomerate of events, collectively called an accident. In these events, it is possible to identify a number of things which are necessary to keep events moving. These things can be termed essential factors, since the undesirable consequences could not occur without their presence.

The major objective in any investigation must therefore be the identification of as many essential factors (essential to the damage) as possible. It must be emphasized that essential factors are all equal in importance in terms of causation. It is a black-white category with no shades of grey. There is no scientifically acceptable way of selecting any one essential factor and giving it the elevated status of "cause" of the accident. Of course, essential factors do differ enormously in their controllability. I would like to emphasize, it is most useful to forget all about looking for the "cause" — it does not exist. The important judgements required are in selecting the essential factors with the most rewarding controllability. More frequently than in the past this will be improved work system design.

The following model is proposed to (1) assist you investigate accidents in a systematic manner and (2) assist you view accident causes from a much broader perspective.

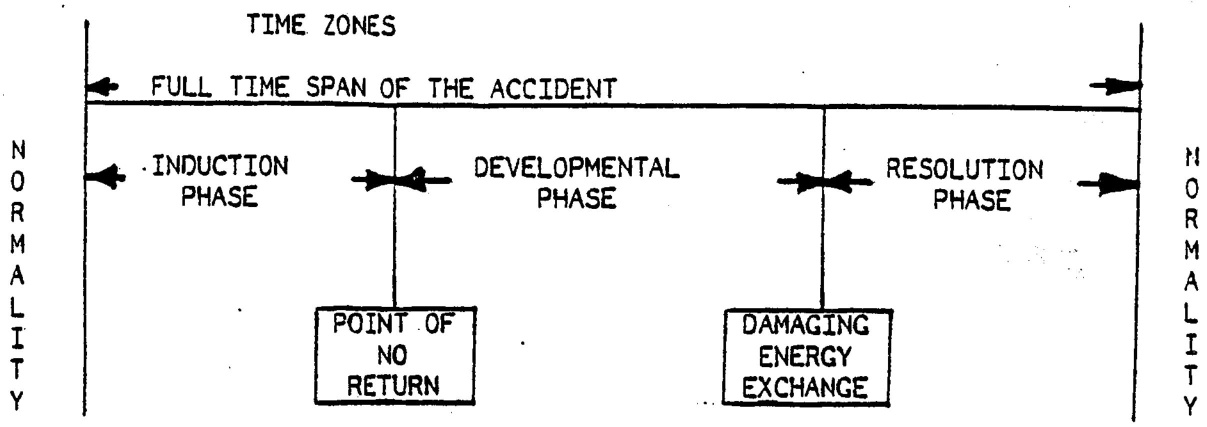

FIG. 1 ACCIDENT ANALYSIS MODEL

It is unfortunately true that people, whether they are involved in an accident or are merely bystanders, tend to concentrate on those factors which are immediately apparent to them and to jump to conclusions. If correct conclusions are to be drawn and worthwhile recommendations made to prevent recurrence, the first step is to establish all of the essential factors in an objective and systematic manner

ACCIDENT ANALYSIS is the term used to describe a systematic study of all the essential factors which lead up to an accident and those different factors which determine the consequences, i.e. injury, damage, process delay, loss, etc.

1. <u>INDUCTION PHASE</u>: Here events occur which lead up to the accident. A final event or triggering will precipitate a point of no return. Up to this point an accident might have been avoided. Past this point an accident is inevitable. To help you determine which factors might go into this Induction Phase simply ask yourself this question:

"If the factor has been avoided or was absent, would the accident have been prevented?"

If the answer is "Yes!", then that factor is a material contribution to the Induction Phase.

For example, some essential factors which lead up to a typical motor vehicle accident may be cited, such as the condition of the road, condition of the vehicle types, brakes, steering, etc., the manner in which the vehicle was being driven, the psychological/physiological state of the driver, actions of other road users, environmental conditions (dust, rain, sun, etc.) and so on.

2. <u>DEVELOPMENTAL PHASE</u>: Here factors interact to determine the consequences of the accident and no longer is it possible for the amount of energy involved in the damaging experience to be altered, but the damage is still alterable. During this period it is possible to take action to make change so that the energy will be changed in a less damaging way. Examples of this are deploying air bags in motor vehicles, shielding eyes with hands, falling or landing with a roll, wearing safety boots, wearing safety harness, and so on.

To help you determine which factors might go into this Developmental Phase simply ask yourself this question:

"Should the factor be absent or different would it only affect the consequences of the accident?"

If the answer is "Yes!" then that factor is a material contribution to the developmental Phase.

Again, a simple example will illustrate this Developmental Phase. If a person falls onto a cushioning object, there may be no consequential injury, but if he falls onto a sharp object, the consequences could be severe.

3. RESOLUTION PHASE: Here resources are expended to return to normality. This is the time from the cessation of the damaging energy exchange until no further attempts are made to overcome the damage. You might also like to broaden this phase into a COUNTERMEASURE phase, i.e. to determine countermeasures to prevent recurrence.

This model for examining accident causes can be further expanded to include the following six elements in each of the above time zones:-

1. Man
2. Man/Machine Interaction
3. Machine
4. Machine/Environment
5. Environment
6. Environment/Man Interaction

While the interaction of these three major elements (Man/Machine/Environment) theoretically exists, its exclusion is unlikely to seriously affect further accident control, as we have not yet reached a stage of development which enables us to cope with it effectively.

In fact, I feel we need not concern ourselves, during this course, with the task of isolating the interactions of the three elements — that is a further development, as is looking at aspects of the individual elements.

What follows is an exercise into techniques of investigation or accident analysis. After seeing the film "Unplanned" you will be asked to identify and list the essential factors that have a material bearing on the accident and to classify them into (1) those which led up to the accident, (2) those which determined the consequences.

Having completed this part of the analysis you will be required to compile a list of countermeasures.

NOTE: Some people find it easier to treat the first two time zones as one.

Since the general climate of organisational (and public) opinion can have an appreciable affect on what can and cannot be done to control accidents, it is important for all of you involved in accident control to communicate clearly with management (and the general public), so that both learn desirable things about accidents. Clear thinking is required, as is accurate terminology. The accident "preventer" cannot have the luxury of indulging his own value system and emotions when analysing accident causes. We've got to see and appreciate what "IS" before we can embark on the hard-headed task of deciding what should be changed so that future "IS" better than the present "IS" by the maximum amount.

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MANAGING A SAFETY CLIMATE

What makes an enterprise successful in controlling occupational hazards? This must be the most frequently asked and yet inadequately answered question among safety professionals. Although the safety management literature is replete with definitive statements of why some enterprises are successful and others are not, no single, simple explanation exists. If it did, all enterprises would have the same set of tactics - the one that produces success.

1. THE NATURE OF CLIMATE

What is climate? There are probably as many answers to that question as there are writers on the subject, but we define "management climate" as managers' perceptions of the many characteristics of their organizations that have a direct impact upon their behaviour. Viewed this way, the process of climate analysis becomes one of determining how managers at various levels and parts of an organization perceive the influences upon them, for these perceptions will cause them to take or fail to take specific actions.

Financial results, such as profitability, volume, and cost, have limitations as management tools because they tell what has happened, but not why. In contrast, climate analysis measures people's perceptions of how the organization is operating, and by doing so tells higher management how well its intentions are being understood and implemented.

Climate analysis speaks to the four aspects of an organization that management can change directly: strategy, structure, processes, and people. The technique deals with content issues, such as whether a company follows a strategy of being a path-finder or a follower in an industry, as well as procedural issues, such as the extent to which a formal planning process exists. By uncovering and organizing managers' perceptions of these issues within the framework of actions open to top management, climate analysis provides a tool not only for gauging the health of an organization, but for improving the effectiveness of its managerial resources.

As a description of the organizational situation, climate analysis is not evaluative, nor is it a direct measure of the extent to which individual needs are satisfied. Rather, it is a diagnostic tool which allows top management to make evaluations knowledgeably and then focus on the needed changes. Furthermore, survey techniques such as those described later in this paper currently exist to translate the concept of climate analysis into an operational reality.

2. WHAT IS A SAFETY CLIMATE?

Once again there are probably as many answers to that question as there are writers on the subject, but for the purposes of this paper "Safety climate" is defined as "employees' perceptions of the many characteristics of their organization that have a direct impact upon their behaviour to reduce or eliminate danger".

Viewed this way, the process of safety climate analysis becomes one of determining how employees at various levels and parts of an organisation perceive the influences upon them, for these perceptions will cause them to take or fail to take specific actions with regard to hazard control.

The concept of safety climate analysis is relatively new in safety management theory and the question is frequently raised whether "safety climate analysis" is merely a different name for an "attitude-to-safety survey". The two share a common mode of data collection - people are asked to report their reactions to their organizations in answer to a series of questions - but from that point on, some differences distinguish them.

Firstly, the sample for an "attitude survey" normally starts at the bottom of the organization and works up, usually one or two levels, sometimes a little higher. But a "climate analysis" starts at the top of the organization, usually with the managing director, or other leader, and works its way down, perhaps 3 or 4 levels. It includes a much smaller number of people, as opposed to the larger number covered by an "attitude survey".

Because each type of activity addresses itself to a different group, the nature of the questions will be different. For example, a climate analysis could ask about "the clarity of corporate goals for safety and health", a topic usually inappropriate for shop floor level. Therefore, because the two groups typically surveyed are dissimilar, the issues being investigated are distinct.

Secondly, attitude surveys in general grew out of a reaction to "scientific management", which viewed human beings as little more than units of production, and, out of a fascination with the findings of the original Hawthorne studies and some of the early studies on leadership. The thrust of this 'attitude measurement' was to encourage worker satisfaction, which in turn would (hopefully?) lead to greater production. Thus, many "attitude surveys" deal with employee satisfaction, and focus upon supervisor-subordinate and work-group interactions, which are thought to be most influential on satisfaction, for example,

"Climate analysis" has not evolved from this direction, but from a concept of enterprise management and a focus upon organizational performance. For any organisation to be justified those in that organization must have a mission, and to accomplish that mission the organization must have a strategy, whether articulated or not, and people must be organized in some kind of structural relationship. The elements are related by a series of processes such as planning, decision-making, performance measurement, and so forth. It is the perception of these elements - strategy, structure, processes and people - that causes people to act in certain ways and that, I term "climate". Climate may also be thought of as a measure of the state of managerial health of an organization from the perspective of managers themselves.

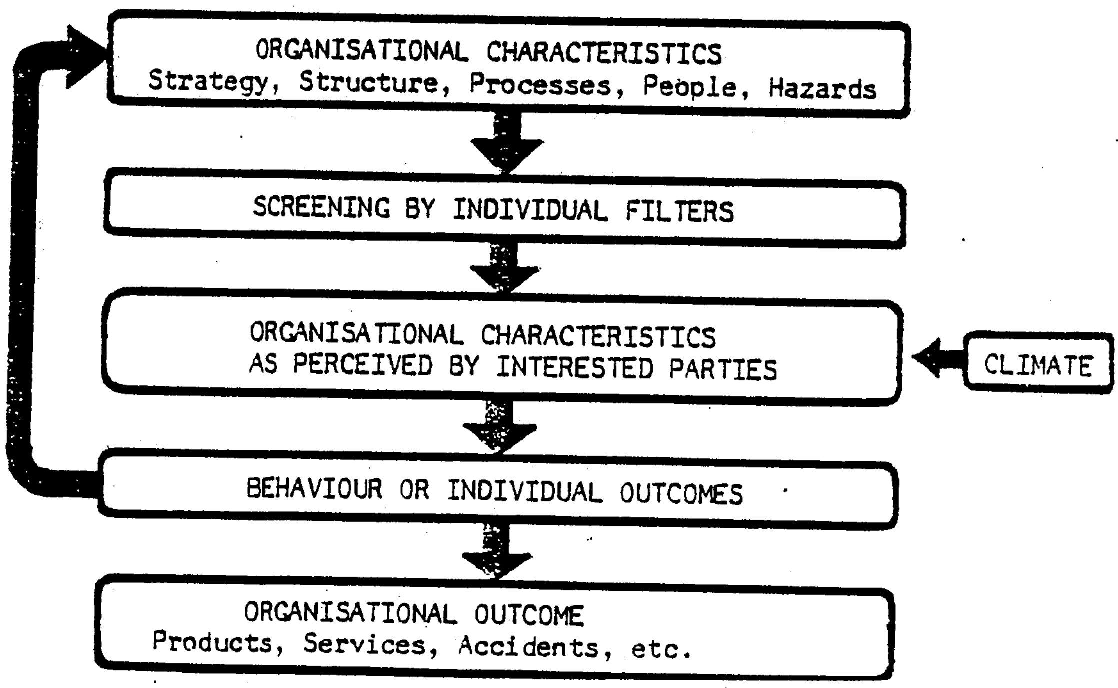
This paper deals only with management climate and gives no attention to attitude surveys. In it, the terms "climate" and "management climate" are used interchangeably. Further, the paper now sets out to explore a particular type of organizational climate and to examine its implications, namely the climate for safety.

To comprehend safety climate, one must be aware of what attributes are measured and why those specific attributes and measurement techniques are chosen. Because safety climate, or any climate for that matter, although a tangible condition of an organisation's operation, does not have an objective identity until analyzed, the nature of the analysis instrument itself helps to create that identity. That is, the assumptions the analysis makes concerning the origins of climate, the audience with which it deals, and the information it seeks will lead to a specific type of result. Therefore, before a measurement instrument is adopted, it is essential to have an understanding of what safety climate is and what it is not.

3. USING A MODEL TO HELP UNDERSTAND SAFETY CLIMATE

The weight of evidence appears to suggest that organisational climate consists of the qualities of a company as perceived by its present and potential employees. If you like, the climate is the perception of the reality, not the reality itself. For example, if a manager perceives that a performance appraisal system is to "weed out the dead wood" he will operate the process in that manner, even though its intended objective is to direct and increase everyone's performance - thus the perception becomes the reality.

A useful model can be used to help us understand the concept and "position" of climate in an enterprise.



As the model suggests, organizational characteristics may be measured in one or two ways: the characteristics themselves can be measured (i.e. objective measures) or the perceptions of those characteristics can be used (i.e. perceptual measures). These perspectives parallel the two views of climate, but, as already suggested, the climate - that which most directly influences behaviour - is the perception of the reality, not the reality itself. So organizational climate can be viewed as a bridge between formal organizational characteristics and individual behaviour. Its linking function derives from the fact that a person's behaviour is as much a function of his subjective evaluation of his environment, as of its objective real aspects; but this is not to suggest that direct and mechanistic links exist, rather, the effects of the characteristics are mediated through the perceptions and beliefs of significant individuals and groups among management and employees. Clearly some people's beliefs will hold more sway than others and therefore it is necessary to consider the relative power of these individuals and groups in decision making and in influencing the outcomes of specific activities.

To the degree that the model is valid, quite different conclusions can be drawn from measurement at two points (i.e. an objective or perceptual measure). For instance, a formal work permit system yielding written procedures exists in many companies, whereas many perceptions indicate the non use or change of such procedures to accomplish objectives. In these latter cases, the procedures are paper exercises which normally get filed away (until the next 'investigation') and have no real influence on managerial activities. Which fact is more pertinent to managing hazard reduction in that organization, that a work permit produces procedures or that managers do not perceive the existence of procedures to direct their everyday activities?

For the purpose of this paper I have opted for the latter viewpoint and propose to adopt a methodology to measure perceptions of organisational characteristics relating to safety and health programmes, rather than one to measure the safety and health programme characteristics themselves.

4. COMMUNICATION AND MOTIVATION FOR SAFETY

Climate consists of perceptions of the written, oral, and behavioural safety messages sent from higher levels of management. These perceptions, however, do not always coincide with the messages themselves. Other sources of perception may modify or even undermine official communications, because of two possible causes: employees may misperceive the intended nature of the safety messages, or management itself may not be aware of the unintended, subtle messages that it is sending.

While reality provides an important anchor point, perceptions of reality (which do not always coincide with it) are more directly responsible for controlling individual actions. Consider the driver who sinks his tractor in soft ground: his actions are guided not by the realith that the ground is too soft, but by his perception that it is safe. In the same way, top management, for reasons of long-term development, may desire a safety manager to try innovative yet costly approaches to increasing the company's safety performance. However, if that manager believes instead, rightly or wrongly, that his career depends more on maintaining current profits, he may be quite hesitant to innovate.

Two basic approaches to climate measurement exist. The first is to analyze the factual situation through such characteristics as the number of levels of management, the span of control, and the salary levels. The second is to analyze perceptions. Most work in the field employs the second approach, on the assumption that asking the people involved is the only effective method of investigating the climate being experienced.

The summation of individuals' perceptions of the various management issues forms the basis of climate. The fact that these views will not always coincide with reality is an integral part of climate analysis, not a shortcoming of the survey instrument.

4.1 Communication of Intended Safety Climate

The intended safety climate is communicated formally through means such as organizational structure, policy statements, and project designs, and informally through the conclusions drawn from specific management behaviour - what units get most top management attention, which individuals progress most rapidly, what happens when safety targets are not met, and so forth. These messages are transmitted to the levels of management that interact with top management, and these managers in turn communicate a climate to their own units in both formal and informal ways. As the intended safety climate is translated through successive layers of the organization, it encounters certain barriers which can change the nature of the communication. These changes are usually responsible for the failure of an intended safety climate to materialize.

The first barrier is the tendency of the individual to perceive selectively, taking in those messages he wishes to receive and screening out those he does not. A fundamental influence on the ability to perceive a message accurately is the individual's personal needs and motivations. While the head of a company may be motivated in one manner, those under him may have different needs. These differences can cause misinterpretations of intentions.

A second barrier also relates to "motivation". In this case, the individual perceives the intentions correctly but because of his personality modifies the intended climate to fit his own managerial style, a situation discussed below under "Motivation and Perception".

A third barrier, different in nature from the first two, results when informal messages contradict the formal ones. Top management's actual behaviour may not support formal systems designed to produce the intended safety climate. For example, when top management delegates broad approval authority and sets up reporting procedures on a results-only basis, it is encouraging a decentralized management style where lower levels of management enjoy a high degree of freedom. However, if actual experience with this system indicates that people are severely penalized when a mistake is made, subordinate managers will seek approval from superiors before exercising authority to reduce hazards, and especially costly hazards.

Thus, while climate is set initially by top management, a variety of factors can cause significant modification as it travels down through the different layers of the organization and across its different units. Safety climate analysis through measurement of perceptions can determine whether the safety directions that top management wishes to establish are being translated into actions.

4.2 Motivations and Perceptions

As noted above, individual motivations are often a filter through which messages are distorted. Motivation can be described as a drive to satisfy an internal need. Because all behaviour is motivated by some unfulfilled internal need, it is not accurate to speak of "motivating someone". Leadership does not create motivations; rather, it taps those that an individual already possesses, by providing the opportunity to work toward fulfilling them.

Acknowledgement of this fundamental psychological premise has essential implications for managers attempting to create a specific safety climate. First of all, a climate cannot be imposed unilaterally because it is very difficult to make people behave in ways that clash with their personalities. Since people tend to interpret messages in a manner that accommodates them to personal needs, they will, if necessary, selectively perceive information about intended safety climate so that they can pursue hehaviour patterns with which they are comfortable.

For instance, suppose the general manager of a company wishes the heads of its two operating divisions to emphasize the goals of increased productivity and increased safety performance. One division head, motivated by a strong need for achievement and little concern for personal security, may focus on the safety objective, with only a sketchy plan of how the money spent on this goal will be recovered through larger production runs. Because of personal motivations, this head places more emphasis on the riskier safety objective as the basis for operating strategy.

The second division head is a conservative individual motivated more by the need to maintain the status quo than to reach out in new directions. Knowing that safety performance can be a very expensive process, this manager may opt to cut costs in order to increase profitability to such a desirable level that the money will then be available for additional safety activity. Thus, the same overall objectives can be translated into totally different tactical approaches.

Of course, the fact that individuals have different motivations does not mean that managers are helpless in implementing new procedures and modifying climate. First, clear and reinforced communications are the most direct method for avoiding misperceptions. Further, over a period of time, an organisation tends to hire and promote people with attributes suited to its management style. Also, most organizations take into account the strengths and weaknesses of its key people in structuring its activities. Thus, either the organization can change to fit the people, or the mix of people can change to fit the organization.

4.3 Upward Communication

So far, the discussion of perception and safety climate has emphasized barriers to the transmission of messages from top management downward through the company. However, the converse problem can also exist. Messages coming upward may be restricted or misperceived.

Restriction occurs because of the power relationships involved. Subordinates may pass on only the information they think their superiors want to receive - that is, information that reinforces the validity of the decisions made by those superiors or their methods of operation. Various reasons could explain the actions of these subordinates. They may want to cover up for their own real or imagined failings; they may want to enhance their own positions by being remembered as the conveyors of good news; or they may want to avoid the reactions of disappointed leaders. Whatever the reason, top management does not receive a totally accurate picture of the safety climate within the organization.

Because leaders themselves are not immune from human needs, even if they get accurate information from below they may misperceive it in ways that are in keeping with their original intentions or expectations of success. A combination of restricting subordinates and misperceiving superiors can lead to severe distortions of messages.

These barriers to upward communication can be as detrimental to safety climate as inaccurate downward communication. If those responsible for establishing climate do not understand the real situation in their organisations, they will fail to correct deficiencies and instead make additional decisions that may compound problems. Here again climate analysis provides a means of avoiding such difficulties because it results in what is in effect an upward report of conditions throughout the organization, a report based on objective measurement rather than on hearsay or assumptions - that is, a report presented in a manner that minimizes misperception.

4.4 An Example We all Understand

The area of pay practices provides a dramatic example of the potential conflict between perceptions and actuality. All too often employees have a negative view of their company's salary system, even though objective data indicate that it is a high-paying firm.

A company comitted to offering highly competitive salaries expects a return on this investment in improved employee performance. If, however, employees fail to recognise this benefit, the potential motivational impact of the pay plan is lost. If they believe pay scales are poor, the impact may even be demoralizing.

Such misperception is not an isolated problem, but may be the rule rather than the exception. Comparative data on a variety of companies reveal very little correspondence between a company's pay position in the marketplace and overall management perceptions of its pay practices. Virtually no statistical relationship exists between total management measures of actual and perceived pay practices, In other words, management-level employees of companies that are actually high-paying do not consider the salaries offered by their companies to be satisfactory. This result contrasts with the close relationship between managers' belief in high external competitiveness and their satisfaction with pay.

While perceiptions of pay may not accurately reflect a company's competitive position, they nevertheless govern people's feelings of pay satisfaction. Therefore, to achieve maximum effectiveness, a well-paying organization must accurately communicate its competitive stance through the management ranks.

We see that the subject of safety climate (or any climate) is inextricably tied to that of communications. The climate one perceives is established through a myriad of messages. Some of these are well defined and reality-based. Others are really the results of a lack of communciation, and where this occurs, imagination, preconceptions, and personal motivation take over to formulate the climate. To the degree that top management wishes to establish a particular safety climate pattern, it must communicate that pattern frequently and extensively, and must furthermore establish a clear channel of communication upward from below to assure that the message sent was the one received.

5. MEASURING SAFETY CLIMATE

To help determine the likely dimensions of successful/ unsuccessful safety climates I undertook a review of safety literature. The purpose of this review was to define organizational characteristics that differentiate between high versus low accident-rate companies. Here are the results:

5.1 Davis & Stahl (1964) report the result of interviews with the safety directors of 12 coal companies which had won awards for extended periods of work performance without a lost-time injury. This effort was also aimed at determining whether there were features common to the safety programme of these award recipients to which their successful performance could be attributed. While there were some variations, noteable factors found to hold throughout all or most company safety programmes and activities were:

1. a sincere desire on the part of senior management to prevent injuries,
2. the safety advisor had a high staff status and was not subordinate to production personnel,
3. a continual examination and analyses by management of safety rules in the light of job hazard analysis, accident reports and "near-misses" to improve their adequacy.
4. very frequent contact by line management with workers,
5. training of all personnel, both line managers and workers, in accepted job procedures.
6. active safety committees,
7. well developed procedures for investigating and reporting accidents,
8. use of assorted techniques for promoting safety awareness.

5.2 Shafai-Sahrai Study

This study examined eleven pairs of firms representing eleven different industries. The companies comprising each pair were approximately equal in size and engaged in similar work but differed greatly in work-injury experience, the difference in frequency of accidents per year between the high and low accident members of the eleven pairs averaged 50. These results indicate that no one single factor is the sole key to fewer or more injuries; as many as eight different factors correlated highly with the better safety performance within the paired companies. Senior management's interest and direct involvement in company safety activities was one factor found strongly related to lower work injury frequency and severity rates. Aside from its direct effect of demonstrating to other members of management and ultimately all employees a genuine concern about accident prevention, this factor was also believed to indirectly influence a number of others favourable to accident control. Other factors found in the Shafai-Sahrai (1971) research to be associated with low injury rates can be summarized as follows:-

1. a low span of supervisor control,
2. better and more safety devices on machinery and plant,
3. more complete accident recording and investigating,
4. well controlled work environments,
5. the presence in the workforce of older, married workers,
6. workforce containing persons with greater lengths of service on the job.
7. the availability of company recreational programmes and facilities.

This study provided the first in-depth examination of the characteristics of safety programmes and factors that appear linked to successful accident control.

5.3 Cohen, Smith, Cohen Study

This study reports results on distinguishable differences in safety programme practices and other related factors in 42 pairs of work establishments. The members of each pair were comparable in industrial operation, workforce size and geographical locale, but differed by at least 2 to 1 in the incidence of recordable injuries over one year. Analyses conducted across all respondent pairs displaying the greatest accident rate differentials yielded no obvious differences between the questionnaire data for the high versus low groups. Indeed, few response differences were found large enough to attain statistical significance. On the other hand the distribution of the responses to several questions did reveal some differences in the numbers of high versus low accident companies favouring certain primary safety practices and/or in their use and effectiveness of specific secondary and third order programme measures. Such types of differences suggested the low accident companies, relative to their high accident cohorts, as showing more of the following attributes:

1. greater stature and staff commitment given to direction of company safety efforts,
2. greater opportunities for general and specialized job safety training for all personnel
3. more frequent though less formal workplace inspections,
4. a safety programme emphasizing better balance between engineering and non-engineering approaches to accident control.
5. more humanistic approaches in discipling risk takers and violators of safety rules.

6. more older married workers with longer experience on the job.
7. more concerted use of a variety of safety promotional and incentive techniques and
8. greater utilization of outside influence in generating safety consciousness among workers.

5.4 Smith, Cohen & Cleveland

This was a follow-up study to that mentioned in 5.3 above, and selected seven pairs of the previously used 42 pairs in which to (1) evaluate and validate the results of the earlier questionnaire study and (2) to add to the knowledge gained from that study by looking at safety programme features in more detail and by examining features that could not be examined in a questionnaire. The data collected from the site visits and interviews within the seven pairs of companies basically reflected the major findings of the survey mentioned in 5.3. However, the site visit data did reveal some interesting differences between high and low accident rate plants in several safety programme areas: These may be summarized as follows:

1. low accident rate plants had greater management commitment and involvement in plant safety matters, in addition the management of the low accident rate plants displayed greater skills in managing both material and human resources.
2. Low accident rate plants used a humanistic approach in dealing with employees in which greater levels of informal worker/line manager interaction were encouraged.
3. low accident rate plants had a higher level of house-keeping and displayed environmental qualities greater to those of the high accident rate plants.
4. less turnover and absenteeism were experienced in low rate plants and
5. safety matters were given high priority in company meetings and production scheduling, based on the conviction that safety is an integral part of production systems and accidents are actually symptoms of design faults in that system.

5.5 A 1976 study carried out in U.K. industries by the Accident Prevention Advisory Unit of the HSE, reported findings very similar to those outlined above.

When the organisational characteristics identified in the above studies are drawn together they assist in forming a coherent organisaational pattern of a safe work environment: management is actively involved in safety management and creates a general administrative control climate in which work is to be performed .

This climate results in increased performance reliability of workers, good housekeeping, and high design and maintenance standards for work environments. There are well developed personnel-selection training and development programmes in which safe conduct is an integral part. Communication links between workers and management are kept open, enabling a flow of information regarding production as well as safety matters and finally general management philosophy is not strictly production oriented but also people oriented.

6. DIMENSIONS IN A SAFETY CLIMATE MEASURE

The dimensions included in the West Australian study therefore included:

(1) perceived influence of safety and health legislation

(2) perceived corporate attitude to safety and health

(3) perceived organisational status of safety advisor/ engineer/officer

(4) perceived importance of safety and health training

(5) perceived effectiveness of safety and health training

(6) perceived effectiveness of encouragement (versus discipline) in promoting safety

(7) perceived effect of departmental/section safety record on promotion

(8) perceived risk level of workplaces

(9) perceived status of safety targets relative to production pressures

The demensions, therefore include those organisational characteristics found to discriminate between high versus low accident-rate companies, plus the additional dimension of the perceived impact of both local and overseas safety and health legislation.

7. QUESTIONS THE WEST AUSTRALIAN STUDY ATTEMPTED TO ANSWER

(1) Do managers in different companies differ in how important they perceive the safety climate in thier organisations?

(2) Do managers in different organisations have common perceptions regarding the relative importance of the factors which contribute to successful safety performance in their organisations?

(3) Will the safety climate of the different companies be related to the LTIFR's of these companies?

8. RESULTS OF THE WEST AUSTRALIAN STUDY

One hundred and ninety eight (198) questionnaires were distributed among eight (8) companies. Due to a prolonged strike in one of the companies the responses from that company were delayed, with only seven (7) completed questionnaires returned - those seven returns were excluded from the statistical treatment of the overall responses. From the remaining seven companies a total of 140 usable responses were returned, representing a usable response rate of 71%.

All results were subjected to a rigorous statistical analysis and were shown to be significant. However the details of the statistics involved are not relevant to this paper and hence are excluded.

Instead, the graphs shown in Figs. 8.1 to 8.7 present the results of the safety climate analysis in an easy to understand format.

The horizontal axis shows the nine dimensions used and the numbers correspond to those given in Section 6 above.

To see how the seven companies compare with each other I have simply drawn the separate results on the one chart - see Fig. 8.8

Initial visual inspection of the seven profiles suggests a striking similarity between them, but when all seven profiles are superimposed on the one chart, differences are highlighted - this is illustrated by Fig. 8.8 (admittedly a little clustered). The profiles imply that the line managers who responded to this survey hava a unified set of cognitions regarding the safety aspects of their organisations and this strongly suggests that organisational safety climate has both theoretical and applied significance in that it can be regarded as a characteristic of industrial organisations.

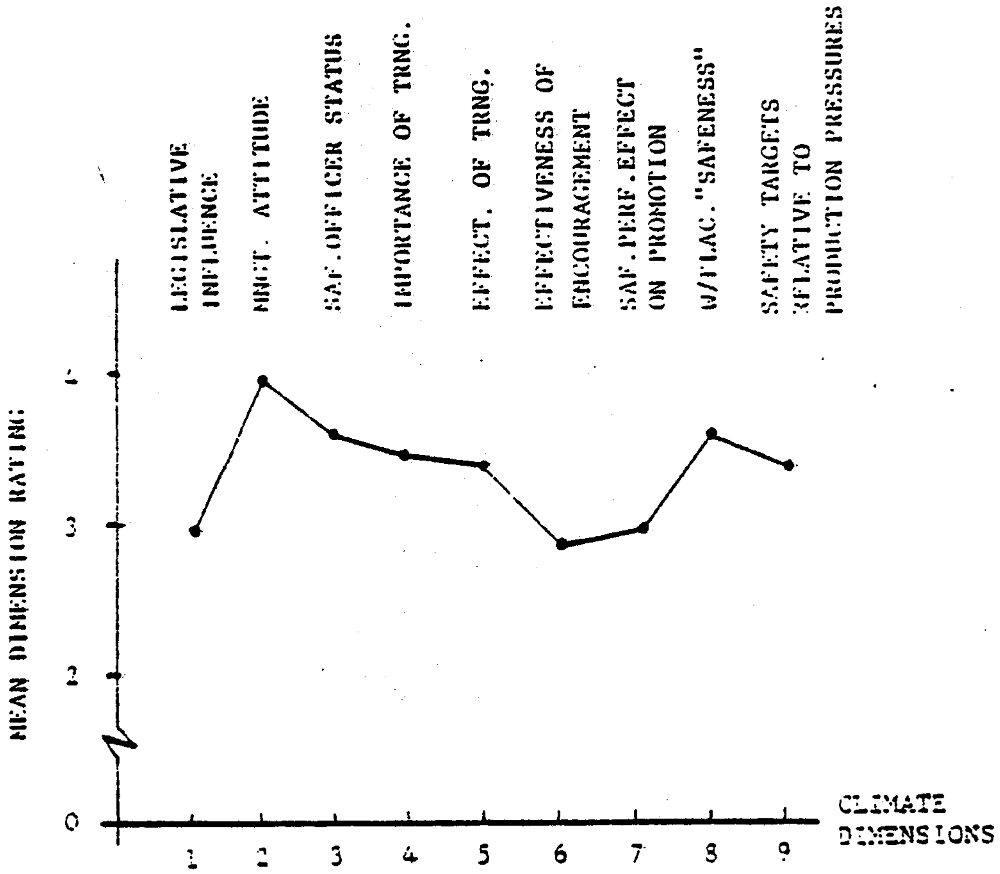


FIG.8.1 GRAPHIC PRESENTATION OF SAFETY CLIMATE DIMENSION RESULTS - COMPANY "A"

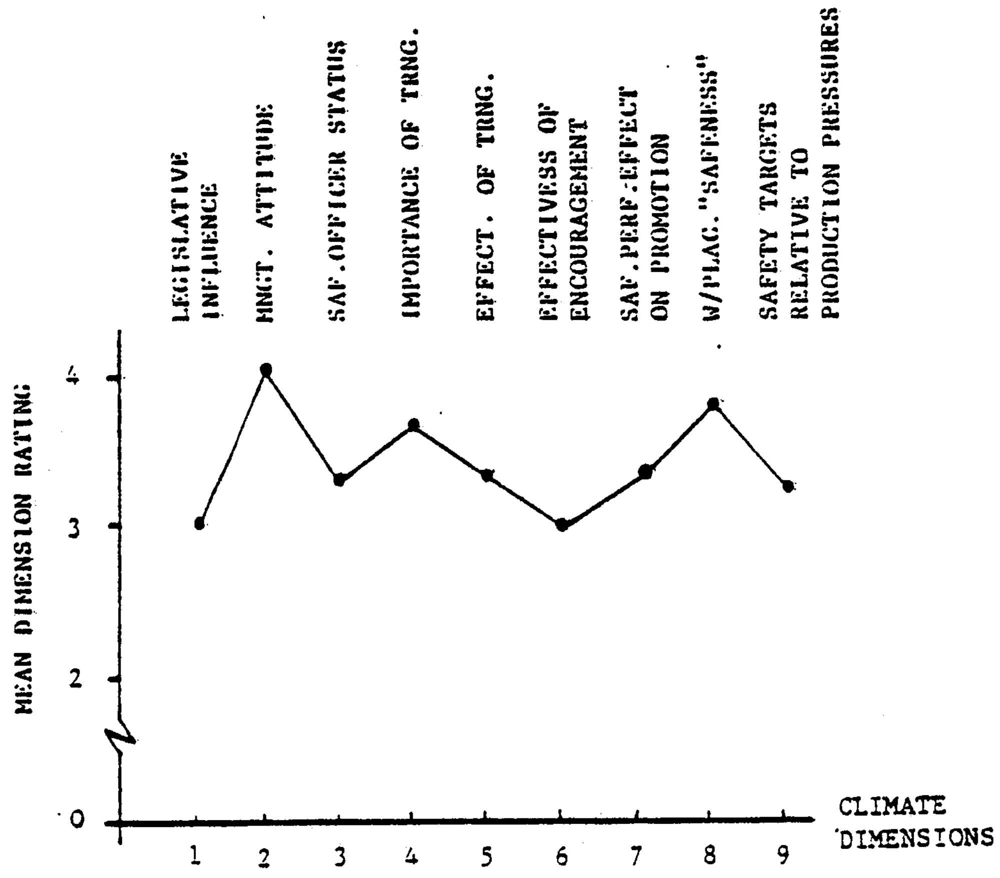


FIG. 8.2 GRAPHIC PRESENTATION OF SAFETY CLIMATE DIMENSION RESULTS - COMPANY "B"

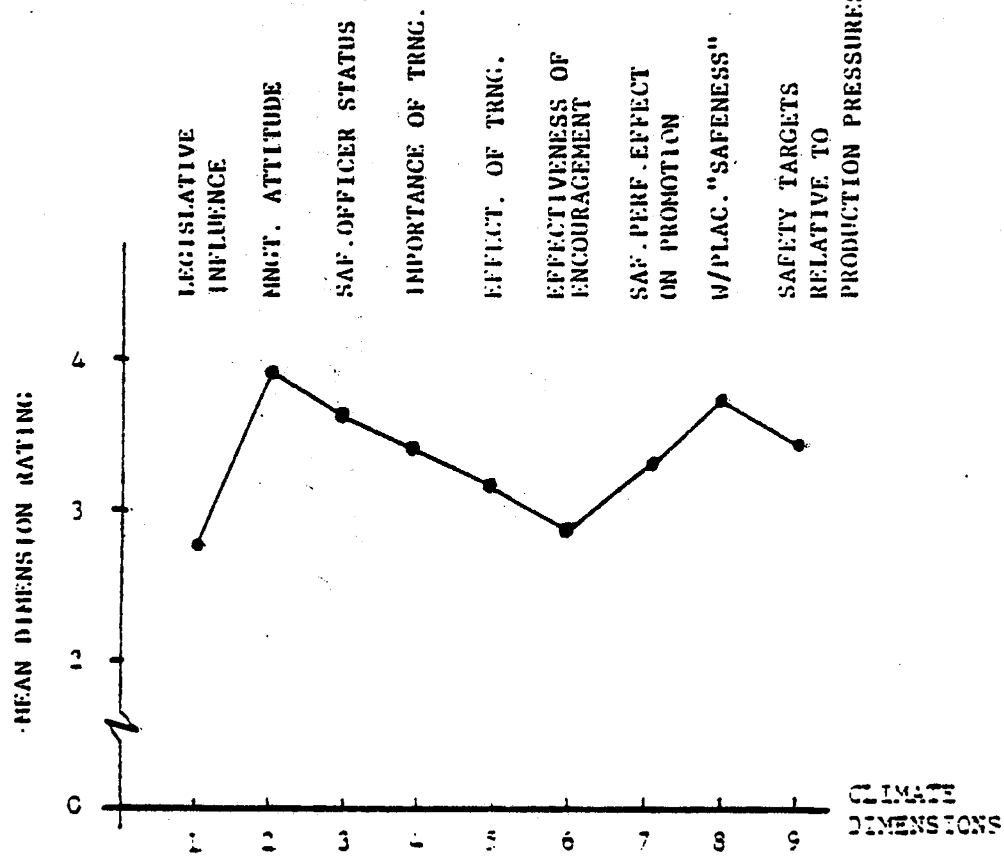


FIG.8.3 GRAPHIC PRESENTATION OF SAFETY CLIMATE DIMENSION RESULTS - COMPANY "E"

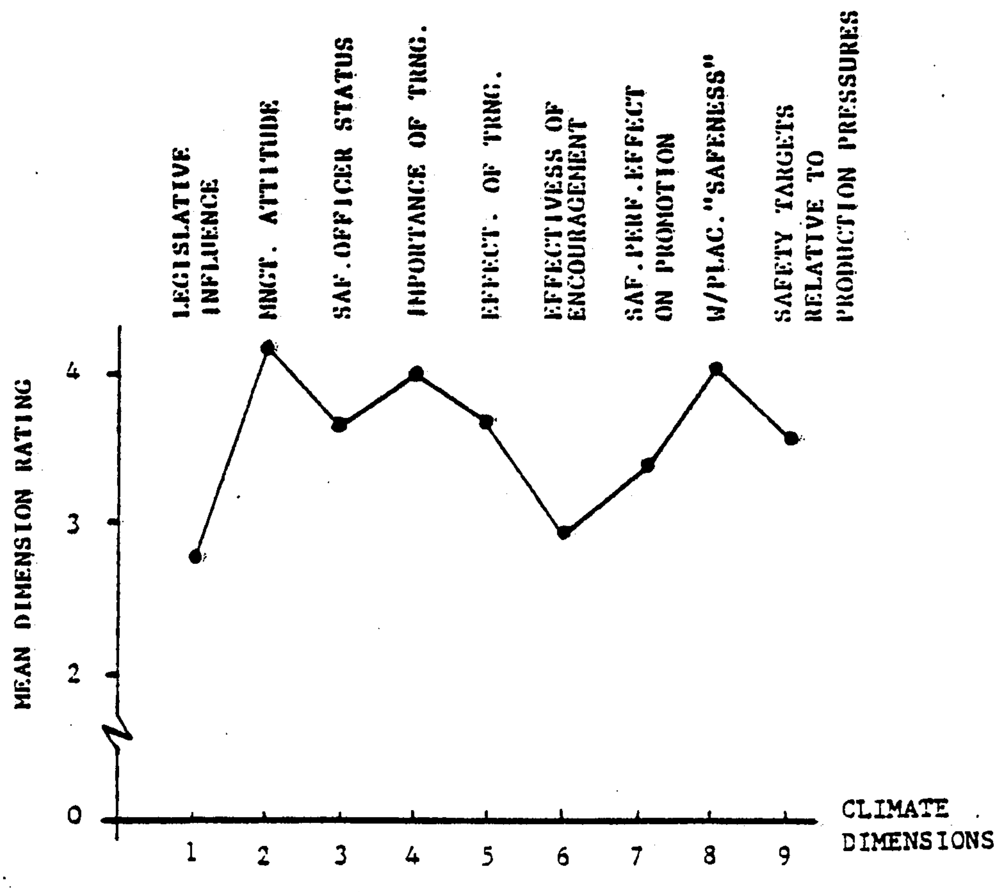


FIG. 8.4 GRAPHIC PRESENTATION OF SAFETY CLIMATE DIMENSION RESULTS - COMPANY "F"

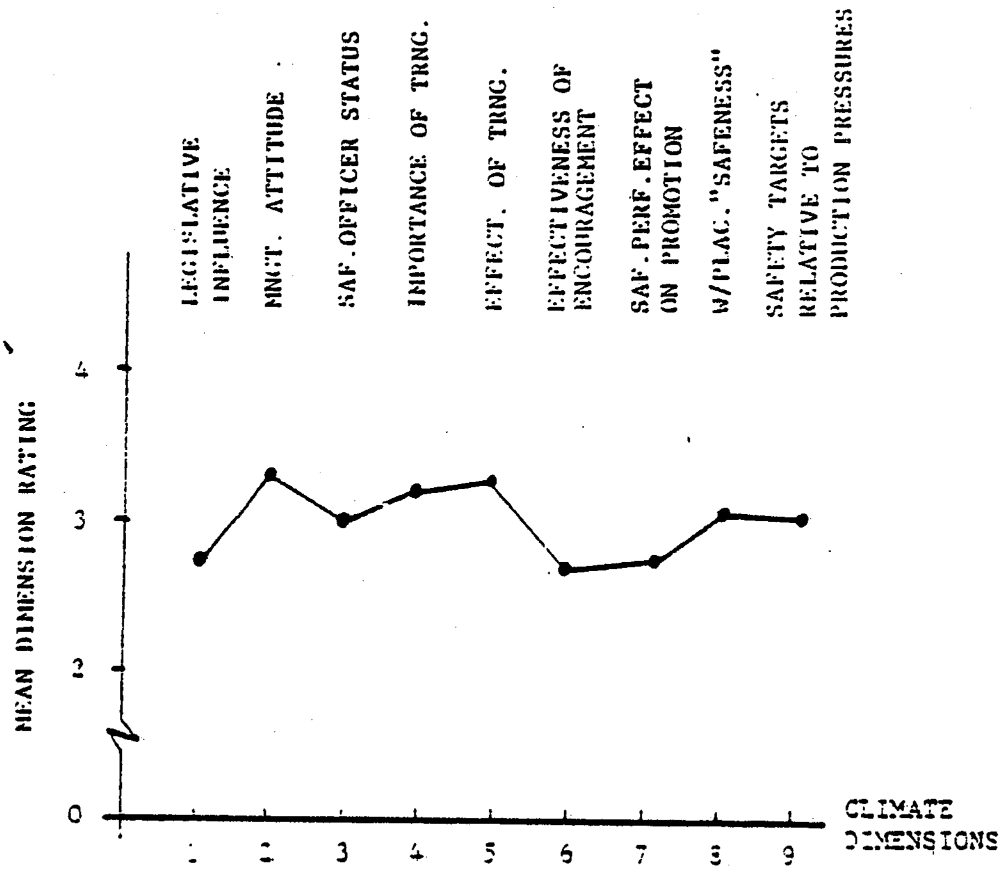


FIG.8.5 GRAPHIC PRESENTATION OF SAFETY CLIMATE DIMENSION RESULTS - COMPANY "C"

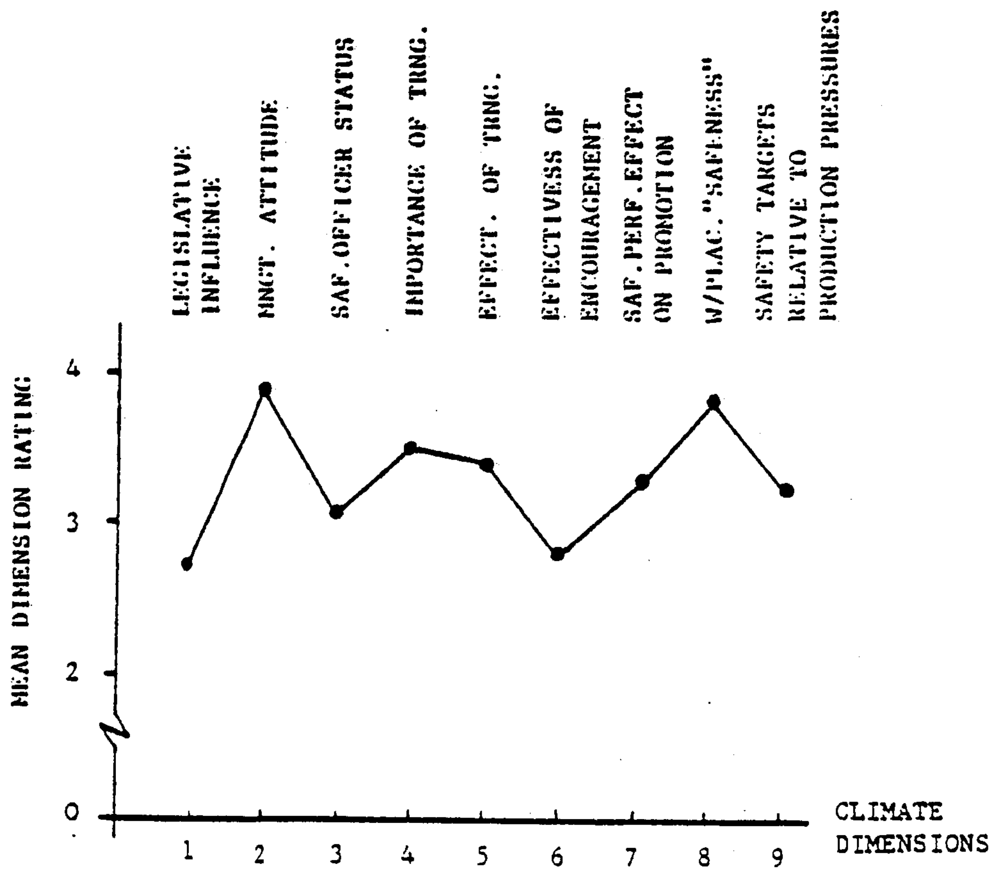


FIG. 8. 6 GRAPHIC PRESENTATION OF SAFETY CLIMATE DIMENSION RESULTS - COMPANY "D"

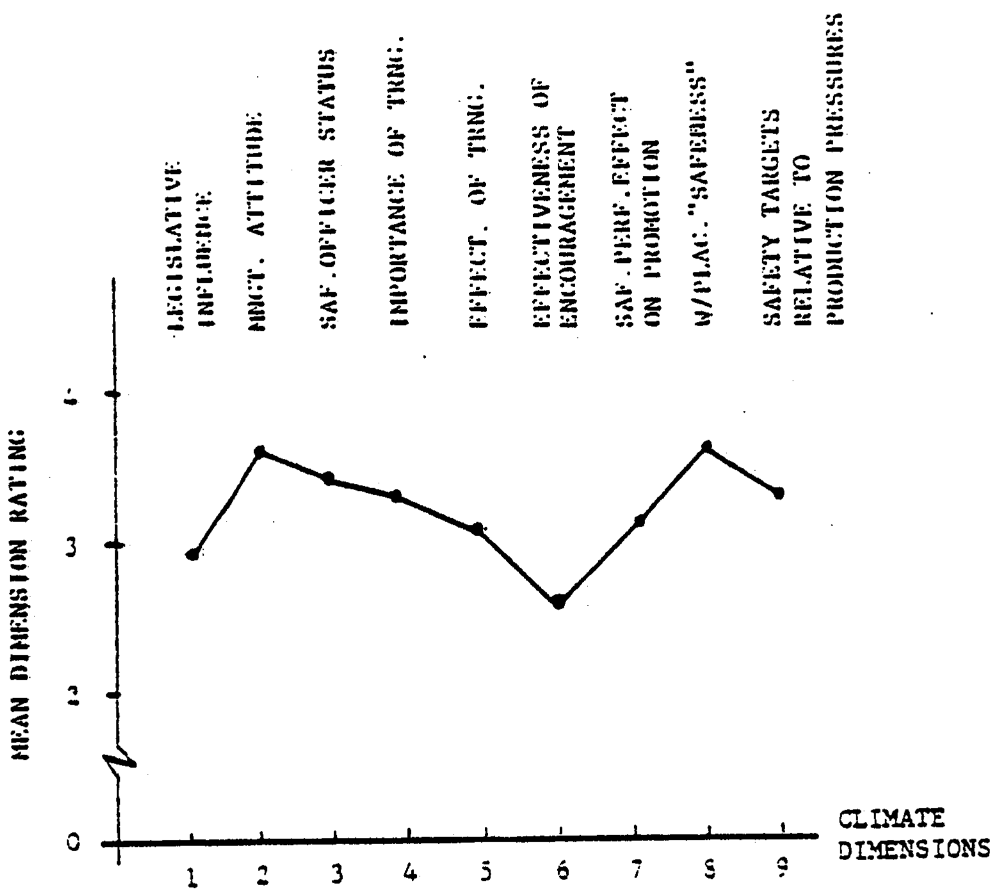


FIG.8.:.7 GRAPHIC PRESENTATION OF SAFETY CLIMATE DIMENSION RESULTS - COMPANY "G"

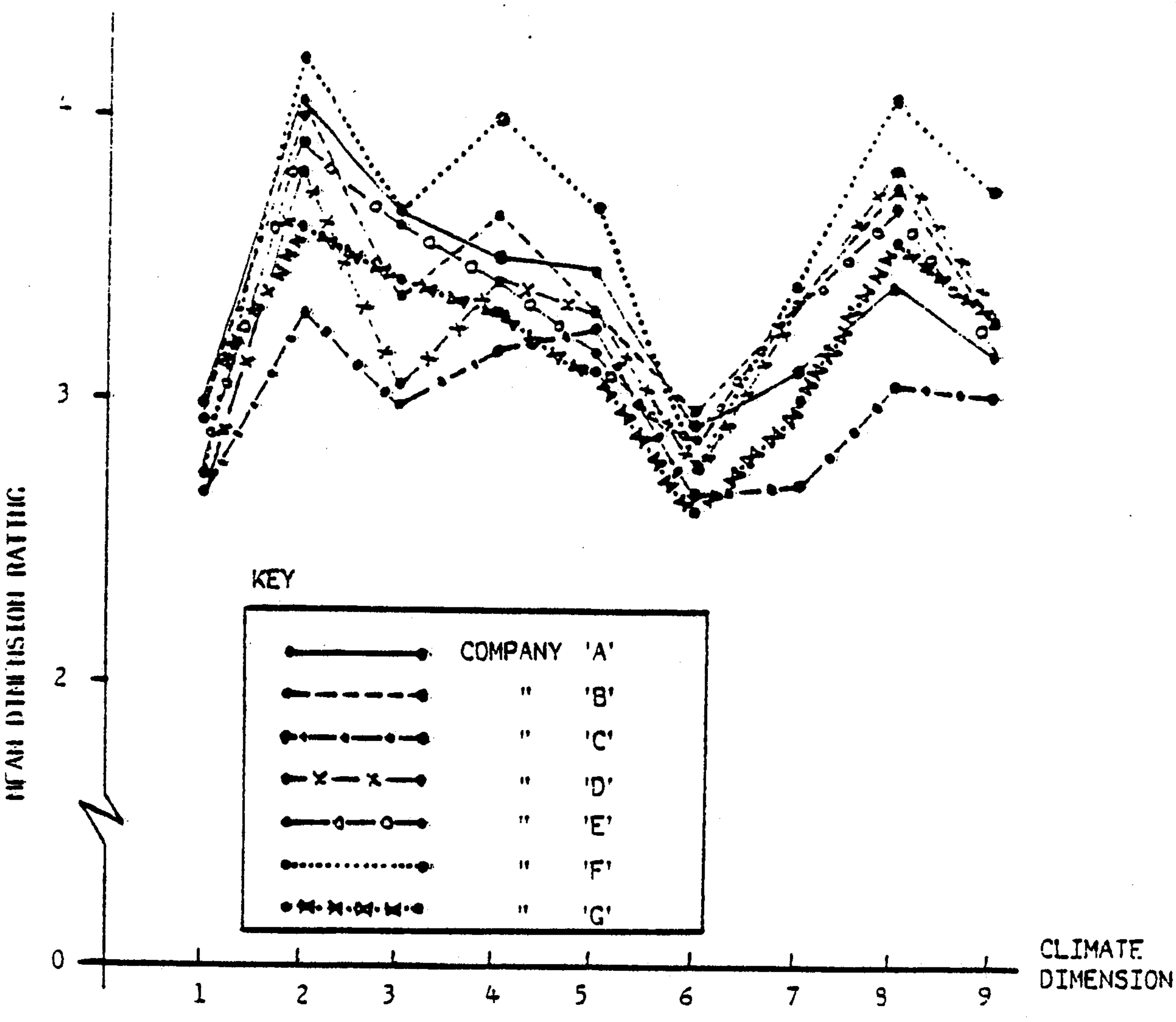


FIG. 8. 8 A GRAPHICAL COMPARISON OF COMPANY SAFETY CLIMATE PROFILES

9. SOME COMPARISONS OF SAFETY CLIMATE

Companies "F" and "G" are in the same industry category and producing similar products, therefore could justifiably make some quantitative comparisons. Company "F" had not experienced a work injury resulting in lost time for over two years, and was operating with a LTIFR of zero at the time of this study, whereas Company "G" was operating with a LTIFR of 30, plus, it experienced a fatality a few months prior to the study. It is also important to make the point that Company "G"'s LTIFR had increased from 14 to 30 in the 12 months period June 1979 to June 1980. (Here we must assume that Company "G" continued to classify lost time injuries consistently over this period. This is a reasonable assumption to make regarding an organisation conducting an on-going accident prevention programme, as any attempt to inflate the LTIFR for internal purposes would be self-defeating).

Significant differences were found between the two climate scores on:

(a) Dimension 2, i.e. the line managers in the low accident rate company reported a higher commitment to safety by their senior management.

(b) Dimension 3, i.e. that line managers in the low accident rate company reported a higher status being given to their safety officer.

(c) Dimension 4, i.e. the line managers in the low accident rate company allocated a greater importance to safety training.

(d) Dimension 5, i.e. the line managers in the low accident rate company perceived the safety training being conducted as being effective for reducing work injuries.

(e) Dimension 8, i.e. the line managers in the low accident rate company reported a higher perceived level of workplace 'safeness'.

Company "C" emerged from the survey with the lowest overall safety climate score and with the highest LTIFR (60), whereas Company "F" provided the highest overall safety climate score and as mentioned earlier enjoyed a LTIFR of zero. These two companies are not in the same industrial category and for the reasons given earlier, extreme caution must be exercised when comparing LTIFR's across industrial categories. However, a sufficiently large difference exists between the two LTIFR's to justify a deeper examination of the differences in safety climates bwtween these two companies.

Significant differences were found in Dimensions 2,3,4,5,7 & 8.

10. SOME OVERALL CONCLUSIONS

The results shown in Fig. 8.8 clearly indicate that Dimension 1 labelled "Management Attitude" was perceived to be the most important contributor to lower work injuries for all seven companies. This dimension reflects line managers perceiving the following items as important for successful performance: (1) a strong desire by senior management to make the company a safer and healthier workplace, (2) senior management being well informed about safety and health issues, (3) safety issues being assigned high priority in senior management meetings, (4) senior managers participating on safety and health committees, (5) senior management encouraging constructive criticism of potential dangers in workplaces, (6) senior management ensuring that line managers are fully aware of their safety and health responsibilities and (7) that senior management voluntarily pursue safety and health policies and not because of external or labour force pressure. Irrespective of the company's overall climate score, this dimension, pertaining to senior management attitude, received the highest rating in all companies.

Dimension No. 8 labelled "Workplace Safeness" accounted for the second highest rating in six out of the seven companies. The items which were perceived to contribute towards a high level of "safeness" in workplaces included: (1) adequate maintenance of guarding on dangerous machinery, (2) adequate arrangements for the maintenance of protective equipment, (3) correct procedures for the handling of flammable, toxic and corrosive materials, (4) adequate arrangements to keep workplaces in a clean, orderly condition, (5) adequate arrangements for the supply of protective equipment, (6) low fire risk levels, (7) adequate systems of inspection to identify hazardous/dangerous machinery and conditions and finally, (8) the company itself was considered to be a safe place to work in when compared with other companies in a similar industry.

Dimensions 4 and 5, which incorporated "Importance of Safety Training" and the "Effectiveness of Safety Training" towards reducing work injuries, can be combined together for comment as the two ranked almost equal to each other within all companies, but there was a wide variation across companies particularly with respect to the perceived importance of safety training, as Fig. i.8 illustrates. In six of the seven companies the "importance of safety training" dimension was rated higher (3rd place) than the dimension "effectiveness of training" (4th place). Lines managers perceived safety training within their companies being an important pre-requisite for successful safety performance because (1) adequate resources were allocated to safety and health training for senior management, (2) adequate money was spent on safety and health training for themselves and foremen levels, (3) adequate money was being spent on safety and health training for workers, (4) trade union representatives should receive safety and health training at the company's expense and (5) adequate funds were allocated for induction training for new employees. The type of safety and health training in six of the seven companies was perceived to require improvement if it was to contribute effectively towards reducing work injuries and particularly induction training for new workers.

Dimension No. 3 which elicited perceptions on the company's "Safety Engineer's /Officer's Status" produced a consistent finding in Companies "A", "E", and "G" where the Safety engineer/officer was viewed to be a person having authority bestowed on him by senior management and a person who should and could provide competent advice on safety problems encountered by line managers. Respondents in Companies "B", "C", "D", and "F" perceived their safety engineer's/officer's contribution to company safety in less favourable terms relative to effective training being provided and having safe workplaces despite the respondents high ratings of senior management's attitude to safety. The reasons for this are unclear at this point in time and further investigation would have to be made before any conclusions could be drawn.

Dimension No. 7, dealing with the perceived importance of a good or bad departmental safety record on a line manager's promotion prospects produced a consistent finding across all companies. Relative to management attitudes, safety engineer/officer status, effective training, and being allowed to balance safety requirements with production requirements, the question of accountability for safety performance was <u>not</u> perceived to influence managers' promotion prospects significantly. This dimension was rated consistently low, usually 7th of the 9 dimensions used.

Dimension No. 6 yielded an unexpected result, in that line managers in <u>all</u> companies, perceived a disciplinary approach to safety as being an effective one to reduce work injuries.

Items which produced this disciplinary view of achieving safer behaviour included: (1) younger employees have accidents for reasons other than lack of guidance, (2) workers who refuse to wear protective equipment should not continue to be employed (3) only discipline and firm control through strict safety rules will restrict accidents in workplaces, (4) only an approach which has each individual responsible for his own safety will reduce accidents, and (5) the main reason younger employees have accidents is because they refuse to obey safety rules.

The findings of Cohen et al. (1975) and Smith et al. (1978) in their studies of American workplaces identified "a humanistic approach in discipling risk takers, violators of safety rules, and in dealing with workers generally" as a necessary dimension or management style for low accident rates in companies, hence its inclusion as a dimension in this present study - the findings in this smaller study of West Australian companies is quite the contrary of the earlier results, but caution is necessary in any attempt to extrapolate the present findings because of the small sample size. The consistency of the findings is very interesting and should be explored in greater depth via a computerized item analysis, and, in further research, in a larger sample of Australian Companies.

Dimension No. 1, labelled "Legislative Influence" received the <u>lowest</u> rating on <u>all</u> companies and reflects the perceptions of line managers towards items such as (1) the company could be a safe place to work in without the influence of safety legislation, (2) that more frequent visits by members of the Inspectorate would not necessarily contribute to lower injury rates, (3) that more stringent government regulations would not reduce work injuries in the company, (4) that members of the Inspectorate are not viewed as sources of competent advice on safety matters, (5) that the infrequent visits by the Inspectorate does not ensure compliance with safety legislation and finally (6) that the development of safety legislation in overseas countries such as the U.S.A. and the U.K. had not influenced company management to allocate increased resources to safety matters.

11. <u>IMPLICATIONS</u>

The overall consistency of the safety climate profiles across the different industries, coupled with the high significance of the results from this exploratory sample, would suggest that further research be undertaken. Also on viewing the similarity of the emergent profiles there is temptation to extract a "right" safety climate for all organisations - this would be incautious at this stage. Determination of the appropriate climate depends on a number of highly complex issues which resist imposition of absolute external standards. Instead, any safety climate must be judged on the pragmatic criterion of how well it helps an organisation achieve its objectives.

Despite the need to emphasize the distinct aspects of each company's safety climate, some common denominators did emerge from this study. Findings such as these help present the management of an individual company with a picture of what exists, what was "typical" from this exploratory study, and what is possible. A consideration of these elements can lead to a description of what is best for a particular company, and after further research, what is best for a particular industry and from a larger cross sectional study what is best for a particular state within Australia.

The major implication of the findings of the empirical work in this study is that a strong management commitment to workplace safety is the major factor which will affect the failure or success of safety programmes in industry. The concept of safety climate, as used in this study, also has the implication that line managers possess a unified set of cognitions regarding the safety aspects of their organisations, and furthermore, that these cognitions are not significantly influenced by governmental intervention in safety and health matters. Instead these cognitions are largely related to perceptions of senior managements' attitudes to the functions of safety education or training, workplace "safeness" and the prompt control of work hazards. On the other hand, the status of safety personnel, the usage of a "softer, encouragement. approach to promote safe behaviour and the balance between production pressures and safety demands, while important in themselves, all appear to play less important roles in the business of achieving low work injury rates. Attempting to improve safety levels in workplaces without a perceived strong management commitment, without providing information and training to workers, without the training being monitored for effectiveness and finally without adequate systems to ensure a satisfactory level of perceived workplace safeness, would appear to meet with little success, that is, if the empirical results of this study are accepted as being valid for other industrial settings.

INSPECTION AND CONTROL PROCEDURES

PLANNED INSPECTIONS

Introduction

1. Inspection procedures, designed to monitor the working environment ("unsafe conditions") and the people employed in that environment ("unsafe acts") have long been a feature of safety programmes.

   Traditionally objectives like

   1.a) Maintaining a safe work environment and controlling the unsafe actions of people, and

   2.b) Maintaining operational profitability

   were seen to be the basis on which inspection procedures were mounted. General guidelines like "the ultimate responsibility rests with management", "authority for carrying it (inspections) out extends down through all levels" all sound like excellent management principles, yet writers failed to become specific with reqard to frequency of inspection, determination of inspection areas,compilation of logical planned checklists and appointment of responsible members to undertake the inspection.

2. Inspection objectives as stated in paragraph 1 above tend to suggest that control of unsafe actions of people (operators?) are the major factor in achieving a "safe work environment" and that "operational profitability" appears to be a separate issue rather than, in part, the result of healthy and safe working conditions.

Inspection Techniques

3. Techniques vary, however, basically there are two types of inspection that have generally been carried out a) The unplanned (visual) inspection and b) The Planned Inspection.

4. The Unplanned (Visual)Inspection as the title suggests is a form of inspection that the supervisor will theoretically do on a casual basis during the normal course of the working day. It is maintained that this is a normal part of the supervisory responsibility and therefore should be effective. The relative effectiveness is however, open to discussion. In the view of the writer, the casual inspection is rarely consciously pursued and suffers from the problem that the supervisor,"living in his own mess" rarely sees the problems. This is particularly the case when he has no standard to compare with.

5. The Planned Inspection. This is more carefully planned and usually carried out from inspection checklists. It follows therefore, that the standard of the inspection, all other things being equal, will be as good as the standard of the checklist.

   This I believe is the key. Frequently checklists are nothing more than a general list of common hazards which are applied to each area of the workplace. One well known text lists 15 "basic hazardous work areas" to be used as a guide i.e.

   a) pinch points
   b) catch points
   c) shear points
   d) squeeze points
   e) flying objects
   f) falling objects
   g) electricity
   h) gases

   etc.

..2/..

The same text goes on to say "a well planned inspection depends on knowing where to look and what to look for" leaving the rest to your imagination.

6. The following is a typical checklist from which we should be able to establish some of the problems I am hinting at, at this stage

HOUSEKEEPING CHECKLIST

AREA.................. SUPERVISOR.................. DATE.........

ORDERLINESS, CLEANLINESS

1. Floors,aisles, storage space ...
2. Trucks, trailers, conveyors ...
3. Desks, files, foremen's areas, office ...
4. Corners, out-of-the-way places. ...
5. Machines, furnaces ...
6. Workplaces, tables, benches ...
7. Tool & supply cupboards or containers ...
8. Tool cribs or areas ...
9. Mechanics' benches or areas ...
10. Washrooms,toilets, fountains ...
11. Lockers - personal ...
12. Yard areas ...

SCRAP AND RUBBISH

13. Should have been removed ...
14. No containers ...
15. Wrong type of containers ...
16. Scrap containers not tagged ...
17. Rubbish in scrap containers ...

TOOLS AND SUPPLIES

18. Inadequate for purpose ...
19. Worn out, broken ...
20. No place for ...
21. Wasteful or inefficient use ...

MATERIALS

22. Badly piled or blocked ...
23. No ticket or identification ...
24. Should be stocked, scrapped or otherwise disposed of ...

POWER (wastage or leakage)

25. Current ...
26. Steam ...
27. Compressed Air ...
28. Heat, fuel, light ...

LIGHT AND VENTILATION

29. Condition of fans, blowers, hoods, fixtures ...
30. Inadequate light, air, ventilation. ...
31. Obstructed by dirt, etc. ...

MAINTENANCE (repairs, overhauls, replacements)

32. Floors, doors, walls,windows ...
33. Wiring, service pipes, etc. ...
34. Machines ...
35. Hoists, tractors, motors ...
36. Other machine accessories ...
37. Cranes tractors, conveyors ...
38. Trucks, trailers ...
39. Tables, stands, benches ...
40. Racks,trays,skids, platforms ...
41. Miscellaneous equipment ...

SAFETY

42. Hazard-direct control ...
43. Hazard-indirect control ...
44. Unsafe practice ...
45. Accessibility of strechers, fire extinguishers ...
46. Breach of safety rules ...
47. Failure to instruct.

Safety Officer.....................

* DIAGRAM 1

Discussion

7. One Example of Inadequacy - Rope Checks

Item 19 in the checklist, set under the general heading TOOLS AND SUPPLIES invites the safety officer to approve or criticise in respect of the characteristics, Worn Out/Broken. Clearly in any substantial work area there may be a considerable number and variety of commodities which should be separately assessed. To illustrate the inadequacy of such tick systems it is supposed that ropes are used in course of work. Here follows a list of considerations which may have to be taken in account when assessing the safety of this single commodity which, in the checklist, may be crushed among a multiplicity of others:

8. Rope Characteristics which should be tested

Strength.
Stretch with load.
Permanent stretch.
Recovery from stretch.
Length
Size
Flexibility
Twist direction & torque
Flex life in bending
Slipperiness
Texture
Moisture and Atmosphere.
Temperature resistance.
Combustibility.
Sunlight resistance.
Rot resistance.
Chemical resistance
Colour
Ageing
Uniformity.
Contamination
Toughness against wear.

9. Brief Critique of the Checklist

a. The document, which was devised by a major company in the U.S.A. and was adopted, with variations, by many others, divides the 47 items under illogical and inappropriate subdivisions to the extent that coherent inspection is disrupted. Thus, questions of Order and Cleanliness cannot rationally be distinguished from Scrap and Rubbish. The notional distinction between Materials and Supplies is also obscure.

b. Basic policy questions, such as the adequacy of articles used at work (Item 18), wasteful use (Item 21) and power utilization (Items 25-28) have little direct relevance for the safety officer, and have no place in a routine tick list.

c. The intermixture of articles used at work — which appear under almost all subheadings and often in inappropriate context — with the very occasional references to substances used at work causes confusion.

d. The clumping of unlike items under arbitrary headings frustrates any rational geographic progression.

e. It is quite clear that the list has been devised without reference to any inventory of articles used at work.

f. The list is deficient even when dealing with so basic a matter as fire precautions. Apart from a passing reference to fire extinguishers (Item 45), the other routine fire checks are ignored.

g. The eclectic by specific listing means that many items, and descriptions of items, are omitted. By omission these may escape inspection or, quite wrongly, be characterised as safe or without risk to health.

h. Lack of preparatory work or serious consideration of the purpose of of inspections is identified by the vague and general headings - Unsafe Practice (Item 44) and Breach of Safety Rules (Item 47) being just two examples.

10. We see therefore a need for a system that will enable us to clearly determine the inspection requirements for any organisation. These requirements must be specific to the extent that

a) Inspection areas are clearly defined
b) Inspection items are determined
c) Specific parts to be inspected are identified
d) Conditions to be inspected for are detailed
e) Frequency of inspection is decided
f) Responsibility is allocated.

11. Inspection areas: - these can and must be clearly defined so that confusion does not exist between departments/sections. The easiest way to designate areas will be to draw in Departmental boundaries on a map or plant plan. Total holdings of the organisation must be assigned in this way. Responsibility must also include access ways that may generally be considered to belong to other organisations, i.e. rail loading depot/siding, roadways, etc. (See diagram 2).

12. When the outline plan of the departmental responsibilities has been prepared and discussed with each department, copies of the plan should be disseminated.

At this time the departmental manager must determine a further subdivision of his departmental area into smaller manageable work or functional units. Ideally these units will have a line supervisor directly responsible for them and clearly defined manning, however, this will depend on the size of the organisation. If this can be achieved it will clearly identify actual operations as well as lines of responsibility. (See Diagram 3)

13. When the final assignment of areas is completed unit/functional supervisors will then be required to carry out a detailed analysis of their appointed areas.

14. To simplify this procedure we use a form which is consistent with the requirements of paragraph 10. Note that this process is a once only analysis to determine the actual inspection requirements and need only be updated as additions and deletions to inventories occur.

15. Examine the Worksheet S.I.D.1 shown here in Diagram 4.

16. a) The worksheet initially requires completion of subunit identification details. This will be straight forward. Comprehensive suggested inspection categories are listed and these should be evaluated in accordance with the environment, completing accurately those details required in columns 2-4. Columns 5 and 6 will be completed at "leisure" after careful consideration.

b) Column 2 requires all items appropriate to the category under inspection to be specifically listed (i.e. Bench Grinder). As each item is listed columns 3 and 4 must be completed for that item (and ultimately columns 5 and 6).

c) In column 3 we list the specific parts of the item which require inspection, i.e. tool rest; stone/buff; eye guard; etc. As each part is listed we in turn complete column 4.

d) In column 4 we list the specific unsafe condition for which the parts already identified, need be inspected:- i.e. adjustment exceeds 1/16", loose; dressing, worn, chipped, cracked, etc.

e) Column records responsibility for inspection i.e. Foreman (F), leading hand (LH), Supervisor (S).

f) Column 6 requires a simple indication of inspection frequency, i.e. daily; weekly; pre-start; after use. Simple codes can be developed effectively, i.e. daily (D), Annually (A), and so on.

17. When all S.I.D.1's have been completed for each subunit, departmental supervisors should examine them for accuracy together with the officer who prepared them. When this review has been completed a very thorough inspection requirement will have been determined. One problem still exists however and that is perhaps obvious. The S.I.D.1's need to be reorganised so that separate listings are available both on a frequency of inspection and responsibility basis.

In this regard then, the final requirement is to reorganise data onto actual inspection checklists. (See Diagram 5). When this is finalised a complete record of inspection requirements will exist by time and appointment.

The inspection programme should now commence and returns are to be audited.

18. Summary

In the manner described above, the organistion will develop the capacity to inspect comprehensively, its entire facilities.

For continued effectiveness periodic reviews are necessary as subunit areas change, new hazards are detected or when an accident may reveal weaknesses.

The entire system, however, is designed to reduce the opportunity for accidents and I believe aggressively implemented, the formal inspection system will assist in achieving this goal.

SAFETY INSPECTION CHECKLIST

DEPARTMENT________________ SUB UNIT________________

INSPECTION AREA________________ PERIOD____________

CHECKING OFFICER________________________

INSPECTION ITEMS AND PARTS	CONDITIONS TO INSPECT FOR	INSPECTION RESULT

INSPECTION ITEMS AND PARTS	CONDITIONS TO INSPECT FOR	INSPECTION RESULT

INSPECTION ITEMS AND PARTS	CONDITIONS TO INSPECT FOR	INSPECTION RESULT	INSPECTION ITEMS AND PARTS	CONDITIONS TO INSPECT FOR	INSPECTION RESULT

WORKSHEET - SAFETY INSPECTION DETERMINATION SID 1.

DEPARTMENT ______________________ SUB UNIT ______________________

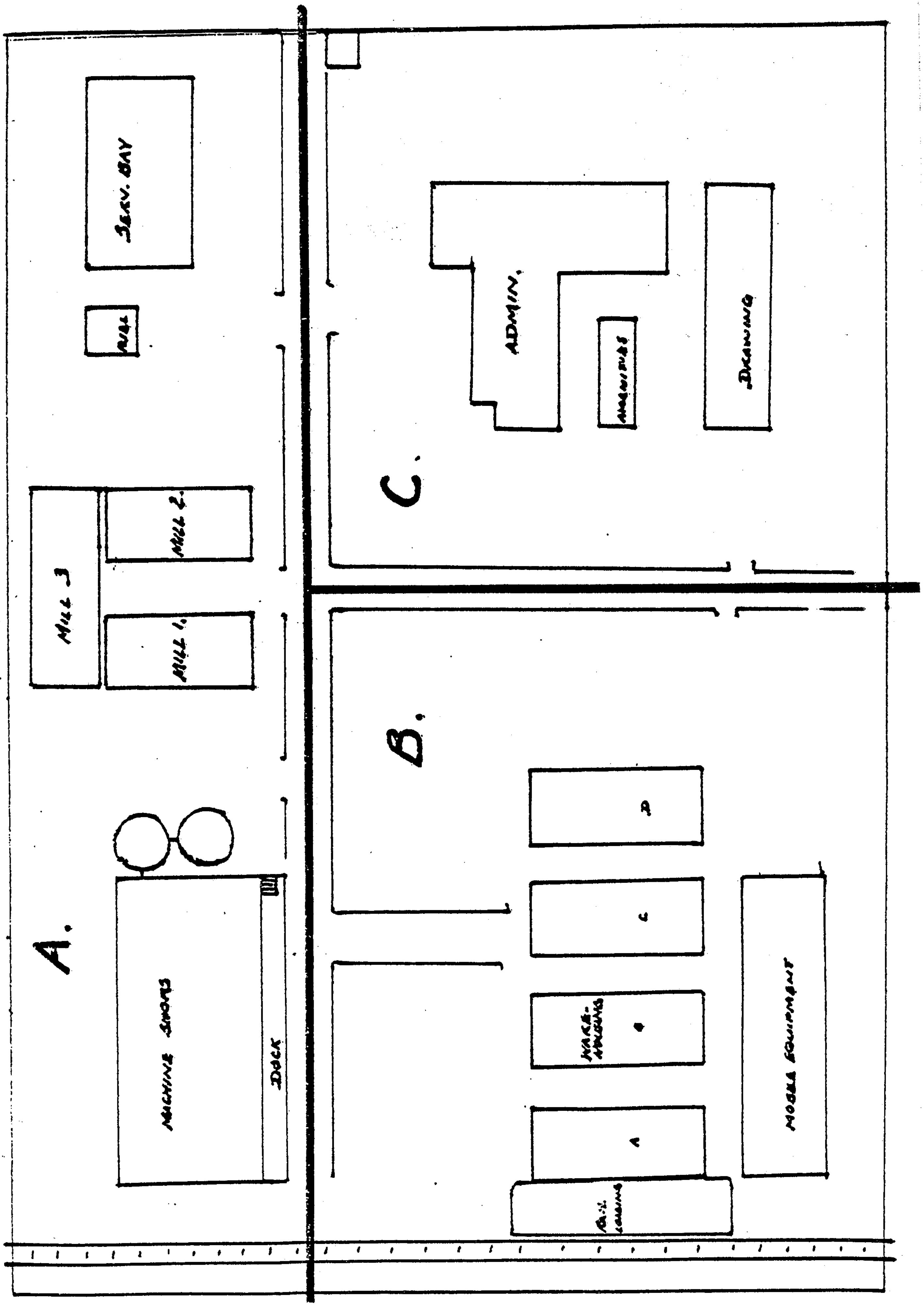
SUPERVISOR ______________________ SUB UNIT SUPERVISOR ______________________

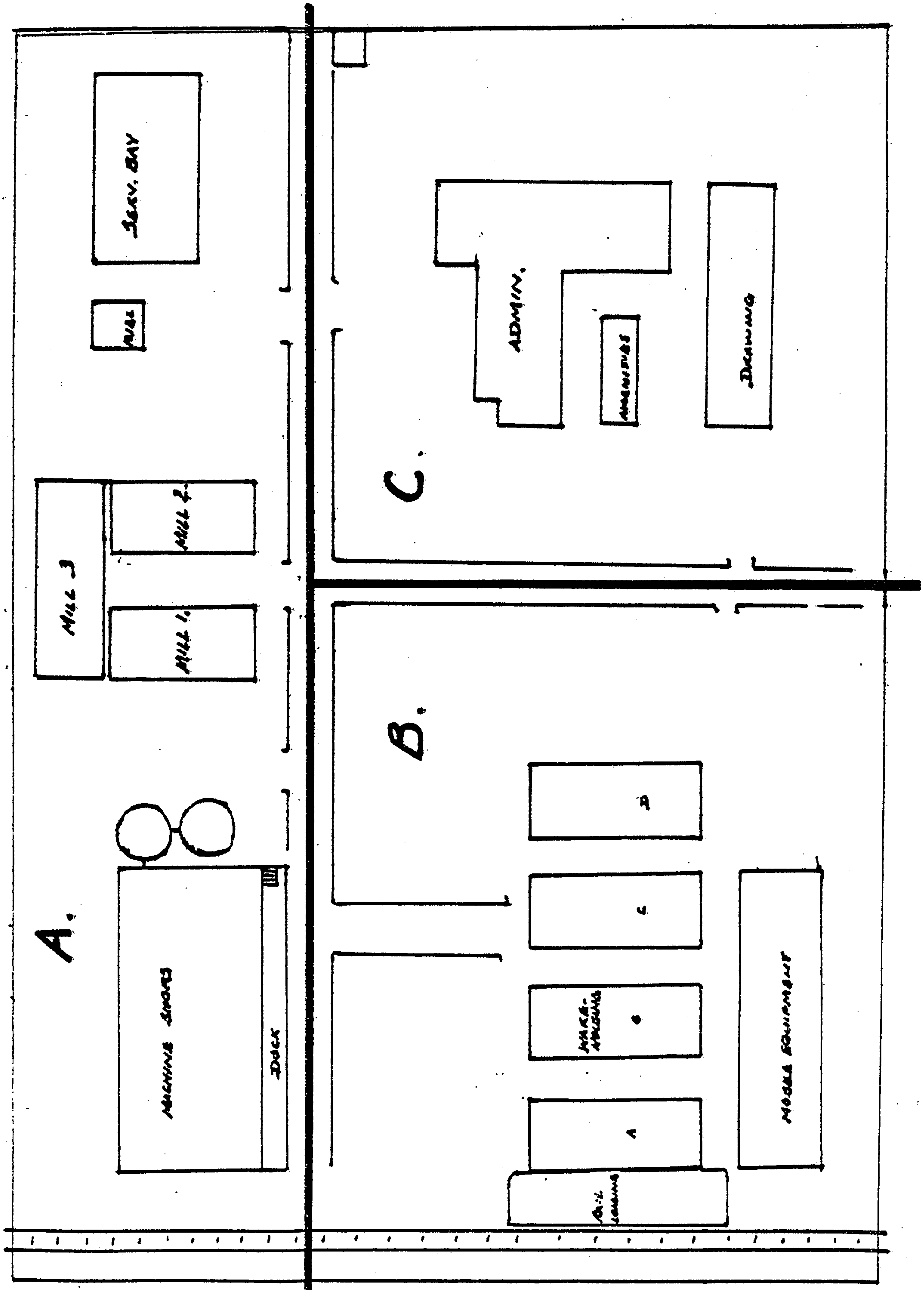
1. INSPECTION CATEGORIES: Examine each suggested category in turn. When one category is applicable to your work area complete columns 2 - 4 clearly and concisely. As each category is completed, move on to the next. Columns 5 and 6 can be completed when each area has been categorised.

1. Atmospheric Conditions	☐	8.	Handtools	☐	15.	Shafts, Pits, Sumps,etc.	☐
2. Buildings & Structures	☐	9.	Material Handling Equip.	☐	16.	Storage Equip.& Areas	☐
3. Containers & Tanks	☐	10.	Pers.Protective Equip.	☐	17.	Transportation Equip.	☐
4. Electrical Equipment	☐	11.	Pressurized Equipment	☐	18.	Walkways & Roadways	☐
5. Elevators & Man Lifts	☐	12.	Production Equipment	☐	19.	Warning & Signalling Equipment.	☐
6. Fire Fighting Equipment	☐	13.	Supporting Equipment	☐			
7. Hazardous Materials	☐	14.	Power source Equip.	☐	20.	Other	☐

2. INSPECTION ITEMS:	3.PARTS TO INSPECT:	4. CONDITIONS TO INSPECT FOR:	5. HOW OFTEN:	6. BY WHOM:

2. INSPECTION ITEMS:	3.PARTS TO INSPECT:	4.CONDITIONS TO INSPECT FOR:	5. HOW OFTEN:	6. BY WHOM:


A.
B.
C.
SERV. BAY
MILL
MILL 1.
MILL 2.
MILL 3
MACHINE SHOPS
DOCK
ADMIN.
DRAWING
WARE-
HOUSING
MOBILE EQUIPMENT
A
B
C
D


SERV. BAY
MILL 3
MILL 2
MILL 1
A.
B.
C.
MACHINE SHOPS
DOCK
ADMIN.
DRAWING
WARE-HOUSING
MOBILE EQUIPMENT

LIABILITY OF EMPLOYERS

Introduction

1. Employees who are injured at work have a number of rights and remedies available to them. In Western Australia the most commonly known right is to the benefits provided for in the Workers' Compensation Act. In addition, injured workmen may have an entitlement to social security benefits if workmens' compensation, is for some reason, not available to them or there is some delay. The less commonly known remedy for injured workmen is a claim for damages against an employer. This claim may arise for one of two reasons as follows:-

a. a breach of the employer's duty of care (at common law,)

b. a breach of a statutory duty by an employer.

Aim

2. The aim of this paper is to examine in relation to paragraph la and lb the common law liability of the employer, vicarious liability of the employer, employers' duties of care, breaches of statutory duties by employers and defences available to employers incorporating employee responsibilities.

Common Law Liability

3. The common law principles with regard to the relationship between employer and employee first appeared in the 1800's and have undergone a process of development and refinement ever since. Whilst initially the workman had little protection the common law has developed to the stage where there are clearly defined responsibilities which rest on both parties to the contract of employment.

4. I would emphasize here that Common Law is not like statute law (i.e. Acts and Regulations of a Parliament), but is based on the precedent of court decisions recorded over long periods of time. These decisions, often added to, have become the basis for common law.

5. The very essence of the claim for damages at common law arises from the relationship of master and servant (employer/employee) where one of the general duties of the master is to take reasonable care for the safety of the employee, in all aspects of that employment. It is not altogether clear, however, if in fact the cause of action in this situation is actually based on a breach of the duty of care which is generally referred to by Law under the title "Negligence", or a breach of the contract of employment. In any event the difference is academic as the damages arising in either case would be identical.

6. Common Law as distinct from worker's compensation considers the concept of "fault" and amounts for damages under common law are usually considerably higher. Damages are usually assessed on the degree of fault, age of the 'victim', extent of pain and suffering, disfigurement, an amount for general damages and any other relevant factor.

7. Contributory negligence is a common law factor and where appropriate, a percentage figure, determined by the Court, is deducted from the assessed damages.

Employers Duty of Care

8. The employers duty, as recognised by law, is to take reasonable care for the safety of his employees in all circumstances of the employment. This duty of care is usually classified by most texts on this subject under the following categories:

a. provision of a safe place of work,

b. provision of a safe system of work,

c. provision and maintenance of safe plant and equipment,

d. provision of competent staff to manager and supervise the business.

However, how is this standard of 'reasonable care' defined? The standard of care required might be said to be that amount of care that would be exercised in the same circumstances by a reasonable man. In fact the degree will vary greatly according to the circumstances.

9. Standard of Care. The standard adopted by the Courts is an objective one - what would a reasonable employer have done in the same situation? In determining this standard of reasonable care several questions arise. When considering the employers duty of care should consideration be made that whilst an employer, the defendant is also an entrepreneur and businessman (and is therefore concerned to make a profit), or should safety override these considerations? Where an employer's business involves risks to workmen by the nature or method of operation, should the employer be subject to claims for damages on each occasion an employee is injured? As an ordinary, reasonable man can the employer be allowed to indulge in occasional oversight, slips or errors common to most members of society, or should the employer be considered to be "infallible"? In examining the nature of the employers duty of care and in assessing what is the standard of the ordinary, prudent, reasonable employer, it is, therefore, necessary to consider principles enunciated by courts, and to consider the extent that they are likely to provide a reliable guide.

10. Duty of care owed personally and to each employee. The duties of care are owed personally to each employee and therefore an employer is unable to delegate this responsibility concerning health and safety to a third party (Wilsons and Clyde Coal Co. V English (1938) AC 57).

Assume that an establishment was engaged in a process which was hazardous to the safety of employees. Specialists (perhaps Engineers) are called in to rectify the problem, however the plant continues to be hazardous to the workmen. The fact that the employer had called in experts to solve the problem would not be admissable as a form of defence. The employer's duty remains a personal one and compensation would be payable for an injury incurred under these circumstances. This principle applies to the whole of the employers undertaking. This will include not only plant and equipment but also that of supervision of safety of premises.

11. The duty of the employer is owed personally to each and every individual employee. Therefore in considering the nature and extent of the employers duty, one must take into account the individual characteristics and idiosyncrasies of employees that are known or ought to be known to him. Thus an employer knowing that an employee was unable, for medical or other reasons to work at heights, would be negligent in ordering the employee to so work.

12. Should the employer then not only consider the probability of personal injury but also the seriousness of the consequences of an injury to each individual if an accident were to occur? This question can be best illustrated in the Paris V Stepney Borough Council (1951) AC 367.

"Paris was employed by the Council as a garage attendant. He had lost the sight of one eye prior to entering into this employment, a fact that was subsequently discovered by the employer during a medical examination (conducted for the purpose of assessing his eligibility to join a superannuation scheme). Thus the employer was deemed to have known of the condition of the employee's eye"

"Paris received an injury to his right eye, which rendered him totally blind, when he was dismantling the chassis of a motor vehicle. He was using a steel hammer to knock out a rusty bolt when a fragment of metal broke off and lodged in the eye. He broughta claim for damages against the employer, alleging that he should have been supplied with suitable goggles to protect his eyes".

"The employer had supplied goggles for welders and for employees working on grinding machines but not for men employed on the maintenance and repair of motor vehicles. There was some suggestion of the likelihood of pieces of metal breaking away and lodging in the eyes of workmen, but actual occurrences were rare. It was not the general practice of workmen employed in the garage to wear goggles. In these circumstances, it was virtually conceded that there would be no negligence on the part of the employer if it had failed to provide goggles for workmen possessing the sight of both eyes. Paris argued, however, that the gravity of the consequences of any injury to his right eye was such that a higher degree of care was owed to him by the employer".

In a majority decision the House of Lords accepted the argument of Paris and upheld an earlier verdict entered in his favour.

13. Another more common application to industry embodying the same principle can be seen in a statement by Devlin, L.J. in Wither V Perry Chain Co. Ltd. (1961) 1 W.L.R. 1314, at p.1320:

"It may also be on the principle of Paris V Stepney Borough Council, that when the susceptibility of an employee to dermatitis is known there is a duty on the employer to take extra or special precautions to protect such an employee".

14. Experienced Employees. The fact that employees are experienced does not negate the employers obligation to provide a safe method of carrying out their work, especially where the work is to be performed in the context of a systematic operation which has been established by the employer. It is the responsibility of the employer to establish and lay down a safe system of work. Where the system is defective, the employer will have failed in his obligation. It is the duty of the employer to consider each situation, devise a suitable system of work, instruct his employees as to these work requirements and any special equipment required. Obviously the employer cannot be certain that they will do as they are told, when alone, however if he does all that is reasonable to ensure that his safe system is operated he will have done what he is bound to do.

Vicarious Liability

15. Where an employee is injured due to the negligence of a fellow employee a claim may be brought against the employer by way of a claim for damages. This is the doctrine of vicarious liability which provides that an employer is liable to compensate a person who suffers injury or loss as the result of the negligence of an employee provided the negligent act occurs in the employee's employment.

16. When is an employer "vicariously liable" for the results of his employees acts and or negligence? When can the employer avoid responsibility by saying that the fault was that of his servant and not himself?

Generally an employer is just as responsible for the havoc inflicted through the acts (or ommission) or negligence of his servants as if the damage was done by his own hand. A company has no human existence apart from those who hold its shares, run its affairs and work for it. The company can do itself no wrong - its troubles all arise through the "misdemeanours" of those who work for it. The exception applies when the wrongful act occurs outside the scope of the employment. The difficulty in these cases would be in deciding if the act was within the scope of the employment.

17. "Skylarking" or "horseplay" is often discussed, albeit a forbidden aspect of company life, it still occurs. If an injury occurs to an employee and is caused by another employee engaging in "horseplay" is the company still liable? If an employee breaks the arm of another through tripping him in a workshop the company is responsible. If the same incident occurred at a dance hall in the evening then the company is not responsible.

18. Consider this statement:

> "We do not allow smoking in this plant. We deal with inflammable materials and no one is allowed even a puff inside the building, except in the canteen. In breach of our orders an operative smoked, caused a fire and explosion in which another employee was injured. Is the company responsible?"

In a word "yes". Providing he was doing something he was employed to do. Ask yourself this question "Was he doing something which he was employed to do - albeit in a thoroughly wrongful way - or was he doing something which came right outside the course of of his employment?"

19. In the question cited in paragraph 18 the case involved an attendant at a petrol pump. He knew he should not throw matches around, but he did. He lit up, flicked away his match and the inevitable explosion occurred. The employer met the plaintiffs claims saying in defence, that the man was acting outside the scope of his employment and they should not be held liable. They lost. The man was employed to fill customers' tanks and that is what he was doing. The fact that he did so improperly did not free the employer from the responsibility of the damage caused.

Breach of a Statutory Duty

20. Each state and particularly Western Australia has legislation designed to regulate working conditions and more specifically health, welfare and safety in the workplace (however limited). A failure to comply with these statutory requirements can give rise to an application for damages on behalf of an employee injured as a result of that breach.

21. An action of this type exists independently of and in addition to an action based on Common Law breach of duty as mentioned earlier. It is an action at common law based on a statutory provision for the safety of employees. It is therefore sufficient for the plaintiff to prove non-compliance by his employer within the terms of the appropriate Act or Regulations. It is therefore a case of strict or absolute liability and will, by itself, and with nothing further, enable an employee injured as a result of that breach to successfully bring a claim for damages.

Defences Available to Employers

22. Two principle defences are available to employers enabling them to defeat claims for damages brought by injured employees. The first of these is contributory negligence, i.e. the employee has contributed to his injuries. The extent the employee is to blame will reduce by the same amount, any amount which may otherwise have been awarded. (It is important to note here that this is no defence to an action based on a statutory breach of duty). There is however, a limited defence available to employers regarding claims arising out of a breach of statutory duty. This could apply where the breach is caused entirely by the injured employee. Let us assume an employee is injured because an employer installed a dangerous machine in a factory. The machine does not comply with the appropriate Machinery Act. If the employee was given sole responsibility for the selection of the machine and ensuring that it complied with statutory provisions, then if that employee was injured whilst operating the machine he would (on the probabilities) be unable to recover damages.

23. The second defence available to employers is "volenti non fit injuria" which loosely translated means voluntarily assumes the legal risk of injury. This defence has little application in modern context and involves the employer proving the employee undertook a dangerous activity knowing there was an inherent risk of injury and foregoing any right to claim damages which he might otherwise have. The courts are reluctant to apply it in an employment situation.

Employee Responsibilities

24. This paper place considerable emphasis on employers' responsibilities and perhaps quite correctly. However, I would be most incorrect if I left you with the feeling that the employee has no responsibilities.

Employee are under an obligation to take reasonable care not only for the safety of others but also for their own safety. Even where an employer has been in breach of the primary duty, an employee must nevertheless continue to take reasonable steps to avoid injury and failure to do so, will cut down the quantum of any damages to which he might otherwise be entitled. An employee may also have statutory responsibilities in various areas of State legislation which will be examined separately.

Summary

25. To conclude we have a system where on one hand the onus rests upon the employer to provide a safe system of employment and on the other, the employee is bound to act with an appropriate degree of care and responsibility in the daily performance of his work.

An employer further is not - at general law - under a duty to ensure absolute safety. Negligence on his part must be proven before a liability can arise.

It is essential that both parties of the contract of service are aware of their statutory responsibilities and further the existence of the common law grounds outside workers compensation.

Perhaps if nothing more, to highlight these factors for all, may ultimately give rise to a safer and mutually respected environment between master and servant.

THE WORKERS' COMPENSATION AND ASSISTANCE ACT 1981

SHORT TITLE

1. AN ACT to amend and consolidate the law relating to compensation for and the rehabilitation of workers suffering disability by accident or disease in the course of their employment, to establish a Workers' Assistance Commission, to continue the Workers' Compensation Board, and for related purposes.

2. Date of operation to be fixed by proclamation. (3rd May 1982)

3. Purpose of Act:

   (a) to make provision for the compensation of:

      (i) workers who suffer a disability; and

      (ii) certain dependants of those workers where death of the worker results from such a disability:

   (b) To promote the rehabilitation of those workers with a view to restoring them to the fullest capacity for gainful employment of which they are capable; and

   (c) to promote safety measures in and in respect of employment aimed at preventing or minimising occurrences of disabilities.

APPLICATION

4. Not to training, participating or travel in connection with sporting activity.

PART III COMPENSATION

5. (Section 19) Travel clause amended.
An injury sustained on a journey without substantial default or wilfull act
   - between residence and place of employment
   - between any work camp or trade school
   - and arises out of journey providing no substantial interruption or deviation, is covered by compensation.

Accept where death results burden of proof on employee.

"Substantial default" includes the consumption of alcohol or drugs.

"Substantial interruption" means in excess of one (1) hour.

6. S.21 - Employer liable to pay compensation from date of incapacity.

7. S.22 - Where it is proven that the disability of a worker is attributed to:

   (a) voluntary consumption of alcoholic liquor or a drug of addiction, or both, which impairs the proper functioning of his faculties;

   (b) failure, without reasonable excuse, proof of which is on him, to use protective equipment, clothing, or accessories provided by his employer for the worker's use; or

   (c) other serious and wilful misconduct;

   compensation shall be dissallowed unless resulting in death or serious and permanent disablement.

8. S.50 - Makes rules in relation to hearing loss determinations.

9. S.64 - Worker to submit himself for medical examination as required by the employer.

10. S.72 - Payments may be suspended during:

    (a) periods of imprisonment;

    (b) periods of prescribed rehabilitation treatment in event of refusal to co-operate, ceases without authorization, fails to attend regularly.

11. S.79 - Compensation may be dissallowed if disclosure of previous similar injury not made.

12. S.84 - No unsuccessful attempt to resume work will effect workers' compensation payments.

CIVIL PROCEEDINGS

13. Employer may request employees to commence civil action in the event of payments continuing beyond 12 months. Worker required to commence proceedings within 42 days or advise employer in writing of his intention not to take proceedings (rights then extinguished).

14. S.93 - Liability of persons other than employer and indemnity of employer.

WORKERS' ASSISTANCE COMMISSION

15. Appointed in accordance with S.94 - 96.

16. Functions:

(a) to control and administer the General Fund and the Trust Fund;

(b) where necessary or desirable, to participate in research into the causes, incidence, and methods of prevention of accidents, injuries, losses of functions, and diseases in respect of which compensation may be payable under this Act;

(c) where necessary or desirable, to assist in encouraging the prevention or minimizing of accidents, injuries, losses of functions, and diseases in respect of which compensation may be payable under this Act;

(d) to co-ordinate arrangements for workers suffering injuries, losses of functions, or disease, in respect of which compensation is or may be payable under this Act, to undertake rehabilitative occupational or vocational training, remedial treatment, health recovery courses, or work under special conditions, or to receive pre-employment medical examination and occupational guidance;

(e) to co-ordinate arrangements generally to secure the care, supervision, and assistance of workers suffering injury, loss of function, or disease in respect of which compensation is or may be payable under this Act;

(f) to obtain from all insurers and self-insurers information and returns enabling the Commission to compile and record such statistics, records, and reports as it considers desirable for the better administration of this Act;

(g) where necessary or desirable, to assist in investigating all matters relating to accidents, injuries, losses of functions, or diseases in respect of which compensation is or may be payable under this Act, to study the causes and various methods of treatment and the results of treatment of such accidents, injuries, losses of functions, and diseases;

(h) formulating recommendations and preparing estimates for submission to Parliament of the cost of providing facilities for rehabilitation and re-employment of workers who have sustained permanent or temporary disablement from a compensable disability so as to minimize or remove any handicap suffered by the worker;

(i) to provide registry and support services to the Board; and

(j) the Commission shall provide the Committee with such statistics, records, reports and other information as the Committee may reasonably require to enable it to perform its obligations under Section 151(a).

WORKERS' COMPENSATION BOARD

17. Provided for in Part VI of the Act.

18. Determination by Board final and conclusive.

19. Cases to be determined according to equity, good

conscience and substantial merit. Board not bound by legal precedent.

20. Appeal to the Full Court of the Supreme Court.

PREMIUM RATES COMMITTEE

21. (a) For the purposes of this Act there is established a committee by the name of Premium Rates Committee..

(2) The Committee is to consist of:

(a) The Auditor General as a member and Chairman;

(b) The Permanent Head of The State Government Insurance Office as a member;

(c) The Manager as a member;

(d) 3 other members appointed by the Govenor, on the recommendation of the Minister, and referred to as nominee members of whom -

(i) one shall be a person experienced in management affairs in commerce or industry, or both;

(ii) one shall be a person experienced in trade union affairs; and

(iii) one shall be a person experienced in insurance business but not employed in The State Government Insurance Office.

(3) Before making recommendations for the purposes of subsection (2) (d) (i), (ii) and (iii) respectively, the Minister may, in writing, request the bodies known as -

(a) The Confederation of Western Australian Industry (Incorporated);

(b) The Trades and Labor Council of Western Australia; and

(c) The Western Australian Regional Advisory Board of the Insurance Council of Australia Limited,

respectively, to submit the name of a person, or the names of such number of persons as is specified in the request, who, or each of whom, has the required qualification and is willing to act as a nominee member.

(4) The Governor may, on the recommendations of the Minister -

(a) appoint a person as deputy of an ex officio member; and

(b) appoint as deputy of a nominee member a person qualafied for appointment to the office of that nominee member, and subsection (3) applies in respect of such a recommendation with such modifications as are necessary.

(5) In the absence, for any reason, of a member from a meeting of the Committee his appointed deputy may attend the meeting and while so attending has all the powers, authorities, functions and duties of a member.

22. An insurer shall not charge a loading of more than 50% of premium rate.

REHABILITATION

23. Where incapacity exceeds 12 weeks particulars required by Commission. (Penalty $1,000) The Commission may:

1(a) co-ordinate a programme for the worker's rehabilitation, and occupational and vocational training;

(b) obtain estimates of the likely cost of and authorize expenditure not exceeding $2,000 on a programme of occupational and vocational training.

(2) The Commission may -

(a) extend, modify, suspend, or terminate a programme;

(b) authorize expenditure exceeding $2,000 for occupational and vocational training in any case it considers it appropriate to do so.

INSURANCE

24. Principal and contractor deemed to be employers. (S.175)

APPENDIX 1

SCHEDULES.

SCHEDULE 1.

Compensation Entitlements.

Death—dependants wholly dependent.

1. Where death results from the disability and the worker leaves any dependants wholly dependent upon his earnings—

(1) (a) in respect and for the benefit only of all those dependants, if any, who are not of the kind referred to in subclause (2), (3), or (4) a sum equal to 85% of the notional residual entitlement of the worker;

but if a worker dies leaving—

(b) a spouse or mother or a spouse and mother wholly dependent upon his earnings, whether or not there are other dependants wholly dependent upon his earnings, there shall be a minimum amount payable being a sum equal to the aggregate weekly payments for total incapacity of the worker at a rate calculated and varied in accordance with this Schedule as at the date of the worker's death for a period of one year after that date;

(c) in the event of there being more than one dependant wholly dependent on his earnings the amount is to be apportioned between them according to the respective financial losses of support suffered by them, which apportionment is to be determined by the Board;

(2) in respect and for the benefit only of each of those dependants, if any, who is a child, or step-child, under the age of 16 years, a child's allowance weekly until the child attains that age;

(3) in respect and for the benefit only of each of those dependants, if any, who is a full time student child or step-child, and has attained the age of 16 years but is under the age of 21 years, a child's allowance weekly until the child attains the age of 21 years or ceases to be a full time student, whichever is the sooner;

(4) in respect and for the benefit only of each of those dependants who is a child, or step-child, of any age, whether a full time student or otherwise who, by reason of circumstances the Board in its absolute discretion decides, should receive continued support, a child's allowance weekly until such time as the Board orders,

APPENDIX 2

SCHEDULE 2.

TABLE OF COMPENSATION PAYABLE.

Item	Column 1 Nature of Injury	Column 2 Ratio which the sum payable herein bears to the prescribed amount.
	EYES	%
1.	Total loss of sight of both eyes	100
2.	Total loss of sight of an only eye	100
3.	Total loss of sight of one eye ...	50
4.	Total loss of sight on one eye and serious diminution of the sight of the other eye	75
5.	Loss of Binocular vision	50
	HEARING	%
6.	Total loss of hearing	75
	SPEECH	
7.	Total loss of power of speech	75
	BODY AND MENTAL	
8.	Permanent and incurable loss of mental capacity resulting in total inability to work	100
9.	Total and incurable paralysis of the limbs or of mental powers	100
	SENSORY	
10.	Total loss of sense of taste and smell	50
11.	Total loss of taste	25
12.	Total loss of smell	25
	ARM	
13.	Loss of arm at or above elbow	90
14.	Loss of arm below elbow	80
	HAND	
15.	Loss of both hands	100
16.	Loss of a hand and foot	100
17.	Loss of hand or thumb and four fingers	80
18.	Loss of thumb	35
19.	Loss of forefinger	17
20.	Loss of middle finger	13
21.	Loss of ring finger	9
22.	Loss of little finger	6
23.	Total loss of movement of joint of thumb	17
24.	Total loss of distal phalanx of thumb	20

APPENDIX 3

SCHEDULE 3.

SPECIFIED INDUSTRIAL DISEASES.

Column 1 *Description of Disease*	*Column 2* *Description of Process*
*Arsenic, phosphorus, lead, mercury or other mineral poisoning	Any employment involving the use or handling of arsenic, phosphorus, lead, mercury, or other mineral, or their preparations or compounds.
*Anthrax	Wool-combing; wool-sorting; handling of hides, skins, wool, hair, bristles, or carcasses; loading and unloading or transport of merchandise containing anthrax organisms.
Communicable diseases	Employment in an occupation or in a situation exposing the worker to infection by the intermediate hosts of any communicable disease or by agencies transmitting any communicable disease, where within a reasonable period of incubation, specific infection has followed demonstrable action of the particular vectors or agents concerned in the transmission of that disease, or where that action can be reasonably presumed.
*Poisoning by trinitrotoluene or by benzol or its nitro and amido derivatives (dinitrobenzol, aniline and others)	Any process involving the use of trinitrotoluene or of the nitro and amido derivatives of benzol or its preparations or compounds.
Poisoning by a homologue of benzol	Any process involving the use of a homologue of benzol.
*Poisoning by carbon bisulphide	Any process involving the use of carbon bisulphide or its preparations or compounds.
Poisoning by a halogen derivative of a hydrocarbon of the aliphatic series	Any process involving the use of a halogen derivative or a hydrocarbon of the aliphatic series.
*Poisoning by nitrous fumes	Any process in which nitrous fumes are evolved.

* See section 48 (2).

* See section 48 (2).

APPENDIX 4

SCHEDULE 4.

SPECIFIED LOSSES OF FUNCTIONS.

Column 1 *Loss of Function*	Column 2 *Description of Process*
Noise induced hearing loss	Any work process involving continued exposure to excessive noise.
Effects of vibration (including Raynaud's phenomenon and dead hand)	Use of vibratory tools, implements and appliances.
Compressed air illness.	Any process carried on in compressed air.

A GUIDE TO THE MACHINERY SAFETY ACT OF 1974 AND THE MACHINERY SAFETY REGULATIONS 1978

Introduction

1. An Act to provide for the safe design, construction, installation, and operation of machinery, for the inspection of machinery and the conditions under which it is used, and for the safety of persons.

2. This Act binds the Crown. ACT 5

Interpretations

ACT 6

3. (a) Boiler - means any vessel in which for any purpose steam or vapour is generated or is intended to be generated or water or other liquid is heated or intended to be heated, at a pressure above that of the atmosphere, by the application of fire, the products of combustion, or electrical means; the term includes any economiser or superheater or any feed, blowdown, mountings, fittings, connections or ancillary plant or apparatus necessary for the efficient and safe working of a boiler, including distribution pipelines; but the term does not include a fully flooded system or pressurised system where the water is or is intended to be heated to a temperature less than ninety-nine degrees celsius;

(b) Certificate of Competency - means a certificate granted by the Chief Inspector pursuant to section 39, but where a certificate is endorsed with a reference to any restriction, limitation or condition means the certificate as so subject;

(c) Certificate of Inspection - means a certificate granted by the Chief Inspector under section 16, but where a certificate is endorsed with a reference to any restriction, limitation or condition means the certificate as so subject;

(d) Classified Machinery - means a boiler, pressure vessel, crane, lift, escalator, or other machinery classified by the Chief Inspector under section 11 as machinery which shall not be used or operated unless there is in force in relation thereto a valid certificate of inspection.

(e) Crane - means a structure equipped with mechanical means for moving or placing a load by raising, lowering or transporting it, and includes machinery or associated lifting apparatus necessary for its operation and the supporting structure and foundations; but the terms does not include a hoist lift, escalator, or conveyor, or any earth-moving machinery other than an excavator equipped with a jib or boom;

(f) Fence - means any form of protective device designed to prevent bodily injury and includes a guard or guard rail;

(g) Hoist - means any mechanical contrivance other than a crane, lift, escalator, or conveyor, the principal function of which is the raising or lowering or conveying of men, goods, or materials; the term includes men and materials hoists and builders' hoists of every kind and all the equipment associated with the operation of a hoist, whether detachable or not, and any part of the structure or supporting structure which is stressed by the hoist under working conditions;

(h) Machinery - means any boiler, pressure vessel, engine motor, crane, conveyor, hoist, lift, escalator, machine, gearing, or mechanical appliance constructed of any material and worked or capable of being worked by any kind of power, and any supporting structure stressed by its operation;

(i) Owner - used in relation to machinery, means the person to whom it belongs or the hirer, lessee, borrower, bailee, or mortgagee in possession, thereof and includes any attorney, agent, manager, foreman, supervisor or other person in charge of, or having control or management of, that machinery;

(j) Pressure Vessel -means any closed vessel, or vessel open to the atmosphere, not being a vessel heated by the application of fire or the products of combustion or electrical means, and which is a vessel subject or intended to be subjected to a pressure greater than atmospheric pressure, including pressure due to static head, by liquid, steam, air, vapour, gas or gaseous substances; the term includes all mountings, fittings pipelines, and ancillary equipment associated with the vessel for safe operation; but the term does not include:-

(a) a receptacle commonly known as a pressure pack, or a pipeline constructed under the provisions of any other Act; or

(b) a compressed air line, a water line, or a pneumatic loader of explosives when used in a mine;

(k) Serious Bodily Injury - means an injury that is likely to incapacitate the person suffering the injury from working at his ordinary occupation and earning his usual rate of remuneration for a period of three days or more;

Application of the Act ACT 7

4. Except where specific provisions apply the Act applies to machinery of every kind, EXCEPT

(a) machinery driven by treadle, wind or animal power;

(b) machinery driven by hand, not being a crane designed for loads exceeding 1 tonne;

(c) machinery driven by electric motor with a capacity of less than 0.75 kilowatts;

(d) rural machinery (some exceptions: SEE PART IX OF ACT);

(e) machinery used exclusively by a miner; and on which no labour for reward is employed;

(f) traction machinery;

(g) domestic machinery;

(h) any motor vehicle or boat where goods and passengers are not carried for reward;

(i) machinery used or intended to be used in an ocean going ship;

(j) machinery subject to the provisions of the West Australian Marine Act, 1948; and

(k) other machinery as prescribed — (notified in Govt. Gazette).

Mining

5. The Act does not limit or affect any ACT administered by the Minister for Mines.

<u>Registration</u> Part III, Sect. II (ACT)

6. Machinery to which the Act applies will be treated either as:

(a) classified machinery, being a boiler, pressure vessel, crane, lift, escalator, or other machinery which shall not be used without a valid certificate of inspection; or

(b) machinery which requires no certificate of inspection (period not usually exceeding 18 months).

<u>Offences</u> ACT 15

7. A person who uses or operators machinery which is not registered or used for the purpose or conditions on registration commits an offence.

<u>Transaction and Movement of Machinery</u> ACT 20

8. The owner of machinery who sells, leases, hires or otherwise deals in that machinery or moves machinery to another location shall give particulars to the Chief Inspector of the Department of Labour.

<u>Inspection</u> Part IV, Sect 22 (ACT)

9. Machinery whether classified or otherwise may be inspected at anytime by an inspector of the Department of Labour and Industry.

<u>Owner to Assist Inspector</u>

10. The owner of any place or premises on or in which there is machinery shall comply with all directions and furnish the means necessary for an Inspector exercising his powers under the Act.

<u>Certificates of Competency</u> Part 5 Sect 35 (ACT)

11. Machinery to which this part of the Act applies shall be in the charge of a person who holds a Certificate of Competency, permit or license, authorizing him to use, operate, or be in charge of that machinery. This part of the Act applies to:-

(a) any locomotive or tractive engine,
(b) any internal combustion engine,
(c) any winding engine,
(d) any steam engine,
(e) any crane or hoist,
(f) any steam boiler,
(g) any hot water boiler, and
(h) such other machinery as prescribed.

12. For exemptions see section 35(2)(a-m).

Reporting of Unsafe Machinery Sect 62

13. A person who knows of any defect, malfunction or any thing likely to render a machine dangerous and fails to report the matter forthwith, commits an offence.

Use of Unsafe Machinery Sect 63

14. A person who operators, uses or acts as the driver or operator of any machinery:

(a) without exercising due care or;
(b) knowing that any fence, guard, or safety device is inoperative;

commits an offence.

Safety Provisions Part VII Sect 56-68

15(1) Accidents to be reported. Notification is to be given to the Chief Inspector of accidents arising out of or in connection with the installation, working or motion of any machinery of any kind that causes loss of life or serious bodily injury to any person (notice to be given by the owner of the machinery).

That notice shall be by the fastest practicable method available and specify

(a) the cause of the accident as far as is known;
(b) the precise location where it occurred; and
(c) the name of every person killed or seriously injured in the accident.

(2) Where an accident occurs to a person which is not "serious bodily injury" but which is likely to incapacitate him from working for more than one day, the owner shall give notice to the Chief Inspector as soon as practicable, but in any event, within 30 days of the accident.

Accidents to Machinery

16. Where an accident occurs involving the breakage, distortion or damage of

(a) any load bearing part of the machinery;
(b) any boiler or pressure vessel;
(c) any crane, hoist, lift or escalator; or
(d) any other prescribed machinery,

the owner shall give notice to the Chief Inspector as soon thereafter as it is reasonably practicable to do so.

Persons not to interfere with Machinery Sect 72

17. It is an offence to interfere with machinery or any other thing affected or damaged as the result of an accident.

Rural Machinery

18. Special provisions relating to rural machinery are contained in Part IX, Sect 75 of the Act.

Regulations

19. Specific provisions are contained in the "MACHINERY SAFETY REGULATIONS 1978" as follows:

Part 1 - Preliminary
DIVISION A - MACHINERY
Part 2 - General Provisions for any Machinery.
Part 3 - Boilers and Pressure Vessels.
Part 4 - Lifts and Escalators.
Part 5 - Cranes.
Part 6 - Hoists.
Part 7 - Amusement Devices.
Part 8 - Rural Machinery.
Part 9 - Registration, Inspection and Certification.
DIVISION B - CERTIFICATES OF COMPETENCY.
Part 10- Requirements for Various Classes of Certificates.
Part 11- Conditions of Exemption from Certified Attendance.
Part 12- Engine Driver's Engine Room Record Book.
DIVISION C - MISCELLANEOUS
Part 13- Miscellaneous, General and Offences.
Part 14- Fees.

Summary

20. These notes have been prepared as a general guide only and therefore cannot replace a thorough knowledge of the Act and Regulations. If in any doubt on any matter relating to machinery and after reference to the Act inquiries should be directed to the MACHINERY SAFETY BRANCH, DEPARTMENT OF LABOUR, WEST PERTH, 6005 (TEL: 3220171).

Copies of the Act and Regulations are available from the Government Printing Office, Wembley.

FACTORIES AND SHOPS ACT (Some Reference Notes Only)

1. "An Act to provide for the Supervision and Regulation of Factories Shops and Warehouses and for incidental and other purposes".

2. <u>Some Definitions</u>

2.1 "Factory" means - subject to subsection (2) of this section, any premises in or on which four or more persons including the occupier are employed or engaged, directly or indirectly in a handicraft, or in making, preparing, <u>altering</u>, <u>repairing</u>, ornamenting, <u>finishing</u>, <u>cleaning</u>, sorting or adapting articles for trade or for sale or for purposes of gain; and whether they are factories by reason of the foregoing interpretation or not, includes premises of the following kinds that is to say every building, premises, or other place whatsoever in which -

(a) such number of persons are engaged in a manufacturing process;

(b) steam, water, gas, oil, electric, atomic, nuclear, mechanical or any other power exceeding 0.75 kilowatt is used in or in aid of a manufacturing process or in packing goods for transport;

(c) electricity is generated or transformed for the supply of heat, light or power or where coal, gas or other gas is produced for the like purposes;

(d) a bakehouse or other place whatsoever where food or drink intended for human consumption is prepared or manufactured for sale, trade or gain but not including a kitchen of a shop where such food or drink is prepared for consumption or sale in the shop;

(e) subject to section eight, a laundry, dye works or any other premises in or on which articles of clothing are cleaned, pressed, dyed or repaired, and which is carried on by way of trade or for the purpose of gain or as an ancillary to another business;

(f) every boat building yard, ship building yard, dock, dockyard, ship repairing yard or other place in which any ship or boat is constructed, reconstructed, repaired fitted, refitted, finished or broken up for trade or for sale or for purposes of gain;

(g) any clay pit, sand pit, gravel pit or quarry in or on which four or more persons, including the occupier, are employed directly or indirectly in extracting clay, sand gravel or stone;

(h) any premises in which one or more persons are engaged, directly or indirectly in any handicraft, or in preparing or manufacturing goods for sale or trade as paid employees for the purpose of the trade or business of their employer;

but does not include -

(i) any prison or any industrial or reformatory school or any prison or reformatory farm or any training institution within the meaning of section four of the Child Welfare Act, 1947;

(j) a ship;

(k) a colliery or a mine, or a place in which machinery is used about a colliery or mine;

(l) any building premises or place used exclusively for pastoral agricultural, orchard, vineyard, or garden purposes; or

(m) a part of a factory that is a shop.

2.2 "Occupier" in relation to a factory, shop, warehouse or other place whatsoever, includes every person, whether employing any other person or not, in actual occupation of the factory, shop, warehouse or other place, any person employing any person in, or in connection with, the business carried on in the factory, shop, warehouse or other place; and an agent, manager, foreman or other person acting or apparently acting in the general management or control of the business carried on in the factory, shop, warehouse or other place.

3. Section 8 (A)

"This Act applies to factories that belong to or are occupied by or on behalf of the Crown".

4. Section 12 provides for the appointment of Inspectors and Section 16 sets out the general powers of inspectors.

These powers include the right to enter, inspect and examine any place to which the act refers, request assistance from a member of the police force in execution of duties, question and take statement in relation to matters pertaining to the Act, inspect record books required by the Act and exercise other powers prescribed or as may be subscribed.

5. Section 21

Provides for registration of factories.

6. Section 25

Specification and plans for the erection or alteration of any building used or intended to be used for a factory must be submitted to the Chief Inspector.

7. Part IV, Section 33

Requirement for Records and Notices to be kept.
"Time and Wages Book - content of.

8. Part IV, Section 44

Provisions relating to the Welfare and working conditions of employees.

8.1 Provision for "Factory Welfare Board" to make recommendations to the Minister with respect to "all measures necessary for securing the Safety, Health and Welfare of employees".

9. Section 55 (Division III)

Prescribes general conditions in relation to working hours and overtime.

10. Part VII

Provisions relating to Health Sanitation and Safety in factories.
Provides for making of regulations to secure the health and safety of persons employed in factories.

11. Section 63

Provision for prevention of fire and accidents resulting from fires.

12. Section 64-65 Notices of Accidents in Factories

64 (1) Where there occurs in a factory an accident that is caused otherwise than by a boiler or machinery that is subject to the Inspection of Machinery Act, 1921, if the accident -

(a) causes the death of an employee in the factory; or
(b) causes bodily injury to an employee in the factory of such a nature, that the employee is, or is likely to be, thereby incapcitated from work for not less than one day,

the occupier of the factory shall as soon as it is practicable for him to do so give the Chief Inspector notice in the prescribed form containing the prescribed particulars of the accident.

(2) The notice referred to in subsection (1) of this section shall -

Time for Giving Notice

(a) in the case of the death of the employee, be given as soon as practicable after the happening of the accident and before giving the notice the occupier shall inform the Chief Inspector verbally of the accident by the quickest method of communicating the information to the Chief Inspector that is available to the occupier and the Chief Inspector shall thereupon notify the Secretary of the appropriate Industrial Union of Workers of that accident; and

(b) in the case of the incapacity of the employee not more than twenty-four hours after the happening of the accident.

(3) The Chief Inspector or an inspector appointed by him -

Duty of Inspector visit scene of accident

(a) shall immediately on receipt of any notice referred to in subsection (1) of this Section, that relates to an accident of the kind referred to in paragraph (a) of that subsection and may if the notice relates to an accident of the kind referred to in paragraph (b) of that subsection, proceed to the factory wherein the accident to which the notice relates happened and inquire into the cause thereof; and

(b) after the conclusion of such inquiry, if the inquiry is conducted by an inspector, the inspector shall immediately report his finding to the Chief Inspector.

65 (1) Where an accident of the nature referred to in subsection (1) the section sixty-four has happened in a factory, the Minister may direct an inquiry to be held before a Stipendiary Magistrate and two other persons appointed by the Minister.

(2) The Stipendiary Magistrate and other persons may hold the inquiry at such times and places as the Magistrate appoints, and shall report in writing to the Minister on the cause of the accident as soon as practicable after concluding the inquiry.

(3) With respect to the summoning and attendance of witnesses at or upon the inquiry, and the examination of those witnesses upon oath, the Magistrate has all the powers that he would have or might exercise in any case within his jurisdiction under the Justices Act, 1902

(4) Any inspector may attend any inquiry held under this section or any Coroner's inquiry held in connection with any accident referred to in subsection.

(1) of this section and may examine and cross-examine witnesses at the inquiry.

FACTORIES & SHOPS ACT

GENERAL INDEX

FACTORIES AND SHOPS ACT

REGULATIONS:-

Abrasive Blasting Regs.

Benzene Regs.

Factories Shops and Warehouse (Gen.) Regs.

Factories (Health and Safety) Regs.

Factories and Shops General.

Factories (Welfare) Regs.

Factories (Prevention of Fire) Regs.

Footwear Regs.

Factories (Lead Materials) Regs. 1971.

Foundry Regs.

Factories Poisonous Substances 1932

Electric Accumulator Regs.

Shops and Warehouses (H.S. & W) Regs.

Spray Painting Regs. 1971

Superphosphate Regs.

Welding and Cutting.

Asbestos Regs. (1.1.79)

<u>REGULATIONS</u> - Factories (H.S. & W.), Shops and Warehouses (H.S.&W.)

Factories (H.S. & W.)	Shops and Warehouses (H.S.&W.)
Ventilation 7 (1)(2)	N/A
Lighting 17(1)	4(1)
Santitary Conveniences 19(1-12), 20(1), 21(1-3)	6(1-12) 7(1-9)
Washing Facilities 22(6)	10(1-5)
Roofs, walls Ceilings, floors 23, 24(1-2)	11,12
Access and Egress 25-35	N/A
Drinking Water 37	13(1-4)
Change Rooms W.3(1-4)	16(1-2)
Dining Accommodation W.6(1-2)	17

(When doubt arises on any matter please refer to the Factories and Shops Act or the Dept. of Labour & Industry, Murray Street, Perth).

COST FACTORS

2.01 RYDGES, DECEMBER 1975

"The reason industrial safety programs are not recognised as cost effective is because management fails to accurately audit the cost of accidents"

2.02 What are those costs ?

It is possible to fill many pages with numerous costs items which are attributable to industrial accidents, so much so, indeed, that the goal of complete accuracy would be virtually impossible.

The following table is not to be seen as embracing all cost factors. It is divided into two categories, namely, Primary Factors which are tangible and readily capable of dollar measurement and Secondary Factors, whilst undoubtedly costly, are intangible and very difficult to quantify in dollar terms.

PRIMARY

(i) Cost of lost time of injured employees
(ii) Cost of lost time of uninjured employees
(iii) Overtime working necessitated by accidents
(iv) Supervisory lost time
(v) Cost of investigations, reports and claims
(vi) Cost of training replacement workers
(vii) Insurance premiums and penalties
(viii) Re-training and rehabilitation costs
(ix) Cost of materials/products lost or damaged
(x) Cost of plant, equipment and property lost or damaged
(xi) Cost of plant undamaged but rendered idle
(xii) Cost of hiring replacement plant
(xiii) Cost of services expended and irrecoverable

SECONDARY

(i) Productivity losses, failure on orders, loss of bonuses, penalties imposed

(ii) Lower employee morale

(iii) Trade union relations

(iv) Public relations

(v) Recruitment resistance

2.03 It is intended in this paper to look only at Primary costs because the time and money involved in financially measuring the Secondary category would be completely disproportionate to the degree of reliance that might be placed on the results. Also, we have yet to meet any body who knows how to measure the Secondary factors.

Since the problem of collating accident costs was first tackled in the U.S.A. in 1956 a ratio of 4:1 applied to direct costs in order to arrive at indirect costs - to quote from a workpaper of the Standards Association of Australia -
"... has been so slavishly followed that the popularity of the formula may, in part at least, be attributed to the ease with which an answer could be found"

Other authorities speak of a 9:1 ratio and it is known that in one State in Australia one body is using a ratio 28:1

As that brings us back to "lack of knowledge" this paper abandons the use of ratios and attempts a practical approach to measure the Primary costs and restore credibility to the art.

2.04 Taking Primary factors (i) to (viii) which are all labour related we look at the cost of a sample of employees at 2,05

2.05

	LABOURER	ELECTRICIAN	DRIVER	MINE CAPTAIN	ENGINEER	ACCOUNTANT
Hourly rate	$ 3-65	$ 5-47	$ 4-25	$ 7-50	$11-28	$ 9-23
Weekly rate on 40 hours	146	218	170	360	423	346
Annual rate at 52 weeks	7,592	11,336	8,840	18,720	22,000	18,000
Workers Compensation premium schedule rates	7.38%	7.3%	10.03%	8.56%	9.55%	0.23%
Workers Compensation premium per annum	560	828	887	1,602	2,101	41
Annual leave loading	102	153	119	252	296	242
Payroll tax at 5%	385	574	448	949	1,115	912
Long Service provision (minimum)				312	367	300
Site allowance				240		
Board and quarters				7,800		
Superannuation, employer					1,100	900
	$8,639	$12,891	$10,294	$29,875	$26,979	$20,395
Weeks per annum	52	52	52	52	52	52
less annual leave, weeks	4	4	4	5	4	4
public holidays, weeks	2	2	2	1	2	2
casual sickness, weeks	1	1	1	1	1	1
crib breaks	1	1	1	1	1	1
other breaks	1	1	1	1	1	1
Effective working weeks	43	43	43	43	43	43
Attendance per week, hours	40	40	40	48	37½	37½
Hours per annum	1,720	1,720	1,720	2,064	1,613	1,613
COST PER HOUR, minimum	$ 5-02	$ 7-49	$ 5-98	$14-47	$16-72	$12-64
INCREASE on basic hourly rate	1-37	2-02	1-73	6-97	5-44	3-41
% INCREASE (OR ONCOST)	37.5%	36.9%	40.7%	93%	48.2%	36.9%

2.05 (cont.)

It may be noted we have not taken into our tabulation other directly related labour costs such as -

Service allowance
Site allowance
Zone allowance
Travel allowance
Protective clothing allowance
Tool allowance
and so on.

3.01 CASE 1

Accident at 12 noon on 2nd February.

A Water Tanker carrying 16,000 litres of water was working on the approaches to a bridge under construction. The tanker rolled on its side when crossing a windrow of limestone at the edge of an embankment. The operator, in jumping clear, suffered a broken arm and neck injuries.

Cost factors of the accident include :-

1. PERSONNEL

Injured Operator hourly pay rate	=	4.40
Dozer Driver hourly pay rate		4.40
Ganger hourly pay rate		4.60
Foreman hourly pay rate		5.00
Const. Worker pay rate		4.00
Mechanic pay rate		4.60
Safety Officer		5.50

Payroll/wage oncosts may be taken as 50%of award rate.

LOST TIME

Injured operator, 3rd February to 30th Sept.	=	34 weeks
Non injured personnel		
- Foreman at site on 2nd February	=	4 hours
- Foreman subsequently investigating	=	6 hours
- Ganger at site on 2nd February	=	4 hours
- 4 Const. Workers at site on 2nd February emptying Tanker and assisting in righting Tanker	=	3 hours each
- Mechanic from Workshop and at site 2nd February	=	4 hours
- Operator training new operator	=	12 hours
- Safety Officer visits and investigations	=	8 hours
- Dozer Drivers	=	3 hours

2. PLANT COSTS

DOZERS ETC. used to right water tanker total 3 hours @ $10 p.h.	$30.00
Hire of replacement water tanker	375.00
Repairs to damaged water tanker	650.00
Water tanker idle for 3 weeks (90 hours) - hourly charge rate for water tanker	4.00

3. OTHER COSTS

Medical/Hospital fees 2nd February to 30th September	4,000.00

These costs were paid by Workers' Compensation Insurer.

(a) What is the total cost of the accident to 30th September ?

(b) What is the cost to the employer to 30th September ?

(c) The injured operator was declared permanently incapacitated and his compensation claim was settled at 2 years wages, to take effect 1st October. What will be the total cost of that accident ?

It is not necessary to provide for insurances penalties or loss of premium rebates.

3.05 CASE 3

The MISHAP MINING CO. operates a mining concession at Careless Creek, an isolated area, in the extraction of copper ore by open cut mining methods. It then crushes the ore in a Crusher Mill and sells the crushed ore. The mining and crushing of ore are its entire operations.

2,000 tonnes of ore is blasted per shift of 8 hours and transported to the Mill by 5 x 50 tonne dumpers. Each dumper takes one 1 hour to drive from the Mill to the 75 metre level in the Pit, take its load of 50 tonnes and transport it to the Mill for off-loading. Therefore, each dumper makes eight return trips in each 8 hour shift.

The ACCIDENT happened at 12 noon on the 8.00 a.m. - 5.00 p.m. shift when a perimeter section of the pit access road collapsed under the weight of a loaded dumper. The perimeter had been weakened by heavy rain and the precaution of moving the traffic lane cones inwards had been overlooked at the commencement of the shift.

The dumper overturned as a result of the collapse and was extensively damaged. Fortunately, the driver escaped uninjured.

Unfortunately, it was the third time in as many years that an accident of this nature had occurred at Careless Creek and the Mines Inspector closed the Pit for the remainder of the shift whilst he conducted his investigation. He insisted on MISHAP using only single lane traffic on the centre of the road and mining for the next full shift was forbidden until the temporary traffic lane was clearly demarcated and instructions issued to all users.

Traffic and production for the next two weeks (28 shifts) was reduced by 25% until the access road had been repaired, tested and passed by the inspector. All staff were retained on full entitlements during the close down and reduced production periods.

Our exercise is that of computing the costs of the ACCIDENT - not in minor detail but in the main loss areas of :-

A. Labour Cost

B. Machine Cost

C. Other direct cost.

D. Total Cost of Accident.

E. Production to Recoup Cost of Accident.

3.05/1

A. LABOUR COST

The Pit personnel employed per shift comprise :

1 Mine Captain	-	$320	per	week	basic
1 Pit Shift Boss	-	$280	"	"	"
1 Driller Shift Boss	-	$280	"	"	"
3 Drilling Hands	-	$200	"	"	"
2 Bulldozer Drivers	-	$240	"	"	"
1 Shovel Operator	-	$280	"	"	"
6 Pit Hands	-	$200	"	"	"
5 Dumper Drivers	-	$240	"	"	"
20					

In addition to the above basic rates, each employee has employment entitlements of

Zone Allowance	-	$ 20 per week
Leave Loading	-	17½% of holiday pay
Payroll Tax Payable	-	5% of all above entitlements.
Board & Lodgings at Value	-	$100 per week
Workers Compensation Premium Rate	-	10% of gross
Superannuation Fund	-	5% basic paid by employer
Travel Allowance	-	$780 per year
Annual Leave	-	5 weeks per year
Casual Sick Leave	-	1 week per year cumulative
Public Holidays	-	6 days per year
Working Week	-	48 hours on basic rates

We are required to tabulate :-

(1) Direct Hourly Labour Cost of each grade of employee.

(2) Direct Labour Cost of a shift.

(3) Direct Labour Cost loss attributable to the accident.

3.05/3

8. MACHINE COST

The plant and equipment in the Pit comprises :

MACHINE	CAPITAL COST	LIFE
1 Drillmaster	$120,000	12,000 hours
1 R.B. Shovel	450,000	15,000 hours
2 Cat. Dozers	64,000 each	8,000 hours each
5 Dumpers	60,000 each	7,500 hours each
2 Landrovers	10,000 yeach	10,000 hours each
1 Explosives Truck	30,000	15,000 hours

The Machine usage per shift of 2,000 tonnes is

Drillmaster	7 hours
Shovel	7 hours
Dozers	7½ hours each
Dumpers	8 hours each
Landrovers	4 hours each
Explosives Truck	3 hours

We are required to tabulate :

(1) Hourly Rate for each machine.

(2) Machine Cost per shift.

(3) Idle Machine Cost attributable to the accident.

3.05/5

C. OTHER DIRECT COSTS

ITEM	COST
(1) Hire of crane, tractors, jacks etc. and crew for 4 hours @ $250 per hour to remove damaged dumper.	$ 1,000
(2) Repairs to damaged dumper	$ 5,000
(3) Damaged dumper out of action for 50 shifts @ dumper hourly rate $8	$ 3,200
(4) Hire of substitute dumper for 50 shifts @ $20 per hour	$ 8,000
(5) Repair costs of damaged access road	$ 3,000
(6) Fine imposed by Mines Inspector	$ 1,000
	$21,200

We are required to include the above in our computation of Total Cost of Accident (Section D)

5.10/1

1980 Personnel Time Lost on Accidents

		Shop 1 Hours	Shop 2 Hours	Shop 3 Hours	Finish & Dispatch Hours	Total Hours	$
Electricians	-Injured	820	70	270		1,160	8,468
	-Others	1,105	300	801		2,206	16,103
Fitters	-Injured	525	1,010	127		1,662	8,975
	-Others	1,378	2,000	510		3,838	20,725
Drivers	-Injured	215			1,222	1,437	8,148
	-Others	610			2,810	3,420	19,391
Labourers	-Injured	842	1,120	400	760	3,122	15,204
	-Others	1,600	2,418	905	3,100	8,023	39,072
		7,045	6,918	3,013	7,892	24,868	135,906

24,868 hrs. = 3.6% of total labour hours available.

Accident Overtime		Hours	Hours	Hours	Hours	Hours	$
Electricians	- 1½T	600	130	400		1,130	8,249
	- 2T	400		100		500	4,870
	- 2½T	100		50		150	1,825
Fitters	- 1½T	600	1,000	120		1,720	9,288
	- 2T	600	100	120		1,720	12,384
	- 2½T		500	100		600	5,400
Drivers	- 1½T	300			1,800	2,100	11,907
	- 2T	200			800	1,000	7,560
	- 2½T				100	100	945
Labourers	- 1½T	1,000	1,000	400	1,100	3,500	7,305
	- 2T	700	500	400	800	2,400	15,600
	- 2½T	300	400		500	1,200	9,744
		4,300	4,530	1,690	5,100	16,120	$95,077

Total $230,983

5.10/2 **1980 Materials Lost on Accidents**

	Shop 1	Shop 2	Shop 3	Finish & Dispatch	Total
Lost	$	$	$	$	$
Stores	2,500	2,000	870	1,400	6,770
Partly finished	9,200	6,000	1,170	600	16,970
Finished	17,800	8,000	3,100	14,000	42,900
Repair					
Stores	2,000	1,000	950		3,950
Partly finished	7,900	1,200	1,150	2,000	12,250
Finished	12,800	11,100	6,120	8,000	38,020
	52,200	29,300	13,360	26,000	$120,860

It should be noted that included in the above costs for partly finished and finished products is the machine time aborted in bringing the goods to their respective stages of manufacture.

Idle machine time, as a consequence of accidents, is covered under our section on damage to property at 5.10/3.

5.10/3

1980 Property and Property Time Lost

	Shop 1	Shop 2	Shop 3	Finish & Dispatch		Total
	Hours	Hours	Hours	Hours	Hours	$
Lost Machine Time						
Milling	1,120		88		1,208	6,040
Drilling	1,900	200	12		2,112	21,120
Boring	700	15			715	5,005
Turning	980	360	420		1,760	28,160
Tapping	50	50			100	400
Filing		250	50		300	1,200
Oxidise		80	80		160	640
Enamel		200	150		350	1,050
Buff		305	195		500	2,000
Testing				700	700	7,000
Packaging				1,380	1,380	5,520
Prime Movers				1,100	1,100	12,100
Road Fleet					3,420	30,780
	4,750	1,460	995	6,600	13,805	$121,015
	13,805 hours = 6.9% of normal machine hours.					
Repair Costs	$	$	$	$		$
Milling	11,600					11,600
Drilling	8,400	100				8,500
Boring	600					600
Turning	4,100	3,800	700			8,600
Tapping	100					100
Buffing			500			500
Packaging				2,100		2,100
Prime Movers				6,400		6,400
Road Fleet				11,200		11,200
	24,800	3,900	1,200	19,700		$49,600
Lost Property (Capital)	$	$	$	$		$
Milling	14,000					14,000
Drilling	21,000					21,000
Turning				5,000		5,000
Buildings	7,000	1,000	3,000			11,000
Packaging				4,000		4,000
Prime Movers				13,000		13,000
Road Fleet				26,000		26,000
	42,000	1,000	3,000	48,000		$94,000
Less scrap recovery	2,000			1,000		(3,000)
Insurance recovery	7,000			16,000		(23,000)
	33,000	1,000	3,000	31,000		$68,000

Total $238,615

5.11 One could show some obvious and revealing statistics from the foregoing, i.e.

(i) The time lost by the injured personnel of 7,381 hours is considerably less than that loss, namely, 17,487 hours, by the uninjured personnel. Yet the one accident causes both classes of losses.

(ii) Material losses are greatest as the products approach completion.

(iii) The domino effect of idle machine time.

(iv) The 1978 accident costs amount to

Personnel time lost	= 135,906
Overtime arising from accidents	= 95,077
Materials lost	= 120,860
Machine time lost	= 121,015
Repair costs	49,600
Lost Property (capital)	68,000
	590,458
Workers Compensation recoveries	35,000
	$555,458

The organisation achieves a gross margin on turnover, say = 40%

Sales required to recoup the loss $= \frac{555,458 \times 100}{40}$

= $1,388,645

That may be put another way, namely
Annual Sales Budget is $20,000,000 = $385,000 p.w.

Therefore No. of weeks sales required to recoup losses $= \frac{1,388,645}{385,000}$

= 3.6 weeks

(v) The fallacy that Workers Compensation pays for lost time - it does not even pay for time lost by the injured parties.

And so on - management is always capable of interpreting the meaning of dollars.

6.06 As examples we have seen the following savings in two W.A. Government Departments on insurance premiums alone :-

Dept. 1 :-	1966/67 payroll	$2,500,000
	1966/67 lost injury time	3,103 days
	1977/78 payroll	$8,000,000
	1977/78 lost injury time	721 days
	1966/67 insurance premium	$ 110,000
	1977/78 insurance premium	$ 92,000
	Without the reduction in claims the 1977/78 premium would have been on C.P.1 basis	$ 257,000
	ANNUAL SAVING	$ 165,000
Dept. 2 :-	1974/75 Premium rate	= 2.9% of payroll
	1975/76 Premium rate	= 2.7%
	1976/77 Premium rate	= 2.5%
	1977/78 Premium rate	= 2.0%
	ANNUAL SAVINGS	$ 266,500

Our factory example will be more representative of true costs and budgeted savings are projected :-

Personnel lost time	$ 46,608
Materials	30,213
Property	93,845
Direct insdrance	12,000
	$ 182,666

LIKELY DEVELOPMENTS IN SAFETY AND HEALTH IN THE 1980's

JOB SAFETY ANALYSIS

Job Safety Analysis (JSA) is a basic formula for establishing the safe approach to performing a task. A detailed analysis of the job helps identify the risks in order to prevent an injury. The analysis also helps in training programme formulation.

JSA was developed after World War II and was readily accepted by many of the larger steel companies. A number of other companies have made extensive use of this training method in their safety programmes. However, there are still many companies not making use of this valuable tool. On the basis that these companies do not know how to develop and use JSA, the following material will explain in detail how to get the programme started.

Starting a JSA Programme

A JSA is a written procedure designed to review job methods, uncover hazards, and recommend safe job procedures. There are four basic steps in making a JSA:

* Selecting the job.
* Breaking down the job into a sequence of steps.
* Identifying the potential hazards.
* Recommending safe job procedures.

Selecting the Job

Jobs should be selected on the basis of potential hazards or those with the highest incidence rate because this will result in quick payoffs in reduced accidents and increased efficiency. Also, the job selected should not be too broad or too narrow. For example, pulpwood logging would be too broad, but one of the jobs in this industry - such as operating a chain saw - would be suitable. Tightening a screw is too narrow. The breakdown should not contain more than 10 steps. Six to eight steps are about right because most people can remember six or eight steps.

Breaking Down the Job

Because JSA is a written procedure, a form is needed. If you do not have a form similar to the one shown in Appendix A, rule and label an 8½ by 11-inch sheet of paper, using the same headings.

In most cases, a JSA is made by a supervisor and the person or operator who normally does the job with the safety professional acting in an advisory capacity. There are a number of good reasons for this. First, the safety professional would end up doing nothing but JSA's. Also, the supervisor and operator are likely to be more familiar with the jobs in their departments. The person selected to perform the job should be experienced,co-operative, one who is willing to share ideas, and one with a good safety record. Explain to the person what is being done and what a completed JSA looks like, if you have one. Have the person perform the job, one step at a time - what is done first, what is done next, and so on. List the steps that begin with an action word such as "remove", "attach", etc. The reason for keying on action is to emphasize safety and to keep from making the analysis too detailed. The operator is considered safe when not taking any action or doing anything, but as soon as he or she starts to open, attach, lift, etc. the possibility of an accident exists. Each step should tell what is done, not how. For example, in making a JSA for using a stored-pressure water type fire extinguisher, the first step would be shown as follows:

1) "Remove extinguisher from wall bracket".

Number these steps in consecutive order under the heading Sequence of Basic Steps.

Identify the Potential Hazards

Before filling in the next column, Potential Accidents or Hazards, start looking for hazards. Look at the following possibilities:

* Is there danger of striking against, being struck, or otherwise making injurious contact with an object as the operator goes into action?

* Can the operator be caught in, on, or between objects?

* Can the operator slip, trip or fall on the same level or from one level to another?

* Is the environment hazardous, i.e. does it contain toxic gas, vapor, mist, fumes, dust, heat, radiation, etc?

In addition to these, you should also check accident records for this particular job.

For each job step, list the potential hazards. Number each potential accident or hazard with the same number used in the first column. Going back to our previous example of using a water type fire extinguisher, under Potential Accidents or Hazards, you would list 1) "Extinguisher could fall and injure foot. Improper lifting could cause strains"?

Recommending Safe Job Procedures

For each potential accident or hazard list what the person must do to avoid the hazard or accident. Here again you can get your answer by watching the operator, discussing precautions with the operator and drawing upon your experience as well as the experience of supervisors. Number each recommendation with the same number you used for the job step and potential accident. Continuing with our fire extinguisher example, you would list under recommendations: 1) "Grasp carrying handle firmly with right hand, curl fingers and left hand around bottom rim, palm up. Stand close to extinguisher and pull straight out".

When you have completed the JSA, go over it again with the operator. You may want to check with other operators and other supervisors doing similar jobs to make certain you have a consensus of opinion as the best and safest way of performing the job. Make sure your recommendations for performing the job safely are specific and concrete. Such general precaution as "be alert" or "be careful" are useless.

Additional JSA Benefits

In addition to those benefits already mentioned, reduced accidents and increased efficiency, which are broad in scope, there are a number of other specific benefits. In some cases a new way is found to do the job. Supervisors often learn more about the jobs they supervise. When operators are involved in making JSA's it tends to make them more safety conscious and improve their safety knowledge.

In summary, JSA's properly used can be one of the most valuable tools in your safety repertoire. Remember, if you are just starting such a programme, pick out the jobs that are giving you the most problems. Start with only one or two jobs, then expand.

Also, unless the forms are used for training, safety contacts, etc. they are not going to be of much value, and finally, do not expect immediate miracles.

By L.C. Smith, CSB,
Former Manager, Safety Training Institute,
N.S.C.
(National Safety News, Sept. 80)

JOB SAFETY ANALYSIS WORK SHEETS:	JOB:		DATE:
	ANALYSIS BY:	REVIEWED BY:	APPROVED BY:
REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT:			

SERIAL	SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

THE INDUCTION OF NEW EMPLOYEES

Introduction

It would be ideal if all new employees were safety motivated prior to commencement of employment and as well were fully conversant with all safety rules and practices. However, this is not so and will not be so in the foreseeable future.

Because of inexperience, changes in type of work, new environment etc. it is imperative, in the interests of safety, that each new employee be given a thorough induction as the first phase of his employment.

The induction of a new employee is not aimed alone at safety but is designed to fully acclimatize him to his new work situation in every respect so that he can rapidly become a useful and production member of the workforce and orientated to the company safety policies and practices.

The Aims of Induction

For the majority, the first few days on a new job are difficult and trying. The new member must be accumstomed to his supervisor, fit in with a new work team, be accepted by his associates, learn the details of a new job, probably learn a new works vocabulary, learn new sets of work rules, learn to find his way about and adjust to a new environment.

By the implementation of a sound induction an employee can quickly adjust and overcome feelings of awkwardness, inferiority, ignorance and nervousness. Therefore the aims of induction are to:

a) Ensure he has a complete knowledge of the conditions of employment.
b) Give a feeling of belonging to a worthwhile organisation and a feeling of being accepted as a team member.
c) Promote a feeling of confidence.
d) Develop an understanding of the value of safety and the importance of observing safety rules.
e) Obtain as quickly as possible, an efficient and safety conscious employee.

Process of Induction

Induction cannot be achieved in one session or one day, rather it is a series of induction sessions and follow up periods.

The type of induction depends to a great extent on the nature of the employment and prevailing conditions, however it is advisable to follow a set pattern of induction to ensure complete coverage of all aspects.

A proven induction pattern used by many safety conscious firms is:

a) Initial interview by personnel officer when general work conditions are explained. Included at this time should be mention of the company attitude to safety.

c) Briefing by the safety co-ordinator or other responsible person who details the main safety rules of the firm and the reasons behind the rules. The employee at this time may be given a written copy of the safety rules.

c) Introduction to supervisor/foreman.

d) Foreman outlines job conditions as they apply to his particular section including main safety aspects.

e) Employee taken on tour of his partiuclar work place and shown first aid, toilet and other facilities. At this time he should be shown main safety factors affecting his work area.

f) Employee introduced to work mates and allocated a particular "buddy" who can be relied on to assist, guide and advise during the first few days of employment.

g) Employee given detailed instructions of his own job using the appropriate job instruction guide. At this time particular safety relative to his actual work is imparted.

h) Inform employee of:

- the need to ask question if in doubt.
- use of personal safety appliances.
- injury procedures.

j) Periodic discussion and instruction on work and safety measures to reinforce the initial induction phase. This is known as follow-up.

k) Supervisor to see job and safe practices are being observed.

l) Supervisor submits certificate when he considers the employee is inducted.

"Method"

It is not possible to lay down an actual method of induction approach as each participant has individual characteristics, however the following guidelines should be observed:

a) Strive to arouse in the new employee a feeling of friendliness and a desire to co-operate.

b) Don't expect the member to retain all you tell him in the first interview or session, therefore highlight the main points.

c) Don't over emphasize safety in case you get an adverse reaction but don't be casual in what you tell him.

d) Encourage the man to ask questions.

e) Treat him as you would like to be treated yourself.

f) Work to a plan to ensure complete coverage of "must knows".

Induction Coverage

Varying conditions prevent a listing of all safety factors which should be covered in the induction period, however as a guide you should cover those main fields of danger which he is likely to encounter in his first few weeks such as:

a) Danger areas and safe access ways.
b) Safe working methods.
c) Special safety systems such as use of danger tags.
d) Ear and eye protection areas
e) Danger resulting from use of incorrect appliances etc.
f) Hazards arising from worn or faulty equipment.
g) Hazards to or from others working above, below or close by

h) Caution about mobile equipment including overhead cranes.
i) Fire precautions

The Experienced New Employee

An experienced new employee may be over confident and satisfied he can take care of himself. In fact he may be more subject to accident that the "green-hand" as he could well have many unsafe habits which may have a greater effect than in his past employment because of his new environment and different layout.

Experienced new workers do require induction and care must be exercised in the approach to these men as they are more likely to resent correction and enforcement of new safety rules. A good point to remember is - the best way to break a bad habit is by susbstitution of a good one in its place.

Conclusion

New employees are likely to have accidents in their first few weeks on the job, therefore a planned induction is necessary in an endeavour to reduce this accident-prone period.

It is wise to remember that supervision of new employees is a MUST to ensure the enforcement of safe habits and sound working principles.

IFAP Industrial Foundation for Accident Prevention

ACCIDENT REPORT

NATIONAL SAFETY COUNCIL OF AUSTRALIA STATE REPRESENTATIVE ON ALL OCCUPATIONAL SAFETY MATTERS IN WESTERN AUSTRALIA.

COMPLETE THIS FORM FOR ANY ACCIDENT TO PERSON OR PROPERTY WHETHER INJURY RESULTS OR NOT

Cost Item:	
Report No.	

Accident Date	Day Time am pm	Region	Send to	Date Sent	Initials
		Division	1.		
Accident Reported to: Time: Date:		Site	2.		
		Where on Site	3.		

TO BE COMPLETED BY SUPERVISOR OR PERSON IN CHARGE

Personal Injury

Injured Person's ....

Surname (Capitals) Christian Names

Occupation ....

Wages ☐ Piece Work ☐ Age ☐ (optional)
Salary ☐ Contractor ☐

Treated by First Aid ☐ Sent to Hospital ☐
Sent to Doctor ☐ Returned to Work ☐
Alternative Work ☐ Unfit for Work ☐

Part of Body Injured
☐ Head ☐ Leg ☐ Multiple
☐ Eyes ☐ Feet ☐ Neck
☐ Ears ☐ Toes ☐ General
☐ Trunk ☐ Arm
☐ Hernia ☐ Hands
☐ Unspecified ☐ Fingers

Nature of Injury
☐ Fracture ☐ Superficial ☐ Burn
☐ Laceration ☐ Sprain ☐ Amputation
☐ Other ☐ Contusion ☐ Multiple
☐ Dislocation ☐ Concussion

AGENCY OF INJURY
☐ Machinery ☐ Powered Hand -tools ☐ Other eqpt.
☐ Transport ☐ Static eqpt. ☐ Lifting Equipment
☐ Other ☐ Hand-tools ☐ Working environment

Description of INJURY ....

Property Damaged

Description of DAMAGE ....

Accident Costs

Please complete as many of the following items as possible:

Wages –	injured man	$
Wages –	other personnel involved in accident situation	$
Wages –	investigation time	$
Vehicle/Machine Hire Costs		$
Cost to Repair or Replace damaged equipment		$
Overheads & other costs		$
	TOTAL	$

Description of Accident – How did it occur? ....

Note: Other forms also required where applicable:
WORKERS COMPENSATION CLAIM FORM ☐
BACK INJURY FORM (if applicable) ☐
VEHICLE ACCIDENT REPORT FORM ☐
OTHER .... ☐

Signatures:

Supervisor (or person in charge) .... Injured Person .... Witness ....

Date ....

Manager ....

Date ....

For Accident Investigation Report (i.e. Causes, Countermeasures) see overleaf.

Industrial Foundation for Accident Prevention

IFAP

NATIONAL SAFETY COUNCIL OF AUSTRALIA STATE REPRESENTATIVE ON ALL OCCUPATIONAL SAFETY MATTERS IN WESTERN AUSTRALIA.

OBJECTIVE
Is NOT to attempt to fix blame but to get relevant FACTS. Similar accidents can be prevented by implementing effective COUNTER MEASURES.

INVESTIGATION AND ANALYSIS

What sequence of unintended events contributed to this Accident?

1. ....
2. ....
3. ....
4. ....

What sequence of unforeseen hazards contributed to this Accident?

1. ....
2. ....
3. ....
4. ....

Severity or loss potential (i.e. future losses)

Catastrophic ☐ Critical ☐ Marginal ☐ Negligible ☐

Probable recurrence rate

Frequent ☐ Occasional ☐ Rare ☐

COUNTERMEASURES

ACTION needed to prevent accident recurrence

☐ Action to improve clean-up
☐ Order Job Safety analysis
☐ Equip't repair or replacement
☐ Action to improve design
☐ Action to improve construction
☐ Installation of Guard or similar

☐ Correction of congestion
☐ Action to improve inspection
☐ Improved personal protection
☐ Order regular pre-job instruction
☐ Order use of safer materials
☐ Check with manufacturer

☐ Reinstruction of person/s involved
☐ Discipline of persons/s involved
☐ Reinstruction of others
☐ Temp. Relocation of person
☐ Per'mt relocation of person

Specify Immediate Countermeasures taken: ....

....

....

Specify Further Countermeasures to be taken: ....

....

Anticipated completion date / /19

Date / /19 Supervisor's Signature

Departmental/Divisional Head comments ....

....

.... Signature .... Date......./......../..........

Safety Officer/Practitioner/Co-ordinator/Consultant comment ....

....

....

....

.... Signature .... Date......./......../..........

General Manager's comment ....

....

....

....