"What" and "Why" We Have Failed to Learn in Queensland Mining

by

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Abstract

This paper discusses a perspective as to "What" and "Why" we have failed to learn in Queensland Mining. In this paper, it is proposed that what we have failed to learn is that work-related personal damage can be categorised more usefully as Class I (permanent damage), Class II (temporary damage) and Class III (minor damage or inconvenience).

We have failed to learn that collectively, the greatest cost (as measured by any of dollars, pain, suffering and impairment) is associated with Class I and, in particular, the subset of Non-Fatal Permanent Damage. Class I damage has the subsets of Multiple Fatalities, Single Fatalities and Non-Fatal Permanent Damage.

The Mining Industry's knowledge of the number of people involved in this critical level of personal damage (Class I Non-Fatal) is "poor" but insight has been gained from recent data provided by Q-Comp to the Queensland Resources Council. The Mining Industry has arrived at this deplorable state with the best intention of avoiding damage to people and often with people in all roles having a heart of compassion and care for each other.

The mythologies of the health and safety environment involve a firm (and incorrect) belief in the Heinrich incident triangle; human error accident causation, and the notion that 88% of accidents are caused by human error.

This inappropriate thinking is coupled with industry based lagging measures focussed on minor damage which drives inappropriate behaviours at many levels of an organisation. The industry is increasingly becoming rule-based without people understanding the phenomena of how people are damaged at the different levels of damage.

There is a way forward but the beginning of the journey is to define the problem. This paper is one perspective

Introduction

This paper is in two parts. The first part is "What" we have failed to learn in Queensland Mining and the second is "Why" we have failed to make those learnings.

With respect to the "What", the paper will review the size and nature of the personal damage problem associated with work in Australian industry and the Queensland Mining specifically. With respect to the "Why", there are many propositions but it will be suggested that these are three interacting notions, described as follows.

The notions are associated with:

1. the mythology of the Heinrich triangle interacting with:
2. a firm belief in human error accident causation, interacting with
3. the All Injury Frequency Rate and Lost Time Injury measures.

This paper does not present the "How" i.e. how do we go forward? This is a separate conversation and the work of going forward is dependent on an acceptance of the "What" and "Why" but I will say that future personal damage is both (a) predictable, and (b) manageable, if we change our thinking.

We have failed to learn the size and nature of the personal damage problem, the critical levels of personal damage, their likelihood of occurrence, and what produces such damage.

What We Have Failed To Learn

Firstly, let us classify damage as Class I, II and III[a].

Class I, permanent alteration of life, includes fatal (Multiple and Single) and Non-Fatal Permanent Damage. Non-Fatal Permanent Damage includes an upper level where the person does not return to work and a lower level where the person returns to work in a limited capacity, time or skill. Another group, currently not noted, includes those who are able to fully function at work but whose activities and role outside work are permanently altered by the damaged tissue or function

It is suggested that this Class I, II and III classification of personal damage will become more universally accepted and the classification forms part of a recent report of Safe Work Australia[1].

What is the relative size and cost of these various Classes of damage for all industries in Australia?

There have been four snapshots of the damage to people from work, published by the Industry Commission (1995)[2], the National Occupational Health and Safety Commission (NOHSC 2004)[3], the Australian Safety and Compensation Council (ASCC March 2009[4]) and Safe Work Australia 2012[5]. The four studies gave the 'baseline estimates of economic costs' (ASCC 2009) for the years 1992-93, 2000-01, 2005-06 and 2008-09. NOHSC (2004) also estimated the cost equivalent of 'pain, suffering and early death'.

Table 2 summarises relative costs, in terms of Class I and Class II, (Class III damage is not recorded nationally), of the four snapshots. These assessments do not include pain, suffering and early death which would increase significantly the total cost if included.

Table 1 Percent distribution of the quantity of personal damage

	1992-93	***2000-01***	***2005-06***	***2008-09***
Class I Fatal	1.5	3.5	3.3	5.3
Class I Non-fatal	80.5	88.5	88.0	85.2
Class II	18.0	8.0	8.7	9.5
Cost $ billion *	**$20**	**$34.3**	**$57.5**	**$60.6**
2000-01 Goods and Services Exports $132.8 billion 2008-09 Goods and Services Exports $198 billion				

*** Without pain, suffering and early death costed**

[a] Class I damage alters the future of a person permanently and includes such things as fatality, quadriplegia, amputation, disfigurement, impaired spine, emotional disturbance etc.
Class II damage alters the future of a person temporarily and includes fractures, sprains, lacerations etc (e.g. Lost Time Injuries).
Class III damage does no more than inconvenience the person e.g. bruising, dust in the eye etc. e.g. Medical Treatment Injuries

Clearly, the greatest monetary cost is associated with Class I Non-Fatal Permanent Damage. These costs are typically 5-6% of Gross Domestic Product.

Table 2 summarises the numbers of people experiencing Class I damage (Fatal and Non-Fatal) for the years listed.

Table 2 – Class I Damage

Year	No. of Traumatic Fatalities per annum	No. of Cases of Non-Fatal Permanent Damage per annum	Cost of Class I Non-Fatal Damage as a Percentage of Total Costs.	Size of Australian Workforce (millions)
1992-93	693	50,018 (137 per day)	80.5%	6.56
2000-01	410	48,900 per year (134 per day)	88.5%	9.09
2005-06	393	64,000 per year (175 per day)	88.0%	11.2
2008-09	400	85,800 per year (235 per day)	85.1%	11.93
	235 per day (365 days per year)			

The annual numbers of Class I Non-Fatal Permanent Damage are staggering.

In 1992-93 and 2000-01, the Class I Non-Fatal per day figures were 137 and 134 respectively. Between 2000-01 and 2005-06, the workforce increased by 12% (ASCC[4]) while the 134 Class I Non-fatal per day increased to 175, an increase of 30%.

Between 2005-06 and 2008-09 the Class I Non-fatal increased to 235 per day (an increase of 34%) while the workforce increased in size by only 7.2%.

There is a rule known as the Pareto Rule or, alternatively, as the 80/20 Rule or the Rule of the Critical Few. It can be observed that Class I Non-Fatal Permanent Damage represents some 80-90% of the cost of work-related damage and so it is the "Pareto" issue. However, we must not lose focus on Class I Fatal Damage. Class I Fatal and Class I Multiple Fatality present "sovereign" risk to (a) the deceased and their families, (b) people in the management structure, and (c) in some cases, small businesses. Sovereign risk is that risk which has the potential to put a person or an organisation out of business permanently.

Class I Non-Fatal Permanent Damage is rarely the subject of detailed and focussed conversations in organisations even though the relative importance of Class I Non-Fatal Permanent Damage has been espoused for nearly 30 years with its originator being Geoff McDonald of Geoff McDonald & Associates. However, current research being undertaken by Safe Work Australia is focussed on the Class I issue

A recent publication by Safe Work Australia[1] describes compensated damage in terms of the numbers of people associated with each level of damage, as illustrated in Figure 3.

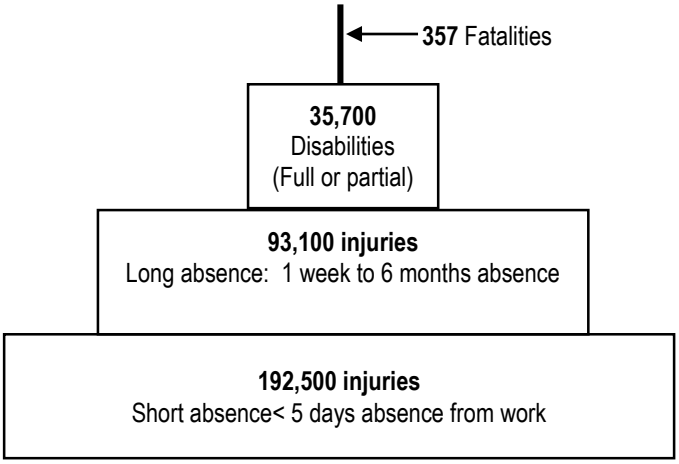

Figure 1 Compensated lost time injury frequency, by category – All Industries – Australia – 2008-09

When one examines the numbers of people in each category, it can be observed that short-term absences (Class II damage) logically contain the greatest numbers of people (Figure 1[1]).

However, that document[1] then expresses damage in terms of weeks lost and Figure 2 and Figure 3 are presented. Essentially, Safe Work Australia's research supports that which has been firmly established by other authors.

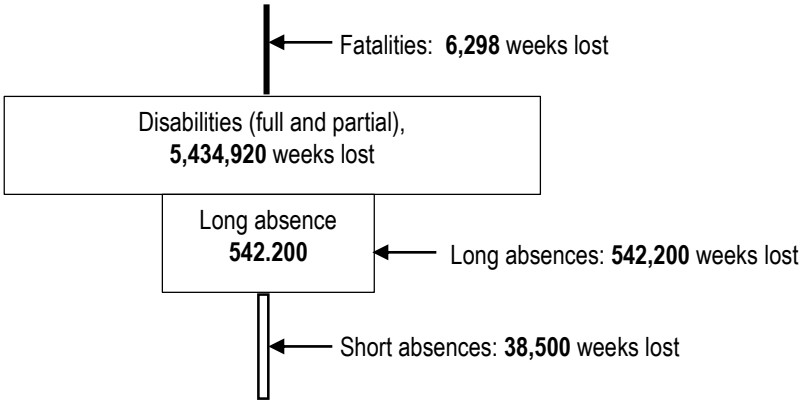

Figure 2 Total compensated lost time (in weeks), by category – All Industries – Australia – 2008-09

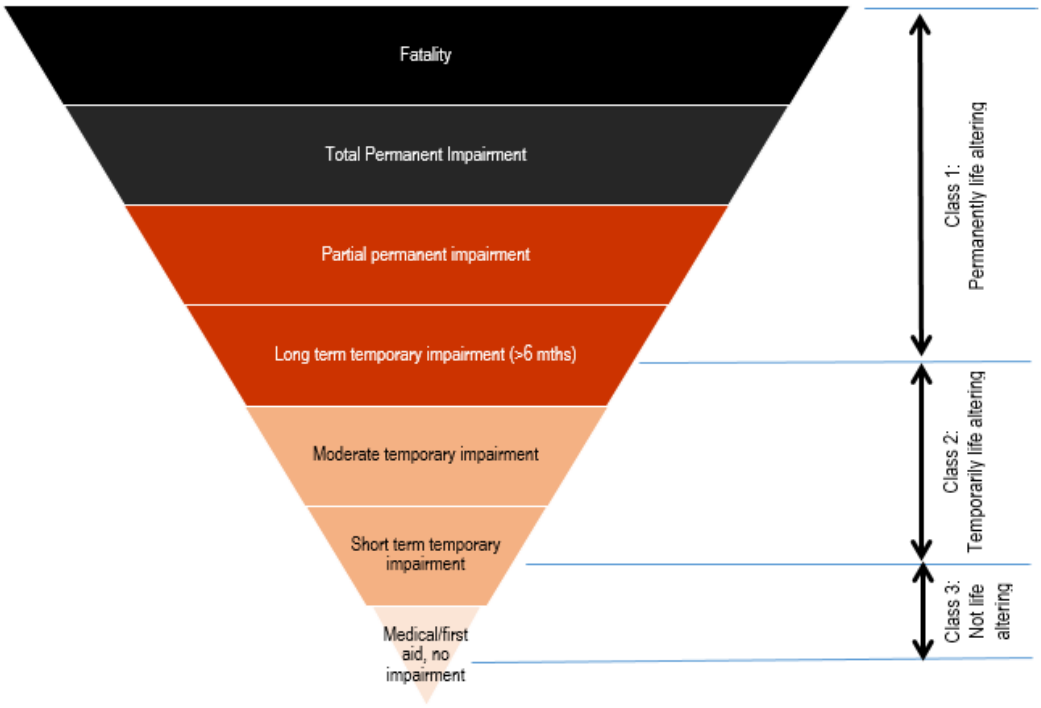

Figure 3 Severity-based classifications of WRII (work related injury and illness) outcomes

Class I damage (Multiple Fatality, Single Fatality and Non-Fatal Permanent Damage) should preferably consume:

- 80% of our health & safety conversations
- 80% of our health & safety resources
- 80% of our health & safety leadership behaviours
- 80% of our health & safety system content

While it is useful to gain some insight into the numbers of people involved in the various classes of damage as well as the alternative measures (e.g. cost, weeks lost), it is useful to also understand the chances (likelihood) of the particular consequences of Class I Single Fatality and Class I Non-Fatal Permanent Damage.

Table 3 is derived from Table 2 and summarises the likelihood of traumatic fatality and Non-Fatal Permanent Damage for all Australian Industry for the 4 years illustrated. Likelihood is expressed in terms of the size of the group of people required for any one person to experience fatal/non-fatal permanent damage in any one year.

Table 3 Likelihood of Class I Damage – All Industries

	Likelihood of a Fatality (1:X people employed)	**Likelihood of Non-Fatal Permanent Damage**
1992-93	1 : 9,466	1 : 131
2000-01	1 : 22,170	1 185
2005-06	1 : 28,498	1 : 175
2008-09	1 : 29,825	1 : 139

Class I traumatic fatality likelihoods are decreasing – a positive for all industry. Class I Non-Fatal Permanent Damage is highly likely to occur and is increasing which is a shameful situation.

Let us now focus on the Mining Industry.

The likelihood of a fatality for Queensland Mining (all sectors) in the last seven (7) years is 1:20,000 people employed[6].

With respect to Class I Non-Fatal Permanent Damage, Table 4[7] shows the likelihood of permanent disability in New South Wales Mining between 1992 and 2008.

Table 4 Likelihood of Permanent Disability NSW Mining (Workplace Injuries) – 2001/02-2008/09

Year	No. of Permanently Disabled	Calculated No. of Employees	Likelihood of Permanent Damage 1:'X' people employed
2001/02	369	16,918	1 : 46
2002/03	369	15,080	1 : 41
2003/04	303	14,731	1 : 49
2004/05	248	16,243	1 : 65
2005/06	284	17,222	1 : 61
2006/07	346	19,469	1 : 56
2007/08	204	19,964	1 : 98
2008/09	311	20,865	1 : 67

The data for NSW beyond 2009 is not accessible by the author but the published values of permanently damaged people for the years 2000-2009 are staggering. The likelihoods will be shown to be much worse than Queensland and Western Australia for the years beyond 2009. The reasons for the NSW situation are not understood.

With respect to Western Australia Mining between 2009 and 2013 (4 years) there were 2,471 cases of permanent damage in the Western Australia WorkCover system. The average number of employees for all sectors was 90,000, giving a likelihood of permanent damage for Western Australia Mining of 1:144.

It is then useful to consider the employer reports of Queensland Mines and Quarries for 2012/2013[6]. There were 32 cases reported with employment numbers for all sectors being 55,000. On the basis of this calculation, the likelihood of permanent damage for Queensland Mining would be 1:1,720 persons employed. This leads to the question – is Queensland Mining twelve times less risky than Western Australia Mining? The answer is self-evident.

Q-Comp has provided the Queensland Resources Council with Queensland Workers' Compensation data (company and person not identified) to allow some initial analysis. In that dataset there were 12,283 claims over the years 2009-02013 inclusive. This dataset includes both Class I and Class II damage. It contains 1407 Permanent Damage cases with 559 of those involving >60 Days lost. The majority of the 848 Permanent Damage cases (<60 Days Lost) involve hearing loss. It is useful to focus on those people in the dataset who are classified as >60 days lost work and the people who have been permanently impaired who have also lost >60 days. This filter removes those who have applied for industrial deafness compensation.

The other reason for including the >60 day cases is based on the following research[8] which discusses the reducing chances of returning to work the longer a person is damaged and away from work.

> *The weight of the evidence over the last 20 years[9,10,11,12,13] shows that people who are out of work in the medium to long-term are at greater risk of negative health*

outcomes. Furthermore, the more time spent away from work, the less likely a person is to ever return.

Whatever the reason for sick leave, it is important to realise that missing work influences recovery.

Figure 4 shows how the number of days spent away from work impacts on a person's chance of return. In many systems, the likelihood of return to work is down to 50% after 45 days off work.

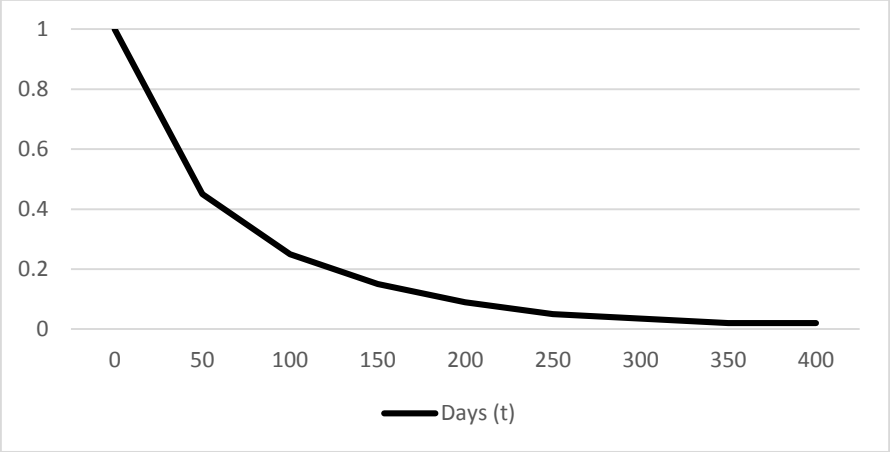

Figure 4 Likelihood of return to work after various length of time off work

This is supported by the following information[14]

Both internationally and within Australian and New Zealand, there is growing awareness that long-term work absence, work disability and unemployment are harmful to physical and mental health and wellbeing.

Work absence tends to perpetuate itself: that is, the longer someone is off work, the less likely they become ever to return.

If the person is off work for:

- *20 days the chance of ever getting back to work is 70%;*
- *45 days the chance of ever getting back to work is 50%; and*
- *70 days the chance of ever getting back to work is 35%[15].*

This section of the position statement examines the available evidence regarding the health effects of remaining away from work.

Selecting a 60 Day threshold for preliminary analysis of the Q-Comp data is useful.

Therefore, with this information it is useful to look at the number of people in the Q-Comp dataset who have been classified with >60 days lost (but not classified with Permanent Damage) and those who were permanently damaged and lost >60 days. Table 5 shows the story for the Queensland Mining Industry between 2009 and 2013

Table 5 No. of People Experiencing Non-Permanent Damage (>60 Days Lost) and Permanent Damage (>60 Days was lost) 2009-2013

	No. of People
No. of Permanently Damaged >60 days lost	559
No. of >60 days (Not Permanently Damaged)	703
Total No.	1,262

To allow a calculation of the likelihood of people experiencing >60 days lost and permanent Damage (>60 days lost), it is necessary to examine the exposed population i.e. the number of people in the Queensland Mining Industry. Table 6 shows the number of people employed by year in the Queensland Mining Industry based upon ABS data.

Table 6 No. of Persons Employed in Queensland Mining Industry, by Year

Year	No. of Persons Employed (ABS Data)
2009	45,659
2010	41,578
2011	53,365
2012	64,112
2013	72,006

This allows for a calculation of a likelihood of 1:219 persons employed with respect to Queensland Mining for Class I Non-Fatal Permanent Damage (>60 Days lost) combined with the more serious levels of Class II damage (>60 days lost).

Table 7 summarises the situation and now it seems we are comparing 'apples' with 'apples' when looking at the performance of the mining industry for 2 States of Australia.

Table 7 Likelihood of Permanent Damage in W.A. and Qld

State	No. of Permanently Damaged People	Average No. of Employees Per Year	Likelihood
Western Australia Mining - 2009-2013	2,471	90,000	1 : 144
Qld Mining – 2009-2013	1,262 *	55,000	1 : 219

* This number includes some > 60 Day cases which will not involve permanent damage

In essence, we have failed to learn the size of the problem and the likelihood of any one person experiencing Class I Non-Fatal Permanent Damage in the Queensland Mining Industry.

What we have also failed to learn in Queensland Mining is that there is a clear pattern to the story of Class I Non-Fatal Permanent Damage. The Western Australia Mining Industry has been subject to study and the "first" level of analysis is illustrated in Figure 5. There are layers of analysis beyond those depicted in Figure 5, but it is beyond the scope of this paper to discuss them. Class I – Single Fatalities – has its own but different pattern.

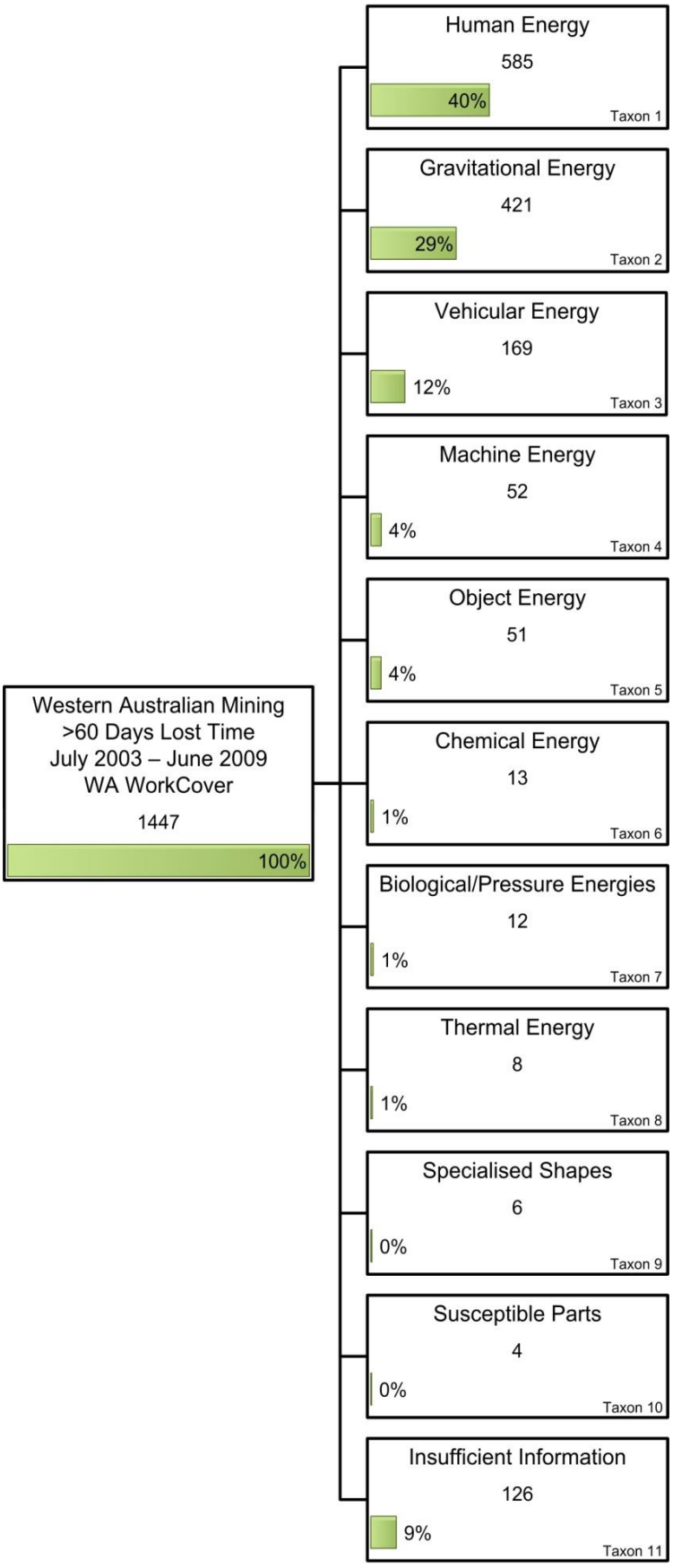

Figure 5 Taxonomy by Damaging Energy – Western Australia Mining >60 Days Lost Time July 2003 – June 2009

Some initial insight into the pattern of Q-Comp mining data of 1,262 cases Class I Non-Fatal Permanent Damage (>60 Days lost) and Class II >60 Days is given in Table 8[16].

Table 8 Initial Insight into 1,262 Cases of Class Non-Fatal Permanent Damage (>60 days lost) and Class II (>60 Days) – Queensland Mining 2009-2013

Type of Incident	No. of Incidents
Muscular Stress	457
Falls	323
Vehicle Accident/Rollover	107
Being Hit by Falling/Moving Object	95
Mental/Psychological/Bullying/Violence	61
Being Trapped Between Objects	54
Hitting Moving/Stationary Objects	54
Insufficient Information	54
Other	57
Grand Total	1,262

This data needs significantly more analysis to allow clear statements to be made. For example, are the falls - Falls to the Same Level / Falls while Ascending or Descending (fixed or mobile plant) / Falls from Height / Falling Objects? Do the Falls to the Same Level involve slipping or tripping? It is with these insights that the Queensland Mining Industry can have an appropriate focus. This is why the dataset needs to be studied and reported back to the Mining Industry.

The industries within Queensland Mining that are producing these 1,262 cases are as listed in Table 9.

Table 9 Class I Non-Fatal Damage (>60 days lost) and Class II (>60 days lost) by Industry – Queensland Mining – 2009-2013

Industry	No. of Cases
Coal Mining	526
Other Mining Support Services	247
Mineral Exploration	118
Copper Ore Mining	101
Other Non-Metallic Mineral Mining and Quarrying	52
Other Construction Material Mining	42
Petroleum Exploration	42
Other	176
Grand Total	1,262

It is now useful to consider the number of Permanent Damage cases of the Q-Comp data with the data of Queensland Mines & Quarries, remembering that the Q-Comp data has a total of 1,407 Permanent Damage cases (559 cases >60 Days; 848 cases <60 days involving a significant number of hearing loss cases).

The Queensland Mines & Quarries Safety Performance and Health[6] provides Table 10 for the number of people permanently damaged.

Table 10 Number of Permanent Damage Cases, 2008-13

	2008-09	2009-10	2010-11	2011-12	2012-13	
Coal – surface	23	36	40	16	16	
Coal – underground	8	5	10	3	7	
Coal subtotal	**31**	**41**	**50**	**19**	**23**	
Metalliferous – surface	0	3	1	3	6	
Metalliferous – underground	3	2	1	3	1	
Metalliferous subtotal	**3**	**5**	**2**	**6**	**7**	
Quarries	5	1	5	3	2	
All Operations	**39**	**47**	**57**	**28**	**32**	**Total: 203**

Essentially, there is significant under-reporting by the industry to Government.

In summary and with respect to the "What", we have failed to learn the size and nature of the personal damage problem as well as the pattern. Every line manager, every operator, every tradesman should know the relative size and cost of the permanent damage problem and be able to reduce the pattern to a series of four or five succinct statements. Hence the need to study the Q-Comp data and establish the pattern for Queensland Mining.

Therefore, we have failed to describe the pattern of Non-Fatal Permanent Damage in Queensland Mining. The Q-Comp data of 1,262 people requires analysis and presentation as it is your story.

The Western Australia story is clear with respect to Non-Fatal Permanent Damage. At a high level, the energies which are damaging people are Human (over-exertion), Gravitational (falls to the same level, ascending/descending equipment) and Vehicular (jolt/jar/ride vibration). Unfortunately, the common and strong focus on an appropriate person at the centre of the incident has the following mythologies being espoused in industry as effective controls: people need to lift correctly, people need to watch where they're walking, people need to maintain three points of contact on access systems, people should drive to the conditions. Hence, no effective change occurs.

Why Have We Failed to Learn?

With respect to "Why" we have failed to learn, the paper is suggesting that there is an interaction of the incident triangle with a firm belief in human error incident causation interacting with LTI (Lost Time Injury) and AIFR (All Injury Frequency Rate) measures.

With respect to the incident triangle, a study by Heinrich[17] showed that in a unit group of 330 similar accidents (all of the same approximate cause), 1 resulted in a major, 29 in minor injuries and 300 resulted in no injuries whatsoever. Figure 6 graphically portrays the net result of this research.

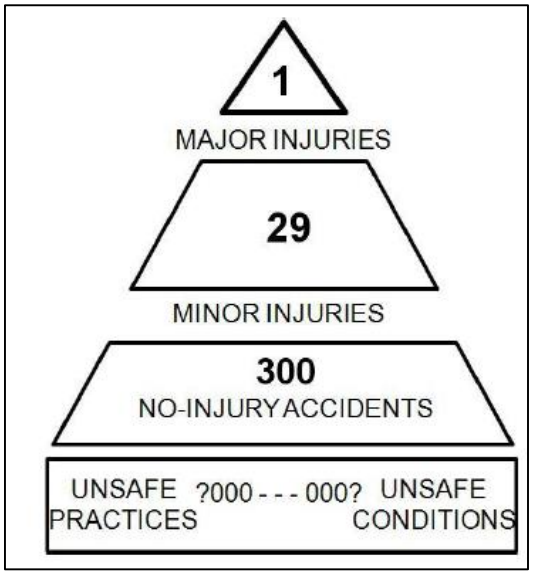

Figure 6 Foundations of a major injury (Heinrich)

00.3 per cent of all accidents produce major injuries
08.8 percent of all accidents produce minor injuries
90.9 per cent of all accidents produce no injuries

Frank E Bird in 1969 "built" upon the 300:29:1 ratio but with different logic applying. He made an analysis of 1.75 million accident reports from 297 American insurers. After an additional 400 hours of confidential interviews to establish the base of the triangle, he concluded:

> *The 1-10-30-600 relationships in the ratio would seem to indicate quite clearly how foolish it is to direct our total effort at the relatively few events terminating in serious or disabling injury when there are 630 property damage or no-loss incidents occurring that provide a much larger basis for more effective control of total accident losses.*

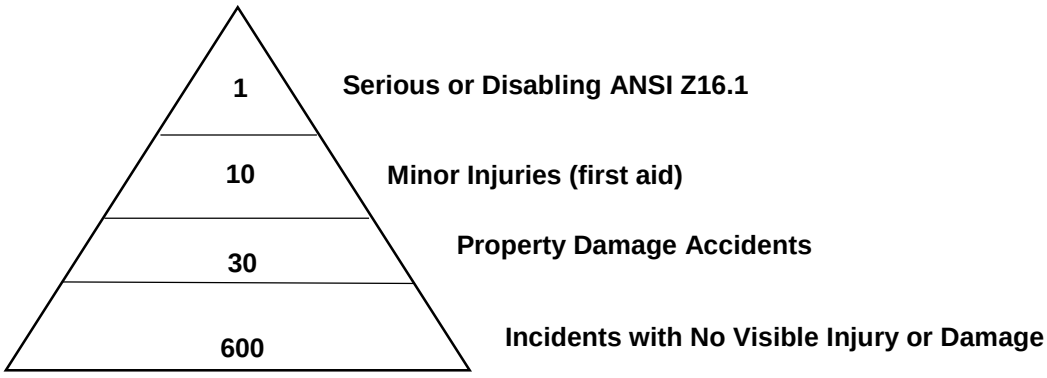

Figure 7 The Bird Accident Ratio Study

This triangle is often presented as an iceberg, as per Figure 8.

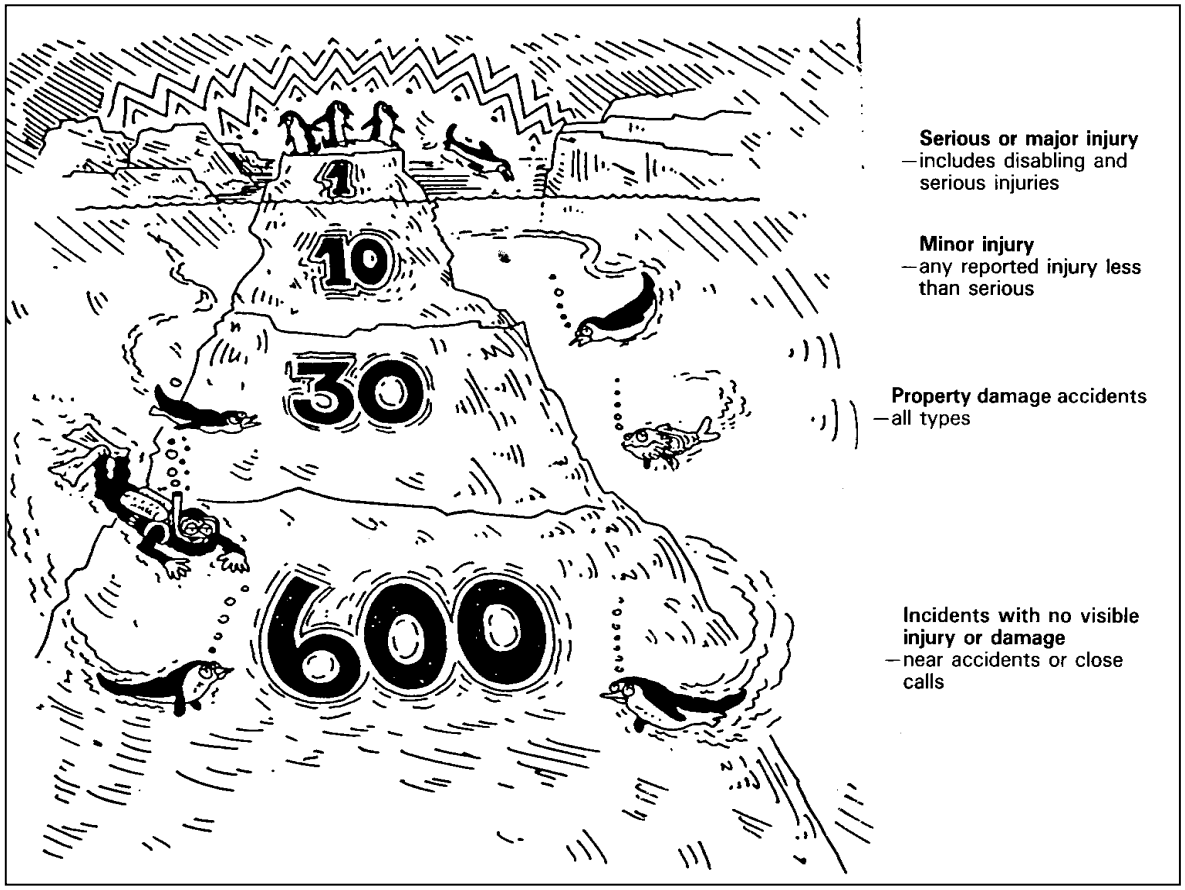

Figure 8 Iceberg triangle

Industry has held tenaciously to this incident triangle and a number of associated core beliefs. It is suggested that these core beliefs are, at least:

1. Manage/eliminate the bottom of the triangle and the top will disappear.
2. Measure the bottom of the triangle (Class III damage) and you will have a strong indication of your success in the world of injury management.

But, what does the damage data tell us? It tells us at least 3 things.

Firstly, the "top" of the triangle does not even look like the "bottom" of the triangle. It is a different damage pattern. In the main, the pattern of Multiple Fatalities does not look like the pattern of Single Fatalities, does not look like the pattern of Non-Fatal Permanent Damage and does not look like the pattern of Minor Damage. You only have to ask yourself the question – which part of the body is most often represented in Minor Damage? The hands and fingers are over-represented, hence the strong focus on gloves but this is not the problem with Multiple Fatalities, Single Fatality or Non-Fatal Permanent Damage which is a Class I issue and is the area that is critical in terms of being managed correctly.

Secondly, the data leads to the conclusion that this triangle is, in fact, a "Descriptive" statistic. It shows a ratio of numbers. It is not an "Inferential" statistic: that is, you cannot infer properties at the top of the triangle based on the properties at the bottom of the triangle.

Thirdly, the data also tells us that if you direct 90% of your management effort on the bottom of the triangle, i.e. Class III (Minor Damage) and some Class II (Temporary Damage), you will first cause the iceberg to sink so that the top will become less visible and it will be less the subject of discussion.

Then the iceberg will rotate and invert when the minor damage is being fully managed. That which is now most visible and attracting most people's attention is the lower end of the damage spectrum. The previous and significant effort on Class II and Class III damage then "proves" that the management's focus and effort was appropriate when it was not.

These statements are perhaps a little cynical in the light of the fact that Queensland Mining fatality rates have decreased over many decades with Figure 9[6] providing insight.

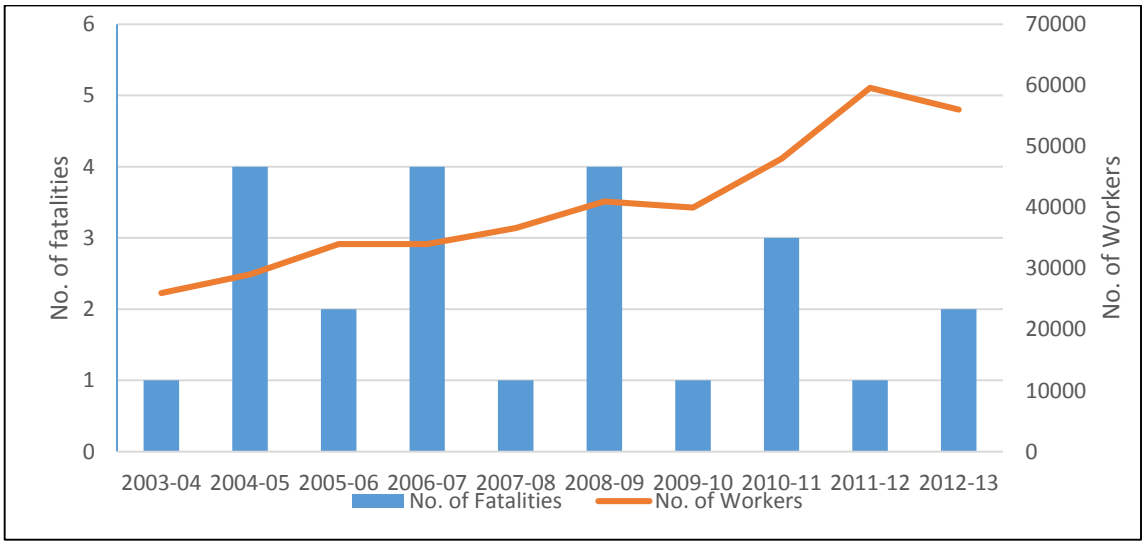

Figure 9 Fatalities versus employment numbers (all sectors), 2003-13

However, with respect to Class I Non-Fatal Permanent Damage, the author strongly holds the opinions expressed above.

As to the "Why" we have failed to learn, the second notion suggests the incident triangle interacts with a widely held view that 88% of incidents are caused by "unsafe" acts / human error and that there must be a "Root" cause. This terminology is associated with what is known as an Egocentric Model i.e. an appropriate person/s must be at the centre of the incident. The "Egocentric" Model contains the notion of zero harm, unsafe acts and unsafe conditions and the belief that something must go wrong for damage to occur. This Egocentric Model is accompanied by the terminology of unsafe acts and unsafe conditions in a consistent ratio e.g. 85/15.

To arrive at this ratio of unsafe acts and conditions, Heinrich had studied 75,000 cases (12,000 insurance records and 63,000 plant owners' records). His logic is expressed as follows.

> *It was discovered that 25 per cent of all accidents would, according to usual but improper methods of analysis, be charged to defective or dangerous physical or mechanical conditions, but that in reality the causes of many accidents of this group were either wholly or chiefly man failure and only partly physical or mechanical. This group, therefore, was found actually to be 10 per cent instead of 25 per cent. This difference (15 per cent) added to the 73 percent of causes that are obviously of a man-failure nature, gives a total of 88 per cent of all industrial accidents that are caused primarily by the unsafe acts of persons. Check analyses, made subsequently on a smaller scale, produce approximately the same ratios.*
>
> *In this research major responsibility for each accident was assigned either to the unsafe act of a person or to an unsafe mechanical condition, but in no case were both personal and mechanical causes charged.*

The famous 88:12 ratio was initially widely accepted with variations emerging by other researchers e.g. 85:15, 90:10 etc.

The incident triangle, the various ratios and the terminology of unsafe acts and unsafe conditions became integrated into various incident models such as the Domino Theory, as illustrated in Figure 10 and Figure 11.

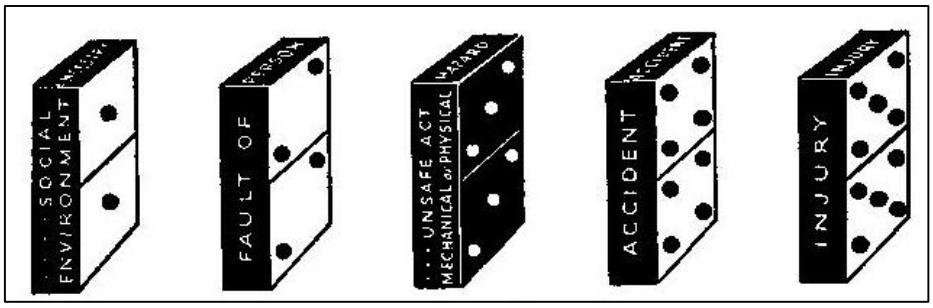

Figure 10 The five factors in the accident sequence

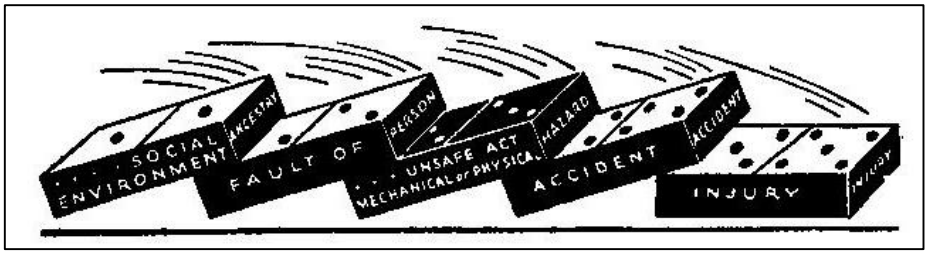

Figure 11 The injury is caused by the action of preceding factors

The Model was updated by Weaver[17], as per Figure 12.

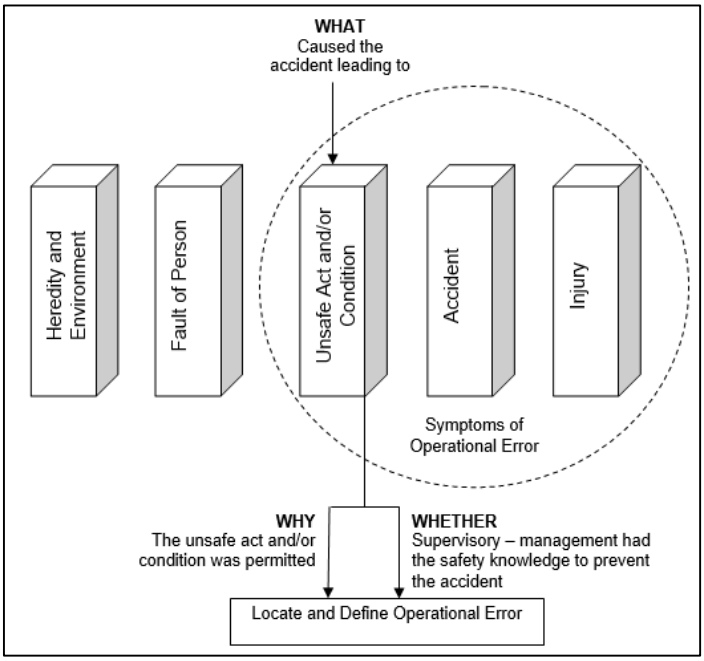

Figure 12 Weaver's updated dominoes

The Bird and Weaver models were increasing the emphasis of management as "prime causative" agents in all accidents. The notion of "cause" was expanding in its definition with the "basic" cause being the unsafe act/unsafe condition, the "sub" cause being the specific

"fault" of the person and the "underlying" cause being the supervisor and managerial faults and the social and environmental conditions outside the workplace. Perhaps the reader can note some similarities and differences to the philosophy, models and underlying words of their own incident investigative models.

All of this thinking has set the foundation for much of incident investigation today and has resulted in the notion that we must prevent all accidents and identify the unsafe acts. If we were to honestly believe in preventing all accidents, it would mean that there would come a time where we could remove all those damage mitigation devices of seat belts, air bags, emergency teams, fire suppression systems, fall arrest systems etc etc. To remove such devices would be foolish and unwise as they do not prevent accidents/ incidents but certainly reduce the total burden of damage.

To test this core belief of human error accident causation, the author regularly presents the following question (Figure 13) to both leaders and operators.

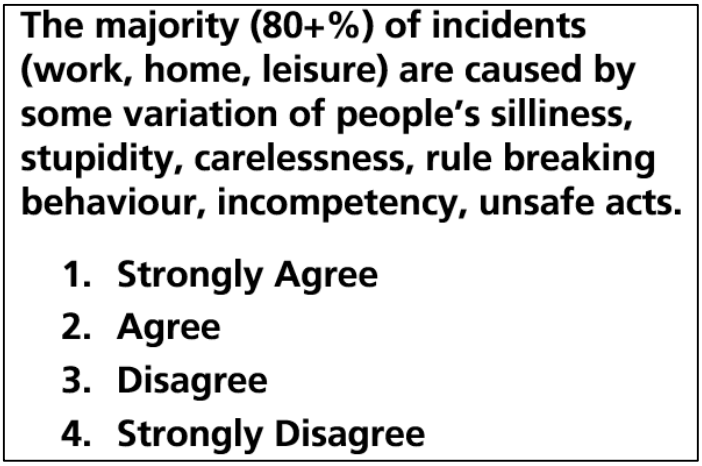

Figure 13 Focussing question to test a core belief

You may wish to answer this question individually, but it is suggested to you that the correct and true answer is that the question must be "strongly disagreed" with if we are to go forward as an industry.

As a result of incident investigative and analysis models principally founded on unsafe acts / unsafe conditions, there are many incidents investigations which have resulted in 88% of recommendations centred on (a) the operator's behaviour, and (b) the system issues that result in those operators not demonstrating appropriate behaviours in the immediacy of the incident.

Using the word "unsafe" to guide one's observations is totally unscientific, highly emotive and detracts from clear thinking. If the incident investigators' frame of reference for guiding observation is "unsafe" acts, then an internal and powerful filter is in place. An observation must first have a value judgement applied to it and the observer only notes the value judgement of "unsafe". What if the solution lies in the observer's perception of safeness

Are there alternative and clearer ways of thinking? The answer is 'Yes' but the purpose of this paper is to describe "Why" we have failed to learn.

It is suggested that the "Why" of the incident triangle interacts with an Egocentric 'Human Error' Model resulting in an industry preoccupied with invalid, irrelevant and unreliable measures. The overriding requirement of any measure is that it is:

- **Valid**: actually measure what they purport (claim) to measure
- **Relevant**: meet their intended purpose (i.e. are useful for informing decision(s), noting that different information may be relevant to different users and decisions), and
- **Reliable**: are complete, free from omission, bias and error.

The current lagging measures of LTIFR and AIFR inappropriately drive leadership behaviours; workers work in fear of experiencing Minor Damage and are possibly cognisant that the emphasis on the potential for Minor Damage is inappropriate but do not have the knowledge to question the focus.

Other measures which are valid, relevant and reliable will emerge over time but it is suggested that it will be an industry-based measure because of the large population base that is required to be able to validly measure Non-Fatal Permanent Damage. This is what currently occurs for fatalities. If Non-Fatal Permanent Damage occurs at an annual rate of 1:200 employees, then a group of people working together for 10 years have to statistically work together for 20 years to create enough exposure time for an Damage case. Therefore, it is critical that work teams become knowledgeable of that which damages at the level of Class I Non-Fatal Permanent Damage and that the work tasks are organised appropriately.

Summary

This paper is an attempt to capture one set of thoughts as to "What" we have failed to learn and "Why". If one were to accept the propositions of this paper, then the "problem" has been at least partially described. This is the beginning of the change process. There is a way forward that is scientific and objective and will involve passionate, committed and informed leadership.

The paper suggests there is an urgent need to study the Class I Non-Fatal Permanent Damage arising from Queensland Mining activity. This will assist in a more complete statement of what is happening. We must learn from the past if we are to manage the future.

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