

ATTITUDINAL CHANGE: THE MISSING ELEMENT IN MINE SAFETY PLANS?

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ABSTRACT

Despite the continued improvement of safety performance in the Australian Coal Mining Industry, safety continues to be the No.1 industry priority. The underlying cause of safety problems on mine sites is multifactorial in origin and requires the application of rigorous scientific methodology in order to provide valid, reliable and meaningful priorities on which to act.

The objective of the present paper is twofold. Firstly, to outline the results of our diagnostic mine site safety survey findings which have identified "attitude" as an important behavioural factor impacting on mine safety performance. Secondly, to present a suggested model to identify and prioritise the underlying causal issues and provide valid and reliable information with which to further assist in the preparation of SAFETY MANAGEMENT PLANS.

Until we establish in a structured and systematic way exactly what are the causal issues impacting on safety performance in our mining industry, we cannot hope to put in place the right strategies in our Safety Management Plans. Once uncovered, then and only then is it possible to put in place a FUTURE DIRECTIONS SAFETY BLUEPRINT to further improve our safety performance from cuts and bruises through to fatalities.

Industry initiatives to improve safety performance in mines will largely depend upon changing many of the attitudes and behaviours that make up the mine culture and codes, which in turn influence the way in which mineworkers perform their daily work.

SAFETY - A NO.1 PRIORITY IN THE AUSTRALIAN COAL MINING INDUSTRY

Safety remains as the No. 1 priority in the Australian Coal Mining Industry. This is reflected in the commendable commitment by the Mining Companies and their employees to the continued decline on almost all of the safety performance statistical measures reported* by both the Open Cut and Underground Industries in Queensland and New South Wales.

In 1995, ACARP stated as its Occupational Health & Safety Objective:

"ACARP has cooperated in the production of a new OH&S research strategy for the coal industry, the aim of which is the elimination of serious or permanent disabling injuries and fatalities within 10 years".

On 4th April 1997, the Queensland Chief Inspector of Coal Mines stated in his "Foreword" of the 1995-1996 Report on "Statistical Analysis of Lost Time Injuries in Queensland Coal Mines":

"The coal industry is being challenged to better manage personnel and equipment to eliminate injury at mines. The industry will soon have to demonstrate they have taken adequate precautions through the provision of Safety Management Plans. Audits by inspectors are to be increased to ensure the Safety Management are performing as designed."

Our inter- and intra-industry business experience reveals that the Queensland and New South Wales Mining (and the oil refining) industries are amongst the most safety-conscious industry sectors.

Yet despite its continued improvement, the rate of injury, workers compensation claims and fatalities remains high compared with other industry sectors. For example in 1996-97, Queensland had 4 fatalities and NSW had 5 fatalities and one Contractor on its coal mine sites.

Today the safety performance of the Australian Coal Industry is now more than ever under the microscope. In 1997, two investigations have already addressed safety in the Mining Industry and in July 1997, the "Black Coal Industry Inquiry" has announced that health and safety from mine to port is to be studied and compared with best practice overseas.

This paper has not attempted to address the issue of whether the currently-used statistical measures are the most appropriate or whether frequency of all items reported in Minesite First Aid or Safety Log Books should be used. One thing is for certain and that is the Behavioural Sciences literature evidences the fact that "if you measure it - the frequency drops", at least initially.

PRESENTATION OBJECTIVE

The objective of this paper is twofold:

1. SECTION I: Review a cross-section of our mining industry survey findings
2. SECTION II: Outline a suggested process with which to develop strategies for incorporation into Mine Safety Management Plans to further improve the safety performance of the coal mining industry ranging from cuts and bruises to fatalities.

COMPANY POLICIES & PERFORMANCE

An overview of the Company Occupation Health & Safety Policies displayed in Foyers, Offices, Crib Rooms, Muster Areas, Plant, Machinery etc., reveals statements such as:

- "Safety is everyone's No. 1 priority"
- "Each of us has a personal responsibility for safety"
- "Safety is everyone's responsibility"
- "Zero is the only acceptable level of incidents"

and so on.

Examination of the statistics produced by the Queensland Coal Board and the NSW Joint Coal Board reveals interesting trends. In general, safety performance statistics reveal that the same mines tend to be amongst the "industry-best" whilst others consistently fall at the "poorer" end of the statistical scale - irrespective of whether they are Open Cut, Longwall or non-Longwall Underground Mines.

SECTION I - REVIEW OF SURVEY FINDINGS

People's attitudes affect their work behaviour and the safety performance of the mine. Our diagnostic survey results over almost two decades reveals that one of the most fundamental factors impacting on safety performance in the coal (and metalliferous) mining industry is people's "attitudes towards safety" - irrespective of whether the mine safety performance is perceived as "good", "poor" or somewhere in between.

Industry initiatives to improve safety performance in mines will largely depend upon changing many of the attitudes that make up the mine culture and codes, which in turn influence the way in which mineworkers perform their daily work.

Survey Findings of Companies with "Good" Safety Performance

Survey results of Companies with a very strong commitment to safety reveal "attitude" to be the single-most factor impacting on their "good" safety performance. A summary of results of such surveys reveal employees' perceptions to be:

- The Company has a very good attitude and is very highly committed to safety as a No. 1 priority - production targets are secondary
- Compared to other comparable mining companies in the area:
 - Company and commitment to safety is very high
 - Safety attitude and performance is very good
- Senior, Middle Management and Supervisors, have a very good attitude and a very high commitment to safety
- Employees have a very good attitude and a very high commitment to safety
- Near hits are treated as seriously as actual incidents
- The statement: "Publicly, everyone is concerned about safety - in reality no-one really cares", is incorrect.

Survey Findings of Companies with "poor" safety performance

"Attitude" also emerges in our survey results as one of the single-most important factors impacting on safety performance even in Companies in which employees who perceive themselves as lacking in the necessary degree of commitment to safety. According to these survey findings, employees claim that they:

- Have not fully embraced their Company's "safety first" attitude as their prime focus
- Do not have full ownership of the Company's safety policy
- Do not possess the expected degree of commitment to the policy
- Believe accountability for safety rests with "management"
- Do not really understand the meaning of "personal" responsibility or accountability for safety
- Claim they are not held personally responsible/accountable for:
 - Their own safety
 - The safety of others
 - Property damage
- Claim there are no consequences for breaching site safety rules

- Claim that major variations exist across the site in safety attitudes, standards and commitment that ranges from excellent to bad
- Claim "the only way we can reduce accidents/incidents to zero is by changing everyone's attitude and commitment towards safety", ranging from management to mineworkers.

Other safety issues that emerge tend to vary from mine to mine and examples of our survey findings include:

"Legislation, Policies & Emergency Procedures

- Poor understanding of the Occupational Health & Safety and related Legislation (including "Duty of Care")
- Very good understanding of the emergency procedures and facilities in their section (including accident management).

Reactive Management - Good Accident Investigation

- Workplace safety management is largely reactive and a large amount of effort is put into investigations after an accident/incident
- Accidents/incidents are very thoroughly investigated to determine the real cause
- Once identified - plant equipment, machines, work procedures or work areas that have the potential to cause injury or loss become rectified almost immediately

Education & Training

- Despite the ongoing safety training programmes, the actual training provided to the workforce to:
 - Develop attitudes and skills to work in a safe manner is inadequate
 - Reform their present job in a healthy and safe manner was poor
 - Identify and manage hazards in the workplace is adequate.

Job Satisfaction & Stress

- Poor job satisfaction, boredom, worker apathy, tiredness and poor personal fitness are all important causes of health and safety problems in the workplace
- Absenteeism results in a considerable degree of work pressure and job stress
- Poor and non-performing employees results in a considerable degree of additional work pressure and job stress."

SECTION II - SUGGESTED PROCESS

It was previously stated "people's attitudes affect their work behaviour and the safety performance of the mine". Clearly we cannot hope to successfully introduce change in safety performance in our coal industry without first establishing in a systematic way:

1. Exactly what are the safety attitudes of Management, Supervision and Mineworkers
2. Precisely what other factors directly or indirectly influence mine safety performance
3. Exactly what do we need to target in order to reduce accidents/incidents on our minesites in line with "World's Best Practice".

Until we establish the **causal** issues influencing mine safety performance, we cannot hope to successfully deal with the **symptoms** - i.e. the day-to-day accidents/incidents experienced on our minesites.

Once uncovered, then and only then is it possible to develop a SAFETY STRATEGY or MINE SAFETY BLUEPRINT that can be used as a model with which to successfully manage safety in the mining industry.

The underlying cause of safety problems on mine sites is **multifactorial** as is the cause of hypertension, cancer or schizophrenia. Its complex multifactorial nature requires the application of rigorous scientific principles and methodology to identify, catalogue and examine the multitude of symptoms in order to pinpoint the underlying causes and then prioritise them to provide the industry with meaningful priorities on which to act. There is no room in "pure" science for **qualitative** studies based upon **subjective** impressions biased by personal backgrounds and experiences, and the vagaries of the interactive emotions and motivations and the complex differential reinforcement contingencies that operate between the interviewer and the interviewee that can unwittingly result in eliciting the perceived "selective" information sought by the interviewer.

Whilst the interview technique may be appropriate in simple "soap-powder" studies comparing Product "A" vs Product "B" or polling research such as "which party would you vote for Party A, B or C and why"; it is inappropriate in circumstances involving factors such as mine safety in which there is an infinite number of highly-complexly interwoven (inter-correlated) variables all of which contribute in differing degrees and in different ways with different people in differing circumstances.

“Statistics” and “survey” technology also has well-founded criticisms for example, “you can massage statistics to prove any point you want”, and “you can design a survey questionnaire to give you the answer you are looking for”. Survey findings are certainly limited by the quality, depth and breadth of the questions and by the statistical analytic procedures used.

The underlying philosophy of the recommended approach for the proposed project is based on the fact that the **intelligence** on how to best reduce injuries lies in the coal mining industry itself. Each and every mine employee has one or more excellent ideas based on their wealth of personal experiences on how to address the problem - irrespective of whether the mine ranks at the top or bottom of our statistical ladder of safety performance.

Tapping this enormous industry database requires a high degree of skill and expertise and the application of the behavioural sciences survey design, construction and analysis by statistical packages and mathematical models in order to provide minesites with valid, reliable and meaningful priorities on which to act. Some of the procedural steps include:

Step 1 - Raw Data Collection

1. Identify the target behaviours to be investigated - e.g. “fatalities” or “remote-control equipment operating accidents” or “musculo-skeletal injuries” and so on.
2. Conduct nominal groups sessions to collect the “raw data” from a cross-section of executives, management, supervision, staff, mineworkers and contractors.
3. Brainstorm, identify, concretise and prioritise the specific ergonomic, behavioural, attitudinal, motivational, cultural and technical attributes; and the policies, practices, procedures and “other factors” that must be targeted in order to achieve for example, zero fatalities or zero remote-control equipment operating accidents.
4. Review and extract requisite information from the Coal Industry & metalliferous mining industry databases on the target behaviour under investigation.

Step 2 - Quantitative Diagnostic Safety Questionnaire

1. Design and construct a tailor-made quantitative diagnostic safety questionnaire
2. The construction of the instrument is to be based upon the prioritised raw data collected at the minesite and the mining industry databases

3. Tailor-making the quantitative questionnaire is to ensure that the highly specific causal factors, dimensions and dynamics operating across the minesite and the mining industry which impacts on safety performance is appropriately identified and addressed
4. Questionnaire design is a science of its own and requires a high degree of skill and expertise to ensure that it produces valid and reliable results and recommendations data and does not send the industry up a “blind alley”.
5. The quantitative questionnaire is to be designed such that:
 - It is simple and easy to understand and complete
 - Different people interpret the same question in exactly the same way
 - Structure and wording of the questionnaire does not produce spurious artefacts
 - Digit preference biases are controlled for
 - It has high content and face validity.

Step 3 - Administration of Diagnostic Questionnaire

The Diagnostic Survey Questionnaire should ideally be constructed to be self-administered - individually or in group sessions.

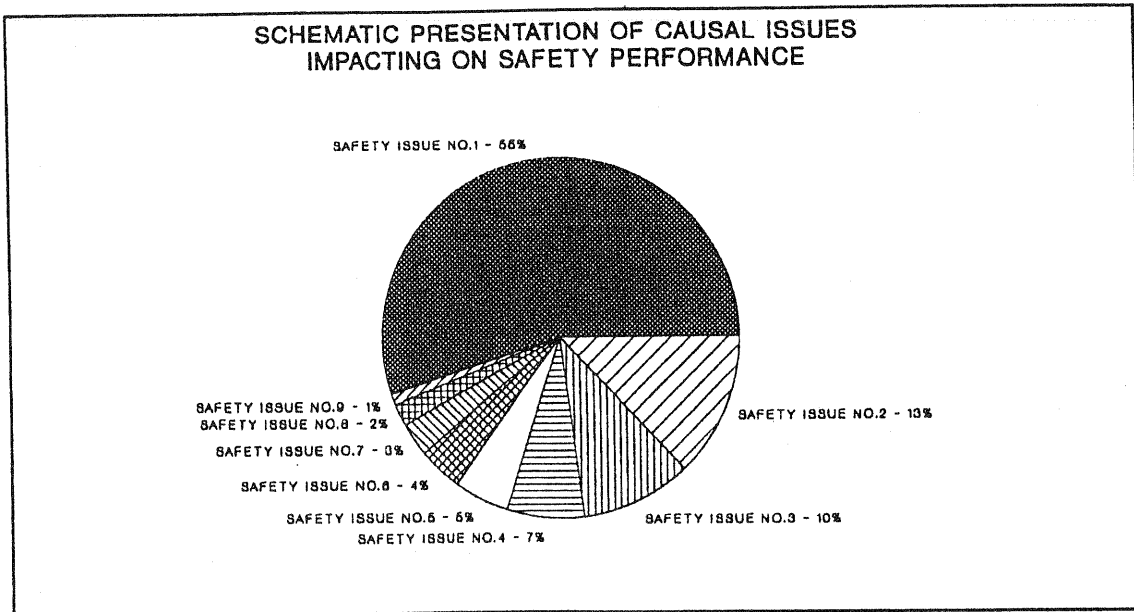
Step 4 - Statistical Analysis of Data

Given the magnitude of the volume of the information, data analysis is to be by means of a set of statistical packages and mathematical models that sort the multiplicity of highly complex inter-relationships and inter-correlations between all of the responses by all of the respondents to identify, diagnose and prioritise the agreed underlying causal factors that need to be addressed in terms of their order and magnitude of importance order that address the target behaviour under investigation. In other words, the mathematical models “rearrange” and “reduce” the enormous volume of data to a smaller set of “components” or “factors” which represent source variables accounting for the observed inter-relations in the body of the data. In summary, the model provides an “agreed” one page summary of:

1. WHAT are the principal causal safety issues to be addressed?
2. HOW important is each causal issue identified?
3. The MAGNITUDE of its importance - in other words does the causal issue account for 55% or 2% of what needs to be addressed? For example, if the Safety Diagnosis on causes of remote-controlled equipment-

operator injuries was to cover 9 principal causal safety factors, they would appear as

follows:



4. Separate statistical analyses can be undertaken to determine if differences exist between the hierarchical layers of the organisation (or industry) or different sections within the organisation. In other words, does Management's perception differ to that of the mineworker at the coal face or in the maintenance workshop.

ADVANTAGES OF RECOMMENDED APPROACH

The advantage of the recommended approach is that it:

1. Identifies precisely what are the principal issues, and exactly what are the key issues influencing safety performance of the target behaviour under investigation as these are often poorly understood and hence verbalised and are sometimes unclear in the minds of management, staff, mineworkers and contractors due to information overload.
2. Consolidates mathematically the 10's of thousands of ideas in the form of answers in a simple meaningful way to pinpoint the most important agreed factors influencing safety performance within (and/or between) minesites.

3. Delineates the:

- Order of importance of each agreed causal issue impacting on safety performance
- Magnitude of importance of each such agreed causal issue
- Priority of each causal issue identified at each minesite for each group under investigation.

4. Quantifies the current status of each such influence to subsequently enable management and the industry to accurately monitor over time the effectiveness of initiatives and corrective safety action programmes.
5. Discriminates mathematically the most important differences in factors including attitudes and perceptions between the different groups.
6. Enables management and the industry to focus on those priorities that will produce the greatest return (Pareto Principle).
7. Provides a valid and reliable database with which to prepare Safety Management Plans to address the causal problems of the target behaviour under investigation.
8. Eliminates the possibility of Safety Management Plans, policies and corrective action programmes being formulated on the basis of personal bias and subjective "beliefs", "gut" feel or what is easy to do.

Most importantly, the recommended approach:

1. DOES NOT present an extensive descriptive catalogue of perceptions, comments or interpretations but rather it identifies, quantifies and orders the priorities of the key causal influences and issues as agreed by the industry. Most importantly, the results are not influenced by opinions of minority or "vocal" groups.
2. DOES NOT report qualitative findings as the interpretation of these is highly susceptible to personal bias. The problem with qualitative information is that it is subject to the bias and interpretation of the person collecting or presenting, and may not necessarily reflect the critical issues that need to be addressed to reduce incidence of the target behaviour under investigation.
3. DOES NOT present findings merely in terms of percentages as these have no predictive validity or utility on how to better manage safety in the future. Moreover, our experience has shown that recommendations based upon percentage analysis can in certain circumstances be grossly misleading.

CONCLUSION

1. Until we first establish in a structured and systematic way exactly what are the causal issues impacting on safety performance in our mining industry, we cannot hope to put in place the right strategies in our Safety Management Plans to address the issues.
2. All too often Safety Management Plans have attacked the symptom without fully understanding the underlying real causes. Not surprisingly, well meaning Safety Management Plans have not always fully realised their objectives.
3. Once uncovered, then and only then is it possible to put in place our FUTURE DIRECTIONS SAFETY BLUEPRINT to further improve our safety performance from fatalities through to cuts and bruises.