BEHAVIOUR-BASED SAFETY: A CASE STUDY ILLUSTRATING A SUCCESSFUL APPROACH.

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ABSTRACT

Industry is becoming increasingly aware of the importance of taking human factors into account in safety management, particularly in the mining industry where human operations dominate. Accidents are commonly attributed to at-risk behaviour or human error. When accidents are investigated, many of the systemic causal factors are human in their origins, eg: inadequate training, bad design or poor safety culture.

Behaviour-based safety programs have become a popular approach to managing the people issues in safety. However in many ways, programs have not delivered on promises and organisations have been left dissatisfied. Common complaints of traditional approaches to behaviour-based safety are (a) narrow scope, focused on behaviour change rather than concurrently addressing *causes* for at-risk behaviour, (b) one-size-fits-all approach rather than a BBS system tailored to organisational characteristics and culture, (c) poorly integrated with existing safety management systems.

We recognise the weaknesses of many of the traditional approaches and have developed an alternative approach that is proving to be successful. We will discuss our approach using a case study of our recent success with a large manufacturing client. We will illustrate the framework we used and the reasons behind its success. We will discuss application of this approach in the mining industry.

Industry is becoming increasingly aware of the importance of taking human factors into account in safety management. This is particularly the case in the mining industry where human operations dominate. In the past, safety has been managed primarily as a technical problem, that can be "engineered out". More recently, it is becoming widely accepted that technical approaches alone are inadequate to reduce the accident rates to desired levels (Reason, 1997). In other words, even when the purely technical problems are addressed, unacceptable accident or injury rates often persist.

WHAT IS BEHAVIOUR-BASED SAFETY?

Behaviour-based safety approaches have become a popular way of managing the people side of safety. The approach was originally developed in the USA. It revolves around what motivates and reinforces people's behaviour. Basically it was recognised that the rewards for behaving unsafely often outweigh the rewards for safe behaviour. For example, common rewards that increase the likelihood of behaving *unsafely* include:

"The boss congratulated me for getting the job done faster"
"I met my production target in a shorter amount of time, so I could take a longer break"
"It's easier to do it this way and I didn't get hurt".

When people experience these sorts of rewards for unsafe behaviour, they will be more likely to behave that way the next time around. This is why short-cuts can often become the norm, with phrases like "That's just the way things are done around here" being commonplace.

Behaviour-based safety programs attempt to address the balance of rewards for behaviour by increasing rewards for *safe* behaviour and decreasing rewards for *at-risk* behaviour. Traditional behaviour-based safety programs attempt to achieve this objective by:

❑ educating people in the workplace about safe and unsafe behaviour

❑ using peers and supervisors to observe worker activities

❑ isolating target behaviours

❑ providing various forms of feedback to individuals and groups in order to positively change safety-related attitudes and behaviours.

Traditional approaches to Behaviour-Based Safety state that…
❑ Almost all incidents occur from *unsafe acts*
❑ For every accident, there are many *unsafe behaviours.*
❑ Identify key *unsafe behaviours*
❑ Train workers/management to observe workers
❑ Perform observations
❑ Provide feedback to reward safe behaviour and draw attention to *unsafe* acts.
❑ Record and use data from observations
(Adapted from USWA).

This feedback usually comes in the form of praise and recognition from peers and/or supervisors.

The fundamental concern about traditional behaviour-based safety programs is that to some extent, they assume that we always have a choice as to whether to behave safely or unsafely. For example, there is an underlying assumption that if haul truck drivers speed or drive recklessly, it is because they choose to do so. Behaviour-based safety programs suggest that if an individual was rewarded for safe behaviour then safer driving would occur.

However, speeding or erratic driving can also be a result of a number of other factors that are not necessarily under a person's control, such as fatigue, poor vehicle design or a culture of production before safety. Therefore, behaviour-based safety programs should not simply focus on individual behaviour change. They need to simultaneously address individual behaviour, systemic factors that contribute to unsafe acts and organisational culture. While this conceptual transition is beginning to occur (Manuele, 2000), many industries are still struggling with putting these new approaches into practice. We illustrate our approach to behaviour-based safety that attempts to overcome this and other problems associated with traditional approaches to behaviour-based safety.

CASE STUDY

A large paper manufacturing company in Australia recognised that many of the injuries and incidents that were occurring at two of their paper mills were attributable to at-risk behaviour. Therefore, the introduction of a behaviour-based safety program was seen to be an appropriate approach to address this issue. However, the initial pilot test of an "off-the-shelf" behaviour-based safety program was largely unsuccessful. This was attributed to several factors, which can be summarised as:

❑ Failure to establish workforce buy-in and commitment to the process.

❑ Workers and unions were concerned about the principles behind behaviour-based safety. That is because they saw it as an attempt to change worker behaviour. The program was seen as a way of management to "pass the buck" for safety to the workforce and it was seen as a way of attributing blame for incidents to individual workers.

❑ The program was too advanced for the current organisation and its workforce to cope with.

❑ The program was not well integrated with existing systems and the required infrastructure was not in place to support the program functioning.

These issues were taken into account and a revised strategy was formulated for the way forward. It involved four phases:

❑ **PHASE 1: ASSESSMENT**

A "rich picture" of the current workplace and workforce characteristics was developed. This picture was developed via (a) an assessment of the current safety culture and (b) a review of current safety management systems. Safety management systems were reviewed through interviews with key site personnel, using a series of structured questions about the safety systems and procedures currently in use.

Safety culture can be essentially characterised as "the way things are done around here with respect to safety". Safety culture measures are a "snapshot" giving insight into the way people are thinking and feeling with respect to safety. Safety culture was assessed by interviewing and surveying a representative cross-section of the workforce about their perceptions and attitudes towards safety. A good understanding of the current culture was developed, giving management an important insight into the way that the workforce "thinks" with respect to safety. Some of the factors that were assessed included:

❑ Attitudes towards taking a pro-active involvement in safety,
❑ Perceptions of management commitment to improving safety in the workplace, and
❑ Attitudes towards short-cuts
❑ Degree of complacency.

The major strengths and risk areas from a culture perspective were identified.

The major incident causes were also determined by reviewing a set of recent incidents. This was important in defining the key hazard areas and the sorts of tasks and behaviours that were most critical to address.

❑ **PHASE 2: DESIGN**

The workforce were actively involved in the development of the new behaviour-based safety program. This involved workshopping the design of the program with key representatives from management, shop-floor and unions. The resulting program was much simpler than the original program. It was recognised that starting with a simple program helps develop workforce acceptance, because it is more accessible and easy to grasp. Ideally, once the program is successfully implemented at a simple level, the workforce can then suggest improvements and developments over time, which improves workforce ownership of the program.

The resulting program essentially consisted of a combination of general hazard observation programs and behaviour-based safety programs. The key elements were that the program gives everyone an easy way of reporting a hazard if they see one. Hazards could be behavioural in nature or they might be factors that might lead to unsafe behaviour/human error. Everyone one-site was trained to identify hazards and identify factors that can contribute to human error and also to think creatively about potential solutions. The trends from the hazard observation forms were also central to being able to detect underlying systemic issues and developing solutions.

❑ **PHASE 3: IMPLEMENTATION**

The program was phased in over three months across two paper mill sites. Every person working on-site (approximately 700) was trained. Importantly, training groups were small (approximately 10 per group) to facilitate interaction and the training groups represented a cross-section of people across the site. Representatives from management and shop-floor were integrated, which assisted in breaking down some long standing hierarchical barriers.

Sessions were interactive. The behaviour-based safety program was actively "practiced" in the training room and potential obstacles to success were identified and resolved during these training sessions.

Participants were not only taught *how* to participate in the program, they were also encouraged to actively brainstorm *why* a program such as this would be helpful in addressing safety at their worksite.   Participants became noticeably more enthusiastic and involved when they had generated their own reasons why the program would be of value.

Participants were taught how to identify unsafe acts as well as to identify factors that might be contributing to unsafe acts, such as hazardous conditions or procedures.

The training sessions were also used as a vehicle for culture change. That is, aspects of the culture that had been detected as issues in the initial culture assessment to do with morale and workplace satisfaction were addressed and one example of how this was addressed was via interactive team-building exercises incorporated into the training sessions.

❑   **PHASE 4: FOLLOW-UP**

A commonly reported reason for program failure is inadequate follow-up once the program has been implemented.   Informal strategies for follow-up included attendance at safety meetings and "walking the floor" in order to identify any obstacles to success. As would be expected with the implementation of a new program, there were a number of issues that threatened the success of the program. Many of these were detected by those on shop-floor once they began to participate in the program and those representatives who identified the problems were encouraged to be involved in the development of appropriate solutions. This assisted in building morale and promoting a smooth implementation of the program.

To date, just under 6 months since program implementation, over 400 hazard observation forms have been lodged. The hazards observed have been addressed via specific solutions (e.g. re-design of equipment) or by general solutions that help to address a range of similar hazards, (e.g. training programs for detecting and recovering from human error).   There has been a reduction in medical treatment injuries since implementation of the program.

A formal follow-up assessment will take place approximately 6-12 months after program implementation. This will involve re-measuring safety culture and safety performance and comparing this to the original assessment in order to determine program success. This is important in estimating return on investment, but also very important in developing continuous improvement strategies to avoid the program becoming stagnant.

FACTORS BEHIND PROGRAM SUCCESS

The implementation of a successful behaviour-based safety program is reliant of a number of factors. Here we outline the principles that we believe are crucial to program success. We use examples from the case study above to demonstrate practical strategies for achieving these objectives. Where relevant, we also demonstrate how these principles improve on many of the traditional approaches to behaviour-based safety and why the approach that we took in the manufacturing industry might also be a beneficial approach to managing the people-related safety issues in the mining industry.

1.   Establish workforce acceptance and commitment to the program.

A behaviour-based safety program is all about effecting change in an organisation. Managing the change process is a critical success factor for any new program int roduced into the workplace.

The challenge of the change process can be met in several ways. Essentially what is sought is workforce acceptance and commitment to the process. A central aim is to get workers to buy-in to the program and see the benefits for themselves. This can be achieved in a number of ways. Firstly, involving workforce representatives in the design of the program enables

them to feel as though they have control in the outcome and enables them to have a sense of ownership of the program. These representatives form a steering committee. These representatives become active advocates of the program, so selection of representatives who have credibility and influence at shop-floor level is important.

Another good strategy for getting workers to buy-in to the program is to get them to generate their own ideas as to the benefits that can be realised with the introduction of a behaviour-based safety program. This can be done as part of the behaviour-based safety program training sessions. Asking the workforce to generate the advantages of the program increases the likelihood that they truly *believe* in the value of it, rather than simply being told.

Once the program has been implemented, commitment can be enhanced by the careful provision of prizes or rewards. There is much dispute over the pro's and con's of rewards given for safety. The downside is that rewards may trivialise safety and represent safety as a "game" rather than as a core value. However, with behaviour-based safety programs, rewards may be useful in acknowledging the identification of a very serious hazard or acknowledging an excellent recommendation for a way to eliminate a hazard (Frederick & Lessin, 2000). It rewards critical thinking and thoughtful involvement.

Finally, emphasis should be placed on the proactive nature of the program. It is important to show the workforce that this program enlists the expertise of every person in the workplace in detecting and correcting the causes of injury *before* they occur.

2. Ensure that the program is applicable to your organisation and its unique characteristics.

Industries and organisations vary considerably in the type of work that is conducted, the way it is carried out, the organisational structure and the culture of the workforce. There are also specific workforce factors, such as level of literacy and cultural background that also need to be carefully considered in the design or selection of a suitable behaviour-based safety program.

Three factors are critical to ensure the applicability of the program to your organisation. Firstly, the need for pre-assessment of the characteristics and culture of your organisation should not be underestimated. This will guide your selection of the type of behaviour-based safety program and development of specific goals and objectives that you want to achieve with the program.

Secondly, engaging the workforce in actively designing the program is important in ensuring that the workforce will accept and use the program. A taskforce or committee made up of a cross-section of representative employees is recommended. Actively involve your workforce in the design of the specific characteristics of the program, e.g. what is going to be observed, who is going to observe, how is the information going to be fed back to the workers, can we integrate the process with other systems and processes in place, and so on.

Thirdly, every organisation has certain tasks when safety is habitually violated. For example, working on certain machinery without turning it off, walking across a conveyor that is active. These habits occur because taking a particular risk saves time or energy but causes no personal injury. Workers will repeat this behaviour over and over until eventually this behaviour becomes habit – behaviour that is chosen so quickly that it is an unconscious decision. The danger emerges when a set of circumstances arise that makes this behaviour more risky than usual (eg. Equipment jams or protective devices fail). The barriers that usually prevent common behaviours from causing injury are no longer present. This is when an injury occurs which usually takes everyone by surprise. Accidents are not random but arise from the nature and function of the organisation.

Therefore, the unique characteristics of the organisation need to be taken into account to determine what the behavioural factors are in this particular organisation that need to be considered. Those subtle, convenient and seemingly safe behaviours need to be identified as

they form a fundamental part of ensuring that your behaviour-based safety program is relevant to your workplace.

3. A holistic approach to addressing at-risk behaviour

Traditional behaviour-based safety approaches attempt to change worker behaviour. Targeting specific behaviour is a good start. As discussed, traditional approaches to behaviour-based safety focus their efforts here by rewarding safe behaviour. While this can have some success, it not the complete picture.

It appears that many workplaces using these programs are much more likely *not* to address the hazards and systemic factors that are often the root cause of unsafe acts (Ref). Human factors thinking has moved on from the old idea that our systems would be safe *"were it not for the erratic behaviour of some unreliable people (bad apples) in it"* (Dekker, 2002).

The behaviour-based safety program must simultaneously address the specific behaviours *and* systemic factors that contribute to at-risk behaviour. In some ways, traditional behaviour-based safety programs have placed too much emphasis on behaviour-change. This has been criticised as "turning the hierarchy of controls upside down, contradicting one of the most widely accepted concepts in injury and illness prevention" (Howe, 1998, p.6). Most approaches to behaviour-based safety include references to studies from the DuPont Company which indicate that the "causes" of most industrial accidents (up to 96% in some studies) are the "unsafe acts" of workers. According to these studies, very few industrial accidents are caused by "unsafe conditions". Our approach recognises the need to address safety from both perspectives: the unsafe act *and* the precursors that contribute to this unsafe act.

As James Reason suggests *"free will is an illusion because of range of actions is always limited by the local circumstances"* (1997). Workers need to be trained in understanding the factors that contribute to human error. Following the widely accepted Reason Model of Error (Reason, 1997), there needs to be a distinction between wilful at-risk behaviour versus behaviour that stems from underlying systemic issues such as:

❑ Organisational culture, eg. a culture of complacency, production before safety.
❑ Management decisions.
❑ Fatigue due to shift structures.
❑ Poor workplace design.
❑ Inadequate tools and equipment.
❑ Time Pressure.
❑ Inadequate Training.

Training needs to focus on hazard perception as well as behaviour-observation techniques.

The data from observations should be capitalised on. It provides an excellent way of being able to identify patterns or systemic issues contributing to at-risk behaviour in the workplace. Good use of this data can guide where safety efforts and resources are targeted.

4. Ensure appropriate infrastructure to support the program

If the system that is developed fails to fit users' work practices, then it will be underused and unlikely to facilitate cultural change
(Tavistock Institute, UK)*.*

The Tavistock Institute in England developed the Sociotechnical Systems approach to managing change (Trist, 1981). It was first developed in the 1930's in the mining industry in the UK. It acknowledges that *people* are a core part of organisations and looks at ensuring that structures and processes in the workplace are aligned or matched with people*,* in order to maximise efficiency and job satisfaction. This is a central principle for managing the smooth integration of a behaviour-based safety program into the workplace. Careful thought needs to

be directed towards ensuring that there are appropriate structures and processes in place to support rather than impede the behaviour-based safety program. For example:

- ❑ Avenues for communication and feedback.
- ❑ Data collection and management processes, i.e. a centralised database.
- ❑ Clear definition of roles and responsibilities.

There needs to be user-friendly procedures for observation, lodging forms, giving feedback, following up on identified hazards, and so on. The integration of the people with the system should be seamless.

Another point to make is that management are key players in the process (Cook & McSween, 2000). Managers across all levels must receive targeted training in their specific role in the behaviour-based safety program. At the middle management level, their role in the behaviour-based safety process centres around:

- ❑ Detecting glitches in the system and resolving these.
- ❑ Maintaining workforce motivation and commitment to the process.
- ❑ Leading by example and actively "walking the talk".

Specific training is required for this level of the organisation acknowledging that they are the lynchpin in the process.

5.   Establish long-term sustained success.

The ultimate aim of any behaviour-based safety program is to develop and sustain a positive safety culture. Many programs appear promising to begin with, but once the initial momentum slows down, they do not result in sustained change.

It is important to assess safety culture to begin with and develop goals and objectives for the desired culture. The gaps between current and desired culture guide the design of the behaviour-based safety program as a way of actively addressing these weaknesses. It is equally important to conduct follow-up assessments to determine what aspects of safety performance and safety culture have improved and where areas for further improvement are evident.

In order to achieve sustained culture change, one of the key proponents of behaviour-based safety programs has acknowledged that it is important to start "small" and allow employees time to get used to an observation and feedback process before adding too much complexity (DePasquale & Geller, 1999). We achieved this by developing hazard cluster categories (e.g. People, Process and Plant related) rather than identifying specific target behaviours. In the next phase, critical behaviours within these clusters can be defined and this is best driven by the workforce.

It is important that the program is aligned with current systems and processes and ways of doing things. If the program is too far removed from other management systems, it increases the likelihood that the program will not be sustained over a long period of time. A good way of maintaining continuous improvement and avoiding the program becoming "flavour of last month", is to write key performance indicators associated with the program into management performance appraisals.

Finally, the bottom line is that behaviour-based safety programs need to demonstrate return on investment. We need to be able to measure and track safety performance improvements. Difficulties with measuring safety are beginning to be overcome, by using a combination of measures that not only track poor safety performance (eg. LTI rates) but also track system health (e.g. Safety Culture) (Dumsa, et al, in press). The initial pre-assessment of safety is vital in being able to demonstrate improvements from baseline performance as a result of the behaviour-based safety intervention.

Interestingly, an example of the link between good safety performance and good organisational performance is evidenced by Paul O'Neill, the former CEO of Alcoa in the U.S. His overall leadership strategy was to make safety improvements. His principle was that when organisations function at a high level in safety, many positive things follow, including improvements in morale, communication and a sense of cohesiveness within the organisation. These factors are commonly attributed to high performing organisations (Peters & Waterman, 1982; Senge, 1990). Some findings from research reveal that there are many important side benefits of behaviour-based safety that improve general organisational functioning. Some of these include: improved employee awareness, culture, communications, involvement, quality and productivity (Krause, 2002).

CONCLUSIONS

This paper has illustrated an approach to behaviour-based safety that was undertaken in the manufacturing industry. The approach has overcome many of the problems associated with more traditional approaches to behaviour-based safety. We believe that this approach holds a lot of promise for the mining industry. Mine sites face similar problems to manufacturing sites with respect to managing people issues in safety. There appears to be a requirement for a program that better integrates behaviour observation and change with strategies for managing human error and it's causal factors. There also appears to be a need for a program that is both accessible and acceptable across the entire workforce.

The case study outlined in this paper demonstrates that our approach to behaviour-based safety undertaken in a large Australian manufacturing organisation, in the first 6 months of implementation, has already begun to show significant improvements in safety performance.

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