

# IMPROVING SAFETY PERFORMANCE DMR NSW STRATEGIES

## DIRECTION

The Safety Operations Group (SOG), Department of Mineral Resources NSW objective is to provide leadership and motivation to the mining industry to continuously improve safety culture and to encourage healthy working environments. This will be pursued by a number of interventions directly related to operations and mine safety management plans; assessment, licensing, approval, certification education, advice, persuasion and enforcement. Having said this the intention is to progressively phase out the role of the Division concerning authorisations (approvals, certification, exemptions) and transfer the role, where appropriate, to accredited organisations thereby reinforcing the site duty of care.

The outcomes envisaged are;

Safe Industry, where the mining industry and stake-holders demonstrate a commitment to the principles of duty of care and due diligence and adopt a robust systems approach to managing risks,

Safe Actions, where the SOG's safety interventions are aimed at being positive and clearly understood by the mining industry and stake-holders and deliver safety and health benefits. The SOG will apply open and fair assessment mechanisms and undertake corroborative investigations of mine management plans and systems. This will be consistent with, and support and encourage, industry self-assessment by adopting an inquiring role rather than a directive role. The plan is to adopt a Risk Identification Management System (RIMS) approach to address hazards state-wide, and

Safe Production, where the assistance of a simplified legislative and administrative framework and regular communication and consultation will enable all existing and proposed mines to operate responsibly to optimise resource recovery .

The government role has developed due to the history of the past century and a half, in both the UK and NSW, where there were many mining tragedies, an industry with rapid adoption of technology and heavy equipment, and the government responsibility to license mining resources. While legislation has been amended in the past it is only recently that mining acts and regulations have undergone or are in the process of complete review.

The legislative change agenda follows the philosophy of the Robens Report of 1972. It tries to reflect the view that there are limits on the extent to which safety can be improved by rules set by external agencies and that the best results will be achieved by influencing habits and creating a framework for better health and safety organisation and action by industry itself.

The mining industry can only continue while the community gives it a "licence to operate". If failure of environmental, financial, or safety performance occurs, our society will lose trust and more than likely withdraw that licence. So the industry must continue to change and improve safety performance.

The scope of change applies to approximately 400 mining operations, 1,000 plus extractive minerals sites, 6,000 mineral claims and 700 exploration licences in NSW with a diversity of mining techniques, people and procedures, locations and working conditions. The bulk of the mineral claims are for opal mining which have different needs from the mining operations. The mining operations range from heavy mineral sands, through a range of open cut clay, gold, copper and other mineral mines, extensive coal mines in the Hunter and Illawarra, to large underground gold and base metal mines in the Central West. The extractive minerals sites vary in size and complexity.

The move towards a regulatory environment with fewer OH&S specification standards, more performance standards and a framework of systems based standards continues previous legislative change. This move to principle-based standards, such as the "general duty" provisions under the OH&S Act 1983 (NSW) shifts the focus to outcomes to be achieved rather than precise hazards to be controlled or the means of controlling them and this enables changes in technology and the new hazards that may arise to be met. The shift to performance-based standards will only be successful if

stake-holders are confident of their own ability, and effective education, advice, persuasion and enforcement can be implemented.

### **CULTURAL CHANGE FOR SAFETY OPERATIONS GROUP**

The next three to five years will be one of culture change; ie the way things are done (and thought about). SOG will try to move the NSW mining industry, including our Group, from a prescriptive style to a performance or outcome based approach, while retaining the lessons of the past. There is a need for a new approach under legislation, and revised regulations and guidelines to assist this change.

Safety Operations will be making procedural changes to reinforce these changes.

The key changes in culture are to general duty of care, performance based regulation and increased industry accountability. The mining industry must be able to demonstrate full responsibility of duty of care for the health and safety of all persons on mine sites. Regulations should describe the outcome with the onus on the industry to achieve the outcome. Industry has increased responsibility for and flexibility in achieving safety outcomes. SOG has increased responsibility to ensure the transition is effective and does not lead to a deterioration in safety performance.

SOG is required to deliver the preceding changes in the following context.

We will try to be constructive and forward-looking facilitators of changes to improve health and safety performance in the mining industry. We will try to be credible consultants to the mining industry and respected enforcers of the legislation. We want to demonstrate high levels of interpersonal communication and teamwork skills. We will perform professional assessments and investigations of compliance and legislative issues. We will try to help to devise and advise industry of best practices, standards, guidelines and compliance requirements.

This is relatively new ground for the Safety Operations Group and there are cultural issues to be modified by internalising and learning the new habits we must acquire.

The key issues SOG will focus on to drive and reinforce this change are;

- Systematic approach to enforcement and education functions via RIMS assessments, verifications (including the small mines area) and work plans,
- Identification of Core Risks and promotion of risk management techniques,
- Core Risk prevention monitoring by examining emergency preparedness plans and systems and trying to develop general warning indicators to flag progressive loss of control over core risks of inrush, air/windblast, fire, explosion, strata failure and transport,
- Data collection, management and usage through the development of our common database system (COMET)
- Communication of the enforcement policy outlining the full range of sanctions applied in the event of non-compliance
- Development of key competencies for Safety Operations officers in the areas of investigation, COMET data-gathering and analysis

### **CULTURAL CHANGE FOR SAFETY MANAGEMENT PLANS**

A number of operators in both the coal and metalliferous sectors appear to have invested considerable effort over the past few years to introduce hazard identification - risk assessments and to develop management plans at sites. A point to note is the apparent disconnect between the accidents that cause individual injuries and fatalities and those that cause multiple fatalities. It is crucial to address both the high consequence low frequency (major core risks) and lower consequence high frequency issues (core risks). It is also essential that cultural issues are addressed, as this is the most likely common link.

A "culture" occurs when a group does certain things in certain ways - what the group has learned to do for survival, pleasure or ease is a series of habits and deeply held values. What we need to do to change the "culture" is teach ourselves a set of habits and develop values that will deliver far superior safety performance. This involves identifying critical behaviour that must be defined to be

- reinforced or stopped
- observed in action to be understood
- adapted to be changed, and
- checked for effectiveness of the modification.

At site level the critical actions may be risky behaviour that has led to a number of near misses or injuries in the past, safe behaviour that could have prevented these incidents, risky behaviour that could contribute to an injury, fatality, or multiple fatalities and safe behaviour that could prevent such an incident. All must be taken into account when developing safety management plans and systems for such plans to be effective.

When we have achieved this culture, we will probably not be able to say exactly what makes the difference between today and that future time. All we will know is "this is the way we do things" and we do it like this because it keeps people safe. We will have moved through unconscious incompetence (what rules?), conscious incompetence (learning new rules), and conscious competence (following the rules) to unconscious competence (safe habits).

Under this scenario the general duty of care becomes a habit not a burden.

## **STAKEHOLDER STRATEGIES FOR SAFETY MANAGEMENT PLANS**

All industry stake-holders must be prepared to move from<sup>1</sup>;

- regulation and prescription to stake-holder responsibility  
because a pro-active nature with ownership and commitment are less likely when trying to avoid penalties based on targets set by someone else
- failure focus to success focus  
because people are working to achieve successful outcomes, earning positive reinforcement and recognition rather than avoiding negative reinforcement and punishment
- minimum compliance orientation to behaviour orientation for improved outcomes  
because processes and people using them control the outcomes. Stake-holders must work on the processes and systems
- management control to employee involvement  
because improved safety performance requires continual involvement from operations and maintenance personnel as well as engineers and supervisors
- individualism to teamwork  
because group behaviours will define the culture and they must be continually promoted to overcome the individualistic reinforcement we get through our pass/fail, win/lose education, legal and sporting activities
- ad hoc approach to a systems approach  
because long-term improvements of safety performance can only be achieved with a systematic approach, in the same vein as Dr WE Deming emphasised for product and process quality.  
Attention must be given to;
  - environment factors such as equipment, tools, machines, housekeeping, temperature, engineering, strata, ventilation, explosives and the processes in use,
  - people factors such as knowledge, skills, abilities and competences, and
  - behaviour factors such as complying, coaching, recognising, communicating and caringThe human factors need as much consideration as the environmental factors. To progress safety improvement, all variables must be addressed. This must not be mechanistic or just functional. It must balance the culture of engineering with the complexities of human thinking, behaviour and social culture.
- blame allocation to fact finding  
because injuries, near misses or reported hazards provide an opportunity to investigate facts, from all aspects of the system, that could have contributed to the incident or impending incident. Immediate environment, people, and behaviour factors must be explored for root causes and all historical factors must also be considered. Root causes always include both environment and human factors that must be addressed by safety management plans and systems.
- reactive to pro-active  
because investigating events preceding an incident, whether it be a near miss, injury or a hazard (incident precursors) will reward stake-holders with increasing levels of control over safety

---

<sup>1</sup>After Geller, "The Psychology of Safety", Ch 3.

performance. This is probably the most difficult behaviour to develop and instil with all the other pressures of viability on a business. However it promises much for the systematic control of hazards and reduction of damage, injuries and fatalities in our industry.

- running repairs to continuous improvement  
this is complex but best approached through a systematic hazard identification, risk assessment and management approach. High potential and consequence hazards need immediate control, low risk hazards can be addressed to a less urgent schedule, but always, both must be managed.
- priority to value  
“Safety is our first priority “ is a common safety slogan in the mining industry. This adoption has increased throughout many operations during the last twenty years. Some operations will be close to turning this conscious competence into unconscious competence by instilling safety as a value, deeply held and unable to be demoted from first priority because it is integral to all thought and activity. Values endure no matter whether the current focus is on quantity, quality or cost.

### **REAL SAFETY MANAGEMENT PLANS, CULTURE AND PEOPLE**

Safety management plans are a positive step to create a safety culture. Pursuit of zero accidents is an important focus. However, pursuit of other, positive achievements is just as important, ie developing a pervasive safety culture. A safe system of work is a positive action and part of an overall mine system and related operational plan. The system needs to be set in the context of an overall plan.

Core risks are generally being addressed through administrative programs, people programs and processes for identifying, assessing, controlling, monitoring and reviewing these critical risks. These programs have a place within an overall safety system. Safety must be managed through an agreed plan that is capable of being implemented with realistic accountabilities, measurable progress, monitoring, review and adjustment - the total quality cycle of PLAN, DO, CHECK, ACT.

The plan is not the end in itself, as it must, for all employees, provide the link to and from a body of knowledge. A sound plan is simply an outward sign of constant vigilance helping to instil a culture of trust and respect. A sound, safe system of work helps people to cope with risks despite some precautions failing and to comply with the law. Mines must have a plan to manage safety; to say who is to do what by when, to chart a course, see results and to review success. There is always plenty to do in a mining operation, so it makes sense to get organised for those risks or something may be overlooked.

In the Piper Alpha inquiry in 1988, the Cullen Report stated, “...(management) were too easily satisfied : relying on the absence of feedback of problems that all was well. They adopted a superficial attitude to the assessment of risk of a major hazard.” “The safety policies and procedures were in place: The practice was deficient”. Similar findings were made in the Royal Canberra Hospital Implosion and the Longford Explosion inquiries - “nothing has happened in the past, so it’s safe”. Stakeholder input was not sought.

The approach needs to involve people who want to help control risks because they are the ones exposed and needs to build in a range of checks and balances because the system must allow for some errors. When something goes wrong how often do we look with hindsight and recognise that the danger was known and the risk could have been controlled ? We generally see that there were no or insufficient in-built checks or balances. The Piper Alpha Cullen report adds weight to this need. “Inspections did not reveal a number of readily ascertainable deficiencies (leading) me to question whether the type of inspection practised could be an effective means of assessing or monitoring the management of safety by operators”. Prior to the disaster, the safety legislation and regulatory approach were prescriptive with a strong technical focus, rather than a holistic view of what would be needed to achieve safety. The off-shore oil and gas industry had not adopted the goal setting, risk assessment and management approach following the Roben’s Report.

The Safety Management Plan Workbook recently published by the Institute of Quarrying cross references industry’s guidelines, which in turn are linked to regulations which amplify the statutory duty of care, and will help operations to comply with the law. But most importantly helps mines to improve safety performance by preventing accidents. There should be no hazard that is considered so unlikely to occur that a mine does not have at least a guide for control and response. The

examples of disasters where this has occurred are the Channel tunnel fire and the Three Mile Island nuclear disaster. In mining the hazards are known, and the controls must be in place.

Safety Management Plans must have a process of 'reality checks', preferably by external, on the ground, in the working environment assessments. There should be no failures in hindsight, as has been linked to the Piper Alpha disaster. After a fatal accident on the platform a year before the disaster, the shift hand over and communication procedure were identified as contributory. These were not addressed and were found to be contributory in the disaster. Similarly, in the Mufulira mud inrush disaster in Zambia in 1970 where 89 lives were lost. An objective risk assessment seemed almost impossible as both the company staff and mines inspectorate appeared to have been 'conditioned' to the hazard by long association. The tailings disposal system was never queried as a hazard mainly due to the long time over which it had been practised. When evidence of tailings ingress to the mine occurred some 22 months before the disaster, their significance was not appreciated. Long established procedures should be questioned by fresh risk assessments with fresh people. Operations must learn how to recognise and heed non-conformance in their plans, systems and procedures.

The plan needs to create a sense of constant vigilance on everyone's part and be actively reviewed to provide a collective mindfulness leading to a robust organisation culture.

A robust, high reliability organisation<sup>2</sup>,

- strives for resilience of system
- reforms rather than repairs
- shares responsibility
- actively seeks information and new ideas
- rewards messengers
- is proactive as well as reactive
- prompts far-reaching inquiries into failures
- has flexibility of operation
- possesses a consistent mindset of wariness

Studies of the implementation of the Cullen Report into Piper Alpha indicate that the culture of the off-shore oil and gas industry in the UK militated against effective use of the Safety Management Plan approach in the critical area of human behaviour. It is crucial that culture and behaviour are factored into the plans to at least the same degree as engineering and working environment factors. If the human and engineering factors can be addressed, safety performance will improve greatly. However, safety culture is not a simple behaviour set that is different to our complex social behaviours and it cannot be treated like another engineering factor captured in manuals. Geller<sup>3</sup> lists fifty principles to apply to instil a total safety culture ranging from being driven internally through leadership, recognition, safety as a value, motivations and behaviour modification.

Such organisations rely on information that is transferred regularly, best processed in a structured way, use of hazard identification, risk assessment, controls, monitoring, review and adjustment in a strong safety culture. A strong safety culture has informed constituents, with institutionalised information transfer processes, who (unconsciously) understand risks and are constantly aware so that they act to avert dangers almost automatically (ie unconsciously competent); where actions demonstrate consistency with a plan, generating trust and respect, constant learning and allowing a flexible culture to evolve. The importance of a flexible culture is that it can shift from centralised control to decentralised control in times of emergency.

It is worth noting that not all significant risks will be able to be controlled by the plan, even if you assume all people will follow the procedures at all times. Control relies critically on the professionalism of front line supervisors. The development and establishment of a strong and disciplined culture needs high quality leaders who devote time, attention and resources to the quality, experience and training of their (team) leaders. With a well devised plan and training the leaders will know where they are going and how they can get there and achieve their stated objectives. The Inquiry into the fatalities from the HMAS Westralia ship fire found that training for key personnel had not been sufficient to enable control over the project or the competency of the contractors; a robust safety

---

<sup>2</sup> After Reason, Prof J

<sup>3</sup> Geller, "The Psychology of Safety", throughout and ch17

management plan captures the experience of competent personnel and retains it. The lack of emergency response competence of the crew leaders on Piper Alpha was also found to be contributory to the loss of life.

It must be heavily stressed that the plan is not an end in itself. An operation can have fit for purpose equipment with sound processes in a "healthy" working environment, but it is the people who make all the difference because they can cope with system failures if they know and understand the plan.

In summary, the safety improvement process must be considered a stakeholder responsibility, not a regulatory obligation. It must be achievement oriented with a focus on behaviour, supported by all managers and supervisors but driven by employees through teamwork. The systems approach is needed, to develop a fact-finding perspective, a proactive focus, and a commitment to continuous improvement. This new perspective reflects new principles to follow, new procedures to develop and implement. This will lead to different understanding, attitudes, behaviours and finally values. Once safety becomes a value it will not be compromised. This will prevent many injuries and save lives. Please keep that vision to drive safety improvement.

#### REFERENCES

- Waring, A and Glendon, A, "Managing Risk", International Thomson Business Press, ISBN 1-86152-167-7
- Geller, ES, "The Psychology of Safety", Chilton Book Co, Radnor, Pennsylvania, USA, ISBN 0-8019-8733-4
- Reason, J, "Beyond Safety Systems", The Miner, OHS, March/April 2000
- Unnamed, "The Mufulira Disaster- Will History Repeat Itself?", Minesafe WA, Vol 10, No.4 December 1999
- Yates, A, "Lessons From Accidents", Engineers Australia, Vol 72, No.1, January 2000.