A BEHAVIOURAL-BASED APPROACH TO IMPROVING SAFETY PERFORMANCE IN THE MINERALS INDUSTRY

Camborne School of Mines

University of Exeter, Cornwall Campus, UK
www.ex.ac.uk/cornwall/csm

ANAM PARAND

Presentation to the Atlantic Alliance Occupational Health & Safety Conference 2007
AIMS

• Background of:
  - UK Quarrying Industry
  - Behavioural Safety
    - what is it?
    - why use it?
    - does it work?

• Overview of:
  - Current Study (BSQ)
  - KPI Figures
UK QUARRY INDUSTRY

- 3000 quarries in the UK, employing 35,000 workers
- 290 million tonnes/yr (approx 8% UK GDP)
- 20% growth of quarry products expected over next decade.

- Hazardous industry
  - HSE has reported it as having the highest rate of injuries of any industry (HSE, 06)

- Hard Target
WHY FOCUS ON BEHAVIOUR?

- Most common injuries across quarry and mining sites:
  - manual handling
  - transport
  - falls from height
  - slips & trips

Figure 1 Pie Chart of Percentage of Behaviours & Conditions Attributed to Workplace Accidents

Figure 2 Heinrich’s (1931) Accident Pyramid
**Behavioural-Based Safety (BBS)**

Psychology of behaviour applied to reduce accident/injury at the workplace

Uses behavioural principles, such as:
- triggers
- consequences

Incentives, feedback and goal-setting

Can be bottom-Up
Use of Observations

- Define
- Observe
- Intervene
- Test
 DOES IT WORK IN PRACTICE?

Success of BBS Across Industries

• McAfee and Winn (1989) - commercial organisations

• Guastello (1993) - "behavior modification techniques are potentially useful in many industries".

• Krause et al (1999) - 73 BBS applications; paper, petroleum, chemical, and food

BBS Applied Research in the Minerals Industry


• Australia Mines - Laurence (2005), Pitzer (2005)

• UK Mines - Simpson et al (1993)
The Unique Work Environment of the Quarry

• Small workforce; many lone workers.

• Lack of evaluative research of BBS with lone workers (Olson and Austin, 2001)

• Peer-reporting often described as vital to the BBS system (Krause, 2002)

• Self-observations.

Support:

- SSM approach.

- Findings of self-monitoring improving safety performance as part of a BBS measure (Olson and Austin, 2001).

- Endorsement from behavioural safety experts (Krause, 1997; McSween, 2003).
CURRENT STUDY

Funded by MIST initially
Currently funded by WBBM & EU Social Funds

OBJECTIVES

• BSQ
• Common unsafe acts
• Root causes
Phases of the BSQ Programme

1. Data Collection
   - Safety Culture Questionnaires, Focus Groups, Accident and Near Miss Record Analyses

2. Identification of KSB
   - 20 Key Safety Behaviours identified had to be specific, observable, prevalent or crucial to safety.

3. Behavioural Observation
   - 1 month baseline measure of 20 KSB carried out by operatives and separately by steering teams.

4. Analysis of Root Causes
   - ABC Analysis - Examining the Antecedents of the Behaviour and its Consequences.
   - Incentives and goal-setting are introduced in order to ensure antecedents and consequences are conducive to safe (rather than at-risk) behaviour.

5. Intervention Period
   - Phase 1 & 3 will be repeated to provide a clearer indication of effectiveness

6. Evaluation of Programme
KPI: Behavioural Safety Index

Figure 1. BSI % During Base-line & Follow-up

- BSI started to increase from the beginning of the baseline
- Hawthorne Effect
- Social desirability bias
- Alvero and Austin’s (2004)

- One month pre & post measure
- Good percentage of involvement
• self-observations well received & favoured over peer-reports.

• Supports the use of self-observations

• Self reporting more compatible method due to geographical or cultural issues?
Figure 3: BSI by Checklist (BASELINE)

- Fig 3 self-reports have assessed a higher no. of safe acts compared with peer-reports.
- Attributable to:
  - lack of self-awareness of own at-risk behaviours
  - dishonesty in self-reports (self-serving/social-desirability bias)

Figure 4: BSI by Checklist (FOLLOW UP)

- However, Fig 4 Peer-reports have assessed a higher no. of safe acts compared with self-reports.
- double-sided query on the levels of honesty of the self and peer reports.
- good level of honesty (14% at-risk acts)
The accident data shows insignificant changes. For example, the lost time accidents have increased and decreased by 1 accident at either site. This insignificant data is due to a consistently low number of accidents year on year.

Call for better (leading) indicators
• The lost days may be skewed due to one or two operatives having a high no. of days off due to injury.
CONCLUSION

• Nevertheless, the tangible data indicates that at both sites:
  - No. of key unsafe acts has decreased (increase in BSI % between baseline and intervention periods)
    - There has been a decrease in minor accidents
    - There has been a decrease or no change of days lost due to injury.

• Workable method for industry

• Encouraging implications for self reporting safety behaviours
  - Worker buy-in of the self-report
  - The increase in BSI (led by a majority of self-reports);
  - Substantial no. of at-risk behaviours reported in the self-report checklists.

• Accuracy of self report?

• “Self-monitoring alone lacks the accuracy and credibility of a more objective observational system” (Hickman and Geller, 2003)

• Combination of peer and self-reporting

• Further measures of evaluation, including leading indicators