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**BEHAVIOURAL-BASED SAFETY IN THE MINERALS INDUSTRY:  
A RESEARCH BASED METHODOLOGY CARRIED OUT  
IN THE UK QUARRYING SECTOR**

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**AIMS**

- Background of the UK Quarrying industry and BBS & it's applications
- Overview of the current study, detailing the BSQ process and results to date


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**INTRODUCTION**



- 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
- 'Hard Target'
- Human element (Peters et al, 1997; Geller et al, 2001; Galvin, 2005).
- Most common injuries across quarry and mining sites:
  - manual handling
  - transport
  - falls from height
  - slips & trips
- BBS



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**What is Behavioural-Based Safety (BBS)?**

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

Behavioural principles, such as:  
 -cues  
 -consequences

Incentives, feedback  
 and goal-setting

Bottom-Up Process  
 Use of Observations

Geller et al (2001) 'DO IT'  
 Define  
 Observe  
 Intervene  
 Test

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### 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

- US Mines -Fox et al (1987) -Rhoton (1980)
- US Quarry - Hickman and Geller (2003)
- S.Africa Mines -Talbot et al (1996); Schutte (1998);
- 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).

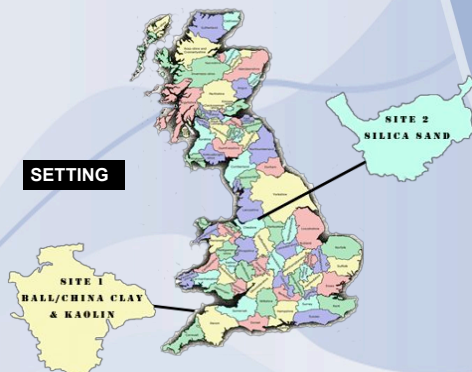


### OVERVIEW OF CURRENT STUDY

#### OBJECTIVES

- Common unsafe behaviours
- Root causes
- BSQ

#### SETTING

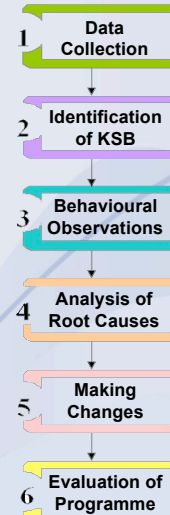


#### PARTICIPANTS

-179 staff



### PROCEDURE



### Phase 1: Introduction to Programme & Data Collection

#### •Data Collection

- Methods: Focus groups, questionnaires, interviews, injury/near miss records
- Regarding: -Current safety culture, systems and controls & Readiness.

### Phase 2: Identification of Key Safety Behaviours (KSB)



#### Formation of the Steering Team:

- Roles
- Divorces the process?

#### Identification of the Top 20 Key Safety Behaviours (KSB):

- Interviews

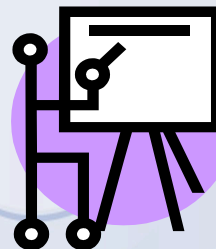


### Phase 3: Behavioural Observations & Training

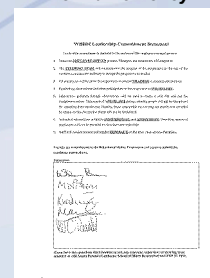
Phase Objectives: -Current baseline measurement

-Gauge operatives' preference of observation method

#### Training



#### No Blame Policy



SELF-REPORT CHECKLIST							
DATE: / /2006							
Vehicles			Yes	No	N/A	Manual Handling	
1) Have you mounted or dismounted a vehicle without using the 'three points of contact' rule?						16) Did you carry/push/pull/raise/lower a load at an awkward position in relation your body?	
2) Have you broken company site speed limits?						17) Did you carry/push/pull a heavy load over what you would perceive as too long a distance?	
3) Have you taken an incorrect traffic route?						18) Did you take sufficient rest and recovery breaks when carrying out repetitive tasks?	
4) Have you used the wrong work's entrance/exist?						19) Did you carry too much weight or a load with an awkward weight distribution balance?	
5) Did you use your handbrake when parked?						20) Did you use the correct tools for the task at hand?	
6) Did you drive a lorry or dump per with the butt raised?							
7) Did you give priority to reversing vehicles?							
8) Did you give priority to larger vehicles?							
9) Did you wear your seat belt at all times while driving?							
Housekeeping & Other			Yes	No	N/A	PLEASE TURN OVER TO WRITE REASONS FOR ACTIONS	
10) Did you clean up all spillages spotted?						Please write your reasons for your actions that WGBM may deem as unsafe	
11) Did you remove all tripping hazards spotted?						The following are examples: Q2: I did break the speed limit as I was in a rush and the limit is unreasonable low. Q1: I didn't use a safety harness because it would've taken twice as long to do the job.	
12) Did you use the correct PPE today for the task being carried out or correct for the work area?							
13) If working at height, did you use a safety harness?							
14) If you saw a near miss, did you report it?							
15) Have you found yourself running and/or rushing around?							

KSBs are Key Safety Behaviours that have been deemed by you guys as the most important and relevant behaviours to keep this a safe site. The purpose of filling out these checklist sheets is to assess the level of these key safe acts and find out possible reasons why these KSBs may be difficult to adhere to.

The checklist is **optional and confidential**. Its sole purpose is to help improve safety of those onsite and help with research searching for ways to make Quanter safer places to work.

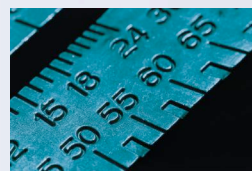
There is a **no blame** policy, which means you cannot be punished for any unsafe behaviour you admit to on this sheet. In fact, there is no way of anyone knowing whose form it is, so, as there is no need to put your name on the sheet or the department you work in. The sheets will be handed to the Researcher and inputted into a table including data from East Golds and Preston Manor. Regular feedback on this table will be provided.

The checklist should take **less than 5 minutes** of your time and is to be filled in once a day. Simply tick the appropriate boxes above and at the end of your shift place it in the box at the weighbridge.

Your participation is essential for this programme to be successful. As the programme continues, the steering team will organise rewards to help promote these KSBs, and changes will be made from your comments. This is a unique opportunity to make a difference to safety procedures and have your voice heard. Remember, it is an **employee programme**, run by the steering team and amended by YOUR suggestions. If you have any questions please contact the steering team on the following contact numbers:

### Phase 3: Behavioural Observations & Training

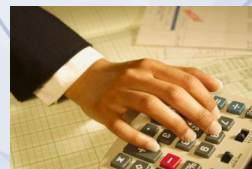
#### Operative Baseline Observation Period



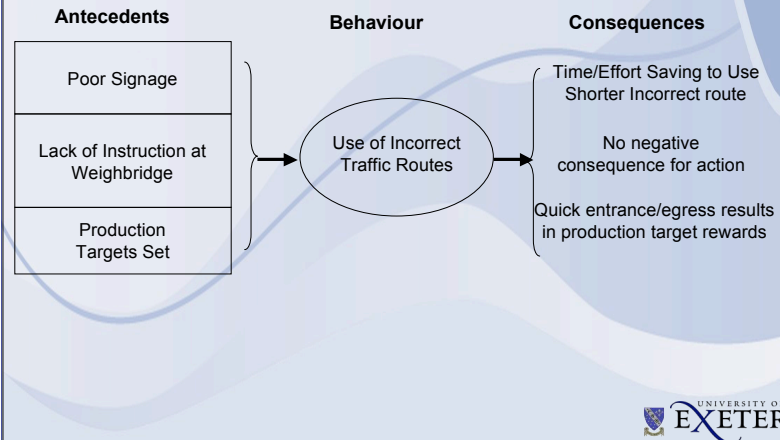
#### Steering Team Observation Baseline



#### Scoring & Feedback



#### Phase 4: Analysis of Root Causes



#### Phase 5: Making Changes



##### Action Plans

##### Reward Schemes & Goal-Setting

-Safety Bonus

-Individual Safety Rewards



#### Phase 6: Evaluation of Programme Effectiveness

##### Evaluation

##### Final Feedback Session



#### RESULTS & DISCUSSION

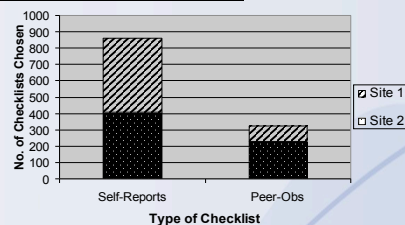


Figure 1: Type of Checklist Preferred

•self-observations well received & favoured over peer-reports.

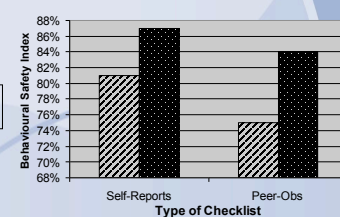


Figure 2: BSI by Checklist

•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)  
 •good level of honesty (18% at-risk acts)



#### RESULTS & DISCUSSION Continued...

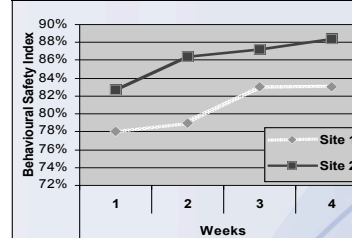


Figure 3: BSI of Combined Checklists

•Positive increase in the safety level  
 •behavioural techniques  
 •one-month only  
 •Anecdotal Evidence: "already appear more involved in site safety"

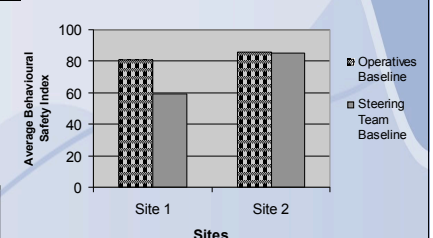


Figure 4: BSI of Two Monthly Baseline Measures

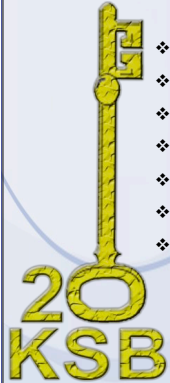
•Contrasting Results



## RESULTS & DISCUSSION Continued...



14 (of the 20) KSB  
common to both sites:



- |                                      |                              |
|--------------------------------------|------------------------------|
| ❖ Use of three-point rule            | ❖ Removal of trip hazards    |
| ❖ Speed                              | ❖ PPE use                    |
| ❖ Use of traffic routes              | ❖ Near miss reporting        |
| ❖ Driving with vehicle butt raised   | ❖ Running/rushing            |
| ❖ Cleaning spillages                 | ❖ Load carried over distance |
| ❖ Priority to loaded/larger vehicles | ❖ Use of tools               |
| ❖ Seat belt use                      | ❖ Use of safety harness.     |

## CONCLUSION

- 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
- Workable method for industry
- Repeated processes to provide a clearer indication of the effectiveness