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Welcome Message

May I, on behalf of the Midland Institute of Mining Engineers, welcome you to this our 7th annual Safety Seminar entitled "Safely Managing the Challenge of Change".

In compiling today's programme we have once again sought to bring together a range of topical and relevant subjects which will appeal to both operators and equipment suppliers, irrespective of the nature of the mineral being mined.

As mining engineers, we are highly aware of the challenges which confront us in all aspects of mining, especially safety. As one of the founding objectives of the South Yorkshire Viewers' Association was the spreading of best practice, especially in relation to mine safety, I feel that events like this continue to meet this objective which is just as relevant today as it was over 150 years ago.

The day will be split into a two sessions with a variety of presentations. Time has been allotted at the end of each presentation for questions and I would you encourage you to take advantage of this opportunity.

The Midland Institute of Mining Engineers encourages membership of our local society which is affiliated to the Institute of Materials, Minerals and Mining, so as to enhance professional status within the mining industry. Many events, including this held today, count towards an individual's Continual Professional Development (CPD) as well as giving an excellent opportunity for networking amongst colleagues within similar spheres of activity.

You will find here today representatives from IOM^3 Membership, who will gladly answer any membership enquiries and will conduct a membership workshop during the lunch break. The IOM^3 stand will be staffed throughout break times.

I would like to thank our supporters for their continued involvement in this important event in our calendar. As President, I would also like to thank the speakers for the presentations you will see today, members of the organising committee for their contributions and, last but not least, to you the audience for making this Safety Seminar a success.

Kind regards
Nicholas Scholey ProfGrad IMMM
President of the Midland Institute of Mining Engineers

Safely Managing the Challenge of Change 2012

Aims & Objectives

The Midland Institute of Mining Engineers was formed toward the end of 1868 and amalgamated with the South Yorkshire Viewers Association (1857) during 1869. The inaugural address of the President, Mr T W Embleton of Methley, was reported to have dealt almost entirely with the problems of safety in the Yorkshire Coalfield and he was quoted as saying;

"We must try to decide calmly and deliberately under what conditions will it be possible to work the Barnsley coal – the great staple of this district, and on which the prosperity of the neighbourhood mainly depends – with safety and comfort of the men."

In this simple phrase Embleton identifies two issues, namely, the economic advantages of working the Barnsley coal together with the need to consider the health and safety of the workforce whilst doing so. He appears not to view these as two separate issues, but to regard them as being mutually desirable objectives for long term commercial viability.

Organisations and individuals may or may not recognise a connection between business efficiency and health and safety, but there appears to be difficulty in integrating these issues in a meaningful and constructive manner. Health and safety issues appear to be reliant on annual initiatives, do not generally appear to be self-sustaining, and focus on outcomes not procedures (i.e. what is done not how it is done).

The purpose of the seminar is to consider the synergy between health and safety management and business efficiency. Root cause investigation of health and safety incidents invariably highlight deficiencies which are impacting, usually more frequently, upon an organisation's ability to deliver its outputs in a predictable manner. It is therefore the intention of this seminar to consider those matters that link health and safety management and the challenge of changes that are necessary in order to maintain business efficiency.

The opinions, conclusions and other information expressed in this publication are those of the individual presenters and may not necessarily be those held by the Midland Institute of Mining Engineers.

Safely Managing the Challenge of Change Seminar Supporters

Health & Safety Executive (HSE) is the national independent watchdog for work-related health, safety and illness.

Cleveland Potash Ltd is a business unit of ICL Fertilizers, and operates the UK's only potash mine to produce and supply potash fertilizers for agriculture and industry uses.

UK COAL is Britain's biggest producer of coal, supplying around 5% of the country's energy needs for electricity generation.

The Hargreaves Group has grown into a major force in the supply, movement and management of mineral resources and the provision of support services to the energy and waste industries.

The Midland Institute of Mining Engineers was formed in response to concerns over the numbers of fatal and other serious accidents that were occurring in coal mines at the time. Over 150 years, the institute continues to provide a forum for engineers in mining to discuss and seek solutions to current technical and engineering problems.

The Mining Technology Division is one of the technical Divisions of the Institute of Materials, Minerals and Mining, working under the umbrella of IMMa, the International Mining and Mineral Association to support Mining and related Industries, by providing a focus for the exchange of knowledge on all aspects of mining technology.

Organising Committee

Mr Nicholas Scholey (Chairman)	President, Midland Institute of Mining Engineers
Mr Phil Baines	Vice-President, Midland Institute of Mining Engineers
Mr Stuart Hoult	Vice-President, Midland Institute of Mining Engineers
Mr Bob Leeming	HMI, Health & Safety Executive
Mr Bill Denton	Midland Institute of Mining Engineers
Mr Peter Scott	Midland Institute of Mining Engineers
Mr Wyn Griffith	Midland Institute of Mining Engineers
Mr Norman E Riley	Honorary Treasurer, Midland Institute of Mining Engineers
Mr Charles Rhodes	Honorary Secretary, Midland Institute of Mining Engineers
Mrs Patricia Rhodes	Administrator, Midland Institute of Mining Engineers

Programme of Events 20 April 2012

8.30 - 9.00	Registration		
9.00 - 9.05	Introduction	**Nicholas Scholey**	**President MIMinE**
	Morning Session	**Chairman Phil Baines**	**Vice President MIMinE**
9.05 - 9.45	" Using Maturity Models For Providing Structured Improvements and Operational Assurance In UK Coal Operations"	Stuart Hoult & Patrick Foster	UK Coal Ltd & Camborne School of Mines
9.45 – 10.15	"Creating a Desired Culture"	David Vint	ArcelorMittal
10.15 – 11.00	"Overcoming the Safety Challenges of Developing a Safety Culture and Safety Leadership"	Dan Terry	Dan Terry Associates
11.00 – 11.20	**Coffee break**		
11.20 – 12.00	"A Career in Coal"	Ian Wilson	LIW Associates
12.00 – 12.10	Presentation by Membership	Sarah Boad	IOM3 Membership
12.10 – 1.40	**Buffet Lunch**	Membership Workshops	Visit Exhibition Stands
	Afternoon Session	**Chairman Stuart Hoult**	**Vice President MIMinE**
1.45 – 2.05	"Changing Safety Culture at Cleveland Potash Teesdock Terminal"	Mark Wilson	CPL - Teesdock Manager
2.05 – 2.45	"Fundamental Requirements for Mining and Managing Safely"	Gerry Huitson	Hargreaves Services
2.45 – 3.05	"How to improve Safety by Automation"	Dale Lockley	Sandvik
3.05 - 3.15	**Closing Remarks**	Nicholas Scholey	**President MIMinE**

“Using Maturity Models for Providing Structured Improvements and Operational Assurance in UK Coal Operations”

Stuart Hoult
&
Dr Patrick Foster

Abstract

As part of developing a revised safety management system for use across UK Coal there was also a need to develop a tool that would allow progress on the implementation of the safety management systems to be tracked and evaluated. A Safety Maturity model was developed for use in UK Coal PLC that was based on similar models developed by Hudson (in 2003) and by Anglo American PLC (2008). The developed model allowed for a "self-assessment" of the maturity to be undertaken by teams from individual sites. Assessments were undertaken at three deep mines and across the surface mine business. Most scores were at the high "planned" stage across the sites, with some variation notes particularly between the two types of mines. The assessment also allowed for the identification of weaker areas so that actions could be identified to compare. The tool has already proved useful in not only identifying where the organisation is as a whole, but also in identifying areas of strength and weakness within systems. As UK Coal progresses as an organisation, it would be intended that the model is used to allow departments within the mine and even individuals to assess themselves against the standards. It will be primarily used during 2011 to inform the company and site safety improvement plans for 2012, with periodic appraisals being used to measure progress and improvements.

Introduction

The maturity model concept is a recent research innovation within the discipline of safety management and safety culture measurement. These models were developed to allow organisations to understand their own level of safety maturity by assessing the level of compliance with various key elements of safety culture relating to the management system and human and behavioural issues.

Many variations of this type of model are being used in the oil and gas industry. Fleming (2001) states that this industry is currently putting considerable effort into establishing best practice and identifying tools and techniques that are proven to be effective in improving safety. Whilst this approach may be logical, its effectiveness may be limited by the difference in safety cultures across the industry and those companies in the early stages of developing their culture will require different techniques than those with a stronger culture. The same principles apply to the mining industry.

Two of the most cited examples are the modules developed by Fleming (Fleming, 2001) and Hudson (Hudson, 2003; Parker et al, 2006). Fleming's

model (Fleming, 2001) consists of ten separate elements, and the overall level of safety culture maturity is made by looking at the level of maturity at each of these individual ten elements. If there are differences in the levels for each of these elements then an average is taken. The ten elements are:

- Management commitment and visibility
- Communication
- Production 'v' safety
- Learning organisation
- Safety resources
- Participation
- Shaded perception about safety
- Trust
- Individual relations and job satisfaction

The maturity refers to the maturity of the organisation behaviours and not the maturity of the safety management system. Therefore Fleming (2001) also states an important point is that this model is only really of relevance to organisations where the technical and systems aspects of safety are performing adequately and the majority of accidents that occur appear to be due to behavioural or cultural factors. This model refers to five layers of maturity:

1) Emerging
2) Managing
3) Involving
4) Co-operating
5) Continually Improving

The model is most used to provide a framework for the selection and implementation of appropriate behavioural intervention.

Hudson's model (Hudson, 2003) has been used to describe the safety maturity in many industries including oil, aviation and healthcare. Hudson similarly uses a five stage approach that describes an organisation in stages from a "pathological" state where the culture is one of not caring and no

system to manage and coordinate the safety performance to a "generative" stage where managing risks is a way of life and fully integrated systems are in place and being effectively used.

There has been other work done and in particular Parker et al (2006) developed a framework consisting of 18 elements and developed a questioning set relating to each element and each maturity level. The way the 18 elements had been constructed with a split between examining the safety management system (11 elements) and attitude and behaviour elements (7 elements) allowed this module to be more easily applied to organisations where a weaker safety management system exists.

The Use of Safety Maturity Models in the Mining Industry

The use of Safety Maturity models within the mining industry is not a new area of safety. The MIRM Maturity chart was developed by a team from the University of Queensland (Joy, 2011). In this model the organisation is shown on a ladder model consisting of five rungs. The lowest rung is called "vulnerable" where a site will "accept that an accident happens", this moves through the reactive stages, where work is conducted to prevent similar accidents right through to the final rung "resilient".

There are many global organisations that have used this type of approach to define the position of their organisation and use this as a means of driving improvement.

Development of a Safety Maturity Model for UK Coal PLC

By global standards UK Coal is a small mining company that took over many of the operating surface and deep mines when the coal industry was privatised in 1995. Although at the time of privatisation it operated 20 deep mines and 27 surface mines in the UK, there has been a gradual reduction over the last 16 years to a point where it currently operates 9 sites. UK Coal remains the largest indigenous producer of coal in the UK, supplying approximately 5% of the total country's energy needs for electricity generation.

Although the mining industry in the UK is largely in decline, what became increasingly obvious was the overall safety performance within the sector which appeared to be on a worsening trend. This period saw UK Coal's safety performance dip, from a period of almost seven years without a fatal accident, to a position where in the years 2005 to 2009 it had suffered seven fatal accidents within the operating deep mines. This was accompanied by

an increase in the level of significant incidents. In 2009 decisions were made to start and address the decline in safety performance, and in 2010 a new safety management system was introduced. This unashamedly drew on best practices from other major mining organisations, and other heavy industry. The revised management system was designed to start building on stronger foundations that had been laid elsewhere. The model discussed the UK Coal Safety Management System which consisted of twelve standards (see figure 1). Within each of the twelve elements a series of requirements had been formulated which needed to be adopted by all sites.

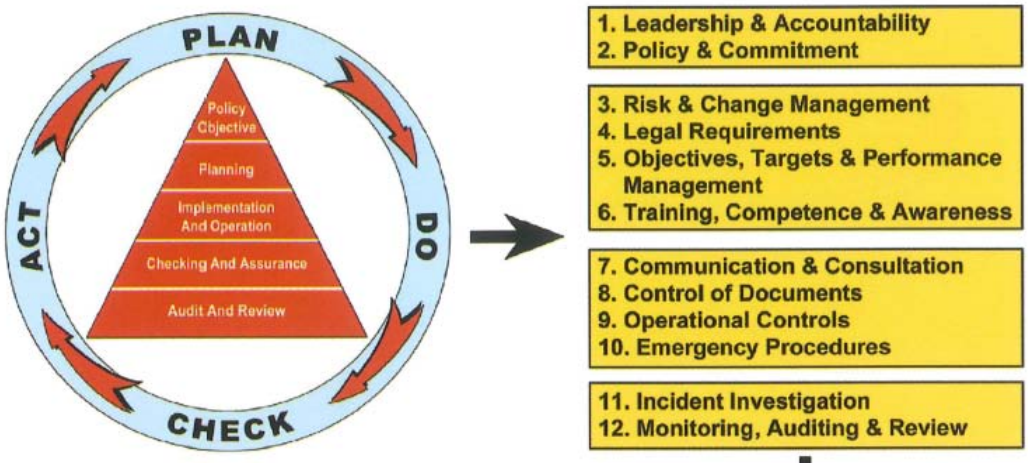

Figure 1 – UK Coal Safety Way

As an organisation we wanted to be in a position to assess our critical compliance against those standards. These standards were written not just to gain compliance, but to stretch the organisation. The model which had to be developed was not only about measuring compliance, as an organisation we wanted a process that would give individual sites, individual departments or if appropriate key individuals targeted development areas to drive a continuous safety improvement down throughout the organisation.

Developing the Methodology

It was decided at an early stage that a safety maturity type approach best suited the organisation, this model became known as the UK Coal Journey Model when implemented it was to be used to measure the progress of implementation of the safety management system in the workplace. In simple terms the device was to combine the "system" and "behavioural" elements that had been separated in other reviewed models. The model

uses the same level titles to denote the 5 levels of maturity as the one developed by Anglo American (which in turn was based on the Hudson model). However, the UK Coal model is unlike any that had been examined during research in reviewing the way other organisations applied the maturity concept, or in deed any of the theoretical models described within this paper. The UK Coal Journey model is shown in Figure 2.

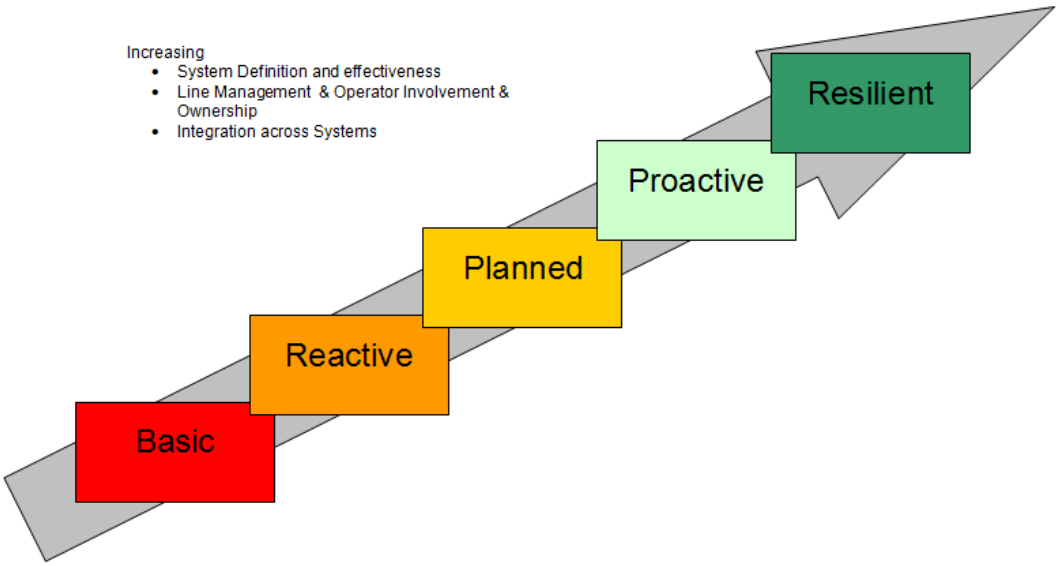

Figure 2: UK Coal Journey Model

The model was developed so that the bottom level has few or no standards in place, and as one moves up thorough the five levels they should start to see more of the requirements of the standards in place. This measure being in place is also about improved compliances with such standards, improved effectiveness and increased ownership of the standards by Manager, Supervisors and Operators. It should be noted that when examining the measurement system it was important that this could be applied at various levels within the organisation. It was also important that at an early stage we did not rely solely on Management views, but had a process that was more able to capture the Workforce views when forming a picture.

When developing the model it was also felt that it was important to recognise that different sites will invariably be at different places on the UK Coal Journey Model, and it was equally possible that the same sites may be stronger in some of the areas covered by the standards than others. One of the significant differences here is that the steps are seen as overlapping.

The journey model was designed not to be an audit tool as such, but to take each standard, and look at how each standard is implemented and what occurs in practice. A self-assessment question set was developed to allow sites to determine their own level of maturity (or how far they were "on the journey"), by making observations for each standard at each of the five levels. From this sites can look at the areas in which they need to improve and put together their own action plan to help these move through the levels.

As we started to develop the questionnaire that underpinned the 12 UK Coal standards it was very apparent that the questions needed to be wide ranging in order to achieve the overall aim. As a result it was not possible to ask one simple question at each step/element. To ensure that the most effective view was taken some elements within the model had to have up to four individual descriptions/question sets. The total number of questions/descriptions and their related subjects are shown in Table 1.

UK Coal Safety Way Element	**Question Set**
1. Leadership & Accountability	1. Safety Leadership & Commitment 2. Safety Management Adoption 3. Rewards of Good Safety Performance 4. Work Planning
2. Policy & Commitment	1. Safety Accountability 2. Safety vs. Production 3. Safety Responsibilities 4. Size & Status of Safety Department
3. Risk & Change Management	1. Major Hazard Risk Management 2. Work Site JSA
4. Legal Requirements	1. Awareness of Legal Requirements
5. Objectives, Targets & Performance Measurement	1. Setting of Targets 2. Monitoring & Accountability
6. Training, Competence & Awareness	1. Training & Competency 2. Assessment of Training

7. Communication & Consultation	1. Communications 2. Workforce Involvement & Consultation
8. Control of Documents	1. Document Control
9. Operational Controls	1. Jobs planning & Procedures 2. Control Measures & Corrective Actions 3. Maintenance 4. Daily Inspections
10. Emergency Procedures	1. Standard of Emergency Planning 2. Maintaining & Monitoring Response
11. Incident Investigation	1. Accident Investigation 2, Quality of Investigations 3. Follow up & Analysis 4. Hazard & Unsafe Act Reporting
12. Monitoring, Auditing & Reviews	1. Safety Performance Measurements 2. Monitoring & Auditing

Table 1 – UK Coal Maturity Model Question Set

A separate "actions" section was also documented, listing suggested actions and interventions that could be undertaken for each element moving up each of the four stages. This was to allow each site to identify actions that they could implement, based on their findings to move them up a maturity level, or to target individual areas that were lower than the average and move these to a new maturity level. The structured marking approach makes it impossible for an organisation to skip through steps, and the weighted element to the marking scheme makes it tougher to move between steps. This is constructed such that it drives the continual improvement element within underpinning organisational safety process.

Calibration and Results

The description and question sets within the model were put together with assistance from Camborne School of Mines and in conjunction with corporate Safety Colleagues from within UK Coal. In order to best test or "calibrate" the model an informal exercise was undertaken at one of the mines in January 2011, after some changes to simplify the language. After further modification the process was put into workbooks and each of the deep mines were surveyed during a two day programme during April 2011. The two days consisted of teams from the mine undertaking the self-assessment exercise facilitated by Camborne School of Mines. This exercise was then validated by carrying out a mine audit against the elements within the operational environment.

The results from each of the teams were collated and presented on a spider diagram. Figure 3 shows such a diagram produced from one of the sites. The S1 – S12 represents the timeline standards that are referenced in the table. It can clearly be seen that there were no elements that were deemed to be resilient (the outer layer in the diagram). Although the results were not particularly inspiring it did reinforce the view that as an organisation we are strong for action and that the "doing" part of the safety management system was also strong. The weaker areas came out in the area of leadership and accountability.

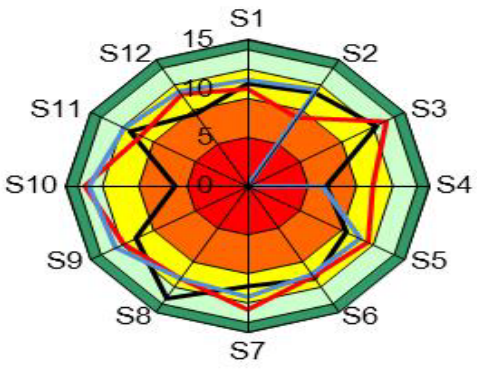

Figure 3 – Spider Diagram for UK Coal Deep Mine Sites

All the sites were asked to produce an action plan that would be used to start to address the weaker areas, with ownership for this plan being with the site Manager. An example can be seen in Table 2.

Standard/Element	Required Changes	Specific Actions	As Measured by	Responsibility
1. Leadership & Accountability (1.3 Rewards of Good Safety Performance)	Promote /celebrate significant safety achievements.	Newsletter Screen in concourse.	Accident free stats Specific Work Standards Achievements	Safety Department Line Management HR Manager
2. Policy & Commitment (2.1 Safety Accountability)	Utilise front line supervisors to drive safety and "buy in" to safety.	Managers Weekly Meeting with Officials Engineers weekly meeting Safety Accountability meeting	Observation Auditing	Line Management
2. Policy & Commitment (2.4 Status of the Safety Function)	Clearer defined roles & responsibilities plus expectations within the mine Management structure	HQ/Colliery Manager consultation Align to UK Coal Safety Policy	Compliance to Colliery Safety Action Plan	HQ/Colliery Manager
4. Legal Requirements (4.1 Awareness of Legal Requirements)	HQ Informing all line Management in new/changes to legislation	Email line Managers bulletin with changes to legislation Refresher updates for line Management (away from pit)	Compliance to all legislation, Company directives & codes & rules	HQ/Colliery Manager
7. Communication & Consultation (1. Communications)	Two way communication between Management & Workforce	Face & Development start up meetings All other meetings	Testing Knowledge Observations	Line Management

Table 2: Action Plan for Typical Deep Mine

As the paper mentioned earlier, one of the fundamental differences between the models used by other organisations and the UK Coal Journey model was the ability to recognise sites may have different standards at different levels of maturity. Table 3 shows the results by standard for the deep mines and demonstrates how the groups marking the workbook thought the different elements were spread.

SCORING FORMS Kellingley Mine

		BASIC		Reactive		Planned		Proactive		Resillient		
1. Leadership & Accountability	1.1. Safety Leadership & Commitment	1 1 2 1		1 1 2 1 3 1 4 1		1 1 2 1		1 1 2 1 3		1 2 3		
	1.2 Safety Management Adoption	1 1 2		1 2 1		1 2 1		1 1 2 1		1 2		
	1.3 Rewards of Good Safety Performance	1 1	3.6	1 2 1	3.3	1 1 2 3 1	2.0	1 1 2 1	1.6	1 2 1	0.1	10.5
	1.4 Work Planning	1 1 2		1 1 2 1 3 1		1 1 2		1 1 2		1 2		
2. Policy & Commitment	2.1. Safety Accountability	1 1 2 1		1 2 1		1 1 2 3 1		1 2 3 1		1 1 2 3 4 1		
	2.2. Perceptions of Safety	1 1 2 1	5.0	1 1	2.9	1 2 3 1	1.8	1 1 2	1.2	1 2	0.2	11.1
	2.3. Safety Responsibilities	1 1 2 1		1 1 2 1		1 1 2 1		1 2 1		1 2		
	2.4. Status of the Safety Function	1 1		1 2 1		1 1 2		1 1 2 1 3 1		1 2		

Table 3: Analysis and Results for the Deep Mine

It is interesting how, by applying this technique, we can combine all the operational sites from across the organisation and get a total score or indicator for the company. This is demonstrated within Table 4.

	Basic (%)	Reactive (%)	Planned (%)	Proactive (%)	Resilient (%)
1. Leadership & Accountability		17	50	30	3
2. Policy & Commitment		6	56	38	
3. Risk & Change Management		11	33	39	17
4. Legal Requirements		22	67	11	
5. Objectives, Targets & Performance Measurement	6	6	44	44	
6. Training, Competence & Awareness		11	67	16	6
7. Communication & Consultation		12	44	44	
8. Control of Documents			33	67	
9. Operational Controls		8	39	50	3
10. Emergency Procedures	11	17	17	38	17
11. Incident Investigation		3	53	36	
12. Monitoring, Auditing & Reviews	6	28	33	33	

Table 4: Analysis of Results from Surface and Underground Mines

By applying this type of process we can identify clearly the areas of weakness for the organisation, and work centrally on some common themes

to help address those weaknesses. The individual sites/departments can form plans to start improving their individual areas of weakness and, where there is overlap, work together.

Next Steps

The model has been used successfully to measure our start point as we aim to introduce the new safety management standards. We have individuals who are now familiar with the process and the intention is to run the exercise again across the surface and deep mine business with a view to informing the safety intervention strategy for 2012, both on site and as a Company. In a drive to capture the broadest view and best inform the plan the exercise will be run with groups of Operational Managers, Supervisors and Site Operatives. The exercise will again be run at the end of 2011 to inform the sites of their starting position in 2012. The intention of UK Coal is to expand the use of this model, using it routinely for audit as well as developing it to measure individual business functions or even individuals within those functions.

Conclusions

The Maturity model concept has already, through the work of Hudson and Fleming, been shown to be a useful tool for organisations to establish their levels of safety culture maturity. The model here differs slightly in that it is directly linked to the Company's own safety management standards. It has been successfully used by teams of Managers, Supervisors and Workers to look at the maturity of the safety management system at their site. In likening the maturity to a "journey" also helps makes the model more practical and friendlier to use. Whilst ultimately you would like to move forward together on the journey it does recognise that different sites will be at different places and it is often important at the early stage of any improvement that the weaker areas are targeted first.

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Hudson P (2003), Applying the Lessons of High Risk Industries to Health Care, Qual Safe Health Care 2003: 12 (Suppl) ppi7-i12

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Notes:

Notes:

‘Creating a Desired Culture’

David Vint

Introduction

ArcelorMittal is the world's leading steel company, with a presence in more than 60 countries. It is the leader in all major global carbon steel markets, including automotive, construction, household appliances and packaging, with leading R&D and technology. With operations in over 22 countries spanning four continents, the Company covers all of the key industrial markets, from emerging to mature, and has outstanding distribution networks.

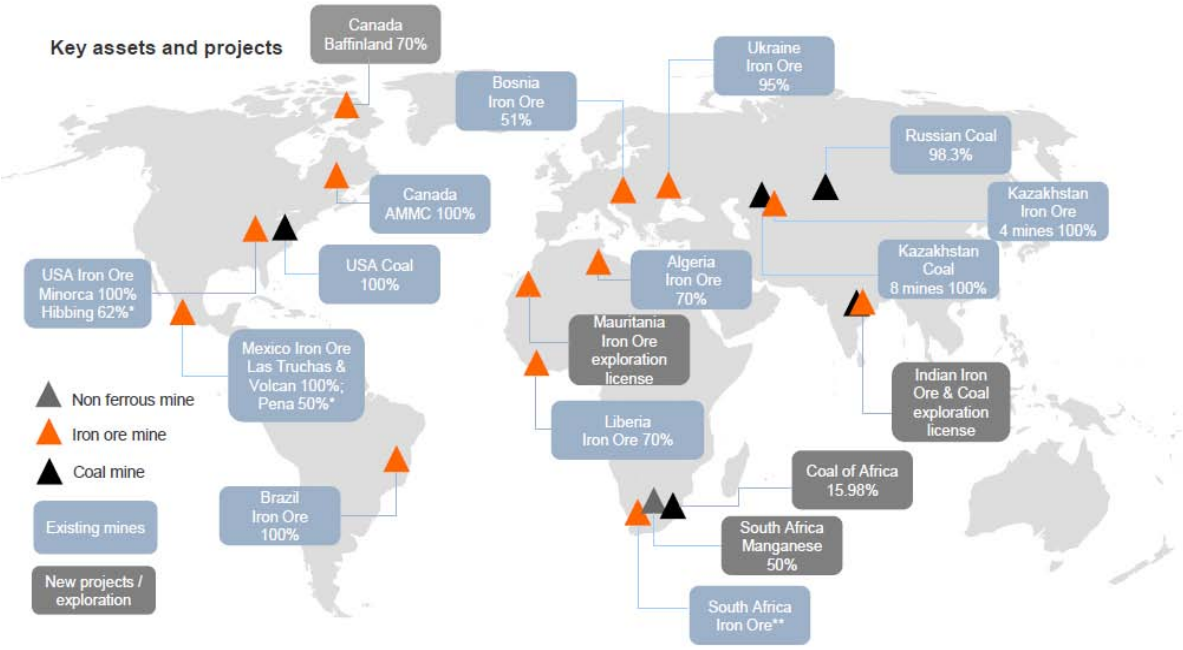
Through its core values of **sustainability, quality and leadership**, ArcelorMittal commits to operating in a responsible way with respect to the health, safety and well-being of its employees, contractors and the communities in which it operates. It is also committed to the sustainable management of the environment.

In recent years, in light of the concentration of the mining industry and raw material price volatility, ArcelorMittal has, and continues to pursue, a raw material self-sufficiency strategy, acquiring mining assets that is complementary to its steel producing activities.

Consequently the Group has built up a substantial resource base in iron ore and coal, which delivers savings in supply logistics and provides a measure of protection against price volatility. It is also a significant supplier of iron ore to external customers, thereby reducing the dependency of its mines on internal Group demand.

The mining business now has a global portfolio of over 30 mines in operation and development, and is the world's 4th largest iron ore producer. In 2011 the Group's mining operations produced 47 million tonnes of iron ore and 7 million tonnes of metallurgical coal.

At present, around 10-15% of production is sold to third parties and that figure is likely to rise.



While expanding and improving its operations, ArcelorMittal Mining has one overriding goal: **to become the safest operation among its peer group.** Improvements in safety have therefore been an absolute priority and substantial progress has been made.

ArcelorMittal was formed in 2006 by the merger of Arcelor and Mittal Steel. The company headquarters are in Luxembourg City, the former seat of Arcelor.

Following the merger the consolidation of the safety processes presented a formidable challenge. The different operations throughout the world had many different Health and Safety Management Systems and the aim was to prepare and implement a common foundation for excellence with world class Health and Safety goals. A comprehensive Health and Safety Policy was created and subsequently improved.

The policy is based on the following clear principles:

- That all injuries and work related illnesses can and must be prevented.
- Management is accountable for Health and Safety Performance
- Communication, involvement and training of all employees are essential in Health and Safety excellence
- Everyone has a role in preventing injuries and illnesses

- Excellence in Health and Safety supports excellent business results
- Health and Safety must be integrated into all business management processes
- Product Stewardship aiming at eliminating Health and Environmental impact for customers.

The success of this policy requires the permanent involvement and commitment of everyone working for and with ArcelorMittal.

The main focus is to drive down the number of employees and contractors being injured, without any distinction, on the **Journey to Zero** that started in 2007.

Journey to Zero

"Journey to Zero" is still being driven along as a core part of the ArcelorMittal safety strategy. JTZ was introduced to embed the Health and Safety principles of the organisation, to align the Groups approach to create a common language and share best practices. A framework for Health and Safety excellence was created using many of the systems that existed prior to the 2006 merger.

A number of these programs/processes are:

Incident Investigation and Root Cause Analysis

OHSAS 18001 Certification

Internal and External Auditing

Visible Felt Leadership – on the shop floor

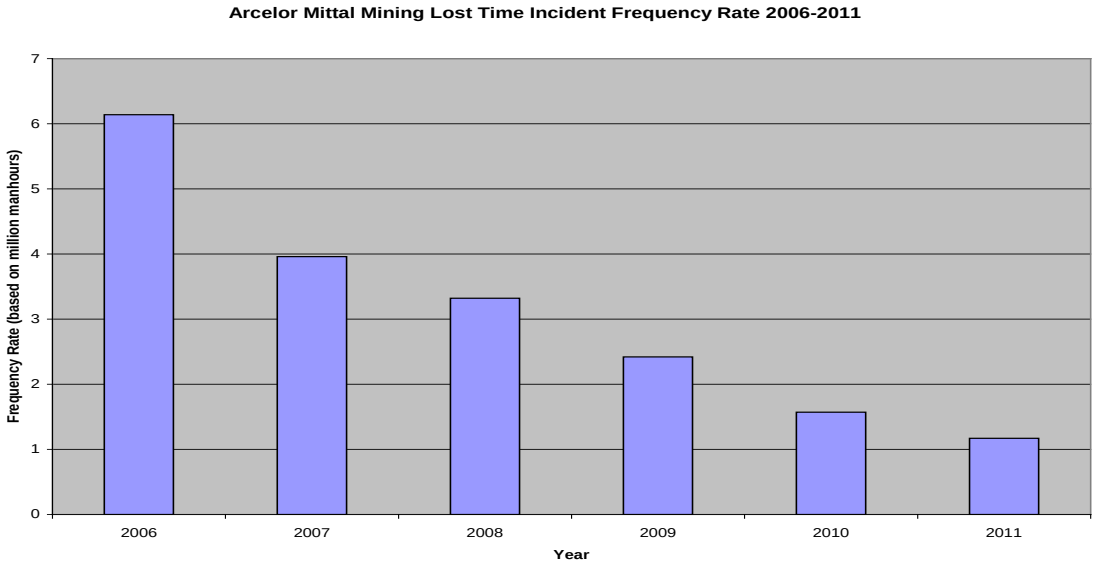
Hazard Identification and Awareness

Fatality Prevention Standards

- Working at Heights
- Isolation
- Confined Spaces
- Contractor Management
- Vehicles and Driving
- Rail Safety

Safety Performance 2006 – 2011

The drive to improve safety since the merger has resulted in a substantial improvement in the Lost Time Injuries with the frequency rate reducing from 6.14 in 2006 to 1.17 in 2011.



The rate of improvement began to decrease from 2008-2009, prompting senior management to ask '*What could be done next to sustain momentum*?'

Benchmarking

With a commitment to continue reducing the number of incidents and achieving OHSAS 18001 accreditation at all operations, further fresh ideas were researched to sustain the downward trend in the number of employees being injured. It was decided to see how ArcelorMittal compared with its peers. To do this a benchmarking study of mining safety leaders was implemented. The main purpose was to identify and examine their safety practices and cultures and research the methodology and innovation applied within each organisation to develop their culture of leadership. Fundamental to the approach would be interaction of the study team with people from all levels of their organisations, to gain an understanding of the impact the safety work had on them and the lessons learnt in the implementation.

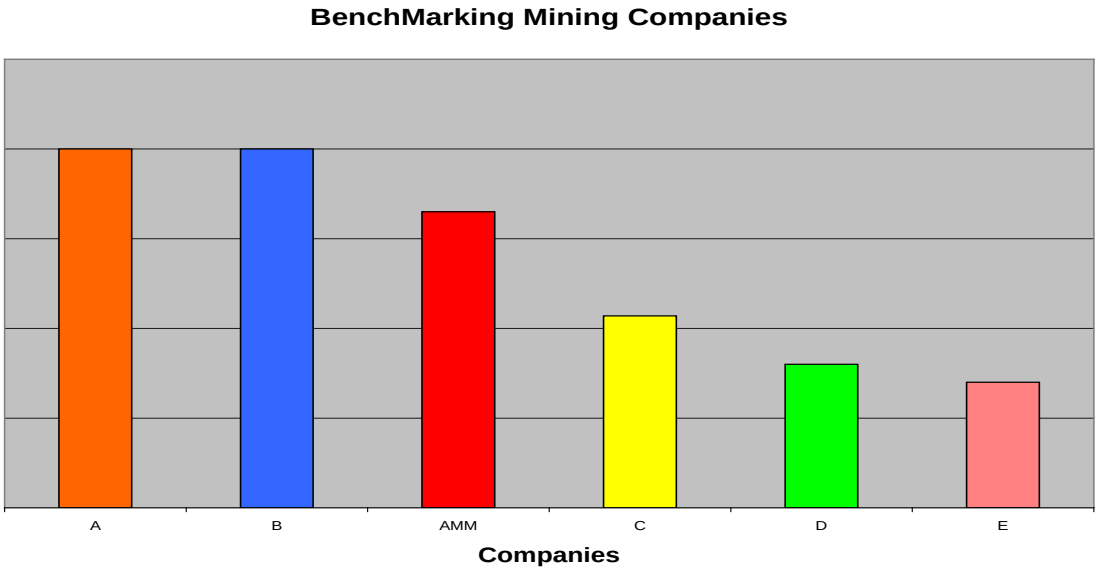
Consequently in 2010, a steering committee drawn from both the global operations and the corporate office was set up. It was decided to examine five comparable organisations. In the first instance Company A, a large

diversified resource company with major business units focused on copper, steelmaking coal, zinc and energy, who are also on a journey of transformation in safety leadership were approached. Following strategic discussions with them four other companies were chosen.

The companies were selected on the basis of:

- Their lost time incident frequency rate (LTIFR)
- Involvement in safety related activities
- Progressive public disclosure (how they presented themselves publicly; website presence etc.)
- Personal experience and that gathered from others (perceptions)

At June 2010 ArcelorMittal Mining had a lost time injury frequency rate of 1.65 based on 1 million man hours. This compared favourably with Companies A & B but lagged well behind the other companies. From this it was determined that the initial target should be to emulate Company C who were similar in terms of products being mined.



The study team visited the operations and corporate offices of the companies and undertook a thorough investigation of their safety organisations, practices and cultures. From this the following key findings were identified:

- All the companies had a clearly defined corporate strategy that was supported at the executive level.
- All the divisions / operations within the companies are following the clearly defined strategy
- All levels within the companies are visibly committed to improving their safety performance.
- All companies were showing sustained improvement in their safety performance.
- Each of the companies pursued a different path towards improved safety performance and yet all were seeing success in creating a culture of safety.
- Passion, commitment and focus were key success drivers.
- Strong leadership is fundamental to engaging the entire organization.

Company A had undertaken a similar benchmark study in 2008 and had identified the same key drivers. This showed that companies were continuously looking to improve their safety performance but the fundamentals in approach remained the same.

Strong leadership was found to be consistent from the CEO and down throughout the organisations. There was visible support to keep up the momentum on continuous improvement. Front line supervisors are key change agents and therefore their training is essential to ensure that the safety message continues through to the very tips of the organisation.

Values based management is essential in conjunction with good process safety controls. Although there is one global vision and corporate initiatives there has to be sufficient flexibility for country specific implementation. Programs and methods have to be fashioned to suit individual cultures; however the overall message must stay intact.

At the start it is vital to create a strong case for change and then to support it later by an environment of continuous improvement. Minimum standards have to be set and are regarded as the anchor points and are not negotiable. The work performance system must include safety as a key performance component.

Employee empowerment is very important. Individuals regardless of their position must feel confident to speak out if they are aware of any

potentially unsafe situations. They must have the power to stop a job if it is unsafe. Contractors should be included and managed as part of the safety culture work and treated the same way as employees.

Key measures have to be defined; after all you cannot manage what you cannot measure. There is a need for one reporting system that is assiduously followed to ensure that good and accurate analytics are obtained. A strong structure must be put in place to support the strategy. Being the 'best in the business' requires more than doing what everyone else is doing.

Excellent practices were observed at all of the selected companies. Every person regardless of their position is shown genuine respect. In depth quantitative and qualitative risk assessments are in place. There is an in-depth synergy between the implementation of ISO Standards, risk assessments and a high number of detailed safety audits; this integration produced significant added value. Individual employees had their own safety plans. Major incident investigations included Community Relations and there is a prioritisation of values. Behavioural matrixes are used to define expectations and leaders are given all the tools they need to drive the process. All the companies have fully developed management systems which provide a consistent and integrated approach across the business including structure, people development, processes and systems, culture and leadership.

The following was the overarching conclusions from the benchmarking study

- A safety leadership program is more than a Health and Safety Management system. It requires careful attention to standards, but also includes values and beliefs; communication; leadership development; and assignment and alignment of accountability and authority.
- There are real business benefits to the creation of a safety leadership program. Virtually every benchmark company indicated that the investment had a tangible ROI.
- Business benefits include fewer lost time incidents, fewer absentee days, lower voluntary turnover, enhanced production, easier access to capital at less cost, and enhanced reputation etc.

After reviewing the performance of the leading companies and reflecting on ArcelorMittal's own safety target *(Journey to Zero)* ArcelorMittal Mining committed to the development and implementation of a true safety

leadership program based on a common safety vision with common values and shared beliefs, called Courageous Leadership.

Courageous Leadership

Following the Benchmark study, the process of implementing its primary recommendation of instilling Courageous Leadership throughout the Mining Organisation was developed. In the second half of 2010, the overall process was devised and the pilot sites were chosen with key milestones defined. Detailed design work for the leadership process also began. Intertek a consultancy expert in, creating safe operations and performance were recruited to collaborate with the ArcelorMittal Mining team to develop and support the implementation of Courageous Leadership.

In 2011, Courageous Leadership process was implemented at 3 sites in the Americas.

In 2012, 5 other regions are scheduled to implement Courageous Leadership. At the end of March 2012 over 5000 employees, (senior leaders, managers, supervisors, contractors and hourly paid employees) will have participated in the training.

During the period 2012 to 2014 it is intended refine and test the process to ensure sustainability, continue with leadership development and embed the values based system of active listening and caring.

Courageous Leadership is not just about safety it is about creating a culture that supports the strategies, goals and tasks that are put in place, a culture that aligns with our vision, caring for our people.

ArcelorMittal Mining initiated the journey by painting a clear picture of success, a picture describing the future…the future of success

'To create value through operational excellence and profitable growth

while caring for the environment and our people,

maintaining, ***SAFETY FIRST ALWAYS***'

ArcelorMittal Mining Vision

'*Leadership, Quality, and Sustainability'.*

ArcelorMittal Core Values

The implementation of Courageous Leadership is designed to create the desired culture that supports these core values and realises the vision.

Setting clearly defined expectations is imperative in laying the groundwork. In the words of leadership guru John Maxwell: "leaders have the courage to take actions where others hesitate".

Courageous Leadership has been defined in ArcelorMittal Mining as:

- **Valuing** people above all other priorities
- **Believing** we can reach zero injuries
- Bringing a positive **attitude** to work
- Eliminating at-risk **behaviours**
- Creating a desired **culture**
- Facing **challenges** with determination
- Accepting the responsibility of **leadership**
- Having the **courage** to make the commitment

The culture of Courageous Leadership is being clearly defined through ongoing communication from the top down and a series of interactive training sessions. At its core is the goal of zero incidents and a belief that creating a culture about care, engagement and empowering people plays a major role in ensuring every person goes home in the same condition every day.

This process of creating a culture of Courageous Leadership is not one of ticking boxes or form-filling. Courageous leadership is not a programme. It is the foundation of a culture of caring aligning with our vision and underpinning the determination to do the right thing under any and all circumstances. It empowers people to speak up when at-risk behaviour is encountered.

Key to the success is helping employees move from a culture of compliance to one of belief, a belief that they are truly of value which changes their behaviours ultimately impacting business results. This concept is heavily reinforced in the Courageous Leadership training sessions. Once an employee believes in the values and vision of the company, they become courageous advocates of change who are willing to speak up when a potentially dangerous situation arises.

In Kuzbass, Siberia where courageous leadership training has now reached supervisor level, the results are beginning to be really felt. As one trainer said,

"We are now beginning to have a true group of courageous leaders. This was the best day of training so far, and the most rewarding. It felt most humbling to have supervisors meet me at the end of the day with tears in their eyes, thanking me for the session."

Courageous Leadership is about having the courage to commit to not only creating, but sustaining a culture so strong when someone new comes into the organization, the culture embraces them, below is such an example…

It was late in the day and the visitor was becoming quite weary but requested to attend the evening shift change meeting. Prior to entering the small meeting room, closed off from the actual work area, a large bus pulled up, full of what looked to be the next shift of the mine's employees. They got off the bus, joking and talking, obviously knowing each other well. A team of about four walked directly into the room, where they met another group of four or five, who obviously had just finished their shift -- judging by the 'worn-out' look on their faces.

The meeting leader began speaking about the day's events going around the table, getting everybody's feedback. He included the visitor waiting patiently for a response followed by what seemed to be a transfer of jobs to the next shift. He took the time to listen to everyone's feedback around the table by asking open-ended questions to ensure they had the opportunity to describe their understanding of the jobs to be performed for the day.

There was one young employee who participated but was obviously not as talkative as the others during the meeting. At the conclusion of the meeting, the visitor requested he stay a few minutes for a short discussion.

He looked a bit nervous, not knowing who the visitor was but the conversation started off with an introduction and explanation including the purpose of the discussion: to gain a better understanding of the culture of the mine.

When the question, "What is more important here at this mine…production or safety?" he responded without hesitation, "safety" followed by an example of a personal story when he participated in a shift change meeting and wasn't able to articulate his understanding of the hazards of the job about to be performed. "Because my supervisor didn't feel comfortable with my understanding of the job's hazards, he took the time to go out

with me to show and make sure I understood the hazards. In my opinion, this action says it loud and clear, safety comes before production."

The visitor wrote quickly as the employee continued to tell stories. At the end of the conversation, the visitor thanked the employee for his time. As the employee grabbed his hard hat to leave, the visitor asked one more question, "I forgot to ask you...how long have you been working for this organization?" "Seven days," the man said. "Seven days?" the visitor responded as if it wasn't clear. "Seven days."

This is an example of how quickly a strong culture can permeate through an organization. This ArcelorMittal Mining employee works at the Brazil mine site and after only seven days has already experienced the leadership skills required to create a culture of Courageous Leadership. By taking the time out to demonstrate the expectations; that is, the importance of safety by going to the worksite and personally showing him the hazards that exist on the job, this supervisor is showing this new employee that he is valued and we do not want him to be hurt. This is an example of Courageous Leadership.

Courageous Leadership Implementation

Many employees of ArcelorMittal Mining have been exposed to Courageous Leadership at this point. In fact, since June of 2011, the Courageous Leadership underpinning principles have been communicated to everyone in Brazil, Canada and Princeton Coal Operations, USA. The process is now being rolled out in Severniy Kuzbass, Russia. This is close to 5,000 people in six months. It is creating excitement and a sense of urgency within the organization where people are curious and want to know what it is and when they can take part. The structure of the intensive training sessions starts with the senior managers at each site, followed by supervisors – who in turn train all employees and contractors on site through a network of trainers.

Recently a senior team of leaders from Baffinland Iron Ore Mines began the journey to building a culture of courageous leadership from scratch, which they will extend to the Mary River Project site in Nunavut, Canada. The operation is located in the Qikiqtani Region of Nunavut on Baffin Island and is in its first stages of development. Here there is a tremendous opportunity to create a culture from the ground up. Standards and symbols will be set that will ultimately form part of the culture at Baffinland.

Later in 2012 similar training sessions are scheduled to take place at ArcelorMittal sites in Kazakhstan, Liberia, Mexico and Minorca, and the USA.

ArcelorMittal Mining has made the commitment to ensure everyone within the mining division is engaged and participates in the Courageous Leadership process. The process has been developed to be delivered consistently to clearly define ArcelorMittal Mining's behaviour expectations that support our vision. ArcelorMittal Mining as a whole are taking on the challenge of embedding a health and safety culture that will go well beyond complying with rules and regulations to one of belief.

Notes:

Overcoming the Challenges of Developing Safety Culture and Safety Leadership.

Dan Terry

Introduction:

1. Developing a safety culture and leading it in today's ever changing work environment is thwart with challenges for many organisations, they can range from;

- *We have always done it this way,*
- *Why should I bother - what's in it for me,*
- *Poor or little communication on safety and health issues,*
- *Apathy,*
- *Little or no visible safety leadership,*
- *Mostly reactive to safety,*
- *The cost, production vs safety,*
- *Production pays the wages*
- *Just another safety initiative, we will be back to normal soon!*
- *Attitudes, beliefs, - safety is not my job role.*
- *Can't see the benefits*
- *Slows us down incorporating safety aspects*
- *Etc, etc.*

a) **Overcoming the challenges** - Effective communication is vital to get staff and contractors aligned and working towards a more positive health and safety culture. This should be ran like a mini advertising campaign

b) **Define your target audience** -work out the best ways to communicate to them. For example: *male workers aged around 20 - 50 years* tend to prefer a visual communication style.

c) **Consistent, clear message** - Our organisation has used a process called Safety Training Reinforcement Process (STRIP) this helps promote the same standardised safety messages and the best positions to place them with embedded positive commands for maximum effect and ensure that all departments are aligned with the message and do not send out conflicting information,

d) **Displaying the behaviour we want to see** - One of the key messages is to get employees and management to really understand the impact of their own behaviours, so your signage needs to reflect this around site, many people will say that they don't work.

I believe if you have the right positive message in the right place you have a better chance of the desired behaviour, however it must be stressed that everyone on site adopts a safe behaviour approach even when production pressures prevail, this is a hugely important area, otherwise potentially doing things unsafe can and will encourage others.

e) **Multiple safety signage placement** - This means you have a consistent safety message or behavioural theme and you repeat it in multiple places, - control rooms, top and bottom of stairwells, induction rooms, changing rooms just before potential hazardous areas etc.

2. Communication

I remember a few years ago being inviting in to an organisation to carry out some behavioural awareness training, to enable staff to understand behavioural aspects However the management did not feel they needed to attend as they had been on a short course some time ago and were very busy at the with a new project.

This was never going to be enough as its crucial that the senior management are onboard. How all management and staff communicate and act day to day is the key as the majority of communication is not just about what we say it's about our daily visible actions. The vast majority of work in overcoming the safety challenges is carried out at site level with an employee led behavioural safety programme, but will hugely benefit from the senior managements input on a daily basis.

The main objective of developing a safety culture program is to align key values and behaviours. But how does a safety or human resources professional change values towards health and safety or improve the way people undertake procedures/tasks?

The secret to developing a safety culture lies in its leadership, from the very top of an organisation right the way through to the shop floor level. Senior management need to set the direction and include influencing middle managers to implement the strategy.

3. Effective Safety Leadership;

Effective safety leadership requires visible and active commitment with regards to health, safety and environmental concerns, we already do this in the areas of production and quality so there is no reason why this cannot be brought into health and safety arena.

We need to see the wider picture, I realise it is sometimes hard for staff in an organisation to see the return on investment (ROI).

Doing things proactively does take commitment, resources and time; however dividends pay off, as a recent study shows the average payout for injuries is on the increase not to mention fines etc.

a) Involvement

- Talking and involving the workforce in the decision making process.
- Not just talking about production or quality, talking about safety and health issues in their area, ask them their own thoughts be open, take notes, act upon the valid points raised, show commitment.
- It is often the smaller things in life can have the biggest impact with regard to employees and contractors.

b) Establishing effective communication and approach to the Health and Safety systems, i.e. Safe Systems of Work, Risk Assessments etc.

- Ask how they are getting on with the risk assessments, what challenges they have, how have they dealt with them?
- Listen first to be understood, many leaders know how to listen for what are sometimes hidden issues.
- Show you are interested in them as human beings not just the workforce; I like to use names when I can.
- Establish trust with each department, and show loyalty

c) Integrating and engaging the workforce in the promotion and achievement of safe and healthy conditions.

- Ask as to their health, one person I know is always pleased to see me on walk rounds as I ask about eczema issues how he is getting along with the new protection.
- Always be approachable, and take the time out, top safety leaders and management realise this, everyone is always busy it part of our work lives, so when someone does take the time out and gives you a little time, it sends a powerful message as to the importance of safe behaviour..
- Clarify expectations with your staff on what you want to see with regard to health and safety issues.

d) Effective "upward" communication, on all safety, health and environmental matters.

- Encourage people to speak up about issues they have, this can take a little time, keep building that all important rapport to create a culture to be proud of.
- Ensure you get some feedback to the individuals concerned
- Listen first to understand the whole situation – people complain about people talking too much but never about listening too much!
- Ensure feedback is acted upon

e) Identify and review the quality awareness/training with regard to safety and health issues

- Is the training or awareness being delivered - internal or external, does it have value, and have the learning's been adopted at the relevant levels.
- Does the training really make people work safer, or is that just part of the overall strategy, and managers should help to re-enforce this.

f) Ensure a consistent message across all departments with workforce involvement and encourage rather than cajoling

- How do you ensure everyone understands you're serious about health and safety issues not just production or quality.
- Anyone can be re-active
- Are all the notice boards up to date with the same sort of information?

4. The one thing that changes everything.

a) This is the one thing that is common to everyone and every organisation, and if taken away can destroy governments and the most successful businesses – that is TRUST.

Low trust organisations have safety and health issues around;

- People distort and manipulate facts
- People withhold and hoard information
- Some people are involved in the blame game
- People pretend dreadful things aren't happening or in denial
- Mistakes are covered up and not reported
- Morale is low with under reporting
- People feel unproductive tension
- Higher absenteeism

b) On the other hand if developed and implemented in an appropriate manner it has the potential to create unparalleled success, this is unfortunately missing in many organisations.

However in high trust organisation we find;

- Information is shared openly
- Transparency is practiced
- Genuine mistakes are tolerated and learned from

- The safety culture is creative
- People talk straight
- There is real communication and collaboration
- People are loyal to those who are absent
- Open and honest dialogue
- There are few meetings about meetings
- Lower absenteeism

f) **The traits of trust**

All of the traits have a sweet spot as illustrated by Stephen M R Covey in his book 'The Speed of Trust'.

Remember you can go too far with each of the traits that is straight talking must be balanced by demonstrating respect, you don't want to talk straight like a bull in a china shop, showing blatant disregard for the feelings of others, you must hit the sweet spot, not too little and not too much.

Any strength used to an extreme can be a weakness.

Leading a behavioural change programme is more than just visible behaviour it the whole approach as in trust, listening skills, integrity, honesty, confidence in the process, drive, etc. your management's daily actions make a world of difference.

What are the traits of trust?

- Straight talking- with the staff and other management
- Demonstrate respect -with all staff and contractors
- Create transparency
- Right wrongs
- Show loyalty
- Deliver results
- Confront reality
- Clarify expectations

- Practice accountability
- Listen first
- Keep commitments
- Extend trust

g) **Celebrating success with the workforce through recognition**

- Celebrating success in the workplace is extremely important
- Employees need to feel positive about their contribution to an organisation
- Safety Leaders have a role to play in helping managers celebrate with their teams

5) The 80/20 Principle

What is the 80/20 Pareto Principle?

The 80/20 Principle asserts that a minority of causes, inputs or efforts usually lead to a majority of the results, outputs or rewards. Taken literally, this means that, for example, 80 per cent of what you achieve in your job comes from 20 per cent of the time spent. Thus for all practical purposes, four-fifths of the effort – a dominant part of it – is largely irrelevant. This is contrary to what people normally expect.

The health and safety behavioural field is no different; by adopting the behaviours outlined will certainly go a long way to being the change you want to see, a well designed, well communicated and well implemented safety initiative will survive and cultivate fruit over time.

So the 80/20 Principle states that there is an inbuilt imbalance between causes and results, inputs and outputs, and effort and reward. A good benchmark for this imbalance is provided by the 80/20 relationship: a typical pattern will show that 80 per cent of outputs result from 20 per cent of inputs; that 80 per cent of consequences flow from 20 per cent of causes; or that 80 per cent of results come from 20 per cent of effort.

The value of the Pareto Principle for a manager or safety leader is that it reminds you to focus on the 20 percent of safety issues that matter. Of the things you do during your day, only 20 percent really matter. (In most cases)

Those 20 percent produce 80 percent of your results. Identify and focus on those things. When the fire drills of the day begin to sap your time, remind yourself of the 20 percent you need to focus on. If something in the schedule has to slip, if something isn't going to get done, make sure it's not part of that 20 percent

In business, many examples of the 80/20 Principle have been validated.

- 80% of accidents stem from 20% of identified safety concerns
- 20 per cent of products usually account for about 80 per cent of the pound sales value.
- 20 per cent of products or customers usually account for about 80 per cent of an organisations profit.
- In society, 20 per cent of criminals accounts for 80 per cent of the value of all crime
- 20 per cent of motorists cause 80 per cent of accidents.
- In the home, 20 per cent of your carpets get 80 per cent of the wear.
- 20 per cent of your clothes will be worn 80 per cent of the time.
- And if you have an intruder alarm, 80 per cent of the false alarms will be set off by 20 per cent of the possible causes.

6. Designing a Programme:

Any programme needs to take into account the cultural maturity of the organisation, and ascertain what;

- Programs or initiatives have been carried out before
- How successful was it?
- Were all levels involved in the process
- Did the employees buy into it?
- How was it communicated?
- What are the trust levels within the organisation?

Start by examining the organisations challenges and how to overcome them, this would include the development of a key event schedule with resources etc.

Below is an overview of some of the initiatives that examine the critical importance of overcoming the safety challenges and leadership issues, including the following;

- Setting direction
- What is alignment
- Morale issues
- Buy-in all levels
- Resources to achieve success
- Clear roadmap, celebrating results
- Visible commitment especially from senior mgmt.
- Walk the talk, top down bottom up
- Overcoming silo cultures
- Tipping point
- Invent once use many times
- Courage to speak up
- Right people for the role
- Good rapport builders
- How to listen
- Able to follow through
- Use the traits of trust
- Walk the talk
- Asking the right questions
- Wiliness to follow through, persistence
- Take initiative, speak out and be accountable
- Ability to lead safety and encourage others

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References:

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Notes:

Notes:

A Career in Coal

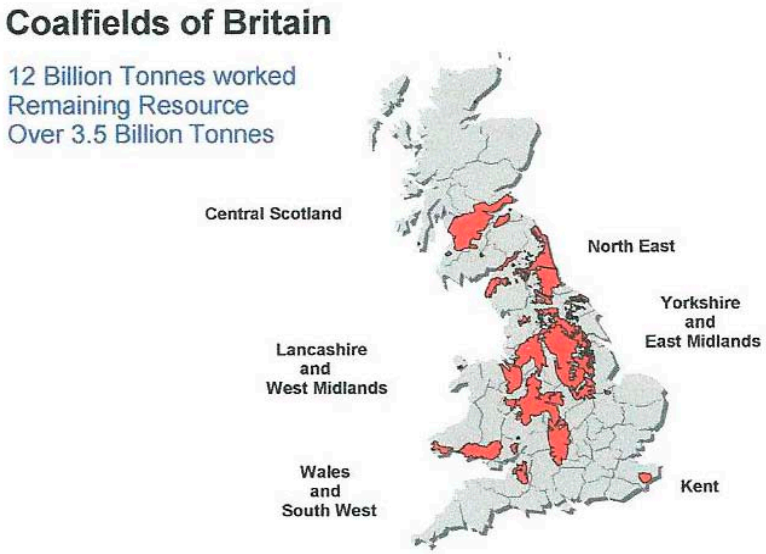
Ian Wilson

The History of Coal-Mining.

From Ancient.....

.....To Modern

Minerals have been extracted in the UK for over 2000 years and coal has perhaps been the most prolific in terms of its value, its importance, its widespread availability and almost certainly in the volume of mineral extracted. It is estimated that more than 12 billion tonnes have been extracted within the UK.



The earliest known evidence of coal-mining in Britain is associated with the Roman occupation from traces of Nottinghamshire coal found on Roman campsites on the Lincolnshire Fens where it is believed to have been used in smelting.

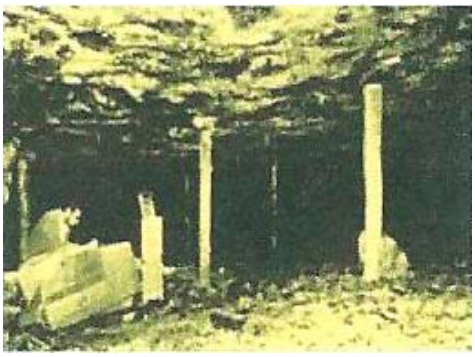
Whilst coal has provided an integral role in keeping the nation's homes heated for centuries, its role in industry as a facilitator of technical development is widely acknowledged and on cold, still, winter days it is often required to provide over 40 % of the nation's energy demand.

As minerals can only be worked where they exist, communities, villages, towns and whole regions developed to enable people to live within acceptable travelling distances of the mineral workings and in order that commerce could take place in the most appropriate locations. Few minerals have caused such an impact on regional development as coal.

Whilst the presence and geography of coal outcrops and the crude meanderings of shallow mining from bell pits and adits provided the first focus of both surface and underground development, technological advancement in mining methods, the sinking of shafts, steam winding, pumping and ventilation, rapidly allowed coal to be mined at significant depths previously regarded as impossible.

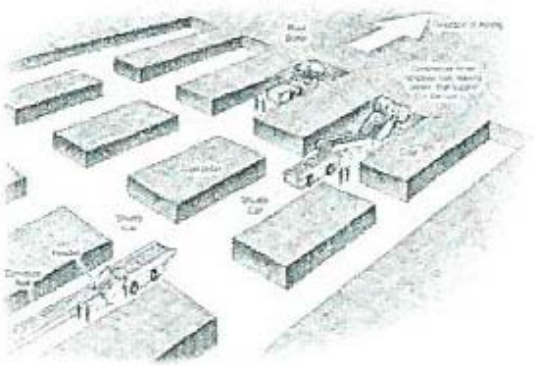
Bell pit mining along crops was prolific throughout the coalfields and the joining up of underground excavations, either by accident or by design created the basis for pillar and stall working and partial extraction systems some of which are still used today.

Partial Extraction Extended

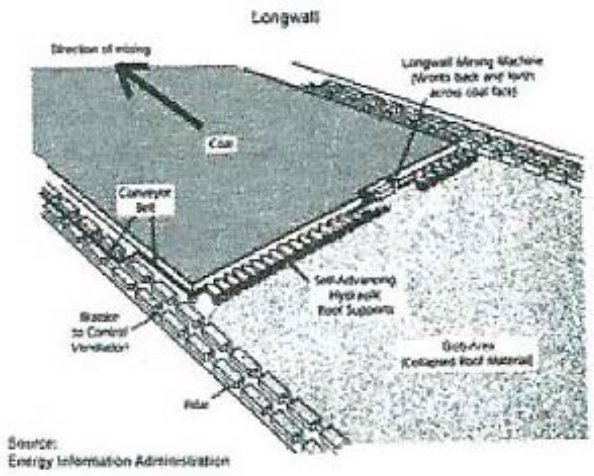


Eventually Longwall Developed to Wider Rooms

The development of early longwall working was probably little more than a progression of stalls being joined up to create wider areas of extraction. The development of systems of support to the roof of the workings enabled wider areas of coal to be progressively removed.



Modern Pillar and Stall



Modern Longwall with Chain Pillars

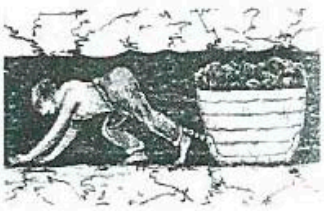
Throughout the last three centuries mining techniques were improved and extended and whilst most areas adopted variations in extraction techniques the principal system of longwall mining improved production significantly to meet an ever increasing demand for power heat and energy.

The final variation which was developed on the longwall theme was the retreat mining system. This system prevails today as the mining methodology of preference in order to maximise production and minimise costs and risk, by proving the ground to be worked in advance of the working face.

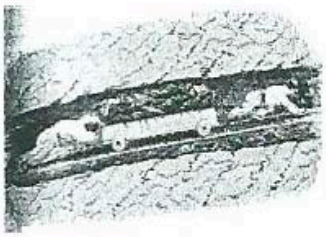
However, modern, highly mechanised pillar and stall working also has its place in providing lower capital intensive production with a higher degree of flexibility.

Transportation.

Hand Crarried

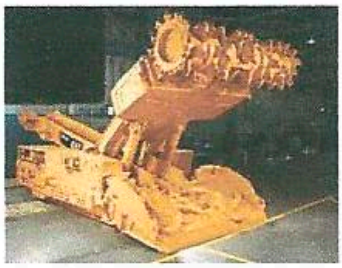


Sledge Being Dragged



Tubs Being Dragged

Transportation systems for moving the coal produced underground similarly developed over the same periods. From the early methods reliant on manual lifting, carrying, or dragging of the coal, to the introduction of small gauge wheeled wagons which were originally pushed and pulled by men, women and children, through to the use of small ponies and thereafter mechanical haulages, locomotives and steel and belt conveyors and combinations of shuttle cars and heavy duty steel reinforced conveyor belting.

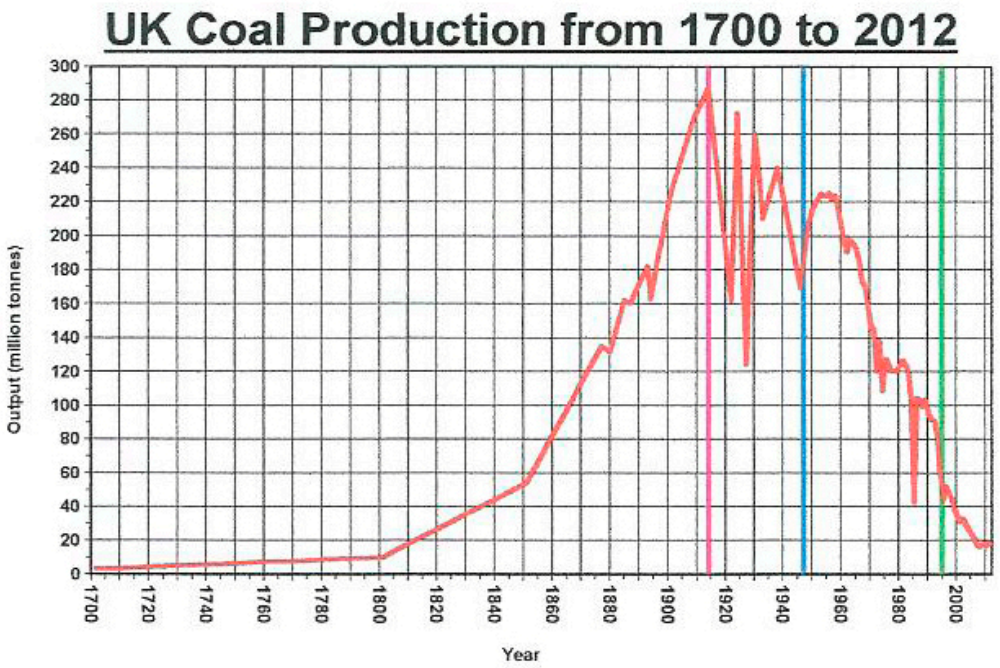


Early transportation of coal from mines to markets similarly developed from manual effort through the utilisation of horse power, to railways, roads,

canals and ships, some journeys often involving combinations of some or a number of the options.
Today coal is produced and transported around the world and traded as a commodity like any other mineral or material.
Coal as a bulk commodity is no longer reliant on local markets and can target and serve markets globally to maximise value.

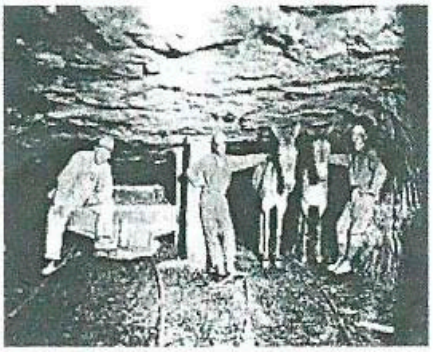
Production.

Coal production figures for the UK are well recorded over the last 200 years but for the 400 or so years prior to that time little is documented.



By the turn of the 18th century less than 3 million tonnes of coal were produced each year. That figure rose modestly to 10 million tonnes over the next hundred years, but then the industrial explosion of the 19th century saw that figure rise to 54 million tonnes by 1850 and 225 million tonnes by the turn of the 20th century The peak output year of 1913 saw almost 300 million tonnes being produced by over 1 million miners in 3000 mines.

Production	290mt
Collieries	3000
Employees	1,000,000
Companies	1500
Mineral Owners	4000
Deaths	1000
Serious Accidents	5000



These 3000 mines were owned by 1500 different companies and the coal was in the ownership of over 4000 mineral owners who were receiving between 2p to 5p per ton royalty on coal which was being sold at the pithead for 50p per ton.
At this time there were over 1000 deaths and 5000 severely injured per year in mining.
It is interesting to see where all that coal was being used.

Here is an approximate breakdown:

- Railways 15.0mt
- Coastal Ships 2.5mt
- Factories 60.0mt
- Mines 20.5mt
- Iron and Steel 31.0mt
- Other Metals 1.3mt
- Brick Works 5.7mt
- Gas Works 1.8mt
- Domestic 35.0mt
- Exports 90mt

Despite a momentous start to the 20th century a number of issues adversely impacted on a tired, under-capitalised and disparate industry governed by individuals and companies with differing, but all important, commercial

drivers which pervaded employment, safety and overall conditions both in the mines and in the social welfare, housing and educational standards of those working in the mines.
The massive effort by UK miners during WWI was disappointingly rewarded by a significant reduction in demand for UK coal and significant un-employment and hardship which was to last for many years. The mid-war and post-war years suffered from a reduction in replacement infrastructure and machinery and a loss of young able-bodied men to work in the mines.
By 1920 a reduction in output of over 80 mt per year was impacting the industry but wages had doubled and company profits had matched that increase. Against such a background, employment was bound to fall, all at a time when technical development fell short of what was needed to take the industry forward and investment in new projects was lacking.
The 1926 strike saw production fall to a new low of 120mt. Less than half of the level produced in 1913.
These levels demonstrated an impact on the industry even greater than WWII.

Nationalisation

Nationalisation brought order to chaos and a consistency of approach never before seen in the coal-mining industry and standardisation, albeit at a price, brought stability and a new vision to an industry previously dogged by fickle markets, fickle owners and a workforce governed by feudal principles.
Nationalisation enabled royalties to be abolished, waste coal to be reduced, technical advancement through initial adoption of best practice and the removal of barriers between mines, both physical and commercial.
Additionally centralisation of resource for pumping, transportation, coal blending and washing resulting in reduced waste and optimisation of existing facilities, brought huge benefits whilst bulk purchasing brought benefits of critical mass.
Post Nationalisation saw a period of significant investment in manpower, resources, training and education for all, new collieries opened and old ones improved way beyond the ability of private ownership.

Where are we today in comparison to 1913?

By comparison 100 years on we see that :-

- 80% of coal use in UK is for Power Generation
- 10% of coal use in UK is for Coke,

- 10% of coal use in UK is for Heat Transfer.

The UK Fuel Mix still requires a considerable contribution from Coal which can reach or even top 50% on cold, still days when demand is high.

Energy Source	%
Coal	29
Gas	44
Nuclear	17
Renewables	8
Other	2

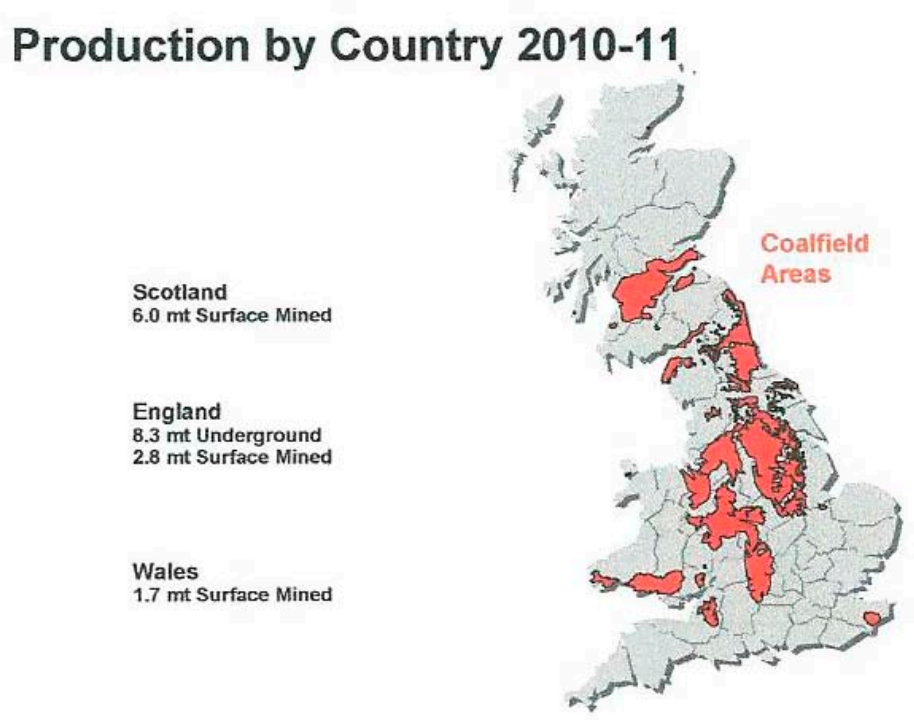
UK Coal demand is still significant. We use over 50 mtpa and produce less than 20mtpa
The point to take on is that we import 10mtpa more than we produce. UK is a good market and therefore a good place to produce coal in.

Where does our coal come from?

A rough breakdown for imports shows that :-

- Russia 10mt
- Columbia 6.5mt
- USA 4.5mt
- Australia 3.5mt

In UK we still produce coal !!!



Scotland	6.0mt	Totally from surface mining. Canonbie may change that.
England	11.1mt	8.3mt deep mine.....2.8mt surface mining. Will the mines keep going, single face strategy and under capitalisation provides a huge risk.
Wales	1.7mt	Mainly from surface mining The position is changing. Unity, Aberpergwm, Margam, Ocean.

There are 14 underground mines in operation. 3,500 people are employed by deep mine operators producing 8.3 million tonnes of coal in 2010/2011. There are 32 surface mines which employ 2,500 people and produce 10.5 million tonnes.

Alternative Energy from Coal.

A major question to be considered is what role energy from coal is going to play in the future. Around the world traditional coal production is continuing and in many countries expanding significantly. China and India are increasing coal production and coal use dramatically.

World coal production is about 6.3billion tonnes per annum, China uses over 3Bt, USA less than 1Bt, with India closing fast behind the States. The rest of the World only uses about 1Bt.

Coal Mine Methane has been successfully developed on a number of sites by Alkane and Green Park in UK, however, as minewater levels continue to rise throughout UK, gas emissions are cut off and long-term, methane emissions will reduce to a sub-economic level.
Commercial Coal-bed Methane extraction is being effected by Igas, who are pushing on to increase the number of projects in the North West of England. Other companies will be progressing projects as gas prices rise.
A significant number of companies are considering Underground Coal Gasification, with about 18 licences issued around the coasts of UK. However, no-one is yet down the path of carrying out a pilot project which I personally believe will need to be on-shore in order that the full impacts of the concept can be properly evaluated in order to gain environmental and social acceptability.

Shale Gas.

There is so much opposition to this option from environmental groups that the concept is banned in many areas of the world and fracking, which is an integral part of the process, is unlikely to be permitted in UK for some time, if ever.
Nevertheless it has the potential to provide a huge gas resource worldwide and it is doubtful whether opposition will be sustained as other options are closed off.
Whilst 12Bt is the estimated figure for total coal production in UK since mining began, it is worth noting that China is using 25% of that figure each year and increasing.

My First Steps into Mining.

In June 1970 I began my career in mining and after a month of basic training I became a Student Apprentice Mining Surveyor at Bagworth Colliery in Leicestershire.
Mining was an alien concept to me as whilst my paternal grandfather had spent a few years in coal mining, other family members had steered clear of the profession regarding it, even then, as something of an occupation for others. My mother often asked me in those early years if I wouldn't like to do something a little cleaner!!!

I loved it from the start and although I narrowly missed being seriously injured in what could have been a very serious accident within the first few weeks, I don't ever remember wanting to leave the industry of my first choice. I regard myself fortunate that in over 40 years I have never had a job I didn't enjoy.

The coal industry of the 1970's was still a huge business and the concept of coal at any price was very much the order of the day. Production was still around 150mtpa.

Bagworth Colliery, like most of the others in Leicestershire, was well over 100 years old when I arrived and it managed to survive, in spite of my efforts, to be the last colliery in Leicestershire, closing in the early 1990's.

Having worked for so many years it had explored and removed coal from a multiplicity of seams and for the remaining 20 years focused on the shallowest seams of the geological sequence.

Given my height I was delighted to find that the thinnest seam being worked was about 1.5m high and the others seams significantly thicker.

During my time at Bagworth from 1970 -1976 the mine developed thick seam working up to 3.2m high by extracting the combined Five Feet and Splent seams. This happened over a period of many months thanks to the vision of the colliery manager, Stuart Skelding, the understanding and co-operation of the Inspectorate and the tenacity of the colliery surveyor Frank Goddard who managed to keep them from strangling each other as the process developed and proved its acceptability.

Improvements in production at Bagworth were always under consideration and the early 70's were busy changing times. Putting aside overtime bans and strikes the colliery wanted to search out new areas to mine but being limited by Ellistown Colliery to the north and Desford Colliery to the south, Bagworth had to make the most of their east - west opportunities.

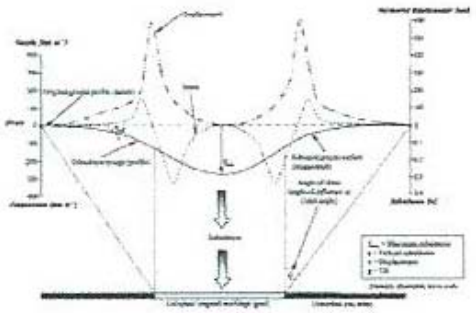
Even those were limited by the Thringstone Fault, a 1000m reverse upthrow in the east and the water-bearing triassic strata to the west, yet it was there that a new approach was trialled and for many months, forward and vertical drilling proved the ground safe to enable the mine to work nearer to the trias than ever before.

Eventually by proving the trias was not an inrush hazard Bagworth was allowed to work all the way to the incrop, releasing many millions of tonnes of coal which otherwise would have been sterilized and this concept, similarly enabled Ellistown Colliery, where I worked from 1976 to 1982, to do the same following lengthy periods of drilling to prove the process safe.

In my time at Whitwick Colliery, there were many issues associated with working the remnants of coal from an old and exhausted mine.

The most significant aspect of Whitwick was in fact its programme of working coal by partial extraction under the centre of Coalville without causing subsidence damage.

This was my first real introduction to the concept that some coal might be too expensive to work because of the costs of repairing properties damaged by the mining.
The system was extremely effective at producing coal from a 1.5m thick seam at about 150 m depth and causing less than 50mm of vertical lowering and virtually no strain, by using a system of headings 6m wide, 600m long with intervening pillars 11m wide.
This system had great success in that location and could produce coal like turning on a tap!
By the time I left colliery surveying in 1983 production was still falling, but plummeted during the strike to an all time low of 40mt.
Post 1984 production rose back to about 100mtpa but the days of coal at any price had gone, the unions' power had started to wane and alternatives to coal produced in the UK were becoming the fuels of choice for energy production.
In North Derbyshire I had the opportunity to learn how to predict ground movements resulting from mining and how to allocate the costs of repairing damage caused by that mining.



At that time the national average cost of subsidence damage was about £1 per tonne, however, costs began to rise and hit levels never before imagined.
The average cost of repairing claims rose substantially for a number of reasons.
Agents acting on behalf of claimants were door-knocking in mining areas and offering to administer claims for householders at no cost to the claimant.
The numbers of claims rose rapidly due to agent activity and greater awareness of the presence of mining. Householders too became more interested in maintaining the condition of their properties as house values rose to all time highs.
BCC became submerged in claims and began paying compensation rather than repairing the damage. Claimants were delighted with their “cash payouts” but many chose to spend it on other things rather than repairing

the damage to their properties. This led to secondary claims or subsequent claims and the ability to differentiate between damage paid for and so called new damage became an impossible task for BCC and further payments were often made to discharge the claims.
This became almost unmanageable for BCC and soon the average price of repairing houses doubled and trebled to the point where Nottinghamshire area of BCC had to ask government for more than £100m additional funding in one year to discharge claims.
Critical analysis of these events led to a reversion to claims being repaired rather than paid out, the exposure of fraud in some areas and inevitably colliery closures where subsidence damage costs were peaking at over £20 per tonne, when only a few years before the average costs were £1 per tonne.

Five years of working on subsidence litigation cases gave me a fascinating insight to court room action and instilled in me a cynical view that no matter what logic told you about a set of circumstances anything can be distorted to provide a different position and nothing is certain in the environment of a courtroom.

In 1992 I was elevated to the dizzy heights of Assistant Chief Surveyor of BCC and whilst I was deployed to administer about 60 private mines in South Wales my principal task, along with two other colleagues, was to market the 32 pits Hesseltine had announced for closure.
Sadly only about a third of those mines were placed into private ownership and only one mine remains in production today, Hatfield Colliery. In my opinion this one only remains due to the vision and persistence of one Richard Budge. Some of you may recognise the name as the guy who managed to buy the English part of BCC at Privatisation for just under £850M.
Having managed to sell some of these exhausted pits I was invited to assist in the sale of BCC as part of the Privatisation process of 1994.

In essence the operational part of BCC was split into 3 parts being England, Scotland and Wales and these were successfully taken over at the end of 1994 by UK Coal, Scottish Coal and Celtic Energy respectively.
The exception to this was the sale of Tower Colliery which was sold to an employee buyout where Tyrone O Sullivan bravely and triumphantly led his men back up the mountain from the village of Hirwaun to demonstrate very successfully, over the following 15 years, that the mine was definitely not exhausted as had previously been announced by BCC
Whilst vast sums of money were paid for the respective parts of BCC having seen how much money was spent with consultants, lawyers, bankers and mining engineers I doubt that much profit ever went back to Treasury for selling this collection of the Nation's silver.

Beyond Privatisation.

Having worked diligently for about 2 years to sell BCC I found myself rather like the proverbial Turkey on Christmas Eve, out of a job !
So I applied to work for the Coal Authority, which was established as part of the Privatisation process and found myself administering the same 60 private mines in South Wales that I had been looking after in 1992 !!
But things moved on and in 2001 I became an Executive Director of the Coal Authority and a Board Member a year later.
In this role I had responsibility for managing a team of about 80 superb staff, Licensing Coal Mining, Managing Subsidence Damage from Historic Mining, Minewater Treatment and Managing Historic Tips including Aberfan, which sadly and correctly we remember today.

And Now for Something Completely Different

In April last year I left the Coal Authority and in order not to spend my remaining years in a state of mental decay, boredom and poverty with occasional trips to hypothermia, I established my own mining consultancy LIW Associates and now I spend my time as an adviser to a number of private and public organisations, a Trustee of the UCGA, President of the Coal Industry Society and a Non Exec Director of Unity Power plc.

The Lonely Winter Days Just Fly By …...

Notes:

The Institute of Materials Minerals and Mining (IOM3) - membership and what it can do for you.

We are once again pleased to support the activities of the Midland Institute of Mining Engineers and to be invited to join in this year's Safety seminar; we look forward to meeting you and to advise you regarding the benefits of membership or upgrading your current level of membership. Make sure you look us up as we will have a stand/display in the room, and will be on call all day.

Professional recognition and registration, is even more important in this day and age of legislation and litigation. It is independent proof of technical "competence" with colleagues, customers, suppliers or regulatory bodies. Professional recognition belongs to you, and only you (not your employer even if they pay your fees), and it is the international benchmark of professional competence which cannot be disputed or devalued. In these continuing difficult and uncertain times of redundancies and factory closures the benefits of membership are even more important – keeping up to date technically and with who is doing what, and networking may all assist if you have been or may be affected. It can only help…but like most things you get out what you put in.

IOM3 has a current membership of over 16,000 individuals, across the world, with licenses from the Engineering Council (at Technician level EngTech, IEng and CEng), Science Council (CSci) and also the Society for The Environment (CEnv). CEnv allows members to demonstrate their environmental credentials at a time of increased pressure on green or sustainability related matters.

The main benefits of Institute membership are:

Events & Networking

- Access to local society meetings end events, such as MIME
- Discounted rates for conferences, workshops and seminars and proceedings
- Access to members' discussion boards and social network sites
- Fellows Lounge / microsite and discussion boards
- Access to the Materials Knowledge Transfer Network (KTN)
-

Publications

- Choice of a free monthly member's magazine – Materials World, The Packaging Professional or Clay Technology
- Free online access to technical journal content

Information services

- Access to bespoke technical information and impartial advice from experts through the Materials Information Service
- Access to libraries in London and Grantham, IMMAGE an abstracting and indexing database for the mining and minerals sector
- Free email notifications of news and content updates relevant to your interests

Careers

- Industry-recognised professional qualifications including CEng, IEng, EngTech, CSci and CEnv
- Professional development and technology updating
- Job alerts from the IOM3 website
- Online recording of continuous professional development (CPD)
- Assistance in times of hardship from the Member's Benevolent Trust

Younger members

- Events and meetings hosted by the Younger Members' Committee
- Discounted student membership

Contact details:
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Notes:

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Changing Safety Culture at Cleveland Potash Teesdock Terminal

Mark Wilson

The presentation looks at how management have changed the safety culture at Teesdock by addressing:

- Involvement of people
- Improving infrastructure
- Establishing a framework for safe working
- Ensuring a consistent message with regards to safe working practice

It is not a technical process that embraces any recognised change management methodology, although there may be some basis in theory present, rather a practical approach that engaged the workforce and made safety the focal point for activities rather than an emphasis on production.

The changes were made without adversely affecting productivity and the result is a marked reduction in accidents.

Notes:

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Fundamental Requirements for Mining and Managing Safely

Gerry Huitson

INDUSTRY PERSPECTIVE

Deep Mining Industry is currently in decline and has been over several decades. As "easy coal" is always taken first the Collieries that remain although previously some of the industry's best producers, are finding it more difficult to remain viable as we move into the future, as they often face more difficult production and face replacement pressures.

However safety is and must always be paramount and must not be affected or distracted from by the current economic situation of the industry.

This is what the Industry and we should expect.

AS AN INDUSTRY WHAT DO WE DO?

Obviously we mine coal and to do this we extract mineral, transport it through a network of underground roadways to the surface where it is processed and prepared for sales to various markets and subsequently distributed. Hence this involves a large number of individuals each with their own areas of expertise.

But how is this achieved?

In the main, we have shafts up to 1 KM deep and mine workings several km from those shafts linked by a network of underground roadways which allow us to supply and ventilate the extraction operations and clear the mineral to the surface.
We have some excellent (and expensive) mining equipment, which in the main is fit for purpose, however with all respect to our industry colleagues, I feel not as well supported by some manufacturers and suppliers and hence sometimes a reliance on 'mine expertise' to a certain degree for its successful application.
We have in the main a vastly experienced well trained workforce.
But all of this sounds pretty straight forward and simple, so what threatens us completing our task and carrying out our operations in a safe manner.

"MOTHER NATURE" (disturbance of her/the earth's natural state)

Where in some industries, "mother nature" may choose to assist the process (eg. Farming, by providing sun and rain to enhance the production of crops, food stuffs, etc.), in our case she is definitely not on our side.
After all what we are trying to achieve is to disturb her and extract from her one of her very valuable assets and we are actually trying to do this in a manner engineered so as she won't be effected or "won't notice".
However she can't help but notice and will do everything in her power to make it more difficult for us.

Hence she provides us with a very difficult working environment where conditions are often hot and humid, which may make it more difficult for our workforce to perform well and concentrate on the task at hand. She pressurises and distorts the ground in which we operate and have extracted so we need to be at our 'engineering best' first and foremost to design and implement adequate ground control measures, but also to ensure constant monitoring and response to wherever she may have particular issues.

She also issues 'dangerous gases' into our working environment which need to be 'understood' by all, as they add additional risk to our operations and our people if not closely monitored and carefully controlled.
She also makes it difficult with respect to the 'prize we seek' by often laying down the coal inconsistently, faulted, varying in thickness, split and banded with dirt.
She will do everything in her power to make it difficult for us to be successful in our mission and as well as the hazards she puts in our way we have our own created by our own operations and processes.
So how do we go about our task and go into battle against 'mother nature' and work safely.
We must be well prepared and have a 'battle plan' that looks after our most valuable resource our people to give us the best opportunity for success.

"OUR ARMY"

What does it resemble?
DAD'S ARMY (Too old and ill prepared?)
Generals remote from the battle who don't understand their operations or their people?

We have a workforce whose probably average age is around 50. In the main well trained and experienced for the task in hand, well equipped (with both technologically advanced equipment and monitoring arrangements to indicate the state of the environment they are working in), authorised and competent to carry out that task. However we also have a younger element (recent green labour and apprentices) who we must also ensure are well prepared for their duties by learning skills, best practice and behaviours from their 'trainers'.

We also have an element of contractors (and in some cases sub contractors) who also need to be well prepared for their task and fully understand not only the task at hand but also the 'rules of engagement'.

All in all everyone must not only just be trained and competent to carry out their task but also of the right mindset to successfully take part in the battle and hence return home safely.

Whilst we can always rely on 'Mother Nature' to do her damndest to make things difficult for us and to try to catch us 'off guard', we can't necessarily

rely on our people to behave as we would like and this can prove to be our 'Achilles Heel'.

Hence we must ensure that they are given the best preparation possible and that they are never complacent and are always of the right mindset and have the right approach, attitude and behaviour.

PREPARATION – CORRECTLY RECRUITED, INDUCTED, TRAINED AUTHORISED AND COMPETENT

We must start at the very beginning and ensure that wherever we recruit, we recruit for the right reasons and they have not only the right level of knowledge and skills necessary, but also the right attitude to working safely.

Wherever we use contractors we must ensure that our selection criteria is not just cost based but also based on the quality of service they provide including their attitude to their workforce (ensuring they are competent and able to safely carry out the task), their integration with ours and ability to work safely together as part of the operation.

We must ensure that our workforce is adequately trained and competent to carry out any task it might face and also ensure they receive further training to bring them up to speed with any changes in technology, methods of work and relevant legislation.

Once selected we must ensure that they (whether our own or contractors) are fully inducted and totally understand their working environment, it's hazards and how they need to behave in any circumstances that they may face including emergency procedures.

Our workforce must always have their wits about them and be both physically and mentally fit for the task in hand whenever they 'turn out'. They must be totally aware of all hazards they face from stepping onto the premises (battlefield) to leaving it and always assessing risk from the situations they face and mitigating the potential of any injury from the operations. They must 'know the rules of engagement' and understand their working environment, be disciplined and stick to orders and know what to do if they are unsure or face unforeseen circumstances.

Attitudes and behaviours must always be right or we will fail.

They must have a team ethic and look after not only themselves but their colleagues and also exist in an environment where all aspects of the operation (battle) are made aware to all and openly discuss and assess to ensure that everyone is knowledgeable of the task and its hazards, aware of how to mitigate against these risks and behaves in the right manner accordingly.

Managers, Supervisors and the workforce need to know and understand what is expected of each other and how they or their colleagues may react in the various situations that they will/may face and be prepared to respond accordingly in the correct manner and at all times communicate efficiently with one another.

WHO ARE ITS "GENERALS"

Board

Who understand the operations and provide both finance and support to ensure operations are carried out in a safe manner and the relevant personnel are held accountable for their responsibilities.

Managers/(engineers / supervisors)

Who must fully understand all aspects of the operations and the hazards that they may face and ensure that both they and the workforce are not only prepared correctly to face those tasks but also carry out their duties in a safe, efficient and responsible manner.

Are these the only leaders of our army?

NO!

What is LEADERSHIP anyway?

"ability to guide and influence people"

Who are the leaders in our industry?

Answer – 'Every one of us'

Who has the most influence on an employee?

- Board Member?
- Manager?
- Supervisor?
- Safety Committee Member?
- Fellow Team Mate?

How do we lead?

By example and hope others follow without giving adequate direction?
We must lead by understanding everything we do regarding the process and ensure that we go about it in the correct manner by:-

Communicating
Auditing
Challenging
Appraising
with one another

We must create a culture/environment where all of our employees are not only fully knowledgeable of the task in hand and it's hazards and know how to mitigate them but are also self disciplined and self/group controlled.

Generally people like to be popular and liked by their fellow colleagues, but if this means in any way not to have the safety of the group or individual at hand and as a priority then there is no place for it.

It should never be "carry on regardless".

It must always be:-
"carry on providing"

- Fully understand operations and associated hazards
- Workforce trained, authorised and competent
- Never complacent, be of the right mindset and have the correct attitude and behaviour
- Adequately supervised
- Safe to do so

Only pressure from industry is to work safely
This pressure must also come from within i.e. the individuals / workforce.

Do people need to have a more "jobsworth" type role **(traffic / safety warden)?**

Should there be a 'no tolerance' approach?
One to think about!

CLOSE

Let's not have our health and safety management systems and culture resemble a script from a 'Carry On' film or 'Dad's Army'. Let us be truly professional about what we do and how we achieve it safely together.

What I am asking everyone in this room to do today is to make a pledge as 'safety professionals' to improve their 'leadership skills and the scope of their leadership responsibilities' and become "better leaders within our industry" i.e. give a commitment to influence those who you come into contact with, not only to work safely but to supervise and manage safely also. We need you to communicate with the people within our industry and create a culture and working environment where we are fully aware of the hazards we face in our daily operations and know how to mitigate them and not only this, we must have the right attitude and behaviour to ensure we always look after ourselves and one another.

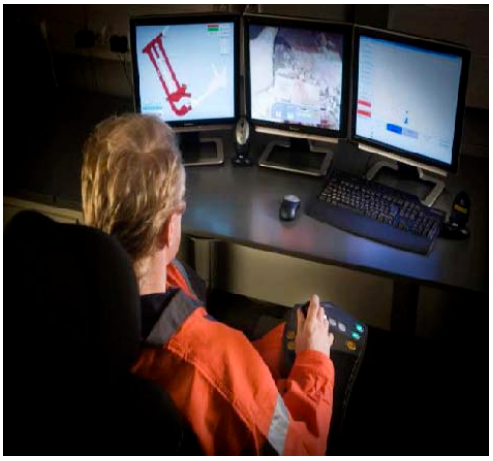
Notes:

How to Improve Safety by Automation

Dale Lockley

How to improve safety by Automation?

- What is Automation? – Is technology the answer to improve safety?
- Achievements with AutoMine system - case stories
- Challenges of Automation System implementation
- Future of Automation



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