Eliminating Falls of Ground in South African Mines

Leading Practice Adoption Guide for the Entry Examination and Making Safe Procedure

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Executive Summary

In December 2007, the Chamber of Mines of South Africa established the Mining Industry Occupational Safety and Health (MOSH) Leading Practice Adoption System to facilitate the achievement of occupational safety and health targets and milestones to be attained by industry by 2013. This process driven system approach identifies a potential leading practice at a mine (the source mine), tests and refines that leading practice and then demonstrates it at another mine (the demonstration mine) that has not previously been exposed to the technology/procedure, to identify mine specific customisation requirements. Finally, the leading practice (the technology, together with the behavioural leadership and communication strategy) is disseminated throughout industry for adoption (at adoption mines) utilising the Community of Practice (COPA) mechanism.

Three Adoption Teams were established to identify and facilitate the industry-wide adoption of leading practices to address the risk of dust, noise and falls of ground, respectively.

Fall of ground fatalities make up approximately 35 % (77 fatalities in 2007) of all mining fatalities in the South African mining industry, with about 50 % of these related to making safe and barring. For this reason, the falls of ground hazard was selected as an area in which a significant impact could be made through the Leading Practice Adoption System.

Practices with the greatest likelihood of improving safety in the shortest time were considered and those concerning entry examination and making safe were found to merit the top priority. The entry examination and making safe procedures applied at Impala Platinum Mines (the source mine) were identified as holding the most potential to constitute a leading practice, and these procedures were subsequently demonstrated and refined at Driefontein Gold Mine, specifically its Masakhane Shaft. The Impala Platinum Mines entry examination and making safe procedure was modified slightly to suit the Driefontein narrow reef, steeper dipping and backfilled panel scenario. Due to the limited time and the extent of the demonstration project, it was not possible to show improvements in safety directly due to the use of the examination and making safe leading practice at Driefontein Gold Mine. Measuring will continue and it is expected that significant improvements in rock related safety will be measurable as the procedure is rolled out on the mine. However, evaluation of the practice in terms of the leading indicators, such as the number of hazards identified, has shown positive results. Softer issues, such as team work

and caring for each other's safety, have also improved and there is some anecdotal evidence to suggest that during seismic events shakedown damage was reduced.

The strategic context of this work is one of continuous improvement towards zero harm from safety hazards to which Chief Executive Officers in the mining industry have duly committed themselves. The objective of this document is for it to serve as a guide to decision makers and adopters to facilitate the adoption of the entry examination and making safe procedure whilst addressing the 'people' issues that aid the process. The scope of the identified leading practice is clearly defined.

The guideline is presented in three parts, with the first part outlining the strategic context, the second part outlining the guidance on adoption of the leading practice at adoption mines and the third part providing the details of the leading practice that is to be adopted, including any reference or example material considered necessary, attached as appendices.

List of Appendices

List of Acronyms

CEO	Chief Executive Officer
COPA	Communities of Practice for Adoption
DME	Department of Minerals and Energy
EXCO	Executive Committee
FoG	Fall of Ground
H&S	Health and Safety
KPA	Key Performance Area
MHSA	Mine Health and Safety Act
MHSC	Mine Health and Safety Council
MHSI	Mine Health Safety Inspectorate
MOSH	Mining Industry Occupational Safety and Health
OH&S	Occupational Health and Safety
PPE	Personal Protective Equipment
SAMRASS	South African Mining Reportable Accidents Statistics System
SIMRAC	Safety In Mines Research Advisory Committee

Part 1 – Strategic Context

1.1 The problem addressed

Rock-related hazards continue to be the single largest cause of injuries and fatalities in South African mines. While they comprise a more serious issue in some mining sectors and commodities than in others, in general there is a concern that this major cause of losses in the industry is not receiving the attention it deserves. Most rock-related injuries and fatalities occur near the active mining face, whether this face is in a tunnel or stope. These areas are where the rock is most unstable, as it has been recently exposed by blasting, is adjusting to new stress environments, is sometimes unsupported and is possibly even subject to dynamic conditions such as seismicity.

In 2007 the Mine Health and Safety Inspectorate (MHSI) reported 221 mining-related fatalities in the South African mining industry as illustrated in ***Table 1,*** with 34.8 % of cases being rock related.

	Gravity Rockfalls Fatalities	**Seismic Rockfall Fatalities**	**Total Rock Related Injuries**	**Total Fatalities**
Gold	27	23	652	115
Platinum	17	2	251	53
Coal	2	2	19	15
Other	4	0	27	38
Total	**50**	**27**	**949**	**221**

Table 1: Rock-Related Fatalities and Total Fatalities in South African Mines for the Period 1/01/2007 – 31/12/2007. (Source: MHSI SAMRASS Data Base 2008)

Figure 1 shows the fatality rate for rockfalls and rockbursts from 1996 to 2007. A downward trend is evident but more can and needs to be done to improve this trend. In

spite of the improvement in actual numbers and the rate of deaths per million hours worked, the total deaths due to rock related incidents was an unacceptably high 77 in 2007 as shown in ***Table 1 and Table 2***.

Entering areas near the active working face to work without careful inspection of the conditions and without making sure that the area is stable is to act recklessly. Although the law requires that entry examination and making safe be carried out regularly and rigorously, anecdotal evidence suggests that this is not taking place. Investigations and enquiries following mine rock-related losses, indicate that many of the incidents were preventable had the potential for a rockfall been identified early and treated. It is evident that diligent examination and making safe had not taken place in many instances. The entry examination and making safe is ideal for recognizing and fixing a potential rockfall problem before it results in loss.

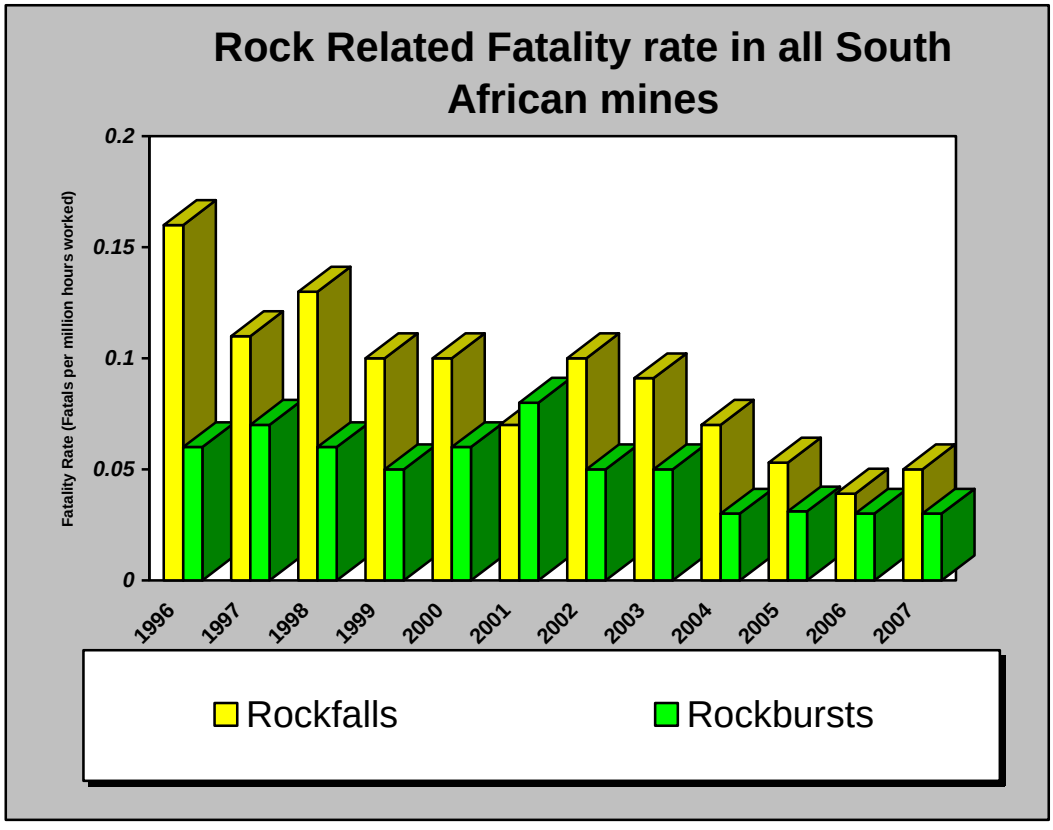


Figure 1: Rockfall and rockburst fatality rate for all mines 1996-2007.

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Rockfall Fatalities	180	115	118	94	91	59	84	83	65	52	55	49
Rockburst/ Strainburst Fatalities	67	77	63	43	51	64	40	48	31	31	30	27
Total Rock Related Fatalities	247	192	181	137	142	123	124	131	96	83	85	76

Table 2. Rock related fatalities in all South African Mines from 1996 to 2007

The purpose of entry examination and making safe is to ensure that all aspects of the working place are safe before re-entry and work begins. In addition to reducing rock-related hazards, which are the greatest, most persistent cause of losses, entry examination and making safe, if carried out correctly, will ensure that ventilation flow is adequate, no flammable gases are present, equipment for mining is available, electrical installations are visually acceptable, traveling ways are clear and rigging of ropes and security of snatch blocks are correct.

The involvement of every worker in the process, first by taking part in the examination and helping with making safe and then by signing a form daily to confirm that he or she is satisfied that the entry examination and making safe were carried out correctly, is a significant departure from the current method of entry examination and making safe. Such involvement will ensure that ownership will be taken by each person in a working crew for their own and their team's safety. This will certainly reflect in improved safety levels and a happier and more motivated workforce.

The selection of entry examination and making safe as an industry focus, combined with the widespread adoption of a more systematic, enhanced practice for these procedures, should result in significantly improved safety figures for the mining industry as a whole.

1.2 Summary description of the practice

The leading practice for falls of ground involves participation of the entire crew in examination of their working place and in taking measures to make it safe before any work begins in that area.

The practice is designed to cover an area starting from a barricade about 10 m from the working face. Up to that point it is assumed that the current practice will take place with examination taking place once a week, or according to the mine's risk assessment. The entry examination beyond the barricade will involve diligent inspection, sounding of the rock and if necessary barring down of loose rocks until solid stable hangingwall or sidewall is achieved. Erection of support according to standard and where extra-ordinary conditions require it will be necessary. This will be a team effort with the work load shared by the whole team.

The practice is as follows:

- The entire team gathers at the barricade
- The entire team proceeds together beyond the barricade to examine, bar down unsafe rocks, erect temporary and permanent support where this is appropriate, and check on ventilation, temperatures and other general safety issues.
- The work of barring, installation of support and generally making safe is shared by all team members.
- The entire team proceeds along the gully from the barricade and then down the face.
- The entire team inspects and ensures that the bottom gully is safe to a point about 10 m away from the panel face that they have exited.
- Once this is completed, all members of the team sign a form (Appendix 1) indicating that they are satisfied that the entry examination and making safe procedure has been followed correctly.
- The competent person then signs the miners' log book, declaring the place to be safe if he or she is satisfied that it is indeed safe to mine.
- Members of the crew then commence the tasks set for the day.

Figure 2 presents the entry and making safe procedure graphically with the 12 steps that are followed.

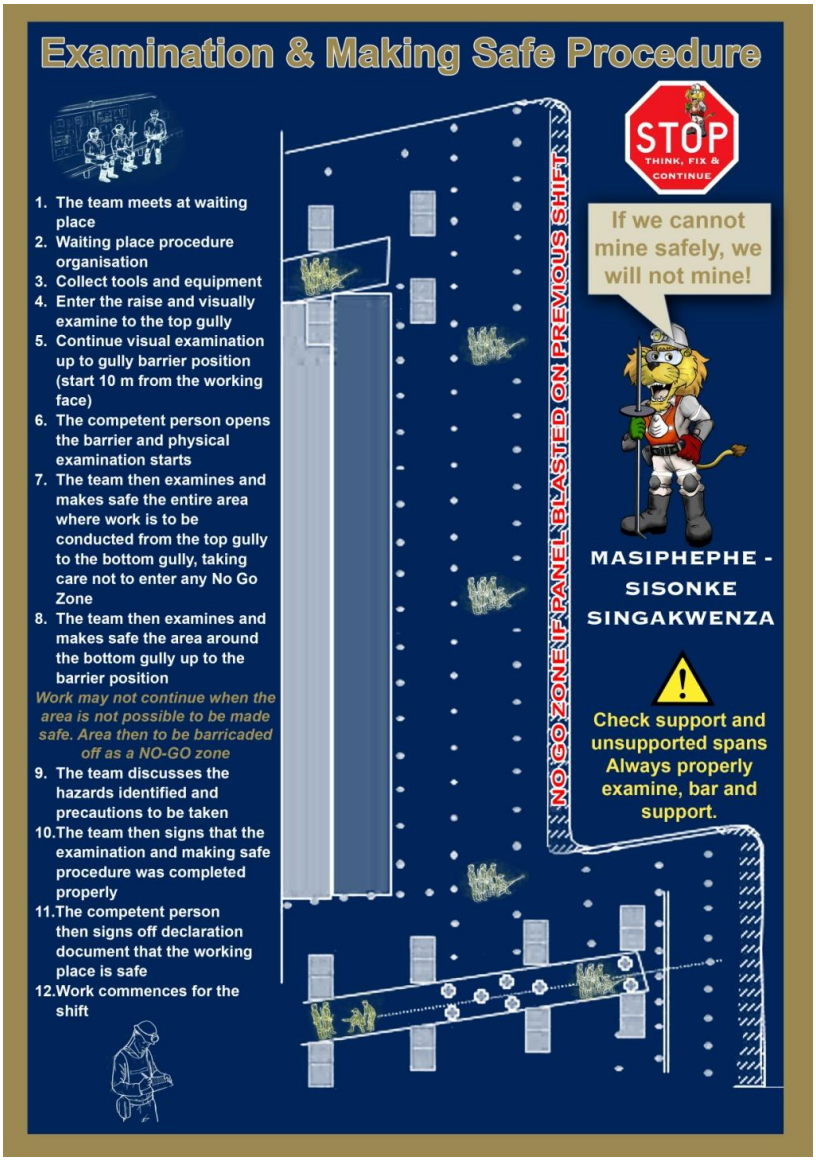


Figure 2: Diagram showing the entry examination and making safe procedure with 12 steps to be followed.

While this procedural solution has demonstrated effectiveness and efficiency in improving rock-related safety in underground mine workings, its success as a leading practice depends on people – people at all levels of employment and their leaders at all levels.

Formal research supporting development of the Leading Practice Adoption System showed that decades of emphasis and effort on technology transfer to improve safety and health performance has, in fact, produced little true transfer of technology or

significant improvement in performance. Research also showed that the need was to realise adoption – not transfer – of technology and leading practice.

Adoption is a human activity and the two most powerful influences on adoption are leadership behaviour (i.e. the actions and inactions of leaders) and behavioural communication (i.e. modes of communication appropriate to different levels of employees and situations) as these have a significant influence on people's decision-making, judgment and behaviour. Communications and leaders' behaviour occur continuously every day in mines in various forms and combinations. Fundamental to this is the recognition that *persons cannot not communicate; and leaders cannot not act.*

Recognising the importance of these two features (i.e. the need to introduce a structured communication strategy to achieve the desired behaviours and a leadership behaviour strategy to evoke and re-enforce the desired behaviours of leaders) distinguishes the Leading Practice Adoption System from past approaches. Therefore, as the appropriate leadership behaviour and communication strategy will expedite the adoption of a leading practice, these 'people' aspects, together with the procedure, comprise the 'leading practice' that is being recommended for adoption across industry, as depicted in ***Figure 3***.

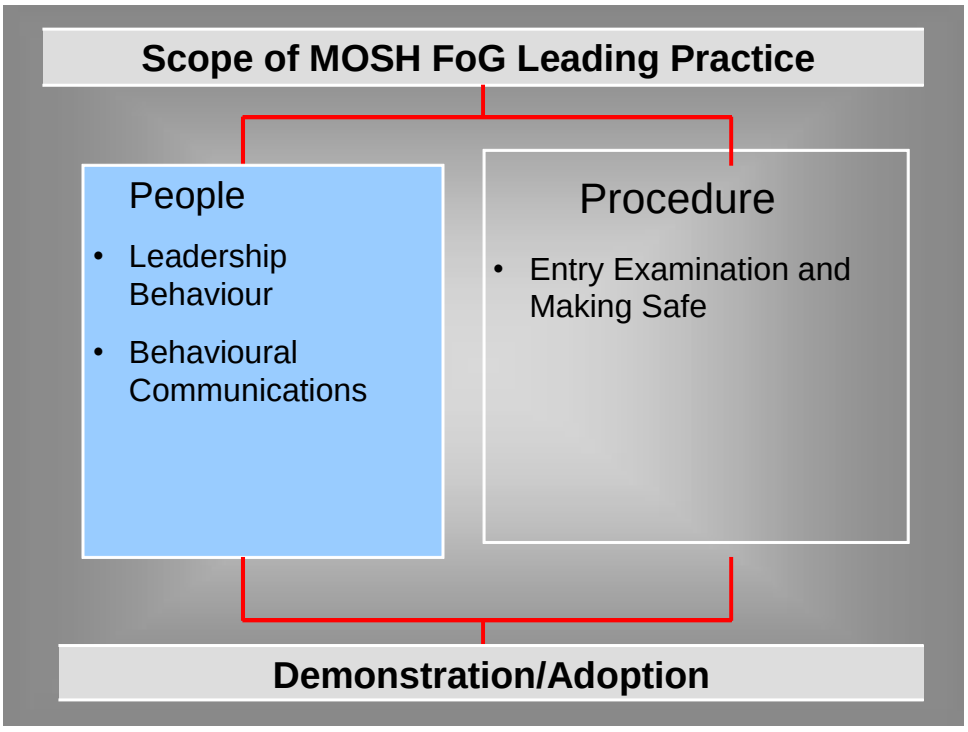


Figure 3: Scope of leading practice.

1.3 Summary of documented performance and impacts

The source mine, Impala Platinum, had enhanced and tested the modified entry examination and making safe procedure since 2003 following a concerted effort to improve safety and particularly rock-related safety.

Subsequently, the leading practice was demonstrated at Driefontein Gold Mine, both in terms of the efficiency of the procedure in assisting in ensuring that the entry examination and making safe process was correctly carried out, and in terms of the effectiveness of a behavioural communication and leadership behaviour strategy. This strategy was aimed at key stakeholders and adopters to address leadership and communication gaps in order to facilitate the adoption of the system.

Monitoring of the effectiveness of the entry examination and making safe procedure covered the following:

Leading indicators – "A" hazards
Quality of support
Distance of backfill from face
Distance of support to the face
Distance between support members
Equipment present to carry-out examination
House keeping
Panel shape and layout
Seismic evidence
Personal testimony

Lagging indicators - Lost Time Days
Injuries (Treat and return to work)

Measure	Without Leading Practice	With Leading Practice
Dip Support spacing (m)	1.4	1.25
Strike Support	2	1.75

Spacing (m)		
Minimum Support distance to face (m)	2.2	1
Maximum Support distance to face (m)	3.5	2.2
Availability of items of Equipment	6	8
Time taken to carry out entry examination and making safe (Hours)	1.2	1.2
Seismic Evidence	Historically, rockfalls and injuries, some serious	3 events (Magnitude 1.3 – 2.4). Few Rockfalls, Minor injuries
Personal Experience	"Expect damage and injury during seismic events"	"Entry examination and making safe works" "Minimal damage and injuries during seismicity due to good examination and making safe and installation of support"

Table 3: Summary of the parameters measured before and after the leading practice was introduced.

1.4 The generic value case

The value case for adopting technological and people solutions to eliminate fatal and serious injuries is a moral, reputational and ethical one.

Substantial research has been carried out in South African mines to determine the fall of ground thicknesses for particular ground control districts. The average thickness of falls

[1] Jager and Ryder, 1999. A handbook on Rock Engineering Practice. pp148

of ground has been found to be less than 0.5 m, and 95 % of all falls have been found to be less than 1.4 m for one ground control district[1]. However, half a metre of quartzite weighs approximately 1,380 kg per square metre of hangingwall. This is more than sufficient to cause serious injury and even loss of life in the event of such rocks detaching from the hangingwall.

However, this represents a small, controllable risk if, firstly, correct early examination and making safe procedures are carried out and, secondly, adequate support is installed to reinforce the rock and to provide support through tendons and timber. Therefore, the injuries and fatalities caused by falling rock could be reduced substantially and even eliminated with currently available technologies.

Many mines have experienced closure of sections, shafts or even the mine itself through Section 54 notifications issued by the Department of Minerals and Energy (DME). This often results in considerable loss in production and profitability for a mine, threatening sometimes its very existence, with social repercussions such as loss of jobs. It is conservatively estimated that one fatal accident costs a company about R2.7m[1]. This is income that comes directly from the profits of a company. With the many fatalities currently caused by falls of ground in mining (77 out of 221 fatalities in 2007), the annual cost of these accidents to the industry is enormous. The process of entry examination and making safe is designed to reduce the possibility of unexpected falls of rock that could lead to injury or death of workers, with all the emotional and psychological scarring to mine personnel, damage to equipment, heightened health and hygiene risks such as dust and poor ventilation, and unscheduled stoppages. If the process is diligently followed before each shift enters a working place or immediately following a change in rock conditions then potential risks can be identified and addressed before they become problems. Working places will be safer with less stoppages for injuries to workers, there will be less falls of rock that will need to be cleared, worker moral should improve together with improved productivity. There is therefore a large incentive, morally and financially, to use the leading practice of examination and making safe.

Additional benefits reaped by a mine implementing the entry examination and making safe leading practice include improved morale from the decrease in injuries. In addition,

including workers in making decisions about safety and training supervisors to listen to workers will have a further positive impact on morale.

The return on investment in occupational safety is difficult to accurately quantify, as is the true cost of the burden of fatal or serious injuries on the individual, families, communities, social services, health services and the employer, both from an economic and a human, ethical and moral point of view. However, every effort must be made to do everything possible, consistently and well, to achieve zero harm from rock-related hazards.

Part 2 – Adoption Guide

2.1 Ensure existence of a clear implementation decision by mine manager

The decision for the implementation of the leading practice must be actively endorsed by the mine manager. This endorsement can be demonstrated by a number of means, including obtaining commitment from the mine manager to

- include the leading practice in the long term strategic/mine and budget plans.
- secure the resources required to implement the leading practice by signing off the budget and plan summary.
- nominate a project champion and team to drive the process.
- agree to the reporting mechanism.
- include the leading practice and its monitored perfomance as a permanent item on EXCO meetings.

Adoption of the entry examination and making safe leading practice must be presented as a major occupational safety priority that has the potential to significantly improve the occupational safety performance of the company. The motivation thereof must be driven by a strong value case which extends beyond the financial costs outlined in 1.4.

2.2 Clarify potential for the mine to benefit – develop the value/business case for the mine

The preparation of a well stated case to justify an investment by the mine in the leading practice needs to cover all issues that have significant business value, even if such issues are not readily quantifiable. The following are considered to be the key components of the value case:

- Occupational health and safety performance improvements
  - *With a large enough roll out of a leading practice on a mine and sufficient time, the lagging indicators will show an improvement in the safety of the operation*
  - *It is estimated that at least a 50 % improvement in rock related safety may be obtained by using the leading practice.*
  - *Key lead indicators will be indicative of the benefit that is likely to be achieved*
- Financial benefit of occupational health and safety improvements
  - *Hospitalisation and other medical costs*
  - *Time off work*

- *Risk premiums*
- *SIMRAC levies*
- *All forms of compensation*
- *Management time devoted to enquiries, reporting and other communication*

• Initial cost to implement the new practice

- *Capital costs of purchasing and installing new equipment*
- *Access to intellectual property (software and other)*
- *Creation of new infrastructure (physical facilities, training and communication aids, etc.)*
- *Initial training of management, supervisory staff and workers*

• Direct impact of the new practice on operational costs

- *Human resource costs*
- *Routine training costs*
- *Equipment maintenance costs*
- *Materials and other consumables*
- *Outsourced service providers*

• Indirect operational impacts of the new practice

- *Productivity, both positive and negative effects*
- *Absenteeism*
- *Staff turnover*
- *Cost of regulatory intervention*

• Other valued business impacts

- *Improved stakeholder relationships internally and externally*
- *Reduced pressure to compel change by rule-makers and other key players*
- *Buy-in and collaboration from all stakeholders*
- *More positive relationship between all operational levels on mines*

In addition to the improved mining efficiencies and occupational safety improvements, the value case for the entry examination and making safe procedure can be built on a strong foundation of potentially significant financial savings (see 1.4).

2.3 Identify gaps and alignments (Mental Models)

The adopters should be ready for and receptive to the behaviour modification that will be expected from them. This readiness must be assessed and addressed before adoption,

to identify the knowledge, attitudes and perceptions that will operate as aids or as barriers to adoption of the leading practice.

Identification of the gaps and alignments is achieved most effectively though a direct enquiry process, outlined in section 2.7 and detailed in ***Appendix 5***, which includes templates for the interview process.

This identification of the unmet needs (gaps and alignments) is an important first step in the process to arrive at a customised leadership and behavioural communication strategy that identifies the objectives, key messages of communication and the choice of communication modalities that translate into the required actions, as depicted in ***Figure 4***. The customisation process is outlined in ***Appendix 5***.

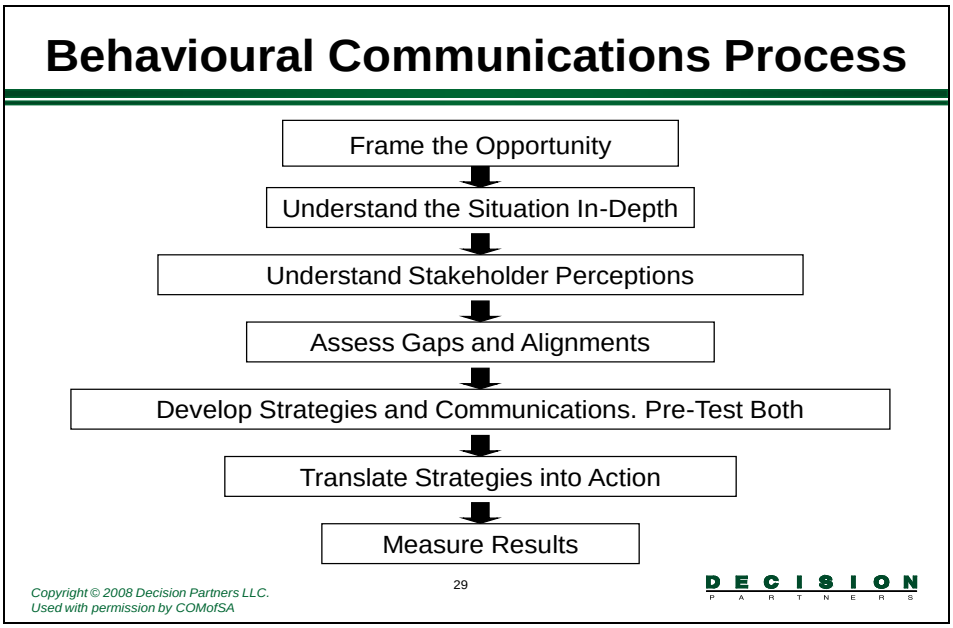


Figure 4: Schematic representation of the seven steps in the behavioural communication process.

As an example, based on previous mental models research (a MOSH mental models survey conducted amongst all commodity groups and all levels of employees in July 2008), some typical gaps and alignments are clear. (***Appendix 2*** provides a typical questionnaire that was used by the MOSH team to identify the mental models of the adopters prior to developing the leadership and behavioural communications strategy tested at the demonstration mine and provided as a generic strategy in this guide.)

Gaps:

- Communication at all levels of employment is lacking.
- Leadership behaviours do not consistently promote a transformative culture in the workplace.
- Supervisors do not communicate respectfully with subordinates.
- Supervisors are not trusted.
- Misunderstanding exists on the cause and effects of seismicity.

Alignments:

- People *and* technology are important.
- Top level executives are taking a firm stand.
- Employees at all levels are eager and willing to be involved in improving safety.

It follows that these unmet needs must be addressed in any behavioural communication and leadership behaviour strategy.

The behavioural communication and leadership behaviour plan developed (sections 2.11 and 2.12), and attached as ***Appendices 3 and 4,*** aligns with and responds to the research findings of the unmet needs of the stakeholders and adopters of the demonstration mine. This strategy is to be customised by the adoption mine in line with the findings of the direct enquiry process conducted on that mine and as outlined in ***Appendix 5.***

2.4 Evaluate fit with mine's safety strategy

As a strong element of adopting the leading practice involves behavioural and cultural change, it is not feasible to implement the leading entry examination and making safe practice as an isolated initiative. In Driefontein Gold Mine's case, the culture change required for application of the leading practice was well aligned with a phase of the mine's Masiphephe programme, emphasising the rights and responsibilities of all employees in respect of their own safety. Real impetus was only gained in the demonstration work as the relevant phase of the broader Masiphephe programme was launched.

Therefore, selecting the right time to adopt the leading practice so that it coincides with the appropriate phase of the mine's health and safety strategy is central to successful implementation and is an important element of the customisation of the generic leadership and behavioural communication strategy provided as ***Appendices 3 and 4*** to this guide.

2.5 Identify project champion and team for implementation

A condition for adopting the leading practice should be that the mine will identify and appoint a person to champion application of the leading practice technology and people components. The mine should adequately free the appointed person from his/her operational responsibilities so that the role can be optimally fulfilled. The primary purpose of appointing champions is to energise and spearhead the progressive growth in the adoption of the leading practice that they are championing. In essence, the mechanism of championship involves leadership to overcome implementation difficulties, as well as effective communication of relevant information to enable other operations to decide to adopt the leading practice.

A project champion should be appointed for the duration of the project. A summary of the key points on championship is given in ***Figure 5.***

2.5.1 Role profile of project champion[2]

Credibility: An essential requirement for success is that the champion should be credible. This individual should preferably be someone linked directly to the Occupational Safety discipline and should be at a high level in the organisation. He/she should have good levels of knowledge, energy, leadership, communication skills and personal credibility.

Involvement: Having selected an individual with the right potential, it is essential that he/she be sufficiently released from normal operational responsibilities to adequately perform the function of championship. To do this, the person needs to become deeply involved in the details of the technology and people components of the leading practice, to appreciate the issues and problems, and to assist in, or be knowledgeable about their solution.

Leadership: An important role of the champion will be that of providing leadership in overcoming implementation problems that arise, and in particular to energise lagging aspects of the process. The champion should also provide input into the development of

strategies and plans for the progressive adoption of the technology and or leading practice at both the mine and across industry.

Communication: Perhaps the most important role that the champion needs to play is that of being an effective spokesperson for the leading practice being championed. To do this, the champion would accumulate key data and prepare appropriate documents and presentations to communicate such performance and technical data to interested parties. The champion would seek out opportunities to present such information, including workshops, conferences, technical journals, meetings of professional societies, internal meetings, and so on.

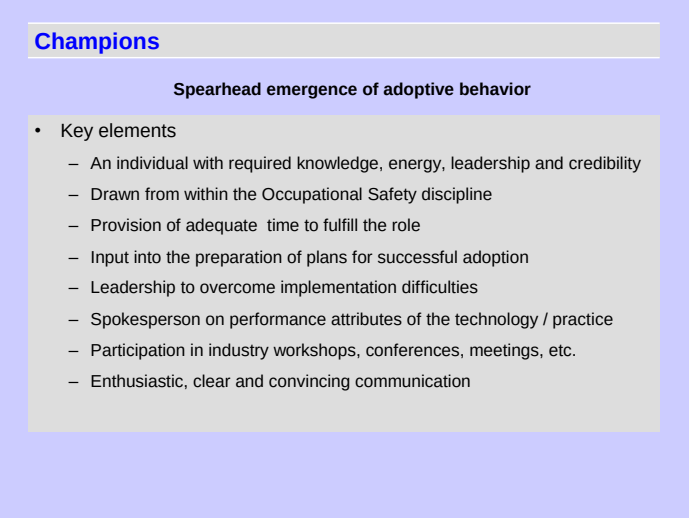


Figure 5: Summary of key points on championship.

2.5.2 Project management team

The adoption mine should appoint a project management team to plan and oversee the detailed execution of the project. The leader of the project team could be the champion, but this should not be a requirement. The champion should however be responsible for reporting progress on the project to all parties that have expressed an interest in receiving such information, particularly key people on the mine.

It follows that the project team must be multidisciplinary with line management, safety specialists, rock engineers, behavioural specialists, communication experts, training practitioners and labour representatives, as was the experience at Driefontein Gold Mine

(the demonstration mine) as depicted in ***Figure 6***.

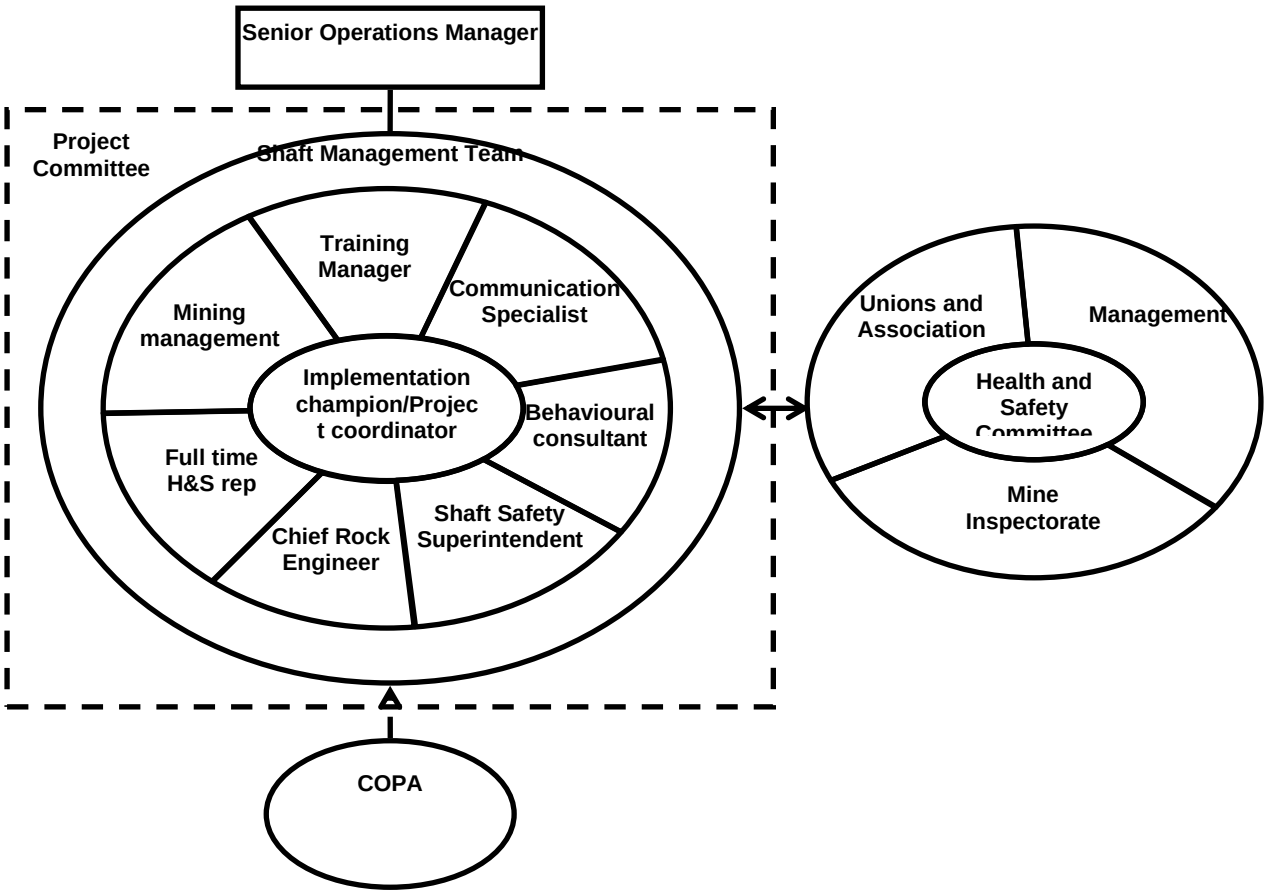


Figure 6: The schematic above shows the multi-disciplinary representation on the Driefontein Demonstration Project and its relationship to senior mine management, tripartite structures and to the COPA.

2.6 Identify adopters (supervisors/workers) and stakeholders (management/OHS Committee/Unions/Safety Reps)

In keeping with the principles of the leading practice adoption system, it is critical that people are involved at all levels of the adoption process, that is the adopters and key stakeholders.

The adopters of the technology are typically the mine managers, mine overseers, production supervisors and workers. This category incorporates:

- those who have a primary or shared role in designing and implementing, and/or approving the design and implementation, of the implementation project, that is the mine management; and

- those who will be most affected by the system and could be involved in the management and/or the implementation of the implementation project, including the end users / adopters, that is those people who are responsible for the operational functionality of the technology or process.

The key stakeholders, that is those individuals or groups who have a stake in the issue but are not directly involved, typically include the DME, the unions, Safety and Health Committees and Safety Representatives.

It is imperative that stakeholders and adopters are identified early in the process as it is these people and groups who will be the focus of the behavioural communication and leadership behaviour efforts, and from whom commitment is required for the successful adoption of the leading practice. As is the case with any behaviour modification process, a change in attitude becomes a change in behaviour and, when sustained, becomes a new culture. It is this level of commitment that is required from adopters and stakeholders: to embrace the change that will lead to the elimination of rock-related accidents and thus improved safety.

The procedure for identifying adopters and stakeholders is the first step (see Figure below) in an eight step process developed for customising a behavioural and leadership communications strategy for implementation as part of the Leading Practice Adoption System. The process is described fully in ***Appendix 5.***

Step	What	Check – go/no-go decision question
1	**Identify adopters and key stakeholders at the mine**	Do we have a good understanding and complete identification of potential adopters and stakeholders?
2	**Select people to be interviewed**	Have we chosen the appropriate people to interview?
3	**Identify and brief the interviewers**	Are the interviewers ready to interview?
4	**Conduct the interviews**	Have all the interviews been done and full worksheets completed and returned for processing?
5	**Summarise the interview results**	Have the interview results been systematically assessed and significant new findings clearly identified?
6	**Use the findings to customise the behavioural communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?
7	**Use the findings to customise the leadership behaviour communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?

8	**Integrate the customised plans into the implementation plan at the mine**	Is the overall implementation plan coherent and properly understood by the mine project team?

Figure 7 Eight step process developed for customising a behavioural and leadership communications strategy. The first step - identifying adopters and stakeholders - is highlighted.

Key points for identifying adopters and stakeholders are as follows:
The Adoption Mine Team should review the Risk Summary summary provided by the Lead Adoption Team (see Appendix 10) and confirm or elaborate on the description of adopters and stakeholders.

A list specifying the adopters and stakeholders that will be the focus of behavioural communication and leadership behaviour efforts in the adoption mine should be prepared by the Adoption Mine Team based on ***Figure 7***.

2.7 Direct enquiry process

Once the stakeholders and adopters in ***Figures 6 and 7,*** have been identified, a shared understanding of their perceptions, attitudes and unmet needs regarding safety management, and more particularly entry examination and making safe, should then be gained. This forms the basis for customising and implementing the leadership and behavioural communications strategy.

The only way to accurately understand people's thinking is to directly enquire into it. A detailed description of how to conduct the enquiry process is provided in ***Appendix 5*** with key points highlighted below.

The interview process should consist of two parts which seek to establish the stakeholders/ adopters beliefs about the causes and outcomes of [the risk/hazard], about the best ways to protect people from [the risk/hazard], and about key leader behaviours and behavioural communication needs.

An appropriate type and number of persons should be interviewed using the final list of adopters and stakeholders at the adoption mine. The types of people selected should ensure good representation of those most likely to be most involved in accomplishing

adoption of leading practice. The number of persons to be interviewed should be between 25 and 30 to obtain useful interview results.

Interviews with the selected adopters and stakeholders should be done confidentially and one-on-one with individuals.

Adoption mine teams should chose as interviewers those people whom interviewees are most likely to feel comfortable with in an interview setting. Interviewers should be self-briefed or trained in the interview to be conducted

The questions to be asked in the interview are provided in the example Worksheet #1 provided in ***Appendix 5***. Interview responses should be carefully documented at the time of the interview onto the Interview worksheet using the interviewee's own words.

A simple analysis outlined in ***Appendix 5*** for summarising the interview results will allow the Adoption Mine Team to better understand the thinking of their stakeholders and adopters and to compare the thinking at their mine with the most informed understanding of the hazard, as summarised in the Risk Summary (see ***Appendix 10***), and the thinking of stakeholders at the demonstration mine.

The analysis worksheet is attached as worksheet #2 in ***Appendix 5,*** together with a recommended analysis procedure.

Members of the adoption mine team could be selected as analysts, or the task may be assigned to two or more individuals associated with the team and adoption effort, and who have a sound understanding of the Risk Summary.

Step	What	Check – go/no-go decision question
1	**Identify adopters and key stakeholders at the mine**	Do we have a good understanding and complete identification of potential adopters and stakeholders?
2	**Select people to be interviewed**	Have we chosen the appropriate people to interview?
3	**Identify and brief the interviewers**	Are the interviewers ready to interview?
4	**Conduct the interviews**	Have all the interviews been done and full worksheets completed and returned for processing?

5	**Summarise the interview results**	Have the interview results been systematically assessed and significant new findings clearly identified?
6	**Use the findings to customise the behavioural communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?
7	**Use the findings to customise the leadership behaviour communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?
8	**Integrate the customised plans into the implementation plan at the mine**	Is the overall implementation plan coherent and properly understood by the mine project team?

Figure 8 Eight step process developed for customising a behavioural and leadership communications strategy. Steps 2 to 5 – the interview steps - are highlighted.

2.8 Customisation of behavioural communication plan

Behavioural communications[1] involves a process of skilful interaction or dialogue with identified stakeholders to attain a shared understanding of the problem. This enables people to make more informed decisions and take appropriate actions to reduce risks. The methods (modalities) of communication selected should focus on addressing people's 'mental models' or their rationale for behaving in a specific way in order to effect the required change in behaviour that focuses more on safety seeking .

A detailed behavioural communication plan developed for and refined at the demonstration mine is attached as **Appendix 3** to serve as the base plan to be customised by the adoption mine. Much of the content was based on work carried out by Decision Partners that identified antecedents of particular behaviour displayed at different levels in the company hierarchy and the required desired consequences. The appropriate communication vehicles at each level were then identified. Many of the communication methods already in use at Driefontein Gold Mine were used, but a number of new initiatives were put in place to complement the mine's Masiphephe safety initiative. These communication models were selected to address the stakeholders' and adopters' unmet needs and were either sourced or developed by the team.

Given the information, gaps and alignments and for purposes of fast tracking adoption, the behavioural communication strategy focuses initially on the short term objective of understanding:

- The implications of carrying out entry examination well or poorly.

[1] Behavioural (Risk) Communications. Chamber of Mines. J Maphalala. 20 August 2008.

- The additional benefits of carrying out a thorough entry examination and making safe process.

The plan should be customised by each adoption mine based on the unique organisational culture and existing communication strategies at each operation.

However, the Adoption Mine Team should first ensure that they fully understand the plan developed for the demonstration mine, and its derivation (i.e. this is included with the plan in ***Appendix 3***), before proceeding with the process of customising the plan to suit their mine specific circumstances.

A detailed description of how to customise this plan is provided in ***Appendix 5*** with key points highlighted below.

The Adoption Mine Team (or a designated plan preparer) should answer the following questions in customising the plan:

- What, if any, of the modes of communication in the demonstration mine's behavioural communication plan should be included in the adoption mine's plan?
- What, if any, of the content or key messages in the different modes in demonstration mine's behavioural communication plan should be kept in the adoption mine's plan?
- What, if any, new content or key messages should be added to the behavioural communication plan for the adoption mine?
- Will these changes best match with the modes that should be used and key messages that should be conveyed in the adoption mine as revealed through the interview results?
- What is the best way to go about implementing the behavioural communication plan?

Considering the communication content of the new plan:

- From the interview results, what correct understandings about [the hazard] should be emphasised in communications?

- What incorrect beliefs or misunderstandings about [the risk/hazard] should be corrected through communications? What key messages should be emphasized in order to do so?
- What do people not know that is important to understand in order to fully appreciate the nature of [the hazard], and which should therefore be emphasised in communications?
- What information about [the risk/hazard] do people most want to know, and which should therefore be emphasised in communications?
- What sorts of messages should be emphasised to help people judge the trustworthiness and competence of their fellow employees and leaders involved in addressing [the risk/hazard]?

On the basis of the answers to the above questions, and the modes of communication available at the adoption mine, the Adoption Mine Team should adjust the modes and content of the base plan provided by the Lead Adoption Team.

Where new material is introduced into the plan, measurable objectives should be identified. These should be in the form of behavioural outcomes.

Step	What	Check – go/no-go decision question
1	**Identify adopters and key stakeholders at the mine**	Do we have a good understanding and complete identification of potential adopters and stakeholders?
2	**Select people to be interviewed**	Have we chosen the appropriate people to interview?
3	**Identify and brief the interviewers**	Are the interviewers ready to interview?
4	**Conduct the interviews**	Have all the interviews been done and full worksheets completed and returned for processing?
5	**Summarise the interview results**	Have the interview results been systematically assessed and significant new findings clearly identified?
6	**Use the findings to customise the behavioural communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?
7	**Use the findings to customise the leadership behaviour communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?
8	**Integrate the customised plans into the implementation plan at the mine**	Is the overall implementation plan coherent and properly understood by the mine project team?

Figure 9 Eight step process developed for customising a behavioural and leadership communications strategy. Step 6 – customising the behavioural communication plan - is highlighted.

2.9 Customisation of leadership behavioural plan

Based on research findings outlined in 2.6, the objectives of the leadership behaviour strategy are:

- Building trust between supervisors and the workforce.
- Developing listening skills particularly amongst the supervisors.
- Communicating the message that mining should not occur if it cannot be carried out safely.
- Communicating the importance of the entry examination and making safe procedure for improving safety.
- Developing the understanding of, particularly seismicity as a component of, Falls of Ground so that the workforce can be coached..

In a manner similar to that for customising the behavioural communication plan, a leadership behaviour plan developed for and refined at the demonstration mine is attached as ***Appendix 4*** to serve as the base plan to be customised by the adoption mine. The plan sets out the required antecedents, key leader behaviours and re-enforcing consequences for those behaviours. As with the behavioural communication plan, the Adoption Mine Team should ensure that they fully understand the plan developed for the demonstration mine, and its derivation (this is included with the plan in ***Appendix 4***), before proceeding with the process of customising the plan to suit their mine specific circumstances.

The adoption mine team (or a designated plan preparer) should answer the following questions in preparing the customised leadership behaviour plan:

- With respect to the stakeholders and adopters involved, who are considered to be the key leaders involved in accomplishing adoption of the leading practice?
- For each leader or type of leader, what key behaviours or actions must they perform to appropriately influence the decisions and actions of the stakeholders and adopters? (The set of Behaviours)
- What must the leaders be provided to enable them to perform these behaviours? (The set of Antecedents)

- What consequences – positive, immediate and certain – must follow performance of the key behaviours that will encourage them to be repeated and sustained? (The set of Consequences)
- What, if any, of the key behaviours, antecedents and consequences in the demonstration mine's behavioural communication plan should be included in this mine's behavioural communication plan?
- What, if any, of the key behaviours, antecedents and consequences in the demonstration mine's behavioural communication plan should be omitted from this mine's behavioural communication plan?
- What is the best way to go about implementing the leadership behaviour plan?

Where new material is introduced into the plan, measurable objectives should be identified.

Step	What	Check – go/no-go decision question
1	**Identify adopters and key stakeholders at the mine**	Do we have a good understanding and complete identification of potential adopters and stakeholders?
2	**Select people to be interviewed**	Have we chosen the appropriate people to interview?
3	**Identify and brief the interviewers**	Are the interviewers ready to interview?
4	**Conduct the interviews**	Have all the interviews been done and full worksheets completed and returned for processing?
5	**Summarise the interview results**	Have the interview results been systematically assessed and significant new findings clearly identified?
6	**Use the findings to customise the behavioural communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?
7	**Use the findings to customise the leadership behaviour communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?
8	**Integrate the customised plans into the implementation plan at the mine**	Is the overall implementation plan coherent and properly understood by the mine project team?

Figure10 Eight step process developed for customising a behavioural and leadership communications strategy. Step 7 – customising the leadership behaviour communication plan - is highlighted.

2.10 Integration of behavioural communication and leadership behaviour plans into the implementation plan at the adoption mine.

Based on the experience gained at the demonstration mine, the Lead Adoption Team should clearly set out guidance to assist the Adoption Mine Team in integrating their customised behavioural communication and leadership behaviour plans into the overall implementation plan at the adoption mine.

A component of the integrated implementation plan should be a monitoring programme that includes appropriate checking and reporting on the occurrence of the desired observable behaviours, as well checking and reporting on provision of the necessary antecedents and re-enforcing consequences.

Step	What	Check – go/no-go decision question
1	**Identify adopters and key stakeholders at the mine**	Do we have a good understanding and complete identification of potential adopters and stakeholders?
2	**Select people to be interviewed**	Have we chosen the appropriate people to interview?
3	**Identify and brief the interviewers**	Are the interviewers ready to interview?
4	**Conduct the interviews**	Have all the interviews been done and full worksheets completed and returned for processing?
5	**Summarise the interview results**	Have the interview results been systematically assessed and significant new findings clearly identified?
6	**Use the findings to customise the behavioural communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?
7	**Use the findings to customise the leadership behaviour communication plan**	Are the customised plans coherent and properly understood by the mine team and can they be implemented and effectively monitored in behavioural terms?
8	**Integrate the customised plans into the implementation plan at the mine**	Is the overall implementation plan coherent and properly understood by the mine project team?

Figure 11 Eight step process developed for customising a behavioural and leadership communications strategy. Step 8 – integrating the customised plans - is highlighted.

2.11 Identify initial implementation site

The selection of the initial implementation site is important. The decision should be based on a stope

- that has a reasonable length of time still to mine,

- that has a grade that is not marginal,
- that has relatively uncomplicated mining conditions,
- that is not too difficult to mine; but
- that has the possibility of demonstrating an improvement in safety with the implementation of the entry examination and making safe leading practice.

While it is feasible to gain operating experience on the procedural aspects at this scale, a broader based implementation at Mine Overseer section level at least, and preferably at shaft level, needs to be mapped out to achieve the required shift in workplace culture.

2.12 Briefing of adopters and stakeholders

Briefing of stakeholders and adopters must be part of the customised behavioural and leadership plan and as such should be based on insights gained from the mental models. These models will have been derived from the direct enquiry research to identify potential problems, attitudes, knowledge gaps and alignments and to acquire a shared understanding of what safety and, particularly, entry examination and making safe mean to employees.

Briefly, it is recommended that all employees on the Shaft have a once off briefing at the start of the programme with monthly follow-up briefs as required. The Shaft Manager has the lead responsibility for the briefings. The briefing should cover the revision of the examination and making safe process, and must highlight the fact that employees have an active role to play and that safety and health is the responsibility of every employee. The person giving the brief must also ensure that he/she portrays his/her support for this process.

2.13 Visits to and or discussions with source and demonstration mines

To obtain a full understanding and address any knowledge gaps of all processes involved in the adoption of new technology, visits to the mines that have already implemented the new technology should be scheduled as an important part of a successful adoption process. Such visits enable the project team to view the process in situ and discuss key success criteria and share learning points. (A team from Driefontein Gold Mine, the demonstration mine, visited the source mine, Impala Platinum Mine, and this experience enabled the demonstration mine team to redesign the process to suit the conditions of deep, steeper, backfilled panels at the demonstration mine.)

2.14 Arrangements for special assistance considered necessary

The communities of practice for adoption (COPAs) mechanism should be utilised as an important network through which experience and knowledge can be shared in supporting adoption and project teams into the future. The COPA mechanism has been established with the objective that members adopt a generous approach to sharing their experience and expertise in the area of occupational health and safety, on the grounds that such sharing will impact positively not only on overall industry performance, but also on their own performance through feedback and reciprocal sharing.

The coordinator of COPA is a key individual though which special assistance and learning can be obtained as it is his/her role to provide all members with useful information that emerges out of, for example, the activities of the adoption teams, from interactions between members, etc. It is also his/her role to facilitate interaction, provision of assistance and personnel exchange between members. This could include visits, discussions and meetings, as well as member interaction in problem solving.

The COPA coordinator maintains a list of the mines and persons who have indicated that they would be prepared to provide such assistance, and or participate in a personnel exchange / secondment programme for a limited period.

All COPA members should therefore, at any time, advise the COPA coordinator of problems that they have been unable to satisfactorily deal with through their interaction with COPA members. The coordinator will then assist by identifying and facilitating contact with persons well positioned to advise or otherwise assist in dealing with the issue.

Other methods through which assistance and expertise can be acquired via the COPA mechanism include the following:

- Direct communication with other members: a readily accessible register of member's contact details, special expertise and interests is available to help direct an enquiry for assistance that a member may have.
- Visits to successfully operating sites to observe effective practices and for problem solving discussions: visits are and can be coordinated through the COPA coordinator

- The COPA web-site: Members are advised per e-mail on a weekly basis of the new material that has been loaded onto the site. This website has available all information exchanged between members (vie email, etc), following discussions, visits etc.; all key documents and information provided by members; an up-to-date version of the adoption guide, updated in the light of operational experience advised by members; and items in newsletters, trade publications, presentations at Association meetings, prepared by the COPA co-ordinator as well as COPA members.
- Participation in regular meetings on topics of key concern or interest: the COPA coordinator is continuously seeking to identify issues that are of common interest to groups of members with a view to arranging meetings between such people to collaboratively address the issue.
- Expert input: in some cases the problems encountered by mines may require expert input beyond that available at mines that have successfully adopted the practice and the coordinator will facilitate the provision of appropriate expert assistance.

2.15 Identification of any special training considered necessary

Interviewer skills training for conducting the mental models interviews may be required as the questionnaires are not self administered.

Individuals selected to deliver the communication brief onsite should be familiar with the language, culture and literacy levels of the employees, in addition to being knowledgeable on the subject matter outlined in ***Appendix 3***.

It is also recommended that key team members undergo leadership and dialogue skills training.

2.16 Identification of key success factors

To facilitate the widespread adoption and success of the leading practice, the following critical success factors should be addressed:

- Addressing the importance of improving safety and the role that falls of ground play in serious accident and injuries.
- Simple and clear messaging in communications.
- Sense of ownership by all stakeholders.

- Focus by the adoption team on the objectives.

Some key success indicators should be:

- Leading practice, the entry examination and making safe procedure, and behavioural communication and leadership behaviour strategy, adopted successfully.
- At least 50 % reduction in the number of “A” hazards reported in stopes once the procedure is implemented.
- Longer term (12 months) a 50 % reduction in lost day injuries on all crews that have implemented the process.
- Effective participation in community of practice for adoption (COPA).

2.17 Design of a monitoring programme

A monitoring programme should be established to monitor performance of the practice. It should include

- Leading indicators such as support spacings, distance of support from the face, the presence of temporary support, the distance of backfill from the face (if used) and the use of preconditioning. The face shape, misfires and leads and lags of panels and gully positions relative to the face may be measured.
- The number of hazards and general rock mass conditions recorded in the panels during audits which may also indicate the impact that the process is having on ground conditions.
- Lagging indicators which may in the longer term indicate the effect and benefit of the entry examination and making safe procedure on safety. These lagging indicators may include lost time days or rock-related injuries.
- Records of the presence of equipment to carry out the entry examination such as pinch bars and the availability of personal protective equipment for the crew. ***Appendices 1 and 8.***
- A programme to assess the behaviours and quality of communications between team members and their supervisors as this is essential to derive full value from the practice and ensure sustainability of the change.
- Monitoring on a longer term basis of the shift in the mental model as an indicator of whether adoption of the procedure is leading to a change in workplace culture and attitudes of all employees towards safety.

2.18 Development of the implementation plan for the mine

The development of the implementation plan should be the responsibility of the project champion and members of the project team. Involvement from the adopters and unions should be obtained as it will ensure buy-in from all stakeholders and prepare everybody on the tasks and target dates. Responsibilities should be mapped out clearly and smaller plans could be developed per responsible person. Ideally, this plan should be developed using an electronic programme, such as Microsoft Projects, which will assist in the updating and tracking of progress.

2.19 Implementation at the selected pilot site

Implementation at the selected pilot site should be done strictly in accordance with the implementation plan. At Masekhane Shaft 18 crews were selected (nine day shift and nine night shift crews in nine working places). These crews were trained in the procedure during three consecutive days underground, following a briefing on surface. The various levels in the mining hierarchy were briefed separately.

2.20 Identification and documenting of any customisation needed prior to extension across the mine

In most cases, especially during the piloting phase, some customisation of the practice will be required to accommodate practical considerations. Different sections of a mine may have different mining conditions. For instance not all the faces will be mining on breast and backfill may not always be in use as is the case with preconditioning. Changes in stoping width or dip may also require customisation of the procedure.

2.21 Implementation of customisation

Once the customisation has been applied to the practice, it should be tested. All operating procedures, mine standards and training material must be updated. It is strongly recommended that the behavioural communications framework be included as an integral element of the standard since the most critical feature of the leading practice is the emphasis on full participation and team involvement.

2.22 Managing extension of the practice across the mine

One of the major components of extending the practice across the mine is the training of the crews prior to implementation.

Crew behaviour training with a particular emphasis on sensitising the stope crews towards the roll-out process for the entry examination and making safe procedure should be conducted.

Involvement of all stakeholders and effective communication is required.

2.23 Completion of checklist to confirm adequate consideration of critical elements

Before the roll out can commence, it is necessary to determine whether the mine is "ready" for roll out and implementation and the checklist in ***Appendix 9*** is an example of the relevant questions that should be answered.

Part 3 – Details of the leading practice

3.1 Overview

The following basic requirements have been established for the successful adoption of the entry examination and making safe leading practice:

- Mine leadership support and involvement in the project,
- Appropriate leadership behaviour,
- Appropriate behavioural communications, and
- Sensitisation and training of mine staff at all levels involved in the process.

With the entry examination and making safe as its core element, the
Falls of Ground procedure contains three main components:

- full crew participation,
- the task of examination and making safe carried out together by all members, and
- the signing off by all crew members that entry examination and making safe were carried out according to the required process.

3,2 Site Selection for initial adoption

The entry examination and making safe procedure is applicable for all underground mining operations and sites, including stopes and development ends, although the focus in the MOSH project has been on the entry examination and making safe in stopes.

The selection of the initial adoption site may be guided by the specific area having a poor safety record, particularly in terms of rockfalls. However, an area struggling to maintain production targets may not be suitable. Similarly it may not be ideal to initially select a stope that has a reputation of being a key producer, in case, during the introduction of the practice, delays occur which may tarnish the image of the leading practice for the rest of the mine.

3.3 Equipment

The entry examination and making safe leading practice requires minimal additional equipment to the entry examination and making safe procedure carried out on mines at present. The one piece of equipment that is considered highly necessary is the appropriate length pinch bar and additional quantities (if possible one for each member of the crew) of these are required to be strategically placed in the stopes and access-ways.

The use of and wearing of PPE in conformance with the mine's risk assessment and legal requirements continue to be required.

3.4 Necessary supporting physical infrastructure

A well organised and well lit waiting place for the crew to gather before entering the stope is important for the effective implementation of the entry examination and making safe procedure. This provides the crew with an opportunity to discuss safety and work requirements for the day. There should be enough space for the display of safety messages and those related to the entry examination and making safe procedure.

A physical barrier should be erected between the waiting place and approximately 10 m from the working face.

3.5 Training

Each crew that is introduced to the procedure is briefed on surface before undergoing three days of instruction and training in the procedure underground at their working place. On the first day an instructor who is familiar with the procedure goes through the procedure with the crew at the waiting place and then in the working place. The shift supervisor or shift boss must be present. On the second day the crew lead by the shiftboss performs the procedure while the instructor observes and gives help and correction. The third day the instructor again observes the procedure and reports back on any areas that are well done or need attention. If the shift supervisor is not present then the crew is regarded as not having received the correct training. The mine overseer and shaft managers are also briefed on the procedure by a senior member of the mine management during a workshop in which the procedure, leadership behaviour and behavioural communications are explained.

3.6 Instruction documentation

The entry examination and making safe procedure has been adapted from the mines current entry examination and making safe procedure, see ***Appendix 1.***

3.7 Signage

Typically on mines, overall safety initiatives, such as the Masiphephe safety initiative at Driefontein Gold Mine, are in place and incorporate a major communication campaign. As at Driefontein Gold Mine, the entry examination and making safe procedure can be used as one of many vehicles to convey the safety theme of the initiative. Therefore, only minimal additions may need to be made to the existing communications strategy, but it is also suggested that new sign boards and TV screens be erected in access-ways to the shaft to raise awareness of the entryu examination and making safe procedure.

Other signage could be considered to raise awareness of the system and the general FoG hazard as part of the leading practice.

3.8 Incentive arrangements

The entry examination and making safe procedure should not have any long term negative impact on the production performance of the mine. In fact, it is anticipated that the correct adoption of the system should enhance safety and result in fewer losses and stoppages, resulting in a more profitable mine. It is expected that no incentives in terms of production should be necessary for the introduction of the process. However, the mine may consider encouraging those who have been introduced to the new procedure by offering them a badge or T-shirt.

The improvement in safety due to the implementation of the entry examination and making safe procedure should also be covered by Management's key performance indicators (KPI's) that deal with general safety matters. A relevant KPI may be the number of crews successfully implementing the procedure.

3.9 Operational procedures

Operational procedures for entry examination and making safe, based on a procedure developed by the demonstration mine in cooperation with the MOSH Adoption Team, is given in ***Appendix 1.***

3.10 Relevant mine standards

All relevant mine standards need to be updated to reflect the changes made to the current entry examination and making safe procedure.

3.11 Monitoring and reporting arrangements

In the longer term, the mine's safety records are the major source to indicate whether a significant improvement in safety and more particularly in rock-related safety has been achieved. These records should be available to the adoption team to analyse.

In the short term, improvements such as support spacing and support distance to face should be used to indicate whether improvements in general stope conditions and therefore safety have been obtained. These measurements should be taken (how often) by trained production staff or specifically identified personnel such as training staff, as was the case on Driefontein Gold Mine. These measurements should be recorded in a spreadsheet or database and analysed by a competent person such as a rock engineer.

A measurement programme should be initiated with frequent readings. The frequency will depend on the extent of the sites at which the procedure is being implemented. However, the objective is o collect enough data to perform meaningful analysis as the procedure is introduced to a mine or section. However, the frequency of measurement may be reduced as the procedure is adopted in the mine or section. At this stage, monthly measurements made of leading indicators should be sufficient.

The behavioural aspects of the project are considered to be critical to the success of the project and initial mental models surveys, attitudinal surveys and Behavioural Practice Observations (BPO) ***Appendix 7*** should be carried out at least once before the procedure is introduced and repeatedly on a monthly basis once the process is introduced. It is not necessary to do a BPO on every panel but a number of typical and atypical panels should be chosen to perform these observations. Regular meetings and feedback sessions with the crews should also be conducted on at least a fortnightly basis.

Regular Planned Task Observations (PTO) of the procedure should be carried out at least once before the procedure is adopted in a stope and thereafter as often as possible but probably once a month and reported to line management and the mines safety committee and the Mine/General Manager and mine EXCO.

3.12 Performance measures

In terms of assessing the success of the entry examination and making safe procedure, this will be indicated by the ongoing improvement in the mine's safety performance as the procedure is rolled out to all crews on a mine. The number of crews that are trained in the entry examination and making safe is a leading indicator that should be recorded. How effective the trained crews are implementing the practice should be measured. This can be achieved by monitoring the support spacing on dip and strike, minimum and maximum distances of support from the stope or tunnel face and the availability of equipment to carry out the examination and making safe practice such as pinch bars. Planned Task Observations(PTO) and Behavioural Process Observation(BPO) of the crews carrying-out the examination should be made. The former would document whether the process was followed correctly while the latter would observe the behaviour of the crew. Frequency of measurements of physical and behavioural data will depend on the size of the roll-out of the process. Two aspects should be considered: 1. The need for enough data to draw significant conclusions and 2. Whether the data is valid if it comes from many different sites implementing the process compared to collecting the data from one site. If there are many sites then once a month measurements may be enough whereas if data is only valid if collected from one site than at least weekly and perhaps more frequent measurements if possible are recommended.

3.13 Management of leading practice

No changes to the management structure should be necessary as the procedure is a modification of the current procedure carried out on all underground mines.

Typically, the roles and responsibilities of the key players in the adoption and operation of the system are as follows:

Mine/General Manager

— Holds overall legal responsibility for the health and safety of his workforce and makes legal appointment of senior management to carry out appropriate occupational safety strategies.

— Motivates the capital expenditure and business plan, co-ordinated by the Project Manager, for phasing in the system across the mine.

— Approves purchase order for purchasing any equipment.

— Monitors performance of the system via monthly reports submitted to him.

Section Mine Overseer

— Responsible for providing on-going supervision for the process.

— Monitors the performance of the system through spot checks.

3.14 Risk Management in implementing the system

A risk assessment on the entry examination and making safe is not necessary as the procedure is an enhancement of the current procedure. No new risk is introduced into the current process but rather the approach is to ensure that the current procedure is carried out and that there is involvement by all crew members.

To minimise the risk, crews should also undergo training in the changed procedure as indicated in 3.5 above.

3.15 Proprietary knowledge or technology

Both the source mine and demonstration mine management have agreed that any relevant information on the entry examination and making safe procedure at their mines will be freely available. This is available both directly with the mine and through the COPA mechanism.

Appendix 1: The Driefontein Procedure For Entry Examination And Making Safe

GOLD FIELDS	**Standards**	**Number:** **Mar'09**
Driefontein Gold Mine	**Leading practice for examination and making safe procedure**	**Revision 5b** **Proposal** **DvW**

IF WE CANNOT MINE SAFELY, WE WILL NOT MINE
MASIPHEPHE SISONKE SINGAKWENZA

INTRODUCTION

- Establishing a team concept for examination and making safe of stopes. This entails the entire team appointed to a panel conducting an examination of that area and making it safe and the Competent Person declaring it safe for normal work to be carried out.
- All team members who participate in the process must be qualified as Competent "B" in terms of chapter 14, section 7.1 of the Mine Health and Safety Act, and it is expected that all workers on mining teams should be qualified to this level.
- This standard applies to all mining operations carried out on the stoping horizon after on-reef development has been completed, and covers ledging, stoping, back area sweeping, vamping, reclamation and any other activity that requires persons to enter a stoping workplace.
- Before the examination and making safe procedure is started, the normal waiting place procedure is followed when the team arrives. Importantly the Communication Board must be consulted by team representatives and any problems, comments and/or actions must be discussed with all team members
- The area of responsibility for the examination and making safe must be demarcated for the team members on the mine plan displayed on the Communication Board.
- The Competent Person as referred to in this procedure must be certificated as Competent "A" in terms of chapter 14, section 7.1 of the Mine Health and Safety Act and hold a current appointment for the working place being examined and made safe.
- The poster included immediately after the procedure details sets out the main steps that are to be followed and will be used to promote proper implementation of the procedure in the workplace.
- The communications model appended to this document should be used to guide communications and behaviour during implementation of this procedure.

WAITING PLACE PROCEDURE AND COMMUNICATION

- No person will pass the no-entry barricade before the Competent Person authorises entry into the workplace.
- The team will hand in their attendance cards to be stored in the designated holder on entering the waiting place.
- The start of shift meeting including safety discussion should be conducted first.

- Check for any team member injuries.
- Check that all team members have correct PPE in good condition.
- On completion of this the Dayshift/Night Shift Communication Board should be checked and any actions required from this to be discussed with the team.
- Any hazards identified and noted on the Communication Board to be planned for.
- Plan the team daily activity.
- Plan the individual team member activities

EXAMINATION TOOLS

- Suitable pinch bars of adequate length with gaskets.
- 1 Explosives bag for explosives.
- 1 Explosives bag for fuses.
- Danger tape.
- Paint for marking misfires.
- Socket plugs.
- Scraper wire.
- Approved blowpipe.
- Methanometer.
- Whirling hygrometer.
- CO Monitor.

PERSONAL PROTECTIVE EQUIPMENT

- Hard hat.
- Long PVC barring gloves and arm guards.
- Knee guards.
- Eye protection.

- Earplugs.
- Steel toe cap boots.

DAILY ENTRY EXAMINATION AND MAKING SAFE PROCEDURE

- Waiting place – on arrival of the team, a designated person must visually examine and make the waiting place area safe for the team to enter. This area must be physically examined within a maximum of ten days after the previous physical examination.
- The appointed person must test for flammable gases, temperature and adequate ventilation flow in each area of the working place prior to the team entering that area in accordance with the Code of Practice for Flammable Gas Testing. If the any of these are outside the acceptable limit, the appointed person will not allow the team to enter until the condition has been rectified.
- The team will collect their examination and making safe tools from the areas at the waiting place or within the working place as designated by the Competent Person.
- On completion of all the waiting place procedures, the Competent Person opens the barricade to enter the working place.
- The team then enters the working place using the approved travelling route. During this period, the team members do a visual examination of the travelling way and raise to the top gully of the working area.
- The team will then conduct visual examination along the top gully moving towards the area where work is to be conducted up to the point designated by a gully examination barrier. The barrier will be positioned at least 10 metres away from the closest active mining face.
- The Competent Person will ensure that the travelling way, raise and top gully are examined physically and made safe within a maximum of ten days after the previous physical examination.
- After the Competent Person has opened the barrier, from this point, the team will conduct a full physical examination of the remainder of the route to access the area where work is to be conducted. The team examines the hangingwall, footwall, sidewalls and gully heading as applicable following the Competent Person. They will carry out barring of all loose rock and check on all support installed. If required, they will install temporary support. During this examination, the entire team will assist in the process.
- On completion of the examination and making safe procedure of the route to access the area where work is to be conducted, the team should start their examination procedure of the entire area where work is to be conducted for the shift. The team must examine the hanging wall, footwall, sidewalls and face. They must carry out barring down of all loose rock and check on all support installed. If required, they will install temporary support.

- During examination of the zone around the bottom gully, toe area of the panel and heading, the team must exercise extra care to check for displaced support and unsupported spans.
- The team will conduct a physical examination of the bottom gully up to the position of the gully examination barrier positioned at least 10 metres away from the closest active mining face, and a visual examination from there to the position of its entrance from the raise. They will do this examination even if another team has already examined the gully.
- The team will conduct a visual examination of the second escape if not covered by the above steps.
- The Competent Person will ensure that the second escape and bottom gully is examined physically and made safe within a maximum of ten days after the previous physical examination.
- Throughout the examination and making safe activities, the Competent Person will oversee the activities. His/her role will also be one of coaching and assistance to ensure that the process is completed as required.
- Work may not continue when a panel or part of a panel is found to be unsafe and it cannot be rectified or made safe by the team. Unsafe areas should be barricaded off as a no-go zone.
- If the safety of persons is compromised during the shift after a change in conditions resulting from barring any rockmass, rockfall or seismic activity, a full re-examination and making safe of the respective zones must again be conducted and the working place signed off as safe to mine again.

REPORTING AND COMPLETION OF DECLARATION DOCUMENTS

- On completion of the examining and making safe process, the team discusses among themselves and with the Competent Person the hazards that were identified during examination, the remedial actions taken and any precautions to be taken during the shift.
- Every team member then signs the attached form to confirm that he or she considers that the making safe and examination procedure was followed properly.
- **If any team member is not willing to sign for proper completion of the making safe and examining procedure, the Competent Person will endeavour to understand the reasons and to resolve the situation to the satisfaction of every team member. Should the Competent Person, after consulting with the Health and Safety Representative, consider that there are no justifiable reasons for a team member not signing, he may decide to declare the workplace safe. This will not prejudice the right of any team member to refuse to work in a condition that he or she considers to be unsafe.**
- After all team members have signed for proper completion of the making safe and examination procedure, the Competent Person will declare the workplace safe by signing on the attached

declaration sheet and in the Competent Person's logbook **provided he considers that all hazards have been adequately addressed**.

- The declaration sheet and Competent Person's logbook must be counter-signed daily by the Miner.
- The Miner must record that the working place was examined, the findings of the examination and making safe procedure, and the actions taken in his logbook.
- The Competent Person's logbook and the Miner's logbook must be shared with the Supervisor Operations, Mine Overseer and Manager of this working area on their visits and counter-signed daily by the Supervisor Operations.
- A copy of the signed Competent Person's logbook, together with the acknowledgement signed by the team, must be filed by the Competent Person for the designated area at the end of the shift on surface. This must be available for the next shift to follow-up on any requirements.

END OF SHIFT

- On completion of the shift, the examination tools must be returned to the areas designated by the Competent Person, specifically ensuring that all pinch bars are replaced on the tool boards to be available for the next shift.

GENERAL POINTS

- If any team member or other person have a complaint that the working area is unsafe, the normal mine procedure for handling the employee's right to refuse to work in an unsafe workplace will apply.
- For the purposes of this procedure, no distinction is drawn between contractors and mine employees.

WEEKLY PHYSICAL EXAMINATION AREAS WITH DAILY VISUAL EXAMINATION

- All travelling ways, including gulleys up to the position of the gully examination barrier and second escapes.
- Area between the waiting place and the blasting point barrier.
- All areas and travelling ways designated to the Miner in the Supervisor Operations' log book.
- All inclined travelling ways to be examined from the top down.

- All seals and barricades.

REFUGE CHAMBERS

- Ensure that the Refuge Chambers comply with requirements.
- All workers, including contractors who work in the section, must know where the Refuge chamber is, and know what the evacuation procedures are.

CHECK / EXAMINE THE FOLLOWING:

- Make sure all air and water valves are open.
- Fix any air and water leaks.
- No excessive quantities of water to be allowed to enter into any of the ore passes.
- Ensure all old areas / ends are effectively barricaded off and the correct notices displayed.

Standard approved for use during trials of leading practice

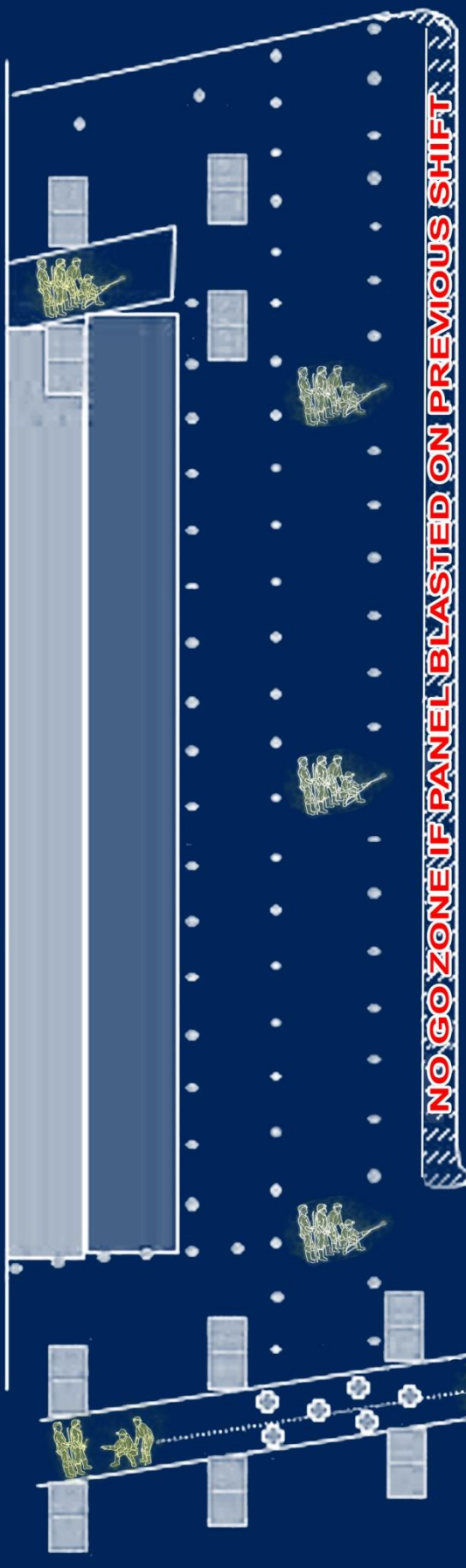
POSITION	*NAME*	*Co NUMBER*	*SIGNATURE*	*DATE*

Examination & Making Safe Procedure

1. The team meets at waiting place
2. Waiting place procedure organisation
3. Collect tools and equipment
4. Enter the raise and visually examine to the top gully
5. Continue visual examination up to gully barrier position (start 10 m from the working face)
6. The competent person opens the barrier and physical examination starts
7. The team then examines and makes safe the entire area where work is to be conducted from the top gully to the bottom gully, taking care not to enter any No Go Zone
8. The team then examines and makes safe the area around the bottom gully up to the barrier position

Work may not continue when the area is not possible to be made safe. Area then to be barricaded off as a NO-GO zone

9. The team discusses the hazards identified and precautions to be taken
10. The team then signs that the examination and making safe procedure was completed properly
11. The competent person then signs off declaration document that the working place is safe
12. Work commences for the shift



If we cannot mine safely, we will not mine!

MASIPHEPHE - SISONKE SINGAKWENZA

Check support and unsupported spans Always properly examine, bar and support.

Workplace: _____ Date: _____

PLEASE INDICATE EXAMINATION BY MEANS OF: √ OR X

1	2	3	4	5	6	7	8	9	10	11

MEASUREMENTS (MINING) – DISTANCE

12	Permanent support – distance to face: Top____ Middle___ Bottom___	
13	Temporary support – distance to face: Top____ Middle__ Bottom__	
14	Ventilation Control – distance to face ___m. Velocity ____ m/s.	
15	Wet Bulb Temperature - °C _____	

We, the members of team _____, confirm that the making safe and examination procedure was conducted according to standard at the abovementioned workplace on the above date

NAME	*Co NUMBER*	*SIGNATURE*	*NAME*	*Co NUMBER*	*SIGNATURE*

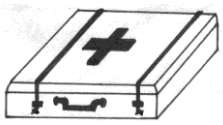
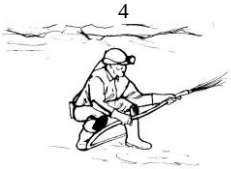
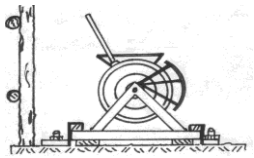
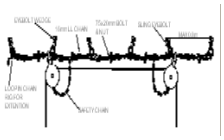
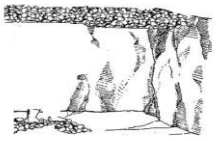
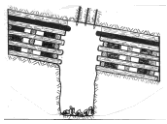
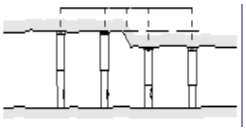
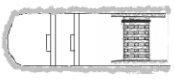
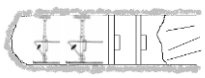
We declare that the abovementioned working place was examined and found safe on the above date.

CAPACITY	*NAME*	*Co NUMBER*	*SIGNATURE*	*DATE*	*TIME*
COMPETENT "A" PERSON					
MINER					
SUPERVISOR OPERATIONS					

EXAMINATION AFTER DISTURBANCE SEISMIC EVENT, ROCKFALL

We declare that the abovementioned working place was re-examined and found safe.

CAPACITY	*NAME*	*Co NUMBER*	*SIGNATURE*	*DATE*	*TIME*
COMPETENT "A" PERSON					
MINER					
SUPERVISOR OPERATIONS					

1.  *TOKEN*	2.  **FIRST AID**	3.  *PPE*
4  WATER DOWN	5.  PINCH BAR	6.  METHANE
7.  ***WINCHES***	 *8.* ***RIGGING***	 9. REEF IN HANGING
10.  GULLY SUPPORT	11.  BROW SUPPORT	**12.**  **PERM SUPPORT**
13.  **TEMP SUPPORT**	**14.**  *VENTILATION*	*15.*  *TEMPERATURES*

Appendix 2: Mental models questionnaire

Falls of Ground
Mental Models Interview Protocol

Interview Purpose: To identify the need / value / priority and risks associated with adapting the proposed best practice in a specific mine – Examination and Making Safe Best Practice – and what is required to make adoption successful.

Introduction

Introduce yourself and your purpose

Hello, I'm << name and company / organization>>. I am conducting interviews on behalf of the Falls of Ground Team. I'd like to give an overview of the work that the Falls of Ground Team is doing, and then ask you for your thoughts on the specific challenges you face with falls of ground in your mine and how our team's proposed best practice might work at your mine. I'd like to thank you, on behalf of our team, for taking the time to help us with this important initiative.

I have some questions to help guide our discussion, but please feel free to raise any topic that comes to mind as we go along. There are no right or wrong answers, and all of the comments you provide will add value to the team's research. I assure you that what you say will be kept confidential to our research team. No personally identifying information will be passed along to any one associated with your company, other companies or the Chamber of Mines.

Before we start, I'd like your permission to have <<name>> take notes throughout the interview. Please be assured that we will not attribute any specific answers to you. We will only report the results back to the team in aggregate, that is, all of the interviews will be summarised. May we proceed on that basis? Thank you.

Opening

Share your agenda

Our conversation will cover two topics. First, I'm going to ask you about the risk of falls of ground at your mine, and then I'm going to ask you about how the Adoption Team's proposed best practice for falls of ground might be adapted for your mine.

Provide background

The Falls of Ground Adoption team is working to significantly reduce falls of ground in mining operations. Our goal as an industry is to reduce falls of ground by 20% each year from 2003 to 2013

Researcher: If Interviewee thinks that he or she does not know enough to answer the question, please use follow-ups, however, don't press if the Interviewee still does not want to answer a question.

- I'm just interested in hearing what you think. Again, there are no right or wrong answers.
- Based on what you know, what are your thoughts on this topic?

Perceived Risk of Falls of Ground at their Mine

Perceived Risks – Questions for revealing thinking and the need and priority for addressing falls of ground in this mine and also context.

To start, perhaps you could tell me a bit about your role in the mine. What is your position?

- **1** Do you have people reporting to you?
- **2** What is your interest in falls of ground at your mine?

Now, let's talk a bit about the potential for falls of ground at your mine

- **3** What are the likely causes of rock falling from the hanging or side walls in your operations?
    - **4** Of the causes you mentioned, what is the most likely cause?
        - Is this also the most harmful to people?
        - If no, which one that you mentioned would be?
    - **5** Thinking about the most harmful cause to people, to what extent is this repetitive?

- **6** Thinking about the most harmful cause << name it>> is there anything that is not understood about why it happens

- **7** From your perspective, what is the single most important thing that can reduce << this cause>> of falls of ground on your mine?
    - **8** Please explain your answer?

- **9** Thinking about current operations at the mine, what is being done well to prevent << this cause>> of falls of ground?

- **10** And what still needs to be improved?

Thank you. Now I'd like to move on and talk about best practices.

Adoption of Technology or Best Practice

Provide scenario:

The Falls of Ground Team is considering an Examination and Making Safe best practice for mines like yours. It would entail making sure that all checks are made, before people enter a working area, by a competent person. It would also ensure everyone implements all procedures for making a working area safe before they enter and while working in it.

Note to interviewers: By best practice we mean a procedure or set of procedures that are routinely used in practice by one or more operations as a particularly good and effective way of doing things to achieve improves OH&S performance.

Best practices would include a procedures, or set of procedures used by an operating mine or group of mines to achieve particularly good performance in the area under consideration. It could be a particular way of using technology, achieving a desired behaviour, or more generally, of arranging for things to be done. It would usually be identified through a benchmarking, or other review, or information sharing process.

Focus on the critical influences on successful adoption

Value and Priority

- **11** So, having heard a bit about the best practice the team is considering, what do you think would be the greatest benefits of adopting this at your mine?
    - **12** Would there be any downsides of adoption?
- **13** What do you think it would take for the adoption of this best practice to be seen as a top priority in your mine?
    - **14** Please explain your answer?

Aids and Barriers to Adoption

Broad Mental Models questions to prompt thinking about aids and barriers.

- **15** When you think about adopting this Examination and Making Safe best practice at your mine, what will be the most important things to enable successful adoption?
    - **16** Tell me why that would be important?
    - **17** If they do not mention it, prompt:
        - **18** What functional requirements would be most important? By that I mean the equipment or the people would mean to do the best practice?
        - **19** What leadership behaviours would be most important? By that I mean, the actions that employees can observe leaders doing or not doing?
        - **20** And what behavioural communications requirements would be most important? By that I mean, communications that enable people to act in a new way?
- **21** When you think about people who will be primarily responsible for implementing this Examination and Making “Safe best practice, what things would be particularly important for them to have in order to implement it successfully?
    - **22** And why would that be important?
    - If they don’t mention it, prompt:

        - **23** How important would training be?
        - **24** How about proper tools?
        - **25** How about leadership by their supervisors?
        - **26** How about behavioural communications?
        - **27** Does anything else come to mind that would be important?

- **28** What barriers might prevent successful adoption?

    - **29** How might <<take the ones mentioned one at a time>> be addressed?

Specific questions about two major areas of focus that will be aids or barriers to adoption

Leadership behaviours

Thinking about leadership now…

- **30** What will be important for you to <u>see</u> your supervisor <u>do</u> to demonstrate support for adoption of this best practice?

    - **31** Why would this be particularly important?
    - **32** Is there anything your supervisor <u>should not</u> do?

- **33** When you think about the adoption of best practice, what should the supervisors in your mine do that they are not doing right now?

    - **34** Why would that be particularly important?

Behavioural Communications

Now I'd like to discuss communications about the Examination and Making Safe best practice.

- **35** Which leaders in your mine would be most trusted by teams working to ensure safety related to falls of ground?

  Falls of Ground - Mental Models Interview Protocol – Reply Sheet

    - **36** Please explain why that leader << if more than one, take them one at a time>> is most trusted?

- **37** For the most trusted leader, what messages will be important for << this leader>> to stress in their communications when they introduce this best practice to the mine workforce?

    - **38** Why might those things be really important?

- **39** What messages will be important for direct supervisors to stress in their communications when they introduce this best practice to the teams working to ensure that mine hanging and sidewalls are kept safe?

    - **40** Why might those things be really important?

- **41** What sorts of messages must be avoided by the direct supervisors?
    - **42** Why?

- **43** What forms of communications would be most effective for introducing this best practice to the teams?
    - **44** Why those
    - **45** Any forms of communications that should be avoided?
    - **46** Why?

Close: Wrap up

You have been very helpful\. I really appreciate the time you have taken to speak with me. In closing:

- **47** Is there anything else that came to mind while we were talking that you would like to be sure the team considers?

- **48** If you could offer one piece of advice to the Falls of Ground Adoption team, what would it be?

That now concludes this interview. Your comments have been very interesting and valuable. On behalf of the Adoption team, and the Chamber of Mines, I'd like to thank you for your time.

Appendix 3: Behavioural Communication Plan For Adopters (Employees Exposed To The Technology)

Communications model for the implementation and maintenance of the leading practice for the Examination and Making Safe of workplaces in the Mine

No	Other party to the interaction	When	Desired Interaction Behaviour	Expected Outcome	Medium	Who must ensure this happens	Control Measure / Follow-up / Over-inspection
Interaction between: Mine Overseer/Manager and							
1	Team Members Team Leaders, Miners, Supervisors Operations	Daily visits	Test the knowledge and look for correct application of standards pertaining to the Team based Examination and Making Safe Process, including the Hazard Identification process by the persons in the working places being visited. Coach the Supervisor Operations in Correcting any shortcomings as encountered. Question members and Supervisors to test and determine effectiveness/quality of the teams ability to communicate and deal with issues pertaining to the relevant Health and Safety information such as; Events (Accidents/Section 54's issued), Mine/Team performance, Raise any concern relating to health and safety of the team due to existing work place, work related or environmental conditions (Unsafe conditions, availability of or contingency if lack of equipment/material exists. changes to any standards or safe working procedure). Discuss any unsafe work practice reported and coach team in understanding the correct procedure and consequence of non conformance (Review recordings on risk communication board). Discuss all relevant general information/briefs issued by the mine for communication. Discuss team production performance against target. Discuss findings of reports and Task Observations with the team and coach Supervisor in resolving any issues. Reinforce participation and correct behaviour. Shortcomings should also be discussed with the Safety Officers and the Training Department's officials for further action and systemic correction through coaching and training. Check availability, relevance and correctness of information placed/displayed pertaining to any safe operating standards, procedures, instruction, guidelines, inspection/investigation feedback reports and any other relevant promotional materials to support a particular safety topic such as FOG prevention.	Effective implementation and sustainability of safe production, including effective implementation and maintenance of the leading practice examination and making safe process. Fully informed teams leading to appropriate risk assessment and action based on identified risks. Team unity and willingness to enter into dialog and participate in resolving challenges	Discussion	Management	During weekly / monthly Supervisor Operations Performance Evaluation
2	Team Members Team Leaders, Miners, Supervisors Operations	Daily visits	As a first point of departure, the Mine Overseer or Manager requests to see the Safe Declaration Sheet from the Miner / Team Leader in the working place. He promotes the team examination and making safe process by stressing the importance of the team's co-operation in maintaining a healthy and safe environment and checks to see that all persons have signed and follows up any matters that may have arisen during the examination and making safe process, also checks to see whether identified hazards have been corrected. The Mine Overseer and Manager must be seen to be supportive of persons who want to correct any safety deficiency before wanting to sign for agreement that the examination and making safe procedure was conducted properly.	Effective implementation and sustainability of safe production, including effective implementation and maintenance of the leading practice examination and making safe process. Team unity and willingness to enter into dialog and participate in resolving challenges	Discussion	Management	During weekly / monthly Supervisor Operations Performance Evaluation

No	Other party to the interaction	When	Desired Interaction Behaviour	Expected Outcome	Medium	Who must ensure this happens	Control Measure / Follow-up / Over-inspection
3	Supervisors Operations Mine Overseers	Performance reviews	Give feed-back to subordinates on the examination and making safe behaviours observed during visits and from weekly / monthly performance evaluations, supporting positive behaviour and agreeing to a plan of action to correct deficiencies where this process is not correctly applied.	Understanding and uniformity in implementation, commitment and ownership for safe production.	Recorded performance reviews	Manager	Performance review process and programmes
4	Supervisors Operations	Weekly	Discuss log book reports and safety performance during log book reviews and performance review sessions	Accurate and meaningful record of quality and effectiveness of supervisory control, communication and measurement.	Discussions	Mine Overseer	Safety Management programme
5	Team Members Team Leaders, Miners, Supervisors Operations	Ad-Hoc	When observing positive behaviour with regards to the correct examination and making safe process, a reward is given to the person or the term in recognition of the positive behaviour displayed	Sustainability of safe production, commitment and ownership for safe production.	Group Meeting	Mine Overseer	Awards and Recognition programme
6	All Employees on Masakhane Shaft	Once off at start of the programme with monthly follow-up briefs as required.	Brief all Masakhane Shaft Employees about the revision of the Examination and Making Safe process, that Employees have an active role to play and that Safety and Health is the responsibility of every Masakhane Employee. He must also ensure that he portrays his support for this process.	Understanding and uniformity in implementation, commitment and ownership for safe production.	Written Brief Group Meeting Discussions Health and Safety Committee Meeting Agenda Item Visual TV Message	**Shaft Manager** Operations Manager Senior Operations Manager Vice President	Briefing evaluation process
7	All employees on Masakhane Shaft	Periodical	Articles portraying positive results and progress of implementation on the revised Team Based Examination and Making Safe Process	Understanding and uniformity in implementation, commitment and ownership for safe production.	News Letters	Shaft Manager Operations Manager	Briefing evaluation process
8	Worker Representative Structures	Weekly until no longer required	Discuss and promote the importance and impacts of Safe proactive examination with the Worker Representative Structures (Unions etc.) and stress the positive principles e.g. -Empowerment of Employees - each worker has a say in his own safety -Support of withdrawal from unsafe workings -Safety is important to all persons and therefore requires a Team Effort -A team can more readily identify a hazard than one person. -Safety in the working place is not dependent on one person only Also indicate personal support and interest in the process and engender support for the process through these structures.	Understanding and uniformity in implementation, commitment and ownership for safe production.	Shaft Forum Communications Meetings	**Shaft Manager**	Employee relations meetings
9	Health and Safety Committee	Monthly	Actively monitor and provide direction in ensuring all matters raised are appropriately addressed. Keep the topic of the revised Team based Examination and making safe process alive at the Mine Health and Safety Committee at monthly meetings and show strong support for the process.	Potential risk which normal process has failed to eliminate are brought to the attention of Management and dealt with in a positive and constructive manner.	Verbal or written report. Discussion. Conflict resolution	Shaft Manager	Health and Safety Committee Meetings

No	Other party to the interaction	When	Desired Interaction Behaviour	Expected Outcome	Medium	Who must ensure this happens	Control Measure / Follow-up / Over-inspection
Interaction between: Supervisor Operations and							
1	Team Members Team Leaders Miners	At the start of the day before going underground	Supervisor Operations to check the communications system is in place to record that the Miners are at work. Conduct appointment and induction of alternate team supervisors as per workplace management procedure when required. Give feed-back to the Miner on safety performance and related issues. (alternate shift reports, material/equipment availability, Health/Safety and any general mine related communications, Safety board and injury free ladder information, Work place and work related risks, Matters raised by Health and Safety Representatives, Service Departments (Safety, Rock Mechanics, Engineering, Environmental, Geology, Mineral Resources, Human Resources and Survey), Matters raised by Management, changes to working standards and safe work procedures and general communications information, any new information pertaining to or affecting health and safety that may have been brought to attention since the previous shift or reported by the alternate shift workers. Interpersonal interaction to be conducted in a manner which promotes positive relations and verifies understanding.	Adequate alternate arrangement is made to appoint alternate Miner. Alternate Miners properly inducted. Arrangement is made to ensure required materials are available and delivered. Relevant information is available and can be communicated. Team Leadership is fully aware of work place and work related risk (Risks can be dealt with appropriately). Required test instruments available and in working order.	Discussion, dialog, communications book, briefs, safety and general notice boards. Lamproom control registers and complaint book	Mine Overseer	Safety Officer Inspections Mine Overseer control documentation and log book evaluations
2	Team Members Team Leaders Miners Mine Overseers Safety Officers Training Department Officials	Daily visits Early and late Shift visits	Test the knowledge and look for correct application of standards pertaining to the Team based Examination and Making Safe Process, including the Hazard Identification process by the persons in the working places being visited. Correct shortcomings as encountered through effective dialog and coaching. Participate and support team leadership during discussions pertaining to the relevant Health and Safety information such as; Events (Accidents/Section 54's issued), Mine/Team performance, Raise any concern relating to health and safety of the team due to existing work place, work related or environmental conditions (Unsafe conditions, availability of or contingency if lack of equipment/material exists. changes to any standards or safe working procedure). Discuss any unsafe work practice reported and coach team in understanding the correct procedure and consequence of non conformance (Review recordings on risk communication board). Discuss all relevant general information/briefs issued by the mine for communication. Discuss team production performance against target. A proper Task Observation is carried out by the Supervisor Operations on the Team based Examination and Making safe process during the early shift. The results of this Task Observation are discussed with the team and shortcomings are corrected, reinforce participation and correct behaviour. Shortcomings should also be discussed with the Safety Officers and the Training Department's officials for further action and systemic correction through coaching and training. Record all findings in the Supervisors log book. Make available or place/display any safe operating standards, procedures, instruction, guidelines, inspection/investigation feedback reports and any other relevant promotional materials to support a particular safety topic such as FOG prevention.	Effective implementation of examination and making safe process. Accurate record of attendance and reference to persons in the workplace in the event of emergency. Appropriate contingency action based on personnel ability to work safely. Fully informed teams leading to appropriate risk assessment and action based on identified risks. Adequate contingency plan to reallocate duty and responsibilities to cater for absenteeism.	Open dialog and participative team discussion, Time and attendance register, Workplace risk identification board. Briefs and Indicators (Graphs, Notes etc. on Waiting Place boards)	Mine Overseer	Supervisor Operations early shift procedure, Routine workplace inspections and audits

No	Other party to the interaction	When	Desired Interaction Behaviour	Expected Outcome	Medium	Who must ensure this happens	Control Measure / Follow-up / Over-inspection
3	Team Members Team Leaders Miners, Mine Overseer	When unsafe acts or unsafe behaviours are encountered,	Supervisor Operations must bring to the attention of the individual (and the team where necessary) any such act or behaviour observed. Every such instance must be recorded in the Supervisors log book. Deal with the issue in a manner which will ensure a sustainable behaviour change. (*The following is a guideline to an effective corrective coaching approach:* *-Approach the person in a non threatening way, stop the act or behaviour, get their full attention,* *-Introducing yourself to them and find out their name* *-Start with a positive, something that they have done correctly.* *-Asking them if they are aware of any unsafe or hazardous situations* *-State what you observed and why you consider it unsafe or inappropriate behaviour* *-Discuss the issue openly seeking a mutual agreeable solution.* *-Confirm you both have the same understanding of the solution and action required.* *-Record this action plan and agree on a follow-up.* *-Do not allow the work to continue until the actions have been completed.* *-End the interaction on a positive and always leave the individual/team with a safety tip and hint*).	All risks that could affect the health and safety of the team are identified and dealt with in a manner which facilitates constructive interpersonal interaction. All team members are satisfied and willing to declare the work place safe.	Open dialog and participative team discussion, Interpersonal Interaction. (Coaching)	Mine Overseer	Supervisor Operations early shift procedure, Routine workplace inspections and audits
4	Team Members Team Leaders Miners, Mine Overseer	Whenever a team member should deem the workings not to be safe or be in disagreement with the procedure or outcome of making safe (During the Examination and Making Safe Process or during the remainder of the working shift) **and the Supervisor Operations is unable to facilitate team agreement**	The Supervisor Operations must personally assess the situation which gave rise to the disagreement and then through a process of dialog and participative issue based risk assessment facilitate an agreed solution and action plan to the situation. The idea is solve the safety problem and not to attack the person for expressing his views and the manner in which these issues are handled must portray this fact. The Supervisor Operations must record every such issue and the agreed resolution in the log book.	All employees are involved in the process and feel free to exercise their right to work in a safe environment. All team members are willing to sign the safe declaration	Open dialog and participative team discussion, Interpersonal Interaction. (Conflict Management and Coaching)	Mine Overseer	Supervisor Operations Routine workplace inspections and audits. Review of Safe Declarations

No	Other party to the interaction	When	Desired Interaction Behaviour	Expected Outcome	Medium	Who must ensure this happens	Control Measure / Follow-up / Over-inspection
5	Team Members Team Leaders Miners, Mine Overseer	Weekly and monthly group meetings	Give feed-back to the teams on their safety performance e.g. Safety Statistics, repetitive Hazards Observed etc. and their performance in terms of the Mine's Safety Management Performance parameters and competition standings. The safety values of the team are discussed with the team during their weekly group meeting or during an early shift meeting at the waiting place. The Supervisor Operations must also, in his discussion, ascertain how the values impact on the lives o the team members and how they support those values during their daily routine	All risks that could affect the health and safety of the team are identified and dealt with in a manner which facilitates constructive interpersonal interaction. All team members take responsibility for their own and fellow workers safety.	Open dialog and participative team discussion, Interpersonal Interaction. (Coaching)	Supervisor Operations	Supervisor Operations Routine workplace inspections and audits. Review of Safe Declarations
6	Team Members, Supervisor Operations, Mine Overseers	On completion of the working shift	Report the days work achieved against target. Raise any concern pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which have been reported. (This must include any need for materials and equipment in order to complete their work safely or guidance on dealing with workplace or work related conditions). Interact in a manner which promotes positive working relations and contributes to a meaningful outcome.	Supervisor/visitor able to make informed decisions in support and guidance to the team. Constraints and risk is managed. Visitors are not exposed to any health and safety risk. Visitors do not perform any act which could compromise the health and safety of the team or themselves. Safe Production culture is re-affirmed.	Interpersonal interaction, dialog and coaching	Supervisor Operations, Mine Overseer, Management	Management, Mine Overseer, Supervisor Operations, Safety and Service department routine workplace inspections and audits
7	Health and Safety Representative and Mine Overseer	Any time during or after the working cycle	Discuss and agree on actions needed to resolve any concern pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which have been raised by the Representative on behalf of team members. Encourage the representative to feel free to approach team leadership with any concern and to assist in finding and communicating amicable solutions. Always interact in a positive and honest, transparent manner to ensure good work relations are maintained. Record all such reports and remedial action in the Supervisors Log book. Close the loop on completion of the action by also recording outcomes when the action has been completed.	Potential risk which normal process has failed to eliminate are brought to the attention of Management and dealt with in a positive and constructive manner.	Verbal or written report. Discussion. Conflict resolution	Supervisor Operations and Mine Overseer	Mine Overseer review of Supervisor Operations Log Book recording
Interaction between Team Leader/Miner and							
1	Team Workers, Team Leaders, Supervisor Operations and other relevant shaft personal.	At the start of the day before going underground	The Miner and Team Leader must notify their Supervisor Operations that they are at work. Source all relevant information regards alternate shift reports, material/equipment availability, Health/Safety and any general mine related communications (Safety board and injury free ladder), Work place and work related risks. Collect first aid and test instruments, ensure in working order (Notify relevant personnel if problems are encountered). Report any new information pertaining to or affecting health and safety that may have been brought to their attention since the previous shift.	Adequate alternate arrangement is made to appoint alternate Miner. Alternate Miners properly inducted. Arrangement is made to ensure required materials are available and delivered. Relevant information is available and can be communicated. Team Leadership is fully aware of work place and work related risk (Risks can be dealt with appropriately). Required test instruments available and in working order.	Discussion, dialog, communications book, briefs, safety and general notice boards. Lamproom control registers and complaint book	Supervisor Operations and Mine Overseer	Supervisor Operations early shift, Safety Officer Inspections Mine Overseer control documentation and log book evaluations

No	Other party to the interaction	When	Desired Interaction Behaviour	Expected Outcome	Medium	Who must ensure this happens	Control Measure / Follow-up / Over-inspection
2	Team Members	At the start of the days work cycle (Waiting Place Procedure)	Conduct waiting place procedure in a manner which encourages open, honest and willing participation and which promotes positive working relations and contributes to a meaningful outcome. Collect each team member's attendance card and ask questions to determine reason/whereabouts of absentees, complete attendance register. Discuss and issue instructions to ensure where persons are absent adequate measures will be taken to ensure no risk is posed. Interact with each team member to ascertain their ability to perform work safely (Lack of ability, material, equipment, injury, health, return from absence, new to working area, personal or work related issue). Discuss relevant Health and Safety information such as; Events (Accidents/Section 54's issued), Mine/Team performance, Raise any concern relating to health and safety of the team due to existing work place, work related or environmental conditions (Unsafe conditions, availability of or contingency if lack of equipment/material exists. changes to any standards or safe working procedure). Discuss any unsafe work practice reported and coach team in understanding the correct procedure and consequence of non conformance (Review recordings on risk communication board). Discuss all relevant general information/briefs issued by the mine for communication. Discuss team production performance against target. Discuss the days intended work, risk assessment, allocating duty and responsibility, guidance for safe work, taking cognisance of all relevant information gathered from all team members.	Accurate record of attendance and reference to persons in the workplace in the event of emergency. Appropriate contingency action based on personnel ability to work safely. Fully informed teams leading to appropriate risk assessment and action based on identified risks. Adequate contingency plan to reallocate duty and responsibilities to cater for absenteeism.	Open dialog and participative team discussion, Time and attendance register, Workplace risk identification board. Briefs and Indicators (Graphs, Notes etc. on Waiting Place boards)	Supervisor Operations and Mine Overseer	Supervisor Operations early shift procedure, Routine workplace inspections and audits
3	Team Members	During the Examination and Making Safe Process	Raise any risk observed pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which may affect the health and safety of the team. Interact in a manner which promotes positive working relations and contributes to a meaningful outcome. The Miner and Team Leader supports the Working team by way of encouraging participation in the Examination and Making process. Should any person have any concern about any matter that can jeopardize the safety or health of any one, the Miner or Team Leader must give attention to that matter and strive to get all members of his team to participate in the correction process and to sign off on the declaration sheet that they are happy with the state of the safety of that working place and that they are happy to continue working there.	All risks that could affect the health and safety of the team are identified and dealt with in a manner which facilitates constructive interpersonal interaction. All team members are satisfied and willing to declare the work place safe.	Open dialog and participative team discussion, Interpersonal Interaction. (Coaching)	Supervisor Operations and Mine Overseer	Supervisor Operations early shift procedure, Routine workplace inspections and audits

No	Other party to the interaction	When	Desired Interaction Behaviour	Expected Outcome	Medium	Who must ensure this happens	Control Measure / Follow-up / Over-inspection
4	Team Members	Whenever a team member should deem the workings not to be safe or be in disagreement with the procedure or outcome of making safe (During the Examination and Making Safe Process or during the remainder of the working shift)	The Miner supports the fact that the safety for each team member is important. The Examination and Making Safe process must continue with the participation of all team members and the safe declaration document should only be signed of by the Team Leader or the Miner once the whole crew have indicated that they are happy with the process and the safety of the working place. Should any person not feel happy about the safety of his working place, it is the duty of the Miner and Team Leader to assist such person and the crew to identify the cause of his unhappiness and to solve that problem, even if it means that they must enlist the help of the Supervisor Operations or the Mine Overseer in the process. The idea is solve the safety problem and not to attack the person for expressing his views.	All employees are involved in the process and feel free to exercise their right to work in a safe environment. All team members are willing to sign the safe declaration	Team Discussion, Interpersonal Interaction. (Conflict resolution)	Supervisor Operations and Mine Overseer	Supervisor Operations Routine workplace inspections and audits. Review of Safe Declarations
5	Team Members	During the full working cycle	Raise any risk observed pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which may affect the health and safety of the team. Interact in a manner which promotes positive working relations and contributes to a meaningful outcome. The Team Leader and Miner must encourage full participation and obtain team agreement whereby they need to work together in identifying any risk which may arise during the shift, stop, assess the risk, agree on and take appropriate remedial action, before proceeding with normal work. (Miner to record every such instance on the safe declaration report and in the miners log book).	All risks that could affect the health and safety of the team are identified and dealt with in a manner which facilitates constructive interpersonal interaction. All team members take responsibility for their own and fellow workers safety.	Open dialog and participative team discussion, Interpersonal Interaction. (Coaching)	Supervisor Operations	Supervisor Operations Routine workplace inspections and audits. Review of Safe Declarations
6	Supervisor Operations (During daily supervisory visit), Visitors to the working place (Management, Service personnel or auditors)	Any time during the working cycle	Report all issues pertaining to Health and Safety, raised by any team member, encountered during entry examination, and the actions taken to deal with the issue. Report all work place or work related matters pertaining to the maintenance and ability to deliver safe production. Miner and Team Leader to request any support or guidance needed to deal with constraints and must encourage team members to participate in all discussions with Supervisors and/or visitors. Inform of any risk pertaining to the workplace conditions, environment or the work being performed, which may affect the health and safety of the visitor. Stop any unsafe act being committed and coach visitor in the correct procedure or behaviour. Interact in a manner which promotes positive working relations and which provides affirmation of belief in the values that drive safe production and the acceptance of responsibility for safety.	Supervisor/visitor able to make informed decisions in support and guidance to the team. Constraints and risk is managed. Visitors are not exposed to any health and safety risk. Visitors do not perform any act which could compromise the health and safety of the team or themselves. Safe Production culture is re-affirmed.	Interpersonal interaction, dialog and coaching	Supervisor Operations, Mine Overseer, Management	Management, Mine Overseer, Supervisor Operations, Safety and Service department routine workplace inspections and audits
7	Team Members, Supervisor Operations, Mine Overseers	On completion of the working shift	Report the days work achieved against target. Raise any concern pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which could not be reported during the normal work cycle or observed on route out of the workings. (This must include any need for materials and equipment in order to complete their work safely or guidance on dealing with workplace or work related conditions). Interact in a manner which promotes positive working relations and contributes to a meaningful outcome.	Adequate planning and action is taken to deal with potential risk (Includes effective communication to alternate shift members)	Verbal or written report. Discussion	Supervisor Operations and Mine Overseer	Mine Overseer review of Supervisor Operations Log Book recording

No	Other party to the interaction	When	Desired Interaction Behaviour	Expected Outcome	Medium	Who must ensure this happens	Control Measure / Follow-up / Over-inspection
8	Health and Safety Representative	Any time during or after the working cycle	Discuss and agree on actions needed to resolve any concern pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which have been raised by the Representative on behalf of team members. Encourage the representative to feel free to approach team leadership with any concern and to assist in finding and communicating amicable solutions. Always interact in a positive and honest, transparent manner to ensure good work relations are maintained.	Potential risk which normal process has failed to eliminate are brought to the attention of Management and dealt with in a positive and constructive manner.	Verbal or written report. Discussion. Conflict resolution	Supervisor Operations, Mine Overseer and Management	Health and Safety Report procedure and Management Meetings
Interaction between Team Members and							
1	Fellow Team Members and Team Supervisors	At the start of the days work cycle (Waiting Place Procedure)	Submission of attendance card. Share any information pertaining to absence of fellow team members. Raise any concern pertaining to personal ability to perform work safely (Lack of ability, material, equipment, injury, health, return from absence, new to working area, personal or work related issue). Raise any concern relating to health and safety of the team due to existing work place, work related or environmental conditions (Unsafe conditions, lack of equipment/material, need for assistance or guidance).	Accurate record of attendance and reference to persons in the workplace in the event of emergency. Appropriate contingency action based on personnel ability to work safely. Appropriate risk assessment and action based on identified risks. Adequate contingency plan to reallocate duty and responsibilities to cater for absenteeism.	Team Discussion, Time and attendance register, Workplace risk identification board.	Team Leader / Miner / Supervisor Operations	Supervisor Operations early shift procedure, Routine workplace inspections and audits
2	Fellow Team Members and Team Supervisors	During the Examination and Making Safe Process	Raise any risk observed pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which may affect the health and safety of the team. Interact in a manner which promotes positive working relations and contributes to a meaningful outcome.	All risks that could affect the health and safety of the team are identified and dealt with in a manner which facilitates constructive interpersonal interaction. All team members are satisfied and willing to declare the work place safe.	Team Discussion, Interpersonal Interaction.	Team Leader / Miner / Supervisor Operations	Supervisor Operations early shift procedure, Routine workplace inspections and audits
3	Fellow Team Members and Team Supervisors / Supervisor Operations	Whenever a team member should deem the workings not to be safe or be in disagreement with the procedure or outcome of making safe (During the Examination and Making Safe Process or during the remainder of the working shift)	When a disagreement occurs during the examination and making safe process, a member of the team has the right to disagree with his fellow workers and not to sign on the declaration sheet. In this case, the Supervisor must determine the reason for such disagreement and resolve the problem to the satisfaction of the team member (solve the problem and not attack the person) and in so doing, together with the team strive to get the working place safe so that all persons can sign off. Should such disagreement still continue, the team member may work through his safety representative or Supervisor and then follow the mine's procedure for "Stoppages and Withdrawals" for unsafe workings. Any team member may also exercise this right at any time during the working shift, should they for whatever reason deem the working place to have become unsafe.	All employees are involved in the process and feel free to exercise their right to work in a safe environment. All team members are willing to sign the safe declaration	Team Discussion, Interpersonal Interaction. (Conflict resolution)	Team Leader / Miner / Supervisor Operations / Health and Safety Representative	Supervisor Operations early shift procedure, Routine workplace inspections and audits

No	Other party to the interaction	When	Desired Interaction Behaviour	Expected Outcome	Medium	Who must ensure this happens	Control Measure / Follow-up / Over-inspection
4	Fellow Team Members and Team Supervisors / Supervisor Operations	During the full working cycle	Raise any risk observed pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which may affect the health and safety of the team. Interact in a manner which promotes positive working relations and contributes to a meaningful outcome. (The Team must come to an agreement whereby they need to work together in order to ensure that each member follows the correct procedure. Should any one team member take a short cut, and not follow the procedure correctly, he may end up by putting the other team members' lives at risk. This must be avoided and each team member has the right to assist his fellow team worker to follow the correct procedures. By following the correct procedure, time and injury can be saved.)	All risks that could affect the health and safety of the team are identified and dealt with in a manner which facilitates constructive interpersonal interaction. All team members take responsibility for their own and fellow workers safety.	Interpersonal interaction (Coaching)	Team Leader / Miner / Supervisor Operations / Health and Safety Representative	Supervisor Operations Routine workplace inspections and audits
5	Visitors to the working place (Management, Service personnel or auditors)	Any time during the working cycle	Inform of any risk pertaining to the workplace conditions, environment or the work being performed, which may affect the health and safety of the visitor. Stop any unsafe act being committed and coach visitor in the correct procedure or behaviour. Interact in a manner which promotes positive working relations and which provides affirmation of belief in the values that drive safe production and the acceptance of responsibility for safety.	Visitors are not exposed to any health and safety risk. Visitors do not perform any act which could compromise the health and safety of the team or themselves. Safe Production culture is re-affirmed.	Interpersonal interaction, dialog and coaching	Team Members / Team Leaders / Supervisor Operations / Safety Representatives / Mine Overseer / Management	Management, Mine Overseer, Supervisor Operations, Safety department routine workplace inspections and audits
6	Team Leaders, Miners, Supervisors Operations, Mine Overseers	On completion of the working shift	Raise any concern pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which could not be reported during the normal work cycle or observed on route out of the workings. (This may include the need for correct materials and equipment in order to complete their work safely or guidance on dealing with workplace or work related conditions). Interact in a manner which promotes positive working relations and contributes to a meaningful outcome.	Adequate planning and action is taken to deal with potential risk (Includes effective communication to alternate shift members)	Verbal or written report. Discussion	Team Members	Mine Overseer review of Supervisor Operations Log Book recording
7	Worker Representative Structures	Any time during or after the working cycle	Raise any concern pertaining to the workplace conditions, environment or the work being performed (Unsafe acts), which have not been resolved to the satisfaction of the member and which they feel requires the intervention on their behalf of the Health and Safety representative. Brief worker representatives on the positives (and shortcomings) of the Examination and Making Safe Process and notify them where this process is being undermined.	Potential risk which normal process has failed to eliminate are brought to the attention of Management and dealt with in a positive and constructive manner.	Verbal or written report. Discussion. Conflict resolution	Health and safety Representatives	Health and Safety Report procedure and Management Meetings

Appendix 5: Customising Leadership Behaviour And Behavioural Communication At Adoption Mines

Background and purpose

Research and experience have shown that communications of all kinds and the actions (and inactions) of leaders at all levels are the most powerful influence on people's decision-making, judgment and behaviour. Tellingly, communications and leaders' behaviour occur continuously every day in mines. It is impossible to get anything done in the course of a day without communications and leaders' behaviour of various sorts and combinations: *Persons cannot not communicate; Leaders cannot not act.*

A leading practice within the Adoption System is described in three parts involving inextricably linked and interdependent activities. They are: 1) technology, knowledge or procedure; 2) communication to achieve desired behaviours and; 3) leadership behaviour to evoke and re-enforce desired behaviours for adoption. These three elements have been documented and developed by the *Learning Hub Adoption Team* at the source and demonstration mines respectively and the challenge is to ensure that these key elements of the leading practice are customised by the *Adoption Mine Team* to appropriately take account of mine specific circumstances at the adoption mines. In respect of leadership behaviour and behavioural communication, this is the challenge addressed in this guidance note.

The purpose of this note is to:

- Present a simple illustration, outlining the steps involved in customising the behavioural communication and leadership behaviour plans developed for the demonstration mine to meet the needs of a mine adopting the practice.
- Provide guidance on conducting and using a direct enquiry process to identify insight-based adjustments to the behaviour-based plans developed for the demonstration mine.
- Provide guidance on integration of the customised plans into the overall plan for implementing the leading practice at the adoption mine.

Key considerations

1. **Implementation of the customisation process should be kept as simple as possible:** The key elements of the customisation process are presented in the following simple diagram, which identifies what needs to be done in an eight step process, along with the quality checks that need to be implemented to ensure a quality outcome.

2.

Step	What	Check – go/no-go decision question
1		Do we have a good understanding and complete identification of potential adopters and stakeholders
2	**Select people to be interviewe**	Have we chosen the appropriate people to interviev
3	**Identify and brief the interview**	Are the interviewers ready to interview?
4	**Conduct the interviews**	Have all the interviews been done and full workshee completed and returned for processing?
5		Have the interview results been systematically asses and significant new findings clearly identified?
6	**Use the findings to customise behavioural communication pl**	Are the customised plans coherent and properly understood by the mine team and can they be
7	**Use the findings to customise leadership behaviour**	Are the customised plans coherent and properly understood by the mine team and can they be
8	**Integrate the customised plans the implementation plan at th**	Is the overall implementation plan coherent and prop understood by the mine project team?

A key point about the process outlined above is that it enables the behavioural communication and leadership behaviour plans to be customised on the basis of insight and not guesswork about the thinking, key beliefs and values of the adopters and stakeholders. This allows the communication and leaders actions to be tailored to the critical behaviours needed to accomplish adoption of the leading practice.

An expanded diagram indicating how the various steps would be implemented and the practical implications of who needs to do what is provided at the end of the note. More detailed guidance is set out in the points that follow.

3. **Attention must be focussed on ensuring that the key tasks in each step are completed as described in order to produce a quality result:** Behavioural communication and leadership behaviour plans typically have goals, or desired outcomes, that are expressed in behavioural terms. They are expressed in the form of what a person could observe happening in the workplace, or hear in a conversation or interview in the workplace. Both should be as a clear result of communications implemented and the behaviour of leaders. Accomplishing desirable goals of this nature is what is needed to achieve the adoption being sought. This can best be done by following the guidance provided.

4. **Responsibilities for stewarding the process to completion must be clearly assigned as must responsibilities for completing the requisite individual tasks:** Implementation responsibilities should be clearly set within the adoption mine team in order to ensure that the entire process outlined in this note is appropriately stewarded. This will ensure that individual tasks are completed as required, and that the outcomes for plans are appropriately measured and reported. This could involve spreading the tasks across many individuals, or perhaps concentrating the process in a small number

of key individuals. While the use of a small number of key individuals may be more manageable, the group should be large enough to reduce the risk of personal bias and to spread the benefits derived from meaningful interaction with staff on a matter that is of direct concern to them.

The Adoption Mine Team should however ensure that a single person with appropriate skill and orientation takes on the responsibility for overseeing the process. The selected person should be experienced in interacting effectively with a wide variety of people, be at ease with and be able to effectively listen to people, and to correctly interpret conversations with people. The training department at mines is likely to have a few such people, but other functions should also be considered. Other persons providing the support needed to execute the required tasks may require special training in order to be effective in undertaking the work, and such training should be provided. The Adoption Mine Team Leader should be consulted on this point as necessary.

5. **The eight-step customisation process must be systematically executed:** To facilitate easy application of the process at adoption mines, each of the eight steps describes an essential task and a small number of sub-tasks. The steps and sub-tasks should be completed in the recommended order without any skipping or reordering of tasks. Guidance on how to complete the tasks is typically offered in the form of key questions to be answered by those at the adoption mine responsible for preparing and implementing the plans.

At the end of each step, a checkpoint question and action is indicated. The checkpoint question is intended to act as a "go/no-go" decision point for the Adoption Mine Team. If the Adoption Mine Team cannot satisfactorily answer the checkpoint question, then they should not go to the next step. Instead, they must take steps to rectify the matter.

Step one - Identify adopters and key stakeholders at the adoption mine.

Adopters and stakeholders are those people and groups who will be the focus of behavioural communication and leadership behaviour efforts. Key points for identifying adopters and stakeholders are as follows:

- The Learning Hub Adoption Team has provided the adoption mine project team with a one page or otherwise simple summary of the risk "story" being addressed by the leading practice, based on the risk summary table finalised during their planning workshop. This is included in this adoption guide prepared by the Learning Hub Adoption Team as Appendix 10. The risk story identifies anticipated adopters and stakeholders for the leading practice. In some cases the Adoption Mine Team may need to modify the risk story to take account of special circumstances at the mine.
- The Adoption Mine Team should review the risk story summary and confirm or elaborate on the description of adopters and stakeholders to ensure that:
  - All members of the team have the same understanding of the risks being addressed by the leading practice and,
  - They have identified the particular adopters and stakeholders at the adoption mine that will be involved in achieving implementation of the leading practice.

A list of the identified adopters and stakeholders that will be the focus of behavioural communication and leadership behaviour efforts in the adoption mine should be prepared by the Adoption Mine Team.

The Adoption Mine Team should address the checkpoint question of whether the team has a good understanding and has a complete identification of the potential adopters and stakeholders in order to make a “go/no-go” decision in respect of proceeding to the next step in the process.

Step two - Select people to be interviewed

The only way to accurately understand people’s thinking is to directly enquire into it. People are complicated and their thinking is unpredictable. One cannot successfully guess or predict people’s thinking and their information needs. The process of direct enquiry requires that an appropriate number of persons be interviewed, as follows:

- From the prepared list of adopters and stakeholders at the adoption mine, the persons to be interviewed should be selected. The people selected should range across the various categories of adopters and stakeholders in such a way as to ensure good representation of those most likely to be most involved in accomplishing adoption of leading practice. The number of persons to be interviewed should be between 25 and 30. This has been shown to be an appropriate number to get useful interview results.

The Adoption Mine Team should address the checkpoint question of whether the appropriate people have been chosen to be interviewed in order to make the “go/no-go” decision in respect of proceeding to the next step in the process.

Step three – Identify and brief interviewers.

Interviews with the selected adopters and stakeholders should be done confidentially and one-on-one. No interviews of people in groups or in a group setting should be done because of challenges in accurately interpreting their results. Also, the circulation of printed questionnaires where people are asked to fill in answers to questions is to be avoided because of challenges in producing satisfactory insights into people’s thinking. Key points in selecting and training the interviewers are as follows:

- The Adoption Mine Team should choose as interviewers those people who:
  - interviewees are most likely to feel comfortable with in an interview setting, that is, to feel free to speak openly and candidly with the person conducting the interview, and
  - are most likely to complete each assigned interview in the manner prescribed.
- Interviewers should ensure that they are well equipped to conduct the interviews by:
  - studying and discussing the risk summary / simple risk story with an appropriate member of the Adoption Mine Team to ensure that they have a thorough understanding of the risks being addressed by the leading practice.
  - reading the interviewer’s briefing on the list of questions to be asked in the interview, as well as the guidance provided on conducting a one-on-one interview properly. The latter, prepared by the Learning Hub Adoption Team, is included in this leading practice adoption guide. As Appendix ???
  - practicing the interview at least once (perhaps with an adoption mine team member), and

- reviewing with the Adoption Mine Team their understanding of the interview and how it should be conducted and documented.

The Adoption Mine Team should check that the interviewers are ready to conduct the interviews in order make a "go/no-go" decision in respect of proceeding to the next step in the process.

Step four – Conduct the interviews.

The interview process consists of two parts which seek to establish the following:

- Stakeholders/ Adopters beliefs about the causes and outcomes of [the risk/hazard]
- Stakeholders/ Adopters beliefs about the best ways to protect people from [the risk/hazard], and
- Stakeholders/Adopters beliefs about key leader behaviours and behavioural communication needs.

In these points the term beliefs should be taken to include attitudes and views that form part of a person's mental model. Similarly, use of the term [the risk/hazard] means the risk associated with the particular hazard that is under consideration. It encompasses the complete picture of the risks associated with a specific hazard in a way that is consistent with the treatment of both concepts in the risk summary.

- Each interviewer should schedule all of their allotted interviews to be conducted one-on-one in a place suitably private and free from noise and other distractions. The interviews should be conducted as planned and as practiced. Interviewers should ask all questions fully, prompting for as complete and in-depth answers as possible. This is a particular aspect of the interviewing procedure that should be focused upon in the practice sessions.
- Interview responses should be carefully documented at the time of the interview using the Interview Worksheet and the Interviewee's own words. An example worksheet is attached as Worksheet #1. Immediately following conclusion of the interview, the brief notes taken during the interview should be expanded upon in the interview worksheets to fully document the detail of the interviewee's responses. One Interview Worksheet should be completed for each interview conducted. Worksheets should be collected into sets for reading and analysis.

The questions to be asked in the interview are provided in the worksheet and are as follows:

Part A: Adopter/Stakeholder beliefs about [the risk/hazard] *(Causes and Outcomes)*

- Please describe your role and responsibilities at the mine.
- Please describe [the hazard] in your own words.
  - How may [the hazard] occur? *or* What are the possible causes of [the risk/hazard]?
- What happens as a result of [the risk/hazard]?
  - How might you be affected by [the risk/hazard]?
  - Who else may be most affected by [the risk/hazard]? What may happen to people who are affected by [the risk/hazard]?
- How important do you think it is to find a way to better protect people from [the risk/hazard]? Why do you say that?

Part B: Adopter/Stakeholder Beliefs about Leading Practices

- What do you think could be done to better protect people from [the risk/hazard]? Why?

- This mine is currently working to bring about leading practices to better protect people from [the risk/hazard]. The interviewer should describe the proposed leading practice in simple neutral terms.
  - What should leaders and supervisors in the mine do to help make sure that these practices are successful?
  - What should leaders not do in order to make sure that these practices are successful?
  - What other kinds of things might stand in the way of the leading practice being successful at this mine? How should these things be addressed?
  - What information would be important for people like you to know about how people can be affected by the risk and what is being done to protect them?
- What is the best way for people like you to receive this information?

Before going to the next step, the Adoption Mine Team should check that all the interviews have been done and that full worksheets have been completed and returned for processing in order to make a "go/no-go" decision in respect of proceeding to the next step in the process.

Step five – Summarize the interview results.

The simple analysis outlined below is designed to allow the Adoption Mine Team to better understand the thinking of their stakeholders and adopters and to compare the thinking at their mine with:

- The most informed understanding of the hazard, as summarised in the Risk Story provided by the Learning Hub Adoption Team, as adjusted by the Adoption Mine Team – see step 1, and
- The thinking of adopters and stakeholders at the demonstration mine, and to this end the Learning Hub Adoption Team have included in this leading practice adoption guide a summary of the mental models that they have previously identified for these persons at the demonstration mine. (See Appendix XXX)

- Persons capable of reliably summarising the interview results must be chosen to undertake this work. The Adoption Mine Team should find the analysis process relatively straightforward. In essence, the analyst will need to carefully read each set of interview notes and make observations against key questions provided in an analysis worksheet. The analysis worksheet is attached as worksheet #2.

- Members of the Adoption Mine Team could be selected as analysts. This would have the advantage of ensuring that some or all of the adoption team members would have a first hand understanding of the interview results. Alternatively, the task may be assigned to two or more individuals associated with the team and adoption effort, but not to only one person. In any event, each analyst should have a sound understanding of the risk summary in order to properly interpret the interview results.

- Working alone, each analyst should read and note their observations against questions posed in the analysis worksheet. Once all interviews have been analysed in this way, the analysts should meet in a group session to share and compare the results of their analyses. The analysts should identify where their individual analyses agree, and why, and where they disagree and why. Disagreements between analysts should be noted. As a group the analysts should address the main questions in the worksheet for analysis, writing detailed answers to the questions, and identifying the most influential beliefs and their underlying rationale in the process of doing so.

- As a final check, the group should re-read the interviews to ensure that the group has adequately captured and described the key beliefs on the questions asked of the stakeholders and adopters.

The questions in the analysis worksheet, Worksheet #2, that form the basis of the analysis are as follows:

Part A: Adopter/Stakeholder Beliefs about [the risk/hazard] (Causes and Outcomes)

- What are the most frequently mentioned causes of [the risk/hazard]?
  - Which, if any, of these causes agree with the Risk Summary?
  - Are there causes that disagree with the Risk Summary? Describe any areas where people may have a difference in their thinking.
  - Is there any information on causes that they say they want to know?
- What are the most frequently mentioned outcomes of [the risk/hazard]?
  - Repeat Prompts above

Part B: Adopter/Stakeholder Beliefs about Leading Practices

- What are the most frequently mentioned opportunities to better protect people from [the risk/hazard].
  - What reasons do they give?
  - Which, if any, of these ways agree with the features of the leading practice?
  - Are there any ways mentioned that differ from the features of the leading practice? Explain the possible reasons for this disagreement.
- What are the most frequently mentioned leadership behaviours that should be done, and should not be done.
  - Repeat Prompts above.
- What information do people say they want? What are the most frequently mentioned best ways to communicate with people.
  - Repeat Prompts above.

- Using Worksheet #2, analysts should then compare the results of their analyses of adopter and stakeholder interview findings with the results of interviews conducted with similar individuals at the demonstration mine. This analysis should note where adoption mine results are similar to those noted at the demonstration mine and where they are different. These similarities and differences are to serve as the basis for customising the behavioural communication and leadership behaviour plans to address the particular circumstances identified at the adoption mine.

The questions in the analysis worksheet that guide the comparison process are as follows:

Part A: Adopter/Stakeholder Beliefs about [the risk/hazard] *(Causes and Outcomes)*

- What, if any, are the key similarities between the results in Part A and those of the demonstration mine that should be emphasized?
- What, if any, are the key differences between the results in Part A and those of the demonstration mine that should be emphasized?

Part B: Adopter/Stakeholder Beliefs about Leading Practices

- What, if any, are the key similarities between the results in Part B and those of the demonstration mine that should be emphasized?
- What, if any, are the key differences between the results in Part B and those of the demonstration mine that should be emphasized?

Before going to the next step, the adoption mine should check whether all of the interview results have been systematically reviewed and all of the significant differences clearly identified as a basis for making a “go/no-go” decision in respect of proceeding to the next step in the process.

Step six – Customise the behavioural communication plan.

A detailed behavioural communication plan has been developed by the Learning Hub Adoption Team to serve as the base plan to be customised by the adoption mine. This is the plan developed for the demonstration mine modified as necessary to take account of the experience gained in implementing it. The plan also provides a clear description of the process that was used to arrive at the plan. The plan and the process used to arrive at the plan are attached as Appendix 3 to this Adoption Guide.

The Adoption Mine Team should ensure that they fully understand the plan developed for the demonstration mine, and its derivation, before proceeding with the process of customising the plan to suit their mine specific circumstances.

The Adoption Mine Team, and not just a single person, should prepare the customised behavioural communication plan based strictly on answers to the following guiding questions:

Guiding questions for customisation of the behavioural communications plan.

- What, if any, of the modes of communication in the demonstration mine’s behavioural communication plan should be included in the adoption mine’s plan? Can any be removed without affecting the overall quality of the plan?
- What, if any, of the content or key messages in the different modes in demonstration mine’s behavioural communication plan should be kept in the adoption mine’s plan?
- What, if any, new content or key messages should be added to the behavioural communication plan for the adoption mine?
- Will these changes best match with the modes that should be used and key messages that should be conveyed in the adoption mine as revealed through the interview results?
- What is the best way to go about implementing the behavioural communication plan?

Additional questions that should be answered in considering the communication content of the new plan are as follows:

- From the interview results, what correct understandings about [the hazard] should be emphasized in communications?
- What incorrect beliefs or misunderstandings about [the risk/hazard] should be corrected through communications? What key messages should be emphasized in order to do so?
- What do people not know that is important to understand in order to fully appreciate the nature of [the hazard], and which should therefore be emphasized in communications?
- What information about [the risk/hazard] do people most want to know, and which should therefore be emphasized in communications?
- What sorts of messages should be emphasized to help people judge the trustworthiness and competence of their fellow employees and leaders involved in addressing [the risk/hazard]? (The creation of trust is a fundamental aspect of all behavioural communication plans.)

- In respect of the modes of communication and the contents of each communication, on the basis of the answers to the above questions, and the modes of communication available at the adoption mine, the Adoption Mine Team should adjust the modes and content of the base plan provided by the Learning Hub Adoption Team.

- Where new material is introduced into the plan, measurable objectives should be identified. These should be in the form of behavioural outcomes. This means that they should be expressed as actions that can be observed as the intended outcome from the communication in question. (What could people be seen to do?) They could also be understandings, concepts or beliefs expressed in conversations or interviews that clearly follow from the communications, as intended. (What could people be heard to say?) While the objectives preserved from the base plan should provide examples of what is required, they should also be checked, and modified if necessary to ensure consistency.
- The Adoption Mine Team should explore the possibility of reviewing their customised plan with one or other of the following: the relevant Learning or Programme Manager at the Learning Hub, the Behavioural Specialist at the Learning Hub, the project team leader at a mine that has successfully adopted the practice, or a qualified external resource with assistance of the Learning Hub. The input received should be used to adjust the plan as appropriate.

The Adoption Mine Team should then check whether the customised plans are coherent and properly understood, that they have readily measurable behavioural goals for communication, and that they can be readily implemented, as a basis for making a "go/no-go" decision in respect of proceeding to the next step in the process.

Step seven – Adjust the leadership behaviour plan.

In a manner similar to that for customising the behavioural communication plan, a detailed leadership behaviour plan, developed by the Learning Hub Adoption Team, is provided in this adoption guide to serve as the base plan to be customised by adoption mines. The plan sets out the required antecedents, key leader behaviours and re-enforcing consequences for those behaviours. Again, this is the plan developed for the demonstration mine, modified as necessary to take account of the experience gained in implementing it.

As with the behavioural communication plan, the Adoption Mine Team should ensure that they fully understand the plan developed for the demonstration mine, and its derivation, before proceeding with the process of customising the plan to suit their mine specific circumstances.
The plan together with the process used in arriving at the plan is attached as Appendix 4.

The Adoption Mine Team should prepare the customised leadership behaviour plan based on answers to the following guiding questions:
Guiding questions for customisation of the Leadership Behaviour Plan.

- With respect to the stakeholders and adopters involved, who are considered to be the key leaders involved in accomplishing adoption of the leading practice?
- For each leader or type of leader, what key behaviours or actions must they perform to appropriately influence the decisions and actions of the stakeholders and adopters? (The set of Behaviours)
- What must the leaders be provided with to enable them to perform these behaviours? (The set of Antecedents)
- What consequences – positive, immediate and certain – must follow performance of the key behaviours that will encourage them to be repeated and sustained? (The set of Consequences)
- What, if any, of the key behaviours, antecedents and consequences in the demonstration mine's behavioural communication plan should be included in this mine's behavioural communication plan?

- What, if any, of the key behaviours, antecedents and consequences in the demonstration mine's behavioural communication plan should be omitted from this mine's behavioural communication plan?
- What is the best way to go about implementing the leadership behaviour plan?

- Where new material is introduced into the plan, measurable objectives should be identified. These should be in the form of behavioural outcomes. That is, they should be expressed as actions of leaders that can be observed and which clearly follow from the leadership behaviour plan, as intended (the key desired behaviours - What could leaders be seen to do?) They could also be understandings, concepts or beliefs expressed in conversations or interviews with leaders or others that clearly follow from the leadership behaviour plans, as intended. (What could leaders be heard to say or what could they be accurately reported to say?) While the objectives preserved from the base plan should provide examples of what is required, they should also be checked, and modified if necessary to ensure consistency.
- As with the behavioural communication plan, the Adoption Mine Team should explore the possibility of reviewing their customised plan with one or other of the following: the relevant Learning or Programme Manager at the Learning Hub, the Behavioural Specialist at the Learning Hub, the project team leader at a mine that has successfully adopted the practice, or a qualified external resource. The input received should be used to adjust the plan as appropriate.

The adoption mine project team should then check whether the customised leadership behaviour plans are coherent and properly understood, and that they can be readily implemented as a basis for making a "go/no-go" decision in respect of proceeding to the next step in the process.

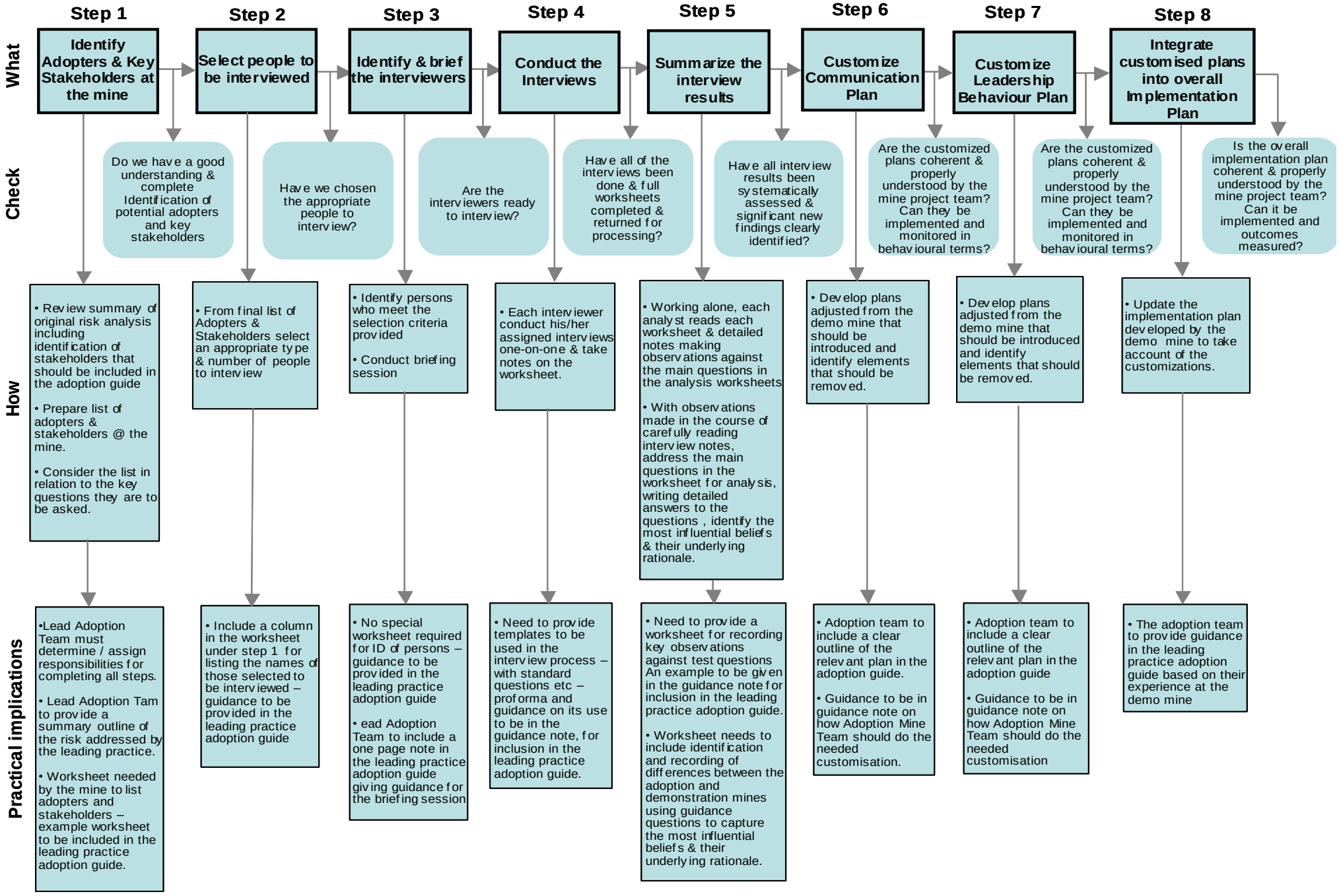
Step eight – Integrate behavioural communication and leadership behaviour plans into the implementation plan at the adoption mine.

With a view to providing guidance to the adoption mines, the Learning Hub Adoption Team should identify and document the key elements associated with integrating the behavioural communication and leadership behaviour plans into the implementation plan developed for the demonstration mine:

- Based on the experience gained at the demonstration mine, the Learning Hub Adoption Team has included guidance in this adoption guide to assist the Adoption Mine Team in integrating their customised behavioural communication and leadership behaviour plans into the overall implementation plan at the adoption mine.
- A component of the integrated implementation plan is a monitoring programme that includes appropriate checking and reporting on the occurrence of the desired observable behaviours, as well checking and reporting on provision of the necessary antecedents and re-enforcing consequences.

Before beginning implementation, the Adoption Mine Team should check whether the overall implementation plan is coherent and properly understood by the team, as a basis for making a "go/no-go" decision in respect of proceeding implementation of the adoption plan.

Procedure for customising behavioural communication and leadership behaviour plans



Worksheet #1: Questions for use in conducting interviews

Name of Leading Practice:			
Instructions: Indicate any particular instructions that need to be followed			
Unique Interview reference number	**Interview Date**	**Name of Mine**	**Name of Worker Position**
[example: *FOG 1*]	[example: *25 July 2009*]	[example: *Impala Plats*]	[example: *Mine Overseer* [

Part A: Adopter/Stakeholder beliefs about [the hazard] (Causes and outcomes)		
1	Please describe your role and responsibilities at the mine.	
2	Please describe [the risk/hazard] in your own words. • How may [the risk/hazard] occur? • What are the possible causes of [the risk/hazard]?	
3	What happens as a result of [the hazard]? • How might you be affected by [the risk/hazard]? • Who else may be most affected by [the risk/hazard]? • What may happen to people who are affected by [the risk/hazard]?	
4	How important do you think it is to find a way to better protect people [the risk/hazard]? • Why do you say that?	
Part B: Adopter/Stakeholder Beliefs about Leading Practices		
5	What do you think could be done to better protect people from [the risk/hazard]? Why?	
Interviewer say: This mine is currently working to bring about leading practices to better protect people from [the risk/hazard]. Describe the proposed leading prac simple neutral terms.		
6	What should leaders and supervisors in the mine <u>do</u> to help make sure that these practices are successful? Why should they do this?	
7	What should leaders <u>not do</u> in order to make sure that these practices are successful? Why should they not do this?	
8	What other kinds of things might stand in the way of the leading practice being successful at this mine? How should these things be addressed?	
9	What information would be important for people like you to know about how people can be affected by the risk and what is being done to protect them? Why is this important?	
10	What is the best way for people like you to receive this information? Why is this the best way?	

Worksheet #2: Analysis of results from interviews

Name of Leading Practice		
Instructions: To be used to summarize results of individual interviews from the Interview Worksheet – Worksheet #1. See guidance provided in the guidar note.		
Part A: Adopter/Stakeholder beliefs about [the risk/hazard] (Causes and impacts)		
1	List and tabulate Interviewees' roles and responsibilities.	
2	List and tabulate mentioned *causes* of [the risk/hazard]	• Which, if any, of these causes agree with the Risk Summary? • List any causes that disagree with the Risk Summary. Describe how people wh were interviewed may be wrong in their thinking about the hazard and risk.
	List any information on causes that Interviewees say they want to know.	
3	• List and tabulate mentioned *impacts* of [the risk/hazard]. Include description of *who* may be affected.	• Which, if any, of these impacts agree with the Risk Summary? • List impacts that may disagree with the Risk Summary? Describe any areas where people who were interviewed may be wrong in their thinking about possible impacts.
	• List any information on impacts that Interviewees say they want to know.	
4	• Summarize Interviewees' comments on the importance and value of better protecting people from [the risk/hazard]?	
Summary of Part A. Compare the results above to the mental models results of the demonstration mine project.		
What, if any, are the key similarities between the results in Part A and those of the demonstration mine that should be emphasized in behavioural communications and leadership behaviour plans?		• What, if any, are the key differences between the results in Part A and those of the demonstration mine that should be emphasized behavioural communications and leadership behaviour plans?

Worksheet #2 Continued

Part B: Adopter/Stakeholder Beliefs about Leading Practices		
5	List and tabulate mentioned opportunities to better protect people from the hazard. Describe why, in the Interviewees' words.	• Which, if any, of these ways agree with the features of the leading practice? • Are there any ways mentioned that differ from the features of the leading practice? Explain the possible reasons this disagreement.
6	List and tabulate mentioned leadership behaviors that should be done to ensure the success of leading practice. Describe why, in the Interviewees' words.	• Which, if any, of these ways agree with the features of the leading practice? • Are there any ways mentioned that differ from the features of the leading practice? Explain the possible reasons this disagreement.
7	List and tabulate mentioned leadership behaviors that should not be performed to ensure the success of leading practice. Describe why, in the Interviewees' words.	• Which, if any, of these ways agree with the features of the leading practice? • Describe any ways mentioned that differ from the features of the leading practice? Explain the possible reasons f this disagreement.
8	List and tabulate mentioned potential barriers to the success the leading practice at this mine? Describe Interviewees' perceptions on how should these things be addressed?	• Which, if any, of these ways barriers and possible solutions agree with the features of the leading practice? • Describe any these ways barriers and possible solutions differ from the features of the leading practice? Explain possible reasons for this disagreement.
9	List and tabulate the information people need. Describe why, in the Interviewees' words.	• Which, if any, of these ways agree with the features of the leading practice? • Describe any ways mentioned that differ from the features of the leading practice? Explain the possible reasons f this disagreement.
10	List and tabulate the mentioned best ways communicate to people. Describe why, in the Interviewees' words.	• Which, if any, of these ways agree with the features of the leading practice? • Describe any ways mentioned that differ from the features of the leading practice? Explain the possible reasons f this disagreement.
Summary of Part B. Compare the results above to the mental models results of the demonstration mine project.		
• What, if any, are the key similarities between the results in Part B and those of the demonstration mine that should be emphasized in behavioural communications and leadership behaviour plans?		• What, if any, are the key differences between the results in Part B and those of the demonstration mine that should be emphasized in behavioural communications and leadership behaviour plans?

Worksheet #3: Customisation of behavioural communication and leadership behaviour plans

Name of Leading Practice

Instructions: To be used to customise the behavioural communication and leadership behaviour plans. See guidance provided in the guidance note. Provide adequate space for responding to the various questions and any other instructions that should be followed.

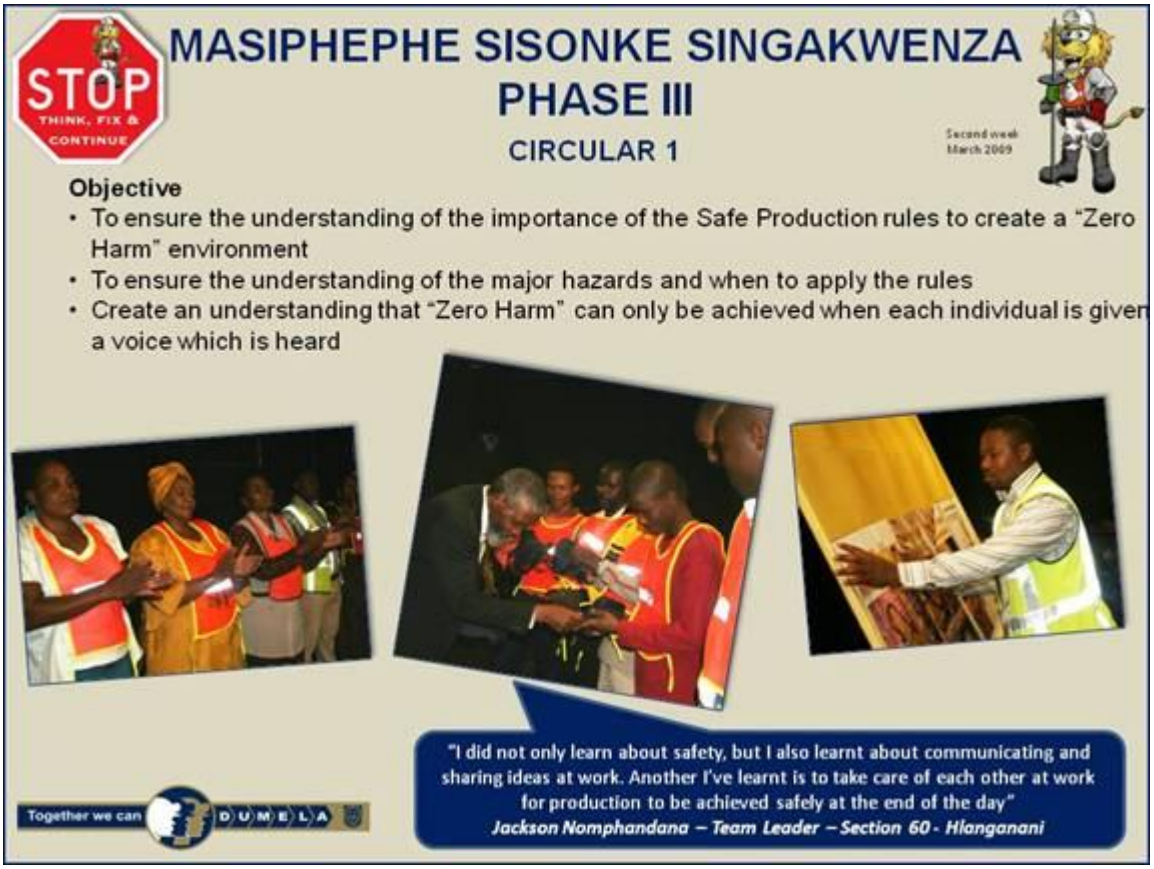
Guiding questions for customisation of the behavioural communication plan

- What, if any, of the modes of communication in the demonstration project's behavioural communication plan should be included in this mine's plan? Can any be removed without affecting the overall quality of the plan?
- What, if any, of the content or key messages in the different modes in demonstration project's behavioural communication plan should be kept in this mine's plan?
- What, if any, new content or key messages should be added to the behavioural communication plan for this mine?
- Will these changes best match with the modes that should be used and key messages that should be conveyed in the adoption mine as revealed through the interview results?
- What is the best way to go about implementing the behavioural communication plan?

Guiding questions for customisation of the leadership behaviour plan:

- With respect to the stakeholders and adopters involved, who are considered to be the key leaders involved in accomplishing adoption of the leading practice?
- For each leader or type of leader, what key behaviours or actions must they perform to appropriately influence the decisions and actions of the stakeholders and adopters. (The set of Behaviours) Why?
- What must the leaders to provided to enable them to perform these behaviours? (The set of Antecedents). Why?
- What consequences – positive, immediate and certain – must follow performance of the key behaviours that will encourage them to be repeated and sustained? (The set of Consequences). Why?
- What, if any, of the key behaviours, antecedents and consequences in the demonstration mine's leadership behaviour plan should be included in this mine's leadership behaviour plan? Why?
- What, if any, of the key behaviours, antecedents and consequences in the demonstration mine's leadership behaviour plan should be omitted from this mine's leadership behaviour plan? Why?
- What is the best way to go about implementing the leadership behaviour plan?

Appendix 6: Modalities Of Communication



A typical example of a communication brief for the Masiphephe Phase III which has a parallel theme to the entry examination and making safe initiative

Appendix 7: Behaviour Practice Observation Assessment Sheet

BEHAVIOUR PRACTICE OBSERVATION

BPO ON PROCEDURE: Leading practice for entry and making safe procedure

REF:_____

BPO CONDUCTED BY:_____

DATE:_____

AT WORKING PLACE:_____

CREW: _____

NAMES OF PERSONS OBSERVED:

1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	
8		16	

NOTE	ACTION REQUIRED				COMMENTS
1a	Did the team find the tools and PPE as specified by the standard easily and readily available for use?	-1	0	1	
1b	Did every member of the team obtain a pinch bar, of correct length with gasket, sharpened at both ends?	-1	0	1	
1c	Was the appropriate danger tape used when necessary in the making safe procedure?	-1	0	1	
1d	Did any member of the team have Elephant footbags to appropriately handle unused explosives materials?	-1	0	1	
1e	Did each member of the team use long PVC gloves while barring to standard?	-1	0	1	
2	Did the appointed person test for flammable gasses, check the temperature, ventilation flow before the team entered each area of the workplace?	-1	0	1	
3	Was washing down done correctly in the travelling way and raise to the top entrance of the panel?	-1	0	1	
4	Was the hanging wall visually inspected to the top gully of the responsible panel?	-1	0	1	
5	Did the team examining the panel collect their tools from the designated place in the top gully?	-1	0	1	
6a	Was bad hanging barred down along the gully?	-1	0	1	
6b	Did they work from a safe position, and ensure team members assisting stood well clear in a safe place?	-1	0	1	
7	Did the team water down and examine the entire gully and heading starting from the back towards the face?	-1	0	1	
8a	Was support installed under unstable hanging that could not be barred down?	-1	0	1	
8b	If hanging was badly fractured, was temporary support installed with headboards at right angle to fracture planes?	-1	0	1	
9	Did the team adjust the chain barrier to indicate that the top gully within 10 meters of the working face had been examined and made safe?	-1	0	1	
10	Did the team examine from the top gully and heading area as per the procedure?	-1	0	1	
11a	Was the face and/or sidewall examined by the team?	-1	0	1	
11b	Did they work on the up dip side from a safe position?	-1	0	1	
11c	Did the team members engaged in barring look back every 2.0m and visually examine hanging wall for cracks/slips?	-1	0	1	
12a	Did the team bar down all loose rock and check on all support installed?	-1	0	1	
12b	Did they install temporary support if required? What type of temporary support was installed?	-1	0	1	
13a	Did the team wash the entire face and check for misfires?	-1	0	1	
13b	If misfires were identified, were they plugged and marked? How many and where?	-1	0	1	
14	Did the team examine the hanging, sidewalls and face area by barring down all loose rocks?	-1	0	1	
15	Did the team mark bad hanging to be blasted down at the end of the shift where required?	-1	0	1	
16	Was the bad hanging area barricaded with red danger tape and the whole team warned about the area of unstable hanging wall?	-1	0	1	
17	Did the team examine the bottom gully completely if it had not been examined as the top gully of the panel below?	-1	0	1	
18	Did the team recognise all serious A-Hazards in the workplace?	-1	0	1	
19a	Which hazards did the team discuss?	-1	0	1	
19b	Were any remedial actions directly implemented? What?	-1	0	1	
19c	Were any further precautions agreed upon to be taken during the shift? What?	-1	0	1	
20	Did all team members sign off for proper completion of the examination procedure according to the standard?	-1	0	1	
21	Did the team keep the examination tools on the face for mid-shift barring?	-1	0	1	
22	Did the team members stop work in any area that could not be made safe during the examination period and report this to the Competent Person?	-1	0	1	
23	Did the miner declare the workplace safe with the team members having signed on completion of the examination procedure?	-1	0	1	

I take note of the observations recorded in the above mentioned process.

Miner:_____ Production Supervisor: _____ MO:_____

DRIEFONTEIN GOLD MINE

Appendix 8: Documenting The Performance Of A Demonstrated Practice

Data to be collected at Driefontein Masakhane Demonstrator Site

Measurements:

Issue	How Often	How many measurements	Accuracy of measurements	Where are measurements taken	By Whom	Data Storage
Rockmass Rating(Qualitative measure)	Weekly or after every blast, whichever comes first	1	Subjective. Attempt to use same person.	Along gullies and panel face	Rock Mechanics Department, DvW, JvZ	Excel Spreadsheet
Temperature/ventilation quality	Daily	At least 5 readings	Thermometer	During examination	Miner	Recorded in Miner note book. Photocopies of noteook stored.Entered into Excel Spreadsheet
Stoping width	Every shift	6	Tape measure	Top, middle and bottom of panel. At face and at last line of support	Production Supervisor	Photocopy of Shiftboss notebook filed. Excel spreadsheet with backed up copy(Rock Eng).
Face Advance	After blast	7	Tape measure	Seven evenly spaced positions along face. Every 5m on a 30 meter panel. Measure from last row of support before blast to face position.	Production Supervisor	Photocopy of Shiftboss notebook filed. Excel spreadsheet with backed up copy(Rock Eng). Record face advance and distances of face to support before and after blast. Determine monthly advance.

Issue	How Often	How many measurements	Accuracy of measurements	Where are measurements taken	By Whom	Data Storage
Blasting sockets numbers and depths	After every blast	Inspect along the length of the face	Tape measure or clinorule	At every visible socket	Miner	Written in miner note book and photocopied. Entered into Excel spreadsheet.
Support Spacing/density	After new row of support installed	6 strike measurements plus all dip distances between new supports	Tape measure	Top, middle and bottom of panel. From face to new support and from new support to previous support row	RE	Excel spreadsheet. Calculation of m^2 per support. Tributary Area Theory(TAT)
Planned Task Observation including Process time	Once a week	Check list	Observation, Closest 5 minutes	During examination	RE department	Completed sheets filed. Information analysed for compliance
No. of pinch bars issued from store	Monthly	n/a	n/a	Stores	MO	Recorded in Excel spreadsheet
Backfill distance to face after blast	After blast	6	Tape measure	Three positions along face	Miner	Recorded in Miner note book. Photocopies of noteook stored.Entered into Excel Spreadsheet
Preconditioning	At each blast	1	Qualitative assessment	Observation of face	RE department	Excel Spreadsheet
Lead and lags	After each blast	2	Tape Measure	In gullies above and below panel	RE department	Excel Spreadsheet
Face shape	After each blast	1	Qualitative assessment	Observation of face	RE department	Excel Spreadsheet

Issue	How Often	How many measurements	Accuracy of measurements	Where are measurements taken	By Whom	Data Storage
Production delays	When they occur	List reasons	n/a	n/a	Miner / Mine Overseer	Copy of Miners Notebook/Excel spreadsheet.
m^2 per stope worker	Monthly	n/a	n/a	n/a	RE	Calculated from face advance spreadsheet
No. of non injuring FOGs & rockbursts	When they occur	Estimated height, width & breadth	Clino-rule/tape measure	n/a	Miner	Photocopy of team leaders notebbok. Excel spreadsheet wih backed-up copy (RE)
No. of Treat and returns	Past year Duration of demonstration	n/a	n/a	Mine safety records	Section Manager/ Safety Officer	Excel spreadsheet/graphs
LDIs for section	Past year Duration of demonstration	n/a	n/a	Mine safety records	Section Manager/ Safety Officer	Excel spreadsheet/graphs
FIFR for section	Past year Duration of demonstration	n/a	n/a	Mine safety records	Section Manager/Safety Officer	Excel spreadsheet/graphs
Rock LDIs for section (seismic & FOG)	Past year Duration of demonstration	n/a	n/a	Mine safety records	RE/Safety Officer	Excel spreadsheet/graphs
Rock FIFR for section (seismic & FOG)	Past year Duration of demonstration	n/a	n/a	Mine safety records	RE/Safety Officer	Excel spreadsheet/graphs
No. of incident free days	Daily / progressive	n/a	n/a	n/a	Mine Overseer	Excel spreadsheet

Issue	How Often	How many measurements	Accuracy of measurements	Where are measurements taken	By Whom	Data Storage
Transfer of persons into and out of section	Monthly	n/a	n/a	Crew compliment documents	Mine Overseer	Excel spreadsheet.
Leave roster	Once off	Last leave dates for crew	n/a	Employment records	Tme office	Bar graph Summary
General health of crew members	Once off	Eyesight, Hearing, Fitness,absentee days	n/a	Medical records	Health Practitioner	Bar graph Summary
Education level of crew	Once off	Literacy, schooling, language fluency	n/a	Employment records	Time office	Bar graph Summary
Training	Once off	Completed courses and dates	n/a	Mine training records	Training Centre	Bar graph Summary

Perceptions:

Issue	Instrument	How Often	How many measurements	By Whom
Attitude Survey	Questionnaire	Once a week. To start prior to demonstration starting	All members of crew	Training department

Appendix 9: Implementation Project Checklist

Implementation Project Factors and Factors Checklist	
1	Is there still a need for the new technology or practice?
2	Is the technology, practice or knowledge ready for transfer and Adoption?
3	Is further development required to arrive at a commercially and practically viable technology or practice?
4	Has the equipment to be tested (technology to be Adapted) been adequately designed to withstand the harsh underground environment?
5	Has the operation of the technology or practice been adequately simplified for mine application?
6	Is a trial installation warranted or will a desktop study provide adequate performance information?
7	Which parts of the mine would benefit most from Adoption of the technology or practice?
8	Which persons on the have the incentive and attributes necessary for championing the technology or practice?
9	Has (will) the mine appointed an appropriate champion?
10	Which persons at the mine need to be brought into the planning of the project at the earliest stage possible, and has this been don
11	Which persons should be invited to join an oversight group to assist in spreading the Adoption experience?
12	Has the mine staff responsible for the Project been provided with adequate time and resources to successfully undertake the Project?
13	Who will take responsibility for documenting and writing up the outcome of the Project for communication to others?
14	What technical support is needed to assist mine staff with the Adoption Process?
15	Are new skills or organisational structures needed to achieve successful Adoption?
16	Will the equipment supplier be able to meet the mine's needs in the event of a successful implementation?
17	Can or should the technology and/or leading practice be implemented as part of a larger, more beneficial system?
18	What are the possible unintended consequences of the technology and/or best practice and how will they be addressed if they aris
19	Do the risks warrant consideration being given to setting up arrangements to underwrite the Implementation Project?
20	Has adequate time been allowed for the Implementation Project to be undertaken to its proper conclusion?
21	What are the criteria for the Implementation Project to be considered complete and successful?
22	What are the criteria for the technology and/or best practice to be considered a success once adopted?
23	Which persons or mines are going to be most affected by Adoption of the technology and/or leading practice?
24	What steps need to be taken to ensure proper communication about the new technology or practice in regard to its application and its positive and negative impacts?
25	What special training is necessary for mine staff to facilitate successful Adoption?
26	Which persons on the mine could make or break the project and how have they been accommodated?
27	What will be the benefits to the various people on the mine who are or will be affected by Adoption of the technology and/or best practice, in particular the workers and first line supervisors?
28	What measures, in addition to training, need to be adopted to gain support of the workforce for the technology and/or leading practice?
29	Which persons will be negatively affected and how have their concerns been taken into account to secure their support?
30	Good and constructive union participation?
31	Strong and constructive Health and Safety Committee?

Appendix 10: Risk Summary

Risk summary: Table of related factors – causal chain for FoG Hazards					
Part A – Description of the causal chain					
No	**Nature of the hazard**	**No**	**Exposure to the hazard**	**No**	**Outcomes of exposure**
1	Gravity induced falls of ground – Mining of rock using blasting techniques together with stresses above the strength of the rock causes fractures to occur. In addition the rock mass is often discontinuous, broken by faults, joints and bedding planes. These conditions may lead to unexpected separation of loose rocks from the rock mass if not supported or removed in a controlled manner. Timely and diligent identification of potential rocks that may separate is important. Installation of support to prevent their separation is critical.	**1**	All underground workers are exposed to falls of rock due to gravity. Falls may occur in any underground excavation. Old excavations that have been supported and stable for a long time may become a hazard due to deterioration of support or changing ground conditions with time. Newly exposed rock that has not been supported is particularly dangerous. Therefore workers involved in stoping or development may be at increased risk. The stope face, gully/ stope face intersection and development-end face are working places on the mine where gravity related falls of ground are most prevalent. The minimum number of workers should be allowed in the stope face or development end. No gathering of personnel should occur at the gully/face intersection.	**1**	There is a real possibility that workers are in danger of being seriously injured by any rockfall. Even small rocks hitting a worker can result in severe cuts that could lead to loss of blood and even death. It is important that corrct PPE is worn at all time to minimize cuts and bruises from smaller rocks. Larger rock can crush workers, break bones in their bodies and inhibit their ability to breathe. With large rock falls PPE may help to a point but correct identification of rocks that pose a threat prior to falling and good area support coverage are required primarily. Headboards on elongate supports and netting between support members may be indicated. Long term scarring physically, emotionally and psychologically is a real possibility of someone involved in such an incident.
2	Shake down falls of ground – The crust of the earth is not completely in equilibrium. There are often adjustments to stress, usually along pre-existing geological features such as faults or dykes. When these adjustments are made there are enormous amounts of energy radiated from the area where movement or rupture occurs. This energy is transmitted through the rock mass in waves that may intersect with free surfaces in underground openings or the earth's surface. Any unsupported rocks may be shaken loose by the seismic waves that move through the rock. It is important to remove all loose rock and resilient support with area coverage is essential.	**2**	Seismic waves may intersect any underground opening therefore any area underground and any worker may be exposed to shakedown falls of ground. However, well supported areas are at less risk. Areas were current mining is taking place such as stopes and development tunnels may be most exposed as there may be insufficient permanent area support in place to cope with the transient waves. Knowledge of rock conditions and good visual and physical inspections of the rock is important in reducing the exposure of people to risk.	**2**	Rocks that appear to be stable under static conditions may move when a shaken by a seismic wave which passes through a stope of tunnel. Therefore examination and preparation of the rock in a mine with a seismic history should be carried out with care. Large rocks should not dislodge with shaking if sufficient support and barring took place. However, as with gravity small falls can result is serious injuries and even death. Area support should be installed in mines with seismic history or where fractures but apparent stable conditions exist.
3	Dynamic failure of exposed rock – When rock is stressed beyond its strength it will fail. The stronger and more brittle the rock, the more violent will be the failure. Over-stressing of rock around an excavation may occur as a result of gradual elevation of stresses due to changing mining configurations or due to transient seismic waves passing by. In either case the failure is usually violent, dynamic, damaging and difficult to predict. Usually the energy is sufficient to crush the rock. Measures that may be taken to reduce the hazard are correct mine layouts, preconditioning of the rock around the excavation and yielding support in and around the excavation.	**3**	Workers involved in mining in stopes and tunnels are particularly a risk from the dynamic failure of rock close to them. As mining progresses there is always the possibility of encountering a geological stress anomaly that increases stress in the rock. Mining may not proceed strictly to the planned shape or configuration which may cause stress to be elevated in the rock. Following a blast the rock may have in a state of unstable equilibrium and minimal actions such as drilling, scrapping or watering down my tip the balance. A transient seismic wave may also be a trigger mechanism to catastrophic	**3**	Workers are usually severely injured or killed when they are exposed to a rockburst that occurs in the face or part of the tunnel they are working in. The velocity the ejected rock may be in excess of 3 m/s and its brittle nature will cut severely. Often the rock is comminuted and this may lead to suffocation of victims. The strategies for this type of rock damage are good mine and panel layouts, preconditioning of the face and limited personnel in the face area. Workers may be psychologically scarred from being involved in an event or knowing someone who was involved or even aware that such events have occurred on their mine.

			failure of the rock at the excavation edge. This may result not only in falls of rock but also extreme movements of the rock sidewall, face and floor. All underground workers may be at risk in tunnels where faults or dykes intersect them. These features are often the source of seismic energy but also the conduit of channeling the energy to a free surface such as a tunnel. Special support in tunnels that intersect known problematic dykes or faults are necessary. Good and systematic planning is essential for all mining panels to ensure correct sequences, leads and lags and their approach to geology or their final remnant. Yielding support is essential in assisting to minimize damage.		
	Data Gaps		**Data Gaps**		**Data Gaps**
1	Early detection of rock movements /trends before there is detachment from the rock from the rock mass.	**1**	**Remote mining operations – mechanization** **Area supports**	**1**	**-**
2	**Geological knowledge in the rock mass. More accuracy of the time and place of a seismic event**	**2**	**Remote mining operations – mechanization** **Area support**	**2**	**-**
3	**Accurate prediction of high risk areas in stope panels and development ends**	**3**	**Remote mining operations – mechanization** **Yielding support**	**3**	**-**
	Summary of major risks		**Summary of major risks**		**Summary of major risks**
1	**-**	**1**	**Labour intensive workings**	**1**	**-**
2	**Increased seismicity in the platinum sector**	**2**	**Labour intensive workings**	**2**	**More seismic related injuries in platinum sector**
3	**Increased seismicity with unltra depth in Gold mines**	**3**	**Labour intensive workings**	**3**	**Major disaster**

Part B - Current risk mitigation controls and strategies – Identify and describe.					
1	**Area support** **Stiff support** **Bolting** **Netting**	**1**	**Remote drilling of faces and support holes** **Area support installed between the face and the first line of support. Bolts and netting**		
2	**Seismic networks**	**2**	**Panel rating systems which identify high risk areas**		
3	**Yielding support** **Layouts** **Regional Support, backfill, bracket and stabilizing pillars** **Preconditioning of panel faces and development ends** **Seismic networks**	**3**	**Panel rating systems which identify high risk areas**		
	Weaknesses		**Weaknesses**		**Weaknesses**
1	**Bolting not applicable everywhere** **Application of area support is not simple**	**1**	**Dependent on good supervision and cooperation**	**1**	
2	**Not enough useful information from seismic systems. Too much data**	**2**	**Timely information to make decisions**	**2**	
3	**Unexpected events**	**3**	**Timely information to make**	**3**	

			decisions		

Part C – Possible improvements in risk mitigation controls and strategies – Identify and describe					
1	Diligent examination and making safe Widely applied face bolting and netting in faces and at gully stope face intersections where applicable Better drilling and blasting	1	-	1	-
2	Greater automation of the seismic locations and artificial intelligence to help in decision making	2	-	2	-
3	Identification and monitoring of precursors of seismicity and rock failure	3	Remote cleaning, drilling and charging of faces	3	-

Summary tabulation of major risks		
No	**Description**	**Priority Rating** High / Moderate / Low
1	Gravity induced falls of Ground	High
2	Shake down rockfalls due to seismicity	Moderate
3	Dynamic failure of exposed rock – rockbursts and strainbursts	High

Summary tabulation of identified improvement possibilities		
No	**Description**	**Priority Rating** High / Moderate / Low
1	Diligent examination and making safe	High
	Bolting in the stope face area	Moderate
	Netting in the face area	Moderate
	Monitoring precursors to rockfalls	Moderate
2	As above. Addressing these issues will address shakedown rock falls	As above
	Greater value added from seismic data	High
3	Greater value added from seismic data	High
	Artificial intelligence to advise on decisions to be taken	High