Appendix A  Relevance of GAP609b findings
Relevance of GAP609b findings to GAP851 investigation

A.P. Squelch
1 Introduction

GAP609b provides some valuable pointers as to the aspects that need to be considered when designing training material and ‘courses’. The overriding message seems to be that ‘learning by doing’; ‘collective or team learning’; and ‘modelling of experts’ are the crucial features to be considered in the development of a relevant training system.

The following sections are a heavily plagiarised and an unreferenced attempt to extract the pertinent details of GAP609b’s findings and supporting documents that have direct relevance to GAP851’s project objectives.

2 Competence

Three fundamental educational variables, which create the critical difference in performance between incompetence and mastery, are listed as:

1. the strategy or internal mental approach used by the student;
2. the beliefs, values and motivation of the student; and
3. the physiology of the student.

In terms of competence, the following definition applies:

“Competence encompasses the broad meaning of capability as the key enabler of performance in a defined range of performance specifications and results from the effective integration (ability to apply) of a range of capabilities such as knowledge, skills, context, content and values, within the workplace”.

If the SA Mining Industry is committed to improve its poor health and safety performance and image, improved competence of its employees is the obvious panacea towards becoming competitive in the global mining village.

3 Learning systems

The diagram in Figure 1 is provided to aid in visualising the component parts in designing learning systems. It is also useful as check list against which to test whether these same components have been considered and dealt with in the design process.
The following are also important:

Knowledge gained from studying African collective learning systems (Ancient African wisdom) points to some key aspects to be considered when devising a training or learning system in the current context:

- the underlying philosophy is one of learning by doing;
- learning is a collective effort and not just an individual effort;
- the best way to learn is to teach others. Knowledge and skills sharing is vital;
- in terms of programme design, there is a need to pay particular attention to the social processes in terms of the bonding and learning rituals and ceremonies;
- learning is accelerated by a high sense of personal purpose, history and destiny as well as career pathing; and
- the principle of life skills: being focused on survival challenges, accelerates learning. Adaptive learning is vital.

The following are also important:

- focused learning: focus on one single task and simple learning objective at a time before moving on to the next level;
- incremental learning: modules have to be developed for each learning objective;
- portable learning: people learn best if there are learning benchmarks through recognised accreditation; and
- self-directed learning: the best learning is self-motivated and self-directed.
4 Unit standards

Unit Standards are not descriptions of the content or procedure or methodology of learning, nor do they replace curriculum documents and guidelines. In the same way, Unit Standards are not assessment tools nor do they replace assessment documents and guidelines. Unit Standards do, however, inform learning programme developers about what the outcomes of learning are to be, and inform assessors as to what must be assessed and the quality of evidence required. Unit Standards describe the results of learning and not the process of learning.

The three interrelated components of education and training are then:

| Learning Programme | Unit Standard | Assessment Activity |

**Figure 2 Components of education and training**

It is useful to think of the relationship between the three components as follows:

We teach TOWARDS the Unit Standard and

we assess AGAINST the Unit Standard

There need not necessarily be a one-to-one correspondence between the three components, i.e. there will not necessarily be one module of learning for each Unit Standard and one assessment activity for each Unit Standard.

**Figure 3 The place of unit standards (Babb, S. 1997. People Dynamics, Jul)**

5 Modelling

Within the context of all of the above, ‘modelling’ (wherein the skills and abilities of an expert are recorded, distilled and imparted to the trainee) is identified as the appropriate approach to training in the SA mining industry. Modelling extracts critical expert patterns, verifies that they are necessary and sufficient to replicate expert behaviour, and expert training design develops a training programme to transfer these patterns to others expeditiously and efficaciously. The result is trainees who are able to
perform at a much higher level of expertise than achieved by conventional training methods, and in usually half the time of conventional methods.

5.1 How to select a modelling method

Modelling is a process for capturing, encoding, replicating, and transferring human skills and abilities (i.e. expertise). The skills and abilities most desirable are those of experts. If one models mediocrity then one gets mediocrity. The result of a modelling process is a ‘model’. When this ‘model’ is installed in others, the result should be an increase in their performance to equal or near equal that of the expert. This is the only valid evidence that the model is successful.

Modelling should not be confused with the traditional education process. Both claim to be able to transfer skills and abilities. The difference between them lies in the origin of the skills and abilities to be transferred. In the traditional education process these come from theory and experience. In the modelling process they come from decoding the unconscious competence of selected experts. In both cases the distilled skills are transferred through the training process.

There are two levels of the modelling process, which we will call ‘modelling 1’ and ‘modelling 2’. Modelling 1 is pattern detection and transference. It detects and explicates patterns of behaviour. It focuses on ‘what’ an expert does in order to achieve a particular result. Modelling 1 is recognised by sets of distinctions, procedures and processes that enable one to achieve the desired outcome. Modelling 1 provides a set of tools. In many cases the patterns of experts have already been made explicit. The experts themselves may even have been able to explicate their own patterns. If the patterns are already explicit, then one should not refer to the process of their acquisition as ‘modelling’.

Modelling 2 goes beyond modelling 1 to focus on ‘how’ an expert does what they do. Modelling 2 focuses on the process used to generate the patterns that form the ‘what’ of level 1. Modelling 2 is recognised by specific sets of beliefs, values, meta-programme filters, physiologies, representational system facilities, and strategies that are used to generate the distinctions, patterns, processes, procedures and tools used at level 1.

In short, modelling 1 explicates ‘what’ an expert does, and modelling 2 explicates ‘how’ they do it. Modelling 1 is like giving someone a fishing rod and a can of worms. Modelling 2 is teaching someone how to make a fishing rod and find worms, as well as how to use them to catch fish. There is a big difference between these two levels (which correlates with Bateson’s levels of learning). Almost any training contains some level 1 material. Most textbooks are full of level 1 patterns. Textbooks and training about level 2 material are very rare. Level 1 teaches how to be successful by copying or imitating powerful patterns. Level 2 teaches one how to create and generate powerful patterns in the first place.

Modelling does not mean that anyone can master any skill, as some believe. If one does not already have the requisite perceptual filters, enabling beliefs, supporting values, representational system facility, strategy sequence, and strategic approach, then it may take years to develop them.

Pre-selection of learners always buys more than training. It may be possible to train anyone to do anything, but it may take several life times to do so. In the real world
learning is much more efficient if one has already developed perceptual filters, and representational system facility.

Pre-selection plus modelling is the key to increased organisational effectiveness. The development of expertise requires time and energy. With modelling the time can be reduced but not eliminated entirely. Contrary to popular opinion there are no magic pills for excellence.

5.2 Steps in the modelling process

The primary methods of modelling are the elicitation of the strategies, beliefs, values and overt behaviours that are critical to the task as opposed to those that are purely idiosyncratic to the expert. There are eight basic steps in the modelling process.

5.2.1 Identify and select experts who consistently exhibit the behaviours of excellence to be modelled

There is a direct correlation between the excellence of the original model and the amount of expertise that can be captured and transferred. In modelling experts it is valuable to have several experts to work with. This allows the use of the contrast frame to aid in separating what is essential to expertise from what is merely idiosyncratic to the individual expert. Also, it is useful to model a few mediocre performers to see, by contrast, what it is that the expert does that the mediocre performer does not do, or what the mediocre performer does that the expert does not do that makes the critical difference in performance. The goal is to assure that the components extracted from the expert are all and only those critical to expert performance.

5.2.2 Elicit or extract components of expert behaviour

Once a model, or models, is identified the next step in the process is elicitation. This is the most critical step in the entire modelling process. It involves the determination of the physiology, beliefs, values, attitudes, heuristics and strategies of the model that enable it to perform in an outstanding fashion. The key is to separate the essential from the merely idiosyncratic, and to find the difference that makes a difference.

First, observe the expert in their work environment performing the actual skill to be modelled. The boundaries of skill, i.e. beginning and end points, are determined and the scope, direction and sub-skill partitioning are defined. Second, observe and interview (both analytically and diagnostically) the expert. In the case of interviews: experts are interviewed using both unstructured and structured formats. In the case of direct observation/skill analysis: the expert is directly observed and interviewed while he or she is engaged in performing the skill.

5.2.3 Synthesise

Once one or more experts and contrast subjects have been elicited, the next step is to synthesise the data gained from the elicitation process into a provisional model. This involves three tasks.

The first is to explicate the components that comprise the behaviours to be modelled. This involves dividing the skills of the expert into sub-skills or collections of specialised behaviours and mental processes necessary to perform the expert behaviour.
The second task in the synthesis process is the identification of the critical components of the behaviour to be modelled, and the creation of a knowledge base. During this process the model’s constraints are identified, the edges of the phenomenon are mapped, and the boundaries are identified that partition the sub-skills. The result of this synthetic process is a critical knowledge base comprised of the beliefs, values, attitudes, heuristics, strategies and physiologies necessary to accentuate the skill.

The third and final task of the synthesis process is the development of a hierarchy or syntax of the critical behavioural components. To do this it is necessary to identify the important components, their hierarchy, and their web of interconnections.

5.2.4 Test and refine the model

The model is then installed in the modeller or in one or more trainees. The test for the success of the model is the ability of the modeller or trainee to produce equal or near equal results to the expert. When this happens the model is complete.

5.2.5 Universalise the model

As the model is tested and revised, a final model emerges that passes the tests of efficiency and effectiveness. This model is in a pure form and produces the best results. For practical purposes, if this model is going to be passed on to a random set of trainees, it will be necessary to generalise or universalise it.

5.2.6 Design training

Once a universal model is formalised the next step is to design a training programme to transfer the expertise captured in the model. This is another major step in the process and incorporates advanced knowledge of the learning process. It involves placing and maintaining trainees in an optimum physiology, removing the disenabling beliefs, installing enabling beliefs, installing motivational values, rehearsing the proper physiological syntax and sequence, and transferring content knowledge. Prior to the training itself, the modeller and in-house trainers and managers look closely at the content of existing courses and together identify and isolate course modules that are essential to learn the skill. The critical course content and behavioural, belief, value, and thinking components represented in the expert model are integrated, ordered and networked to design a training system that will transfer the modelled skill to others.

5.2.7 Conduct training

Once a training design is formalised, the next step is to conduct an initial training. This is done by core trainers, who need to be highly skilled in behavioural techniques in order to transfer values; beliefs and physiologies; as well as to install strategies. During this initial training core trainers debug any quirks in the initial training design.

5.2.8 Train the trainers

It is not the goal of modellers and core trainers to spend their lives teaching any one model. Thus the next step is to train in-house trainers in the use of these methods as well as in the conduct of the actual course. In-house trainers usually teach their initial course under the supervision of core trainers and are placed on their own when ready. Core trainers monitor the results of the training to ensure quality.
This last point has particular significance for the GAP851 project team’s involvement.

6 Conclusions

Concerning underground safety, the most important learning outcome is to have workers with appropriate safety habits or strategies ingrained in their daily expert behaviour. To approach this ideal it is necessary to institutionalise many of the principles and characteristics related to human learning and performance, which are summarised in this report.

In the Methods and Creative Learning Experiences area, the following is apparent:

- people learn naturally through a process called modelling: formal modelling can enhance this;
- learning is a constant body-wide process;
- learning is best done in the context of work;
- cognitive apprenticeship seems a valid model; and
- combining the above mentioned with African Collective Learning Systems suggests the best practice for learning in the mining industry.

In the Organisational Structure and Learning Culture area, the following is apparent:

- teams should work and learn together;
- the workplace is, in most cases, the best place to learn; and
- the ‘bottom up’ approach to change is compatible with the organisation of people working and learning together.

Other components to consider in the process are:

- performance and competency definitions and models;
- learning paths;
- learning support systems; and
- assessment and evaluation systems.

‘Modelling’ is proposed as the most appropriate approach to the formulation of a meaningful training system for the target trainee categories.
Appendix B  Training/instructional material
1 Identify, mark and support hazardous joint, domes, discontinuities

Is there a low angle joint?

How to observe?
Low down & different positions!

Is there a dangerous joint? Fault?
(Continuous? Water? 
Intersecting joints? Filled?)

Mark joint or fault:
Support both sides:
Inform supervisor:
Watch for movement:
Worse parallel to face

Severely jointed hangingwall?

Falls between support:
Spread the load:
Belt?

Is a block moving?

Watch for movement:
Watch for support units that break:
Movement is an early warning of a collapse:
Inform supervisor:

Instructional material
IDENTIFY HAZARDOUS GEOLOGY - 1

Is there a dangerous joint? Fault?

Joints J1: dominant joint set & J2: secondary joint set
Faults: worse than joints, associated, poor ground
Cause: Where do these come from?
Continuous
Orientation: worse parallel to the face
Intersecting joints: form blocks
Condition of joints: in filled? Water? Open joints, what do these do?
Weak and strong side: no strong side
Both sides hazardous
Increase in water
Weak side, weaker side?

Mark joint
Support both sides
Inform supervisor
Watch for movement.

Poster

IDENTIFY HAZARDOUS GEOLOGY - 2

Is there a dome?

Is there a pothole?

Is there rolling reef?

Is there a brow?

Is a joint bounded block moving?

Mark structure
Install more support
Too heavy for support?
Inform supervisor
Watch for movement.

Mark structure
Place pins close to reef

Mark structure
Install more support
Too heavy for support?
Inform supervisor
Watch for movement.

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Poster

Poster

Poster
**IDENTIFY HAZARDOUS GEOLOGY - 2**

Is there a dome?

- **Domes**
  - How to identify: Line curved low, angle joint or wet patch
  - Can transect on a joint
  - There can be a dome above a dome
  - Danger signs: Increase in noise, dust, movement, support failure
  - Support not well positioned?
  - Lock out for support units, failing - dome too heavy for support
  - Mark
  - Inform supervisor
  - Increase support (more sticks, clusters, grout packs, pillars, dewatering)
  - Watch for more movement
  - Retractives?

**STOPE SUPPORT - 2**

How to support a dome?

- Rotate or cantilever failure
  - Angle uneven, poor installation, support insufficient.

- Sometimes additional support is required, large block, dome
- Domes can fail if support is weak
- Poorly installed supports
- Bolts may be too short
- Domes can rotate, slide or cantilever out
- Domes can fall if support is wrongly positioned
- Mark & report
- Problem?
- Install additional support - closer spaced & opposite direction
- Stiffer, stronger support
- Report

- Retracts:
  - Water
  - Dust
  - Support failure
  - Movement

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Document reference: LOMPLANS-1999, under instructions material
Can a keyblock fall out?
(further fallout may follow, hangingwall can unravel)

Keyblocks keep other hangingwall blocks in place
If a keyblock falls out other blocks can fall out
Hangingwall can unravel
Danger from falling rocks
Identify keyblocks and wedges
Support the block
Closer support spacing
Belt
Increase panel over

Fallout of a keyblock ... can lead to more (domino)
2  Loose h/w and s/w not barred out/supported

Poster

BARRING AND MAKING SAFE - 1

Should I bar? Support? or barricade?

Wash down during entry examination

Keyblock - could cave in

Is it safe to bar?

Block too big? Keyblock?

Other blocks can fall?

Friable hanging?

Not sure? Ask another opinion!

Direction of gravity?

Rocks can fall - can injure or kill!

Direction of fall not always down if there is a dip.

If in doubt - ask!

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Instructional material

BARRING AND MAKING SAFE - 1

Make the judgement!

Should I bar? Support? or barricade?

Wash down during entry examination

Keyblock - could cave in

If in doubt - ask!

Whether to bar, support or barricade

How to decide?

Block too big?

No safe position?

Hanging too broken up? Too many joints?

Keyblock?

Not sure...

When to inform superior?

2 people needed to bar?

Support - temporary support / bolt?

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Document reference: LOHPLAT7/11 under instruction material
BARRING AND MAKING SAFE - 1

Is it safe to bar?

Block too big? Keyblock?
Other blocks can fall?
Friable hanging?

If in doubt - ask!

Is it safe to bar?

How to decide?
Block too big?
No safe position?
Could another block fall?
Hanging too broken up? Too many joints?
Keyblock?
Remedial effort?

Follow 6 steps to safe barring whenever possible.
When to inform superior?

Not sure? Ask another opinion!

Whether to bar, support, or barricade

How to decide?
Not sure --- ask?

When to inform superior?

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Document reference: LOMPA700a.00.00.000001.doc
Am I in the right place to bar?
   Rocks can rotate!
   Rocks can bounce and roll!
   Rocks can deflect!
Where will the barred rock go?

Stand on safest side of fault or joint!
Both sides can be hazardous!
Don't stand on weak side!

**If in doubt - ask!**

Am I using the right tool?

**If possible follow the golden rules of barring!**

There are cases...
where this is not possible - one passes...
up dip panels, raises...

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BARRING AND MAKING SAFE - 2

Stand on safest side of fault or joint!
Both sides can be hazardous!
Don’t stand on weak side!

If in doubt - ask!

BARRING AND MAKING SAFE - 2

If possible follow the golden rules of barrning!

Am I using the right tool?

Tools and position
What is the correct tool?
Length?
Hand protection?

Position
Follow 6 steps to safe barrning: there are cases where this is not possible.
- ore, waste, boxes, dip panels, what is done in these cases?
3 Bolts not tensioned and wrong installation angles

Poster

Is the spacing to standard?

Is the support angle right?

Support to face distance okay?

Is unstable block supported?

Instructional material

STOPE SUPPORT - 1

Is the support angle right?

Proper stope support installation - common problems

- Incorrect support
- Incorrect length
- Wrong angle
- Blasted out
- Don’t carry much load

Discipline - proper installation
Quality

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Document reference: LOOMPLATE's own, under instructional guidelines
TUNNEL & GULLY SUPPORT - 1

Is the spacing to standard?

Support units used in your working place

- New standard for support
- Sometimes additional required, large blocks, flat function
- Temporary and permanent

Support spacing and position

Unit length

Spacing too large - fall out between units
- Bolt too short - Bolt may fall or fall with block
- Danger if support is insufficient on gully - long term excavation
- Large upon

- Support gully to any collapse in the slope

Additional support is required

Wrong angle - may not pin through weak layer, allowing block to fall

How to drill support holes properly

- Ensure correct angle
- Use correct bit size
- Drill to correct depth

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Document reference: L020720w1, index referential mark/s
Support to face distance to standard?

Spacing too large - fall out between support and face.

Poster

TUNNEL & GULLY SUPPORT - 2

Is support sufficient?

Is the support correctly installed?
(grooted, and anchored)

Does this need areal support?

Is temporary support in place?
4 Drilling direction, angle, sockets

Instructional material

Drilling off line - overbreak?

Drilling off line - underbreak?

Drilling direction, position, length & spacing

Danger of off line drilling:
- Drilling up - overbreak... breaks up hangingwall - more likely to fail out, difficult to support
- Drilling down - underbreak... can leave bits of roof on hangingwall... these can fall off - danger
- Borders too large
- Overshooting or bed mining... breaks hangingwall
- Drilling into a pillar
- Poor drilling on ledge
- Drilling up overbreak to raise a tunnel
- Long term excavation
- Large holes
- Larger burden

Good drilling discipline
- Good blasting practices
5 Correct installation/orientation/removal of temporary support

Poster

Are the pressures right?

Is temporary support in place?

How to remove support?

Under cover of support - closer than 1m to support or remotely - at a distance

How to support a dome? (rotate or cantilever failure)

Support units used in your working place...

Function of temporary support? Protect from fall of ground if face gone...

Know standard for temporary support...

Danger if missing...

Danger if not installed to standard...

Discipline - proper installation - angle, position & spacing...

Danger when removing...

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Instructional material

Is temporary support in place?
How to remove temporary support?

Under cover of support. Closer than 1m to support. Remotely - at a distance. DISCIPLINED

Temporary support removal in stopes - procedures & dangers

What are the dangers?

When is danger extinct?

Becks held up by temporary support can fail.

This can start further falls.

Under cover of support?

At a distance
Appendix C  Team leader assessment document
**LONPLATS – TEAM LEADERS ASSESSMENT DOCUMENT**

**Basic terminology and concepts**

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravity – danger of falling object</td>
<td>Which objects are likely to fall</td>
</tr>
<tr>
<td></td>
<td>Possible consequences of a falling rock or object</td>
</tr>
<tr>
<td></td>
<td>Direction of gravity in different working places</td>
</tr>
<tr>
<td>Understand that different objects have different weights</td>
<td>Volume, weight (mass) and density</td>
</tr>
</tbody>
</table>

**Basic geology and rock structures**

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify geology that breaks up the rockmass</td>
<td>Joints (J1 &amp; J2), other joints, domes, faults</td>
</tr>
<tr>
<td>Identify unstable/dangerous blocks in the working place</td>
<td>Key blocks, wedge failure, shallow angle fractures, domes, layers (riplets), brows</td>
</tr>
<tr>
<td>Assess danger associated with a discontinuity</td>
<td>Continuity, filling and water</td>
</tr>
<tr>
<td>Identify early signs of a possible collapse in a panel</td>
<td>Undue movement of a block or joint (convergence), excessive closure, premature support failure, inceased water</td>
</tr>
<tr>
<td>Identify a pothole</td>
<td>Point out pothole</td>
</tr>
<tr>
<td>Describe dangers associated with a pothole</td>
<td>Increased jointing, weaker rock, danger of hangingwall FOG</td>
</tr>
</tbody>
</table>
**Force of gravity, examination & making safe procedures**

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe and understand potential hazards associated with barring operations</td>
<td>Falling &amp; rolling rock</td>
</tr>
<tr>
<td></td>
<td>Potential to injure or kill</td>
</tr>
<tr>
<td>Decide whether to bar, support or barricade</td>
<td>Size, position, keyblock, ground condition, support,</td>
</tr>
<tr>
<td></td>
<td>Uncertain – discuss or barricade</td>
</tr>
<tr>
<td></td>
<td>Barricade possible unsafe areas</td>
</tr>
<tr>
<td>Make use of correct barring practice</td>
<td>Purpose of barring</td>
</tr>
<tr>
<td></td>
<td>Tools &amp; protective equipment</td>
</tr>
<tr>
<td></td>
<td>Golden rules</td>
</tr>
<tr>
<td></td>
<td>Exceptions to the golden rules</td>
</tr>
<tr>
<td>Demonstrate correct barring position for different conditions</td>
<td>Ensure personal/others safety - where will barred rock go?</td>
</tr>
<tr>
<td></td>
<td>Rotation, Deflection, cantilever effect</td>
</tr>
<tr>
<td></td>
<td>Weight and dip anomalies</td>
</tr>
<tr>
<td></td>
<td>Slide, topple or fail</td>
</tr>
<tr>
<td></td>
<td>Frangible hangingwall</td>
</tr>
</tbody>
</table>

**Support – stope and gully, tunnels, cross-cuts and travelling ways**

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe and understand the role of support</td>
<td>Provide a safe working environment</td>
</tr>
<tr>
<td>Describe the correct functioning support units used in your working place</td>
<td>All support in your working place</td>
</tr>
<tr>
<td></td>
<td>Correct installation of all units</td>
</tr>
<tr>
<td></td>
<td>Elongates, tendons, clusters, packs</td>
</tr>
<tr>
<td></td>
<td>Active vs passive</td>
</tr>
<tr>
<td></td>
<td>Support spacing and position</td>
</tr>
<tr>
<td></td>
<td>Yield in support unit</td>
</tr>
</tbody>
</table>

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Document reference: Lornplats team leaders assessment document.doc

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### Detail the support standard for your working place
- Units, spacing, support to face distance
- Temporary support
- Stop and gully, tunnels, cross-cuts and travelling ways
- Strength (failure) of support unit (timber, bolt, cement)
- Systematic support installation
- Proper stop support installation - common problems

### Describe when support may need to change
- Matching support to conditions – identify changing conditions
- Support where conditions have deteriorated or are deteriorating
- Early signs of a problem – movement or support failure
- Travelling around support
- Dome or large block support

### Describe the correct procedures for support removal
- Procedures & dangers

### Other

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate correct drilling – stope or development</td>
<td>direction, position, length &amp; spacing</td>
</tr>
<tr>
<td></td>
<td>danger of off line drilling</td>
</tr>
<tr>
<td></td>
<td>Overbreak and associated problems and danger</td>
</tr>
<tr>
<td></td>
<td>Action when entering a working place</td>
</tr>
<tr>
<td></td>
<td>Support not to standard</td>
</tr>
<tr>
<td></td>
<td>Hazards such as large blocks, brows, domes</td>
</tr>
<tr>
<td></td>
<td>Action when entering special or precautionary areas</td>
</tr>
<tr>
<td></td>
<td>Reporting hazardous/potentially hazardous areas – barricade</td>
</tr>
<tr>
<td></td>
<td>Situations requiring evacuation</td>
</tr>
</tbody>
</table>

Document reference: Lonplats team leaders assessment document.doc © Snowden Mining Industry Consultants
Appendix D  Syllabus-measuring modules
1 Identify, mark and support hazardous joints, domes, discontinuities

- See what has been marked – Discuss.
- Work through the panel - back area to front
  - see geology that is missed – Discuss
  - explain dangers/ hazards
  - corrective action

What makes something hazardous:
- Movement
- Infilling and continuous
- Water
- Support failure
- Key block
- Previous FOG

Corrective action:
- Marking of structure
- Support both sides
- Re-check subsequently
  In extreme
  - Pillar
  - More support
  - Barricade

Measure:

<table>
<thead>
<tr>
<th>Total number of hazardous discontinuities</th>
<th>Number of those properly marked</th>
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Number of those missed

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Team Leader:........................................ Employee’s Name:........................................

Gang: ........................................................ Date: ...............................................................

Panel advance since last measure/evaluation: ...............................................................

Other remarks: ..................................................................................................................
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Corrective action:

- Marking of structure
- Support both sides
- Re-check subsequently
  In extreme
  - Pillar
  - More support
  - Barricade
2 Loose h/w and s/w not barred out/supported

- Team leader’s early morning examination
- Discuss how the team leader checks what loose material to remove
- Does the team leader understand what a key block is?
- Are there situations where you should not bar?
- What are dangers of not barring?
- What are the dangers while barring?
- Correct procedure for barring - 5 steps

Measure:

How many loose pieces not properly barred out?  
Is correct equipment available?

Team Leader: ............................................. Employee’s Name: .............................................
Gang: ........................................................ Date: ...............................................................
Panel advance since last measure/evaluation: .................................................................

Other remarks: ........................................................................................................................
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<td>Yes/no:</td>
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What they are
Why
What they mean
3  **Bolts not tensioned and wrong installation angles**

- What is the standard?
- How do you know bolt tension is correct?
- Need to retension - why?
- What happens if the bolt is loose?
- What is the correct angle?
- What happens if the angle is wrong?
- Have you got the correct equipment?

**Measure:**

How many bolts are loose visually?

How many bolts are not to standard tension?

How many bolt angles correct/wrong?

Correct:  
Wrong:

Team Leader: ............................................  Employee’s Name: ............................................

Gang: ..................................................  Date: ..................................................

Panel advance since last measure/evaluation: .................................................................

Other remarks: ..................................................................................................................

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D-4
4  **Drilling direction, angle, sockets**

- What is the correct drilling position?
- What happens if drill too low? Leave the reef in h/w, which could result in FOG.
- What happens if drill too high up? Crack h/w, which could result in FOG
- What if .....

**Measure:**

Are there sockets in the hangingwall?

Is there reef on hangingwall? Dimensions of the reef: L*W*H:

Team Leader: ........................................ Employee’s Name: ........................................

Gang: ........................................ Date: ........................................

Panel advance since last measure/evaluation: ........................................

Other remarks: .................................................................

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5 Correct installation/orientation/removal of temporary support

- What is the purpose of the temporary support? Protect RDOs and those working in the face area?
- Why does it have to be removed?
- What is the danger when it is removed? Will this always happen?
- Correct standard for installation/removal.
- Correct installation for removal.
- Correct procedure for removal.

Measure:

How many units correctly aligned for removal? Right: Wrong:

Has the team got the correct tools? Yes: No:

Observe removal – correct? Correct: Wrong:

Check installation standard – spacing? To STD: Not to STD:

Team Leader: Employee’s Name:

Gang: Date:

Panel advance since last measure/evaluation:

Other remarks:

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Appendix E  Skills evaluation questionnaire
SIMRAC Project GAP 851 - Questionnaire:

1) Identify, mark and support hazardous joints, domes, discontinuities

   Explain what is a joint / dome

   What makes this dangerous?

   What should be done about these?

2) Loose h/w and s/w not barred out/supported

   If you see a piece of loose H/W, what should you do?

   What are the dangers of a piece of loose hangingwall?

   Have you ever seen a piece of hangingwall falling out?

   What do you do if you try to bar and can’t?

3) Bolts not tensioned and wrong installation angles

   What is the purpose of a bolt?

   Does a bolt work if it is loose?

   If a bolt is tight at installation, will it stay tight?

   What angle should a bolt be installed at?

   How is a bolt tensioned?

4) Drilling direction, angle, sockets

   Is there a problem if the RDO is up to the hangingwall?

   What is the problem?

   Is there a problem if RDO too low in reef?
5) Correct installation/orientation/removal of temporary support

Why do we use temporary support?

If not used what is the risk?

Is there a danger in removing temporary support?

What is the danger?

Team Leader: …………………………………………

Employee’s name ………………………………

Gang: …………………………………………………

Date last trained: ……………………………

Panel advance since last measure/evaluation: ………………………………………………………………………

Other remarks: ……………………………………………………………………………………………

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