

# The Hazard Management Process

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Published: 7 December 2003  
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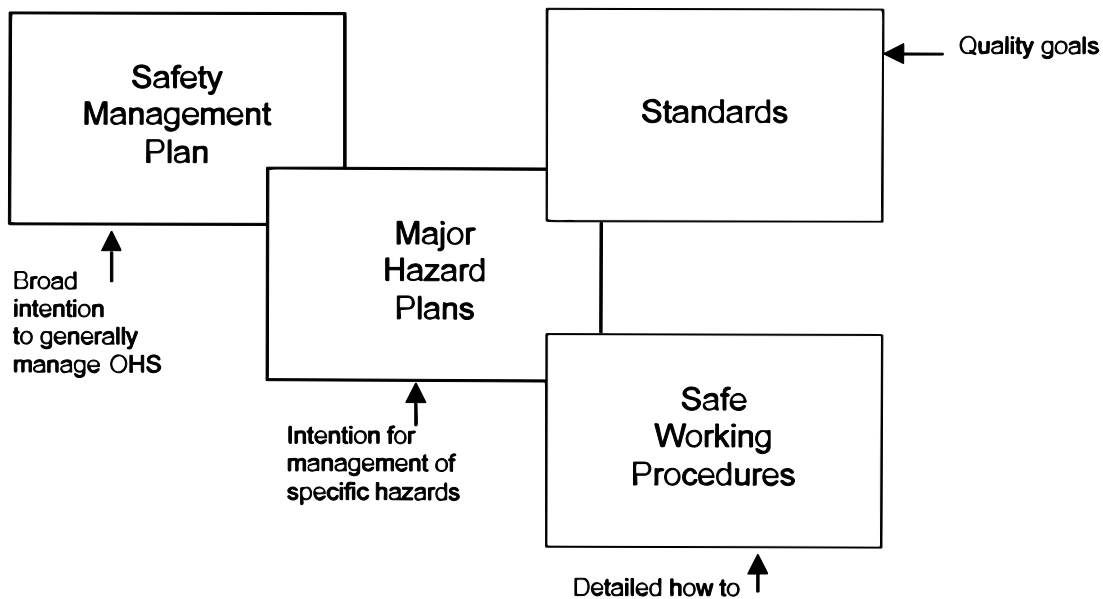
## Abstract

It is a requirement of safety legislation in Old underground coal mines that mine operators have in place Hazard Management Plans for management of defined "principle hazards". Underground mining of any type is an inherently hazardous operation and as such "systems safety" as opposed to "traditional safety" techniques are being used to provide high level hazard management. Systems safety is a logical and organised methodology for evaluating the potential hazards or interactions of a system, installation or device. Systems safety tends to be very inquiring and is biased towards the deficiencies in the managed system rather than the individual. Systems safety differs from "traditional safety" because of these methodical procedures and a team approach.

## Concept

Many major organisations have broad, generic Safety Management Plans which state their intentions with regard to safety management. It is the writers experience that Safety Management Plans must be built upon with Hazard Management Plans which address management of specific hazards.

The hazard management process is depicted below.



Hazard Management Plans address management of specific hazards and it is essential that these plans are in place and actually working.

The Old Coal Mining Industry is seeing a real revolution in the way it handles occupational health and safety and forthcoming legislation may add to the pace of change.

We must ensure our efforts receive the best return for the considerable investment that will be expended.

## Application

Taxonomies of personal damage experience have been prepared for the coal mining industry in Queensland and New South Wales. These taxonomies must form the basis of hazard management plan deliberations.

The focus of the legislation in Old underground mines is on "multiple fatalities". Given the fact that thankfully there are no taxonomies for multiple fatalities the following is one process the writer has experienced for management of multiple fatalities.

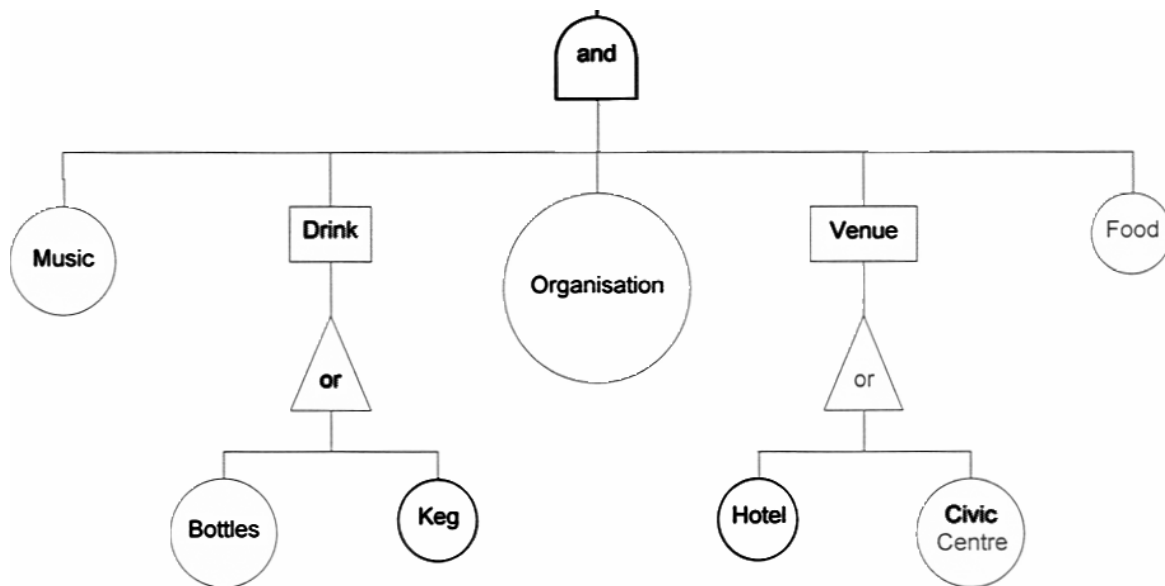
1. Draw/define a picture of what the location consists of i.e. demarcate the site
2. Divide into discrete business activities and list all the hazards of these activities. As a broad cross-section of the company a question like "of the things you do where could you get 1 or more fatalities?" Use the potential hazard category table to indicate yes or no if a cross-sectional slice of the company believes 1 or more fatalities are possible in particular business activities with particular hazards.

Note the focus of this discussion is on safety but the process can equally well be used in other areas using the SPEAR model i.e.

- Safety
- Production
- Environment
- Assets
- Reputation

3. Once hazards that could result in one or more fatalities are identified fault tree analysis (using "and" and "or" gates) is used to establish causes.

Successful Party



Hazards Applicability Matrix – XYZ Underground Mine

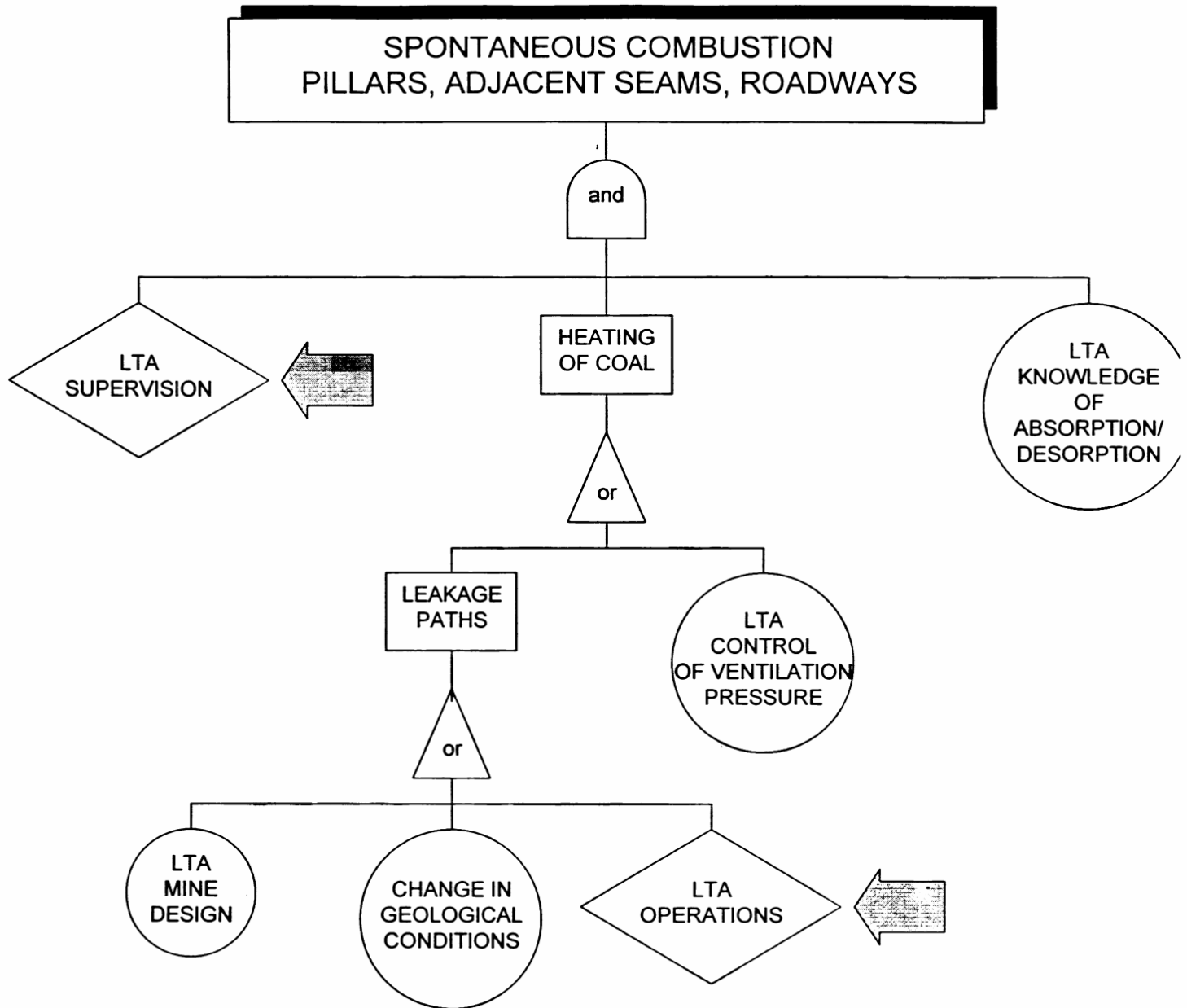
Business Activities																									
Hazards(with immediate fatal potential)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V			

Civil Structure failure (hw, lw, stockpiles)		[		[	[	[	[						[	[	[	[		[		[		[	[
Electricity out of control	[	[	[	[	[	[	[	[	[	[			[	[	[	[		[	[	[		[	[
External threats	[	[	[	[	[	[	[	[	[	[	[	[	[	[	[	[	[	[	[	[	[	[	[
Inrush	[	[	[	[			[						[										
Irrespirable, explosive & toxic atmospheres	[	[	[	[	[	[	[	[	[	[			[		[		[					[	[
Mechanical structure failure	[	[	[	[	[	[									[		[					[	[
Natural disaster																		[					
Outburst	[						[		[	[													
Persons falling from height or into equipment	[	[	[	[	[	[			[									[					
Spontaneous Combustion								[															
Subsidence		[																[		[			
Uncontrolled emergency evacuation	[	[		[		[		[	[	[				[		[		[				[	[
Uncontrolled movement of mobile equipment	[	[	[	[		[			[				[	[	[		[		[		[		[
Uncontrolled release of hazardous substance									[									[					
Uncontrolled release of pressure	[				[	[																	
Uncontrolled strata failure (rib, roof, floor)	[	[	[			[	[	[	[					[	[					[		[	[
Underground explosion	[	[	[	[	[	[	[	[	[	[					[		[				[	[	[
Underground major fire	[	[	[		[	[		[	[								[		[	[	[	[	[

## Business Activities

A – Mining	J – Use of Explosives (Underground)	S – Materials Handling
B – M and M Transport	K – Planning and Administration	T – Storage of Hazardous Substances
C – Provision of Services (Underground)	L – Dewatering	U – Install and Dismantle Longwall
D – Construction Works	M – Waste Disposal	V – Abandon Part of Mine
E – Conveying of Coal	N – Emergency Response	W – Demolition of Structures
F – Repairs & Maintenance of Equipment	O – Roadway Maintenance	X – Portal Maintenance
G – Drilling	P – Monitoring	
H – Ventilation	Q – Provision of Electricity (Surface)	
I – Strata Control	R – Use of Flammable Liquids and Gases	

If companies wish it the hazard potential can be noted and scored  
Using a combination of consequence and probability



A narrower group of subject experts plus one person who knows nothing about the subject area is used for this segment.

4. Once causes are established existing and desired controls for the causes are identified (this usually results in a "gunna list" of recommended improvements to systems).

The 9 box model is applied to ensure, pre-event, continuing and post event controls are in place (ensure a number of controls in each box).

	P Prevent	Monitor	Contingency
Eqpt Engineering			
Procedures			
Skills/Competencies			

Procedures - way of doing things not necessarily defined on paper.

*Controls - What I need to know is what is in place today to meet the intent the control.*

*Ask questions like:-*

Is there a practice/procedure to .....

Who/how control .....

Are major and minor controls clearly differentiated .....

Do you have a process to ... ..

Do you have a model to .....

How do you get notified of change ... ..

Is the model, valid, up to date ... ..

Is it maintained to a standard .....

If the person who normally does it goes on holidays how do you know his/her replacement can do the job ... ..

How do you know it has been done .....

Are records signed by the Manager ... ..

How does the information get to you ... ..

*For example*

CAUSE

How do you today deal with an uncontrolled change of the ventilation system in an underground mine?

## Controls

Role of ventilation is explained at induction training. Ventilation change is documented in Managers scheme.

Mine pressure is monitored at end of shift.

Deputy inspects ventilation system at least once per shift and so on.

5. Identify the position that is responsible for ensuring the control actually happens (he/she does not have to personally do it). If you want to find someone to pin it on? Who makes this happen?

6. Identify to competencies necessary for the person who controls the hazard to be able to do the required job.

7. Establish triggers in management of principal hazards - when doing something in control mode eg testing for gas what does he do when he notices a problem? Triggers result in someone doing something or information transferred up management line and back down - how does information get to someone who will do something?

8. Send out the draft Hazard Management Plans for validation and modify as necessary.

9. The Hazard Management Plans will form the basis of OHS standards and Safe Working Procedures. It is necessary to ensure the standards and safe working procedures are used in the real world and are not simply a decoration on the shelf. The

task of ensuring this occurs is difficult; it will be impossible if employees at all levels are not involved in and consulted about the process from the beginning. Standards and Safe Working Procedures should be reviewed, placed in a standard format and consolidated into one area where they are readily accessible.

Once a list of recommended controls has been developed it is time to ensure the controls are in place and working.

Major steps in this process include:-

1. Review suggested controls to ensure they are in place and effective.
2. Explain HMP process to staff particularly those responsible
3. Gather all existing SWP and standards
4. Compare existing SWP and standards with those required and establish gaps
5. Write additional required SWP and standards (needs a standard format and numbering system)
6. Explain HMP process to all employees
7. Establish if those responsible have required skills and abilities
8. Write Hazard Management Plans
9. Identify training needs
10. Conduct training
11. Conduct a trial audit

## Conclusion

The process outlined above can take considerable time to implement but it has the following advantages:-

1. It involves the workforce in a pro-active way in hazard management.
2. It reflects a genuine hazard based approach.
3. It systematically analyses both the hazards and the required controls in an organisation.
4. The emphasis is on real world solutions to problems.

It is essential that the process outlined above is cognisant of past accident experience and details of past personal damage must be considered in an organised and practical manner as part of the analysis process.

One mining location the writer has worked with decided that approximately 1600 discrete controls were necessary to effectively manage their identified hazards. This emphasises the complex and demanding nature of safety management in the mining industry.

Systems safety approaches of the type outlined in this paper seem to be the way of the future for the mining industry in Old. We must ensure we are in the right track and obtain the best return for our investment.