SELF ESCAPE
FROM UNDERGROUND METALLIFOROUS MINES.

ARE OUR SYSTEMS AS GOOD AS THEY COULD BE?

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This paper examines the worst disaster in an Australian hard rock mine - the 1912 North Lyell fire. When contemplating the outcomes of the disaster, and relating them to our modern Metaliferous mines and our emergency systems, would we fare any better today?

In the last ninety years we have seen great improvements in underground hard rock mining operations. The invention and application of Self Escape systems should have enhanced the ability of the average mineworker to escape their workplace in the event of an underground fire.

Case Study:

The following is a brief account of an actual incident that occurred at a remote mine site in Tasmania Australia, ninety-one years ago.

The Scene:

Saturday 12th October 1912
Mount Lyell
West coast Tasmania
Australia

Day 1:

"Shortly after eight o'clock in the morning, one hundred and seventy miners descended the North Lyell shaft and began to work on six underground levels of the mine. Two and a half hours later, in scattered parts of the mine, men detected the smell of smoke. Although smoke drifted along the workings near the main shaft, the chattering roar of the rock drills indicated that no one was alarmed."

"Between 11.15 and 11.30 five men rang for the cage. Weakened by fumes, they were vomiting when they reached the top tunnel. They said the pump house on the 700 ft. level was on fire, and that the smoke was so dense and suffocating that the pump attendant could not reach a hose that lay near the burning building.

There was no emergency warning system in the mine. To warn the miners below, men would have to descend the shaft and run along the tricky maze of drives and cross-cuts to where the men were at work. This slow and tedious method was not even considered.

The men who escaped from the 700 ft. level thought that once the King Billy pine, which lined the pump house was destroyed, the fire would burn itself out. As they believed that the fire would not spread to the wet, heavy timbers which supported the roof of the drives, the timekeeper merely sent an urgent message to the mine manager at his residence in a nearby town.

When the manager reached the mine at midday he learned that no one had come up the shaft for nearly thirty minutes. Down below, a thick cloud of smoke billowed down the shaft to the lower levels and drifted along the drives to where the miners were working.

The mine was so rambling and extensive that the miners in remote stopes did not see smoke until the fire had been burning for more than an hour. At the 850ft. level, after shift bosses had climbed ladders to the 700ft. level and returned with the news that there was a bank of smoke near the pump house, many miners calmly sat down to eat their crib. They knew the fire would not spread."

The cage is lowered to the 400, 500 and 600 ft. levels. Seventy men are evacuated, three at a time. It is then lowered to the 850 and 1000 ft. levels, but no one rings the bells.

"It was now one o'clock in the afternoon. The manager and foreman now realized the danger. Even if the fire did not spread beyond the pump house, it was burning with insufficient oxygen, and generating large quantities of carbon monoxide, a danger which no one had previously suspected. If rescue parties tried to search for miners or extinguish the fire, they would rapidly succumb to the fumes. The men at the surface could only pray that the fire would soon be quenched and that the fumes would rise up the shaft.

Meanwhile the air compressors which worked the rock drills in the mine were pumping fresh air to the large stopes, hundreds of feet from the main shaft, where it was hoped that the miners would gather in safety. The empty cage was whisked up and down the shaft in an effort to drive out the smoke; the two hillside tunnels were bratticed to confine the upcast smoke within the shaft; the shed which covered the shaft was torn apart to allow smoke to escape; and a surface stream of water was diverted down the pump compartment."

At around 5 o'clock, one compartment of the cage, the only means of conveyance into the mine, jambs in its guides while being whisked up and down the shaft, in an attempt to clear the fumes. "The engine driver now tried to drag the cage clear of obstruction. The cage lurched up six feet and stuck. The cage in the other compartment was lowered to see the damage but it could no longer pass the jammed cage. Below the 600 ft level the shaft was now useless. The miners were cut off from the surface and were at the mercy of a fire which could not be extinguished."

Day 2: – 8am

Men in diving suits are lowered to the 600 ft level.
"They saw in the dim light five dead bodies, four of which they identified. Pinned to the timber was a pathetic note, addressed to a miner's wife:

I will say goodbye, sure that I will not see you again any more ... My mate Lou Burke is done, and so is poor old V. and the driver too. Goodbye."

Day 2: – 2pm

Buckets containing candles and a note pad are hung down the shaft by knocker line, to each of the 850, 1000 and 1100 ft levels.

Day 2: – 5pm
The men at the surface hear the knocker line rap out the signal "Men to go to the surface" Then came the second message "Men at the 1000 ft level" There followed a long silence as the men obviously waited for the cage to rush down the shaft. It is still jammed. Finally the knocker line at the surface clanged out the signal "Haul to surface" Quickly the rope was hauled up. At the end of the rope was a handkerchief wrapped around a tobacco tin that contained a pencilled message:

"*40 men in 40 stope. Send food and candles at once. No time to lose. J.Ryan.*"

Food, beef tea, tobacco, blankets and candles were lowered down the shaft. "Outside the mine there was great excitement when the note was read to the waiting crowd. The excitement mounted when it was learned that fifty-one, not forty men were alive in the stope."

Over the next three days with no way of rescuing the men trapped in 40 stope, kept alive by compressed air piped into the stope, the people on the surface can only communicate by notes lowered down the shaft.

Day 3: – 8pm
"*We can do with more food. Biscuits or something to chew. We can send out now and again to the 1000 ft level. Your parcel to hand with our thanks. We won't leave the stope till you come for us. Regarding the 800 ft level. We are, I am sorry to say quite in the dark. We put down a rope to the 1100 ft level and got nine men out. We also have two diamond drill men. The men in 23 stope, 1000 ft level we know nothing about, not being able to warn them.*
J. Ryan.

Day 4: – 9am
Note sent down the shaft by manager Mr Stitch.
"*To Jim Ryan.*
We have reached 700 and No. 1 engine winze. Also the 850 plat. Have reason for thinking the 1000 plat not too good yet so must wait a while. Shaft full of smoke from the 700 ft up. Keep the fellows peckers up. Will communicate when ready."

Day 4: – 2pm
"*Try and get us as soon as possible. The cold is terrible and there is none of us well. The fumes about the shaft are very thick at times. There is only a few take it in turns to go to the plat and it uses us up. The fumes hang in the 34 stope bad. I think the water at the 1100 is forcing it up. We are all suffering with the cold and wet. We could not lay about much longer. We are depending entirely on the compressed air. If that fails we are done.*"

Day 4: – 6pm
After suitable equipment had been rushed to the mine from Melbourne on the mainland, by steam ship and train, chain ladder ways were fitted to the winze. Ventilation had to be reorganized to ventilate the makeshift escape way.

At dusk, men in smoke helmets forged their way down the engine winze from the 600 ft level, and began searching for the missing miners. Throughout the night, parties of men installed telephone and ladders, and fixed a large bucket to the winding engine in preparation for the rescue of the men.

Day 5: – 1pm
The first drenched miners leave the tunnel mouth. "The sun had set when the last man was walked from the mine. One hundred and nine hours had passed since he had casually entered the cage on that fateful Saturday morning."

Points of Interest

- 42 men lost their lives.
- The fire burned for 3 months.
- It took six months to recover all the bodies.
- Investigations indicated the timber smoldered not burned.
- One theory of the fire origin, was that the fire was deliberately lit. However, this theory could not be proven due to insufficient evidence.
- In 1912, large sources of fuel for a fire such as diesel, tyres and transformers did not exist.
- The Royal Humane Society awarded 27 gallantry medals after the incident.
- At least 11 of the rescuers died within twelve months of the incident from smoke inhalation.
- The North Lyell fire remains today the worst disaster in an Australian hard rock mine.

Examining the Facts

The 1912 incident occurred at a remote mine site which, by today's standards, was technically not very advanced. The mine barely had a telephone system, let alone the advanced communication and escape systems we have today.

The mine, at that time, had no trained rescue teams. There was no suitable breathing apparatus and rescue equipment available within the state.

Of the 170 men underground at the time of the incident-:

⇒ 76 men were saved by self and aided escape.
⇒ 52 men were rescued alive, under the circumstances, a remarkable effort.
⇒ 42 fatalities occurred, with all of the bodies eventually being recovered.

Comments on the Learning's:

Do we consider history and occurrences that have had major negative impacts, or led to disasters in other mines? Do we ask ourselves, could this happen to us?

In my role as a training coordinator with Mines Rescue, I conduct training of underground Mine Rescue teams, in various Metaliferous mines around Australia.
Whilst conducting this practical training, I openly discuss possible scenario's with the teams, based on their particular mine. Most of these rescue workers rate an underground fire as the highest risk of emergency, at their sites.
One topic, or problem that always arises, is the fact that in certain situations in many Metaliferous mines, we do not always provide for a second means of escape, or consider what would occur if the primary means of escape is blocked.

The questions we are asking in Australia at present are -:

- If the primary means of escape is blocked, what are the chances of the people underground escaping in a fire emergency?
- Are our belt worn Self Rescuers adequate for the task?
- Is the workforce competent in their donning and use?
- Do we maintain a second means of egress in fresh air?
- What would happen if the ventilation failed?
- Do we have enough refuge chambers?
- Do these chambers have sufficient room and duration for all contingencies?
- Do we position our refuge chambers in appropriate locations?
- Have we got sufficient equipment and transport, to enable our rescue teams to rescue survivors from a refuge in one operation?
- What is our contingency if the visibility is poor?
- If we had a truck fire in a decline, would we have to extinguish the fire before we could search for survivors, or is there another access?
- Where do we run our services? What are they made from? Will they burn?
- Do we test our water supply for pressure and quantity?
- Is there sufficient access to fire hydrants in our roadways to extinguish a fire? How far would we have to run fire hoses?
- Are there mine plans with fire hydrant locations posted at the mine?
- Are there adequate mine ventilation plans posted at our site?
- Have we the ability to quickly alter the mine ventilation circuits?
- Do we have the equipment and materials on hand to enable rescue teams to quickly build ventilation seals?
- If we lose power due to a fire, how will this impact on our ventilation and communication systems?

When you carefully analyze our modern mine designs, ventilation systems and escape systems, it makes you wonder if we would fare any better than occurred in the case study that follows.

In conclusion, I believe there are still lessons to be learned from this tragedy that occurred all those years ago. In the last ninety years we have introduced a variety of major fire hazards into our mines, such as large electrical installations and transformers. We also depend on a variety of diesel-powered equipment, carrying vast quantities of fuel and oil, and running on massive tyres.

The purpose of this presentation is to try and generate a thought process, to enable us to look harder at the way we currently work. I believe we should think smarter with our mine design and systems, and consider events that have had major negative impacts on mines in the past.

"Those that choose to ignore history, are usually the people that repeat it."

References - : "The Peaks of Lyell" by Geoffrey Blainey
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