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UNDERGROUND COPPER MINING

FIRE EVACUATION

Over two days, in two sessions, we implemented a fire evacuation scenario built in a virtual world, scale-model replica of a real underground copper mine.

The scenario began as a shift supervisor conducted a line out meeting in the control room. Participants gathered in a circle and were assigned various tasks underground to suit their roles, including maintenance, operator and electrician tasks. All participants were responsible for a productive shift, as well as tagging in, wearing required safety gear, and following hoist and safety procedures. Once underground, participants used radio communication to report locations, questions and hazards to the shift supervisor and amongst one another.

After participants were fully engaged in their tasks, a fire broke out, smoke began to fill the air, and shouts of "Emergency" came over the radio. With a short timeframe they had to find their way to the proper egress routes or refuge chambers. All participants were now in survival mode, getting themselves to safety and ensuring others were able to do the same. As the oxygen levels diminished, some would make, while others would not.

A CHANGE IN PROCEDURE

The crew in the scenario was familiar with safety procedures appropriate to vertical development, which includes using primary escape ways in the case of an underground fire.

The virtual scenario we implemented includes significant lateral development. Lateral development tends to use refuge chambers as a primary response to emergencies.

Even though these new procedures were documented, participants used primary escape ways, acting on what was familiar to them rather than what was given from the shift supervisor.

The Safety Manager was surprised at how few people followed protocol, despite the existing training methods in place

SUPERVISORY OUTCOMES

The supervisor was notably overwhelmed and agitated when the first emergency was triggered. Communication channels were jammed with traffic. Under the pressure of the scenario he failed to follow procedures.

This resulted in several deaths as he issued instructions that contravened protocol.

CHANGES TRANSFERRED TO THE REAL WORLD

The signage replicated the real mine. During the fire, with the presence of smoke, the signs were near impossible to read. As a result of this experience plans were drafted to enlarge the signage in the real world.

Participants: 50 on-site personnel
Scenario: UG Fire Evacuation
Site: UG copper mine in the USA

RESULTS

- **30% improvement** in the average time it took for people to safely evacuate across two sessions
- **36% improvement** in how many people safely evacuated across two sessions
- Debrief sessions revealed a heightened awareness of the safety environment, including locations of key equipment; e.g. self-rescuers and refuge chambers

Mine Refuge Chamber

Line Up Meeting

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