Dan O'Toole

Dan started caving in the mid-1980s and is a former President of the Victorian Speleological Association. He is now a geotechnical engineer in an engineering and environmental consultancy. He also has been an ACKMA member (and I hope he will be again). I worked with Dan on a consultancy on Christmas Island in 1998. He recently encountered a case where it was recommended that geotechnical hazards in a show cave be managed using methods applicable to a mine. That provoked him to write the following piece. His final paragraph suggested a future course for ACKMA.

CAVES ARE NOT MINES

Dan O'Toole

As a practising geotechnical engineer, with an interest in caves and karst, I have been asked on a number of occasions to provide advice on issues related to cave stability, rock fall risk and other issues such as construction on karst. Over the years, in undertaking this work, I have come across instances where mining industry professionals have looked at caves and drawn conclusions in relation to geotechnical hazards and risk management based on mining practice.

This is understandable given their professional frame of reference. However, underground mine tunnels are often a dynamic environment. Tunnel blasting results in damage to the rock mass in the walls and roof. Mine tunnels are created over a short timeframe resulting in rapid redistribution of stresses around the excavation. This can result in zones of loosening and instability or high compressive stresses that can lead to rock bursts or squeezing. Excavation of adjacent ore bodies can also influence stability of mine tunnels. Ground support (eg rock bolts and mesh) are used to manage these geotechnical hazards. Practices such as sounding the rock with a steel bar and "baring down" loose material are also used in mine tunnels.

Mine tunnels are workplaces where individual workers can be exposed to these hazards over a relatively long period (consider the annual exposure). It is in this context that mining regulations and codes of practice are written.

Limestone caves are not mines. Solution caves develop over very long periods of time. Stress redistribution happens very slowly during cave formation. Dynamic events such as collapse, sudden draining or erosion during flooding can occur in caves. However, cave passages and chambers tend to be a more stable environment compared to a similarly sized mine void. This may be due to one or more of many factors including:

- the nature of the limestone rock mass;
- the slow solution process of cave formation; and
- the recementing characteristics of calcite in the rock mass.

In this context, the frame of reference that informs mining regulations and codes of practice is quite different from the cave environment.

Of course, show caves are workplaces and the relevant workplace health and safety laws enacted in Australia apply. There are guidelines in several Australian States pertaining to caving as an activity (eg Adventure Activity Standards). Various standards are available to address infrastructure in caves (eg stairs, handrails, lighting). The issue of radon gas in caves is addressed in various guidelines. However, there appears to be little in the way of geotechnical codes of practice or guidelines with respect to show caves as workplaces.

There may be benefit in filling this vacuum to avoid situations where some well-intentioned practitioners may apply a mining frame of reference to a cave. To this end, it is suggested that ACKMA consider developing "best practice" risk management guidelines for:

- show caves as workplaces;
- visitor safety; and
- infrastructure maintenance.

SAVE THE DATES FOR THE 2020 CONFERENCE

@ Jenolan from Sunday 3 to Friday 8 May 2020