

## The Danger of Fallouts in Overhead Shooting

By William Clements

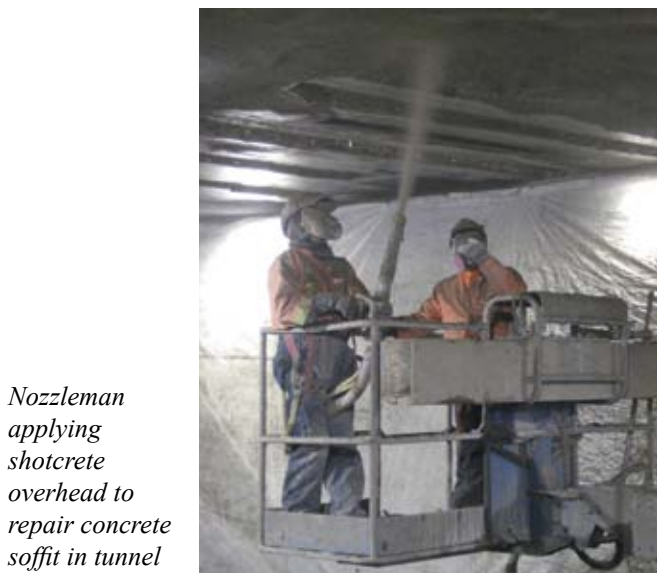
**T**he volume of shotcrete required to cover an area of only 3 ft<sup>2</sup> (0.3 m<sup>2</sup>) with a 4 in. (100 mm) thickness would typically weigh approximately 140 lb (64 kg), a weight that—if dropped from a height of 10 ft (3 m)—would seriously endanger the life of any individual standing below it. This fact should serve as a reminder to all of how dangerous it can be to work under freshly applied shotcrete. Up to several hours after applying shotcrete, it is possible to experience fallouts (the sudden collapse of shotcrete after placement) for a variety of different reasons inherent to shotcrete materials and applications.

Fallouts can be caused by poor quality or inconsistent material; application inconsistencies; cold temperatures; improper dosage of admixtures; or failure of the application equipment, which can lead to increased set times and reduced adhesion to the receiving surface. Vibrations in the rock or on a concrete structure can also cause shotcrete fallouts; these can be especially dangerous because the occurrence can be unexpected and unpredictable.

For underground applications, it is also possible to experience fallouts when the rock-bolted screen is either too close to or too far from the rock face or has not been bolted properly, causing it to loosen. It should also be noted that shotcrete does not always have an anchorage system that is stable enough to

hold the freshly applied shotcrete in place. This can happen when there are inconsistencies in the profile of the receiving surface. In these cases, it is very difficult to detect how thick the shotcrete has been applied and, therefore, which sections may be more likely to fall if a section was shot too thick.

The best practice when applying overhead shotcrete is to eliminate any situation where a member of the shotcrete crew will be working under fresh, plastic shotcrete. The optimum way to achieve this is through planning, roping off any areas where shotcrete has been recently applied, and opening the area for access only when the shotcrete has reached final set.



*Nozzleman applying shotcrete overhead to repair concrete soffit in tunnel*



*Nozzleman applying shotcrete to back in order to provide ground support during the mining process*



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