

# Automation Gaps to Achieve Zero-Entry Mining for Surface Applications)

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## **ABSTRACT**

Zero entry mining operations are designed so that no-one need ever enter a mining zone. Such operations offer great advantages in situations involving health and safety risk, for example for scavenging resources open at depth in surface mines approaching the economic limits of operation. However, a number of automation gaps exist to achieve zero-entry mining techniques for surface mines. These include: the automated collection of geology samples, automated surveying, automated charging and tie in of explosives, autonomous refueling and change-out of teeth on hydraulic excavator buckets. This paper will review the autonomy gaps required to achieve full zero-entry mining for surface operations. In turn, this will assist the mining industry to map out a research agenda to work towards making zero-entry mining a reality.”