16th SGA BIENNIAL MEETING
KEYNOTE SPEAKER

Teresa McGrath

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Gravity Recovery of Gold – Past, Present and Future

The history and complexity of gold ore processing is directly tied to the unique physical properties of gold as well as its distribution within an ore body and its association with gangue throughout a deposit. Gold can occur as metallic gold (free) particles, easily recoverable by gravity methods until it becomes too fine. Gold can also occur locked in a sulfide matrix or in a mineral form, yielding varying degrees of refractoriness. Furthermore, gold can occur in all these forms in a single deposit.

Prior to cyanidation, gold production was mostly the result of concentration via gravity/density separation techniques. The known and recovered gold was the gold we could visibly see; coarse, free gold. While historical techniques such as jigging and sluicing practiced hundreds of years ago were sufficient for capturing gold from alluvial deposits, these types of deposits do not represent most ores being processed through a modern gold plant.

Today, deposits containing fine free gold, ~20 µm and smaller particles, are often being treated with high G-force batch centrifugal concentrators, such as Knelsons and Falcons, which can recover fine gold particles into a small mass (low mass pull), “high” grade, concentrate. However, low G devices like spirals and jigs, can still be found on some gold plants. These concentrators typically aim to recover gold contained within a sulfide mineral, with concentrates characterised by having a higher mass pull and lower grade, often requiring subsequent treatment prior to intensive cyanidation.

Understanding historical and modern-day gravity recovery methods as well as the importance of sampling, mineralogy, ore characterisation, benchmarking and modelling validates their continued use in modern gold plants for gold recovery from amenable ores, and even highlights the potential application of gravity separation for gangue rejection with the intent of turning low-grade, uneconomic resources into reserves.

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Teresa is an Associate Professor at Curtin University in the Western Australian School of Mines and is the Manager of the Gold Technology Group and the industry funded Curtin Gold Technology Project. Teresa earned a BS in Biological Sciences and an MS in Metallurgical and Materials Engineering from Montana Tech in Butte, Montana, USA. Following completion of her PhD from Curtin University in 2015 she joined the Gold Technology Group, the research providers of the Amira P420 Gold Processing Technology Project, the world's largest and longest running collaborative research project in gold processing. She is the co-inventor of the Carbon Scout and recipient of the Curtin Innovation Award for its development. Teresa's interests are all aspects of gold processing, including the basics of gravity and leaching/adsorption, as well as technology transfer, optimisation, automation, sensors, benchmarking and gangue rejection.