**Pyrite re-processing of critical-metal bearing waste for environmental gain**

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Recent estimates of annual global mine waste production, including tailings, have reached as high as 13 billion tonnes (Valenta et al, 2023)[[1]](#footnote-1). Mine waste may contain deleterious elements and may interact with air, water and bacteria to form acids, which are the cause of acid mine drainage (AMD). Mine waste storage facilities, such as tailings dams, must therefore be managed according to strict environmental guidelines, for decades if not longer.

In the case of sulphide ore, a significant component of many tailings dams is pyrite (FeS2), which is a significant contributor to AMD, and yet may also contain other metals such as Cu, Co, Ni, Ag and Pt in solid solution. The application of a patented pyrite processing technology by Cobalt Blue Holdings Pty Ltd, to pyrite-rich waste demonstrates the viability of re-mining activities to 1) extract valuable metals, including critical metals, and 2) reduce environmental liabilities through the co-production of elemental sulphur and hematite, both of which are environmentally benign.

Case studies by Cobalt Blue show that environmental liabilities on tailings dams in some Australian states may be reduced by as much as an order of magnitude, whilst simultaneously producing valuable critical and strategic metals such as Co, Ni and Cu, all of which are essential for the energy transition. Combining the value propositions of metal production and liability reduction changes the economics of many mine waste re-processing opportunities both within Australian and abroad.

References

Valenta, R. K., Lèbre, É., Antonio, C., Franks, D. M., Jokovic, V., Micklethwaite, S., Parbhakar-Fox, A., Runge, K., Savinova, E., Segura-Salazar, J., Stringer, M., Verster, I., Yahyaei, M., 2023. Decarbonisation to drive dramatic increase in mining waste – Options for reduction. Resources, Conservation & Recycling, 190.

1. In this case, we refer to mine waste as that produced from mining and processing activities and subsequently stored in a waste storage facility such as a tailings dam, integrated waste landform or similar. We do not include other forms of waste from the mining industry, such as waste water, truck tyres, and other forms of industrial or municipal waste equivalent. [↑](#footnote-ref-1)