

Development of new technologies for processing low-grade sulfide critical minerals

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ABSTRACT

Australian sulfide deposits contain significant value of critical, strategic, and precious metals. However, in some instances realising this value is hampered by low grades, complex mineralogy and poor recovery utilising conventional technology. To support Australian industry, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) is actively developing novel hydrometallurgical processing systems for economically extracting maximum value from these deposits. As part of this technological development process, the Australian Government Critical Minerals Office (CMO) has funded selected activities for trialling one promising technology - electrolytically driven *in situ* oxidant generation in leach solutions. This process can operate on an intermittent basis and thus has the potential to be powered exclusively using renewable energy.

Whilst initially developed as a targeted process to extract copper from chalcopyrite in existing heap leach operations, focus has also extended to treatment of other critical mineral-containing materials that currently are unable to be processed economically. This technology was evaluated at laboratory scale across such a selected group of Australian deposit and sulfidic tailing samples. The process demonstrated significant advantages in comparison to conventional hydrometallurgical flowsheet options, including (i) improved gangue rejection through operation at elevated pH, (ii) close to complete extraction of value from sulfidic minerals and (iii) rapid extraction of value. This novel process can be readily integrated with existing unit processes, common flowsheet configurations and does not require exotic or unproven technology.

The work program funded by this CMO grant identified several prospective applications of this technology, including the recovery of value from an Australian nickel-cobalt deposit that cannot be effectively processed using conventional technology. If this technology is realised, it has the potential to unlock considerable value from this deposit (\$5 B AUD metal value) and others. The current presentation will outline this technology and the opportunities it offers.