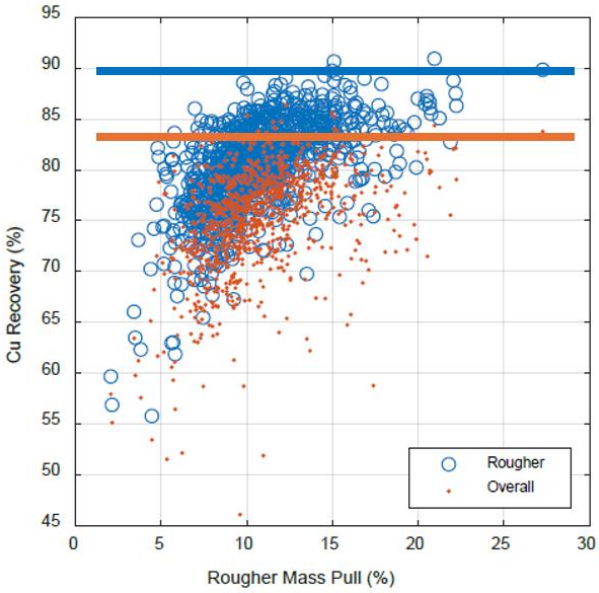
Red Chris flotation circuit expansion – from piloting to full scale

THE OPPORTUNITY

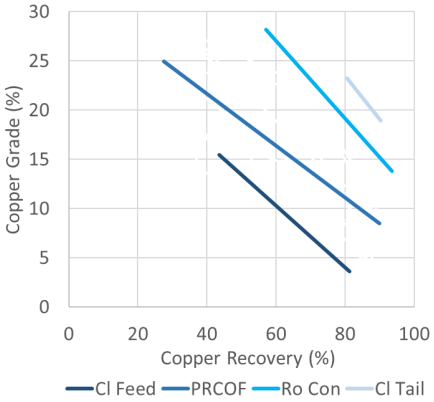
Historical plant data shows a strong positive correlation between mass pull and rougher recovery. Increasing mass pull results in an increase in overall recovery, although it can negatively impact performance of the cleaner circuit.

An industrial benchmarking exercise identified rougher residence time as a constraint on both mass pull and recovery. An opportunity was identified to expand the rougher and cleaner circuits to allow for longer residence times, reduce the negative impacts of higher mass pull on cleaner recovery and ultimately improve overall flotation performance.

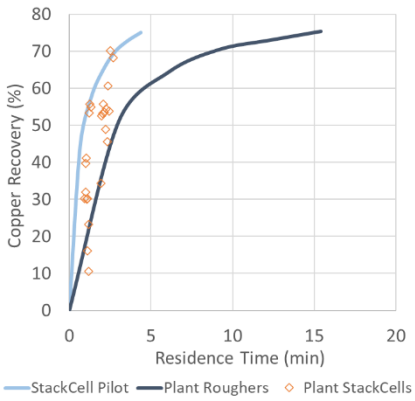
Plant piloting was carried out at the Red Chris mine to confirm the potential benefits of the expansion options.



PILOTING



Grade and recovery plots of pilot column tested with multiple cleaner circuit streams (left) and pilot column in operations (right)



Copper Kinetics of pilot Stackcells, plant tank cells running in parallel, and Plant StackCells (left), and pilot Stackcells in operations (right)

COLUMN PILOTING

- ✓ Eriez Cavitation Tube Column was selected for piloting for its small lateral space requirement and plant familiarity.
- ✓ Piloted 5 process streams in the cleaning circuit.
- ✓ Validated flexible cleaner circuit configuration options to achieve final concentrate grade.

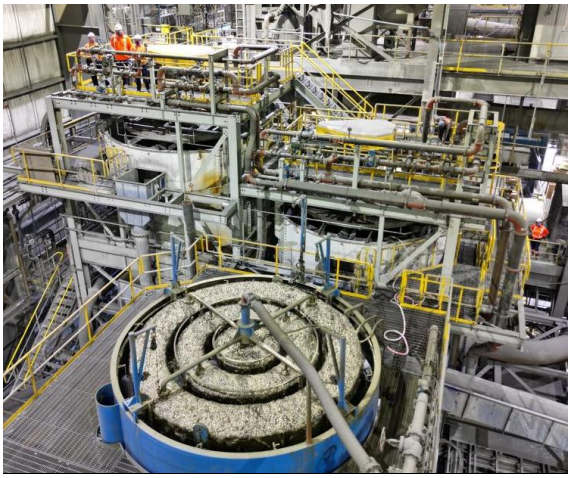
STACKCELL® PILOTING:

- ✓ Eriez StackCell was chosen for rougher expansion piloting due to its compact design suited to the plant layout.
- ✓ Installed 6 pilot StackCells in series for parallel performance comparisons with the plant tank cells.
- ✓ Achieved over 3 times faster kinetics for copper and gold flotation, with equivalent or higher recovery than existing tank cells.
- ✓ 1:1 scale-up at optimal air, level and impellor speed (commissioning data is shown in chart)

FULL SCALE IMPLEMENTATION

Following the successful piloting of the column and StackCells and completion of the engineering design based on the existing plant space and layout, the full-scale implementation took place with the new column installed in 2021 and StackCells in 2022.

Subsequent plant surveys were conducted to optimize operating conditions and confirm the benefits of these expansions, with recovery improvements aligning with results from the piloting work.



Full scale StackCells and column in plant operations

THE BENEFITS

CLEANER GOLD & COPPER RECOVERY

+0.9%/+2.1%

With new column in operations

TOTAL GOLD & COPPER RECOVERY

+0.5%/+0.9%

With new column in operations

ROUGHER GOLD & COPPER RECOVERY

+3.5%/+1.9%

With StackCells in operations

Improved Rougher Tails NPR* Compliance

The addition of StackCells enhanced sulfide recovery in the rougher circuit, leading to improved NPR compliance of the rougher tails.

**NPR = Neutralization Potential Ratio*

Read more in the proceedings

Li, K., Seaman, D., Seaman, B. and Baldock, J. (2024) *Red Chris Flotation Circuit Expansion – From Piloting to Full Scale.* 16th AUSIMM Mill Operators' Conference, Perth Australia, 21-23 October 2024.