Development of a data-driven operational standard for the comminution process of the Candelaria mining site

R. F. Quezada1, S. C. Castillo2, P. A. Goic3, D. Rojas4, A. Moller5 and R. Varas6.

1.Lead Business Analytics, Lundin Mining – Candelaria, 1580000. Email: [rene.quezada@lundinmining.com](mailto:rene.quezada@lundinmining.com)

2.Manager Operational Excellence and Analytics, Lundin Mining – South America, 7550000. Email: [sofia.castillo@lundinmining.com](mailto:sofia.castillo@lundinmining.com)

3.Specialist Business Intelligence, Lundin Mining – Candelaria, 1580000. Email: [paulina.goic@lundinmining.com](mailto:paulina.goic@lundinmining.com)

4.Senior Processing Metallurgist, Lundin Mining – Candelaria, 1580000. Email: [diego.rojas@lundinmining.com](mailto:diego.rojas@lundinmining.com)

5.Deputy Manager Processing Operations, Lundin Mining – Candelaria, 1580000. Email: [adolph.moller@lundinmining.com](mailto:adolph.moller@lundinmining.com)

6.Deputy Manager Process Control, Lundin Mining – Candelaria, 1580000. Email: [rene.varas@lundinmining.com](mailto:rene.varas@lundinmining.com)

Keywords: Minera Candelaria, comminution, throughput, data-driven methodology, operational range, operational standard, adherence, baseline, pilot test, throughput contribution.

# ABSTRACT

Minera Candelaria is Lundin Mining’s biggest mining district, processing approximately 75,000 tons of copper ore per day in its concentrate plant. The comminution area, consisting of the primary crushing and grinding stages, aims to maximize the SAG mills’ throughput while consistently reducing ore size to ensure downstream feasibility. In this work, a data-driven methodology is developed using 22 months of historical data to define an operational standard for the comminution area, establishing operational ranges for several key variables in the process, targeting maximum throughput within a controlled product size. To test this operational standard, a key performance indicator (KPI) called adherence is defined, measuring the proportion of time each variable operates within the standard with regards to the grinding area’s run-time. Then a baseline is built by analysing the adherence and throughput in the historical data, checking a significant statistical correlation between the two, thus hypothesizing that more adherence should imply more throughput. A pilot test is then conducted throughout most of 2024, joining efforts with operators, supervisors, managers and directors from these areas, showing significant results: Increase of adherence approximately from 4% to 11% over the baseline, with a throughput contribution of roughly 65 tons per hour, yielding a run-rate of approximately 540,000 tons per year, and improvements in the efficiency of stockpiling and pebbles processing.