# The effect of primary grind size on flotation recovery and the mineralogically limited grade-recovery curve at Olympic Dam

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## ABSTRACT

Mineralogy underpins the metallurgical response in all mineral processing plants and Olympic Dam is no exception. The mineralogically limited grade-recovery curve, similar to the grade-recovery curve widely used by concentrator metallurgists, sets the separation limit that can be achieved under perfect plant conditions for any given feed mineralogy/liberation. Actual plant recovery will always sit below the mineralogically limited grade-recovery curve for two reasons: 1) liberation measured from 2D sections of particles overestimates the true 3D liberation and 2) perfect separation doesn't occur in plants. Neverthess, the distance between actual plant performance and the curve indicates how well the plant is operating, with a larger gap suggesting the potential for improvements to the plant conditions. The curve can also be used to assess/rank the relative flotation performance of unblended future ores (ie geometallurgical samples) based simply on mineralogical/liberation analysis on a size-by-size basis of samples ground to a specified grind size.

Grind size is selected to achieve satisfactory sulfide mineral liberation without excessive slimes generation and power wastage. Design primary grind size at Olympic Dam is 80% passing 75µm, with further regrind of rougher flotation concentrate to a $P_{80}$ of 30µm. To increase plant throughput, the primary grind size of flotation feed has been increased gradually through changes to cyclone configuration and mill operation. The consequent reduced sulfide mineral liberation in mill feed has a negative impact on flotation recovery but how much recovery are we sacrificing by coarsening up the primary grind? The mineralogically limited grade-recovery curve based on sulfide mineral liberation data can be used in conjunction with the plant data to quantify the effect of the coarser grind and determine the trade-off between recovery and throughput. This paper describes the changes to the mineralogically limited grade-recovery curve using Mineral Liberation Analysis (MLA) results on 1) monthly composite samples and compares the curve of before and after the coarse grind trial and 2) compares the results with geometallurgy samples to highlight any potential impacts to future recoveries at a coarser primary grind size.