

SUSTAINABLE SOLUTIONS FOR MINING AND REMEDIATION



NOVEL PROCESS

- HPSA is a mechanical process (i.e. no chemicals) leveraging particle - particle collisions.
- HPSA focuses on liberating minerals along their intergranular boundary lines, creating a much more efficient liberation at particle sizes that are coarser than the industry standard.
- Slurries are transported by high-pressure pumps through opposing nozzles, creating impinging jets contained in a collision housing.

SELECTIVE LIBERATION

- HPSA uses the difference in Mohs hardness between the base mineral and target mineral for selective liberation, which provides a more energy efficient alternative to conventional grinding mills.
- By liberating target minerals from the gangue, the post-HPSA material can be more efficiently separated by size classification or flotation for increased grade and recovery.
- Due to HPSA's effectiveness at selective liberation, the target minerals are efficiently concentrated earlier in the processing sequence, which reduces the amount of overall material that needs processing. This creates opportunities to reduce or remove downstream unit operations.

CONTINUOUS OPERATION

- HPSA can be used as a stand alone system (typically for remediation and tailings applications) or as a "plug and play" unit in the grinding/regrinding stage of the processing circuit (replacing the need for ball mills, rod mills, and/or attrition scrubbers).
- Throughput scaling options based on processing needs - currently offering units with a range up to 50 tons per hour.
- Units can be applied to any circuit with minerals that benefit from selective liberation. Successful applications currently include, but are not limited to: Uranium / Vanadium / Phosphate / Potash / Graphite / Copper / Molybdenum / Gold / REEs.



GEN A Deployed at Iron Tailings Site



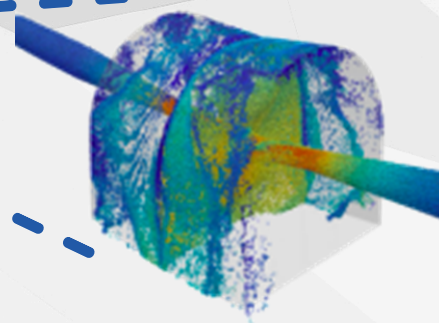
HPSA Skid



GEN B Full Circuit

DISA

GOLD TAILINGS

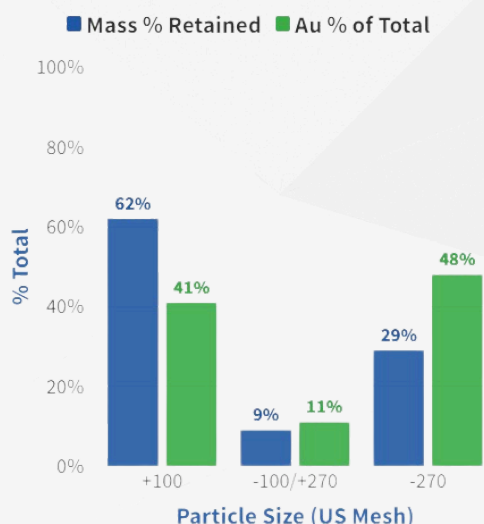


APPLICATION

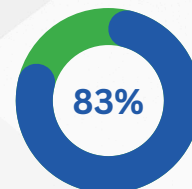
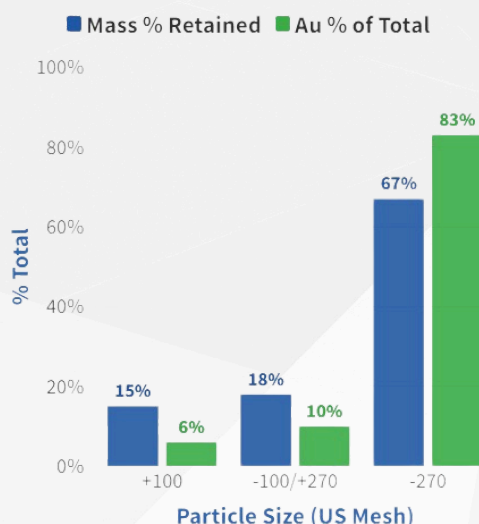
- HPSA's effectiveness at selective particle liberation was evaluated for a gold mineral processing circuit. The results showed HPSA's amenability to gold with improvements for both grade and recovery.
- Due to HPSA's selective liberation abilities, the valuable mineral is concentrated into less mass, reducing the total volume of downstream processing. This presents the opportunity for HPSA to replace the current mill and downstream unit operations in the processing circuit.

RECOVERY & MASS DISTRIBUTION

Feed Material



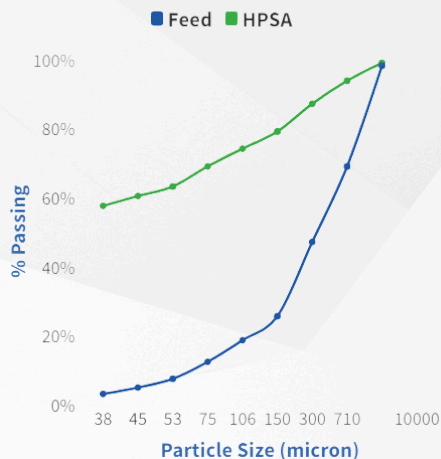
HPSA Product



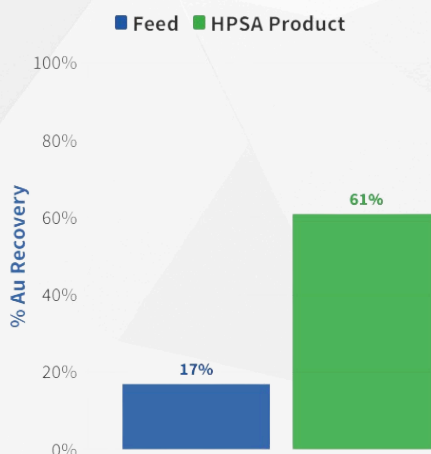
OF THE GOLD WAS CONCENTRATED INTO 67% OF THE TOTAL MASS.

PARTICLE SIZE DISTRIBUTION

HPSA Cumulative % Passing



HPSA Recovery



- HPSA processing was able to reduce the particle size from a P80 $\approx 2,100 \mu\text{m}$ to a P80 $\approx 150 \mu\text{m}$ and increase recovery by 44%.
- The HPSA approach enables a smaller plant footprint and greater efficiencies by replacing the grinding mill(s) and the associated support equipment (media, handling, lubrication, etc.) leading to a financial benefit directly related to CAPEX and OPEX. The operational efficiencies gained leads to a more economical process.