

INTEGRATED ENGINEERING SOLUTIONS

CHEMWES

ENVIRONMENTAL REMEDIATION PROJECT

BACKGROUND

MAED completed a feasibility study for the re-treatment of mine waste slimes dams in the North West Province town of Stilfontein in South Africa to recover gold and to rehabilitate the environment. The old slimes dams contributed to pollution of the area by generating wind-blown dust, contaminating groundwater and causing radon levels in the town to rise above acceptable levels.

There is an estimated 28.2 million tonnes on the old slimes dams with an average gold content of 0.47g/t.

The old slimes dams are reclaimed using hydraulic mining methods with the slurry being screened and then pumped to the new processing facility at a rate of 570,000 tonnes per month.

SCOPE OF WORK

The final project included clean-up, restoration and modification to sections of the old ChemWes uranium processing plant for use as a gold recovery plant. Numbers 1, 2 and 3 old Stilfontein Gold Mine slimes dams, were to be re-processed and leached slurry passed over a linear screen before being deposited on the new No.5 slimes dam in the tailings complex. The entire elution, carbon regeneration, electro-winning and smelting plants, form part of the new scope of work.

Slurry automatically sampled at the plant, is fed over a linear screen and deposited into an agitated surge tank. A constant slurry feed is then pumped to the classification circuit consisting of four streams of primary, secondary and tertiary cyclones each with dedicated feed pumps.

The fine fraction produced by the classification circuit, is sent to the converted high rate thickeners (2 off – 22m diameter x llm high) and the coarse fraction (sand) reports to the refurbished flotation circuit. The high rate thickeners underflow is pumped directly to the CIL circuit.

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At the refurbished flotation circuit, the sand is automatically sampled and conditioned prior to overflowing into the feed tank where further reagents are added. The feed tank distributes the conditioned sand slurry to the flotation cells (4 off x 55kW each). Flotation tails are dewatered prior to addition to the CIL residue stream. The flotation concentrate reports to the agitated pyrite transfer tank which is designed with a 12 hour surge capacity.

The pyrite milling circuit has a constant feed from the pyrite transfer tank. Milling (6'6" x 18' refurbished ball mill – 260kW) is carried out in a closed circuit system with a cyclone. The cyclone underflow is recycled back into the mill with the cyclone overflow reporting to the converted high rate pyrite thickener (5.7m diameter x 3m high) prior to the batch leach circuit.

Pyrite is leached in three agitated batch leach tanks. Once the required conditioning and leach time is achieved, the contents of the tank are pumped into the first CIL tank via automatic samplers.

Slurry flows by gravity through seven refurbished CIL tanks (11m diameter x 24m high - 75kW mechanical agitation added to replace the old Pachuca air agitation/draft tubes). Each tank is fitted with Mineral Processing Separating (MPS) screens to retain the carbon in the tank.

Recessed impeller vertical spindle pumps transfer the carbon counter-current to the slurry flow and carbon is periodically removed from the first CIL tank for elution. The elution process is activated once 5 tonnes of loaded carbon is collected and begins with an acid wash prior to elution and carbon thermal regeneration. Cathode sludge is periodically removed from the electro-winning

OPTIMISATION

Our philosophy is one of reduced capital costs being achieved by managing projects on a partnership basis with our clients thereby streamlining the project team.

Throughput: 570,000 reclaimed tonnes per month 408,000 tonnes per month to the CIL plant Completion: 14 months following contract award Total Cost: ZAR 89m

MAED's ability to utilise an existing facility area along with certain items of existing plant and infrastructure, proved extremely cost effective for our client. In addition, the positive benefit of removing old slimes dams provided a welcome and necessary environmental impact for the highly populated area.

