



GeoBiotics. Enhancing Value Through Biotechnology.

GeoBiotics has developed proprietary technologies for bioleaching refractory sulfide ores and concentrates in engineered heaps. Our GEOCOAT® process is designed to biooxidize refractory gold, copper and other base metal sulfide concentrates, and our GEOLEACH™ process is designed to treat copper and other base metal ores. These processes offer substantial economic benefits in terms of capital costs and operating costs. A major feature of GEOCOAT® is a significant reduction of power consumption compared to other oxidation processes.

In the implementation of either GEOCOAT® or GEOLEACH™, our team provides:

- Comprehensive design and management of testwork programs
- Detailed METSIM process models
- Conceptual capital and operating costs estimates
- Detailed designs of large scale demonstration plants
- Comprehensive basic process engineering packages for commercial plants
- Technical support for detailed design, construction management and commissioning of commercial plants
- Operator training and ongoing technical and operational support.



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GEOLEACH™

The patented GEOLEACH™ technologies offer better kinetics and improved recovery of metal from acid leaching of base metal ores.

HOW IT WORKS

GEOLEACH™ creates active inoculation post agglomeration of ore using GeoBiotics methodology. Using our HotHeap™ technology, process operating parameters can be kept at or near optimum conditions by carefully controlling aeration and irrigation rates throughout the leach cycle, promoting improve kinetics, faster build up of temperature, and maintenance of high temperatures for longer periods. The metal contained in the pregnant leach solution produced during the treatment of base metal sulfides is recovered by conventional SX/EW, or other base metal recovery steps as applicable.

THE GEOLEACH™ PROCESS OFFERS:

- Increased metal recoveries without increasing operating costs
- Ability to economically treat low grade ores allows reduction in cut-off grade and an increase in ore reserves
- Reduced power consumption compared to other oxidation methods
- Reduced leach cycle time and inventory
- Reduced acid consumption
- Ability to retrofit existing heap leaching operations with minimal capital investment
- Ability to cost-effectively treat low-grade chalcopyrite and other sulfide ores

GEOCOAT®

HOW IT WORKS

Using conventional heap leaching unit operations, the concentrate, pre-inoculated with bacteria, is coated onto a crushed and sized rock substrate (either low-grade ore or waste rock) and stacked in engineered heaps on impermeable pads. The bacteria added to the heap acts as the catalyst to oxidize sulfide minerals. Oxidized residue is separated from the rock substrate through a simple washing process for further processing by conventional cyanide leaching to recover gold (or for base metal concentrates, residues are disposed of as tailings). The substrate is recycled for coating and stacking. The metal contained in the pregnant leach solution produced during the treatment of base metal sulfides is recovered by conventional SX/EW, or other base metal recovery steps as applicable.

THE GEOCOAT® ADVANTAGE

The benefits of GEOCOAT® include:

- Capital costs 50-70% less than other oxidation processes
- Reduced power consumption, 15 to 20% of consumption of pressure oxidation and stirred tank oxidation
- Ability to economically treat low grade ores allows reduction in cut-off grade and an increase in ore reserves
- Conversion of arsenic to a non-leachable and environmentally acceptable ferric arsenate form
- Operational simplicity reduces the requirement for a skilled labor force
- Ability to accommodate substantial sulfide grade variation
- Rapid engineering and construction
- Ability to easily expand operations by simply increasing pad areas and conveyor lengths



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