



Smith & Loveless Inc.

Copper Mine Utilizes DI-SEP® SX Filtration System To Go On Line



Application Profile: Cerro Verde
S&L Equipment: DI-SEP® SX Filters
Installed: 1995



The Andes Mountains surround the seven S&L DI-SEP® SX Electrolyte Filters at the Cerro Verde Copper Mine (top) located near Arequipa, Peru. These filters remove virtually all impurities allowing for the production of 99.99% pure copper plate.

Seven Smith & Loveless **DI-SEP® SX** Electrolyte Filters went on line at the Cerro Verde Copper Mine located near Arequipa, Peru in December 1995. The filters were part of a \$275 million dollar expansion designed to increase production of pure copper plate from low-grade copper ore. The Cyprus Company owned the job, and Fluor Daniel Wright of Vancouver, British Columbia, Canada, designed the expansion.

Copper plate production starts out as an open pit mining operation of low-grade (0.7%) copper ore. To the naked eye, the ore looks like plain red rock, which is then crushed into large stones and further crushed into small pebbles. Using a weak sulfuric acid solution, copper is literally eaten out of the rock. The copper is captured in the acid solution and is pumped to the solvent extraction process for removal.

The solution passes through several steps that result in a copper concentration of about 40 PPM in a strong sulfuric acid solution. A major concern is that no matter how careful the extraction process, a small amount of impurity will remain in the copper/acid solution. Because the mine produces between 28 and 30 tons of copper plate per day (and will double as part of the expansion), any impurity in the copper plating can drastically affect the value of the copper produced. Smith & Loveless' **DI-SEP® SX** Electrolyte Filters remove virtually all of the impurities in the solution, and permit the production of 99.99% pure copper plate.

Smith & Loveless equipment at Cerro Verde consists of seven stainless steel filter vessels, interconnecting stainless steel piping and valves, blowers for air scouring and full controls through a Programmable Logic Controller. Equipment operation is fully automatic, but includes capabilities for operator interface, either at the panel or at their master control computer. The Smith & Loveless Controls Package includes an operator interface terminal that provides a view of everything that is happening with the touch of a button.

The equipment includes six dedicated service filters and a seventh backwash filter. When one of the service filters becomes dirty, it is cleaned by backflushing it with clean solution from the other five service filters. Because the solution contains valuable copper, the seventh filter cleans the backwashed flow from the service filters and sends the copper, thus extracted, on to the plating process. This unique concept was requested by Cyprus and implemented by the Smith & Loveless design team.