HIGH PRESSURE ACID LEACHING

HIGH-PRESSURE ACID LEACH PILOT-PLANT FACILITY

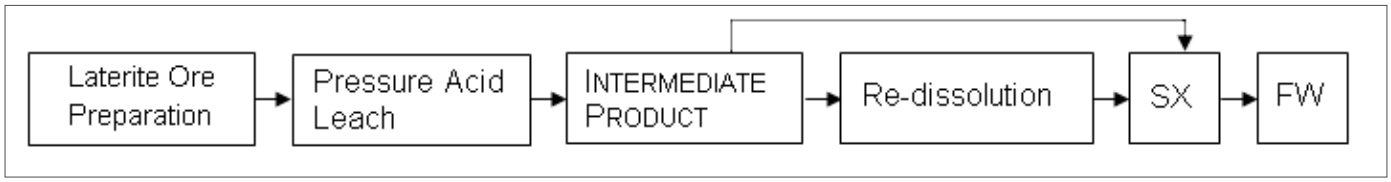
HIGH-PRESSURE ACID LEACHING (HPAL)

Major reserves of nickel are contained in laterite ores, which have traditionally been treated by pyrometallurgical methods. Hydrometallurgical treatment, by direct acid leaching of the ore at temperatures above 240°C, is however an alternative treatment option for several new projects. The basic steps in the process are:

FEATURES OF HIPAL

This pilot plant is capable of automatic, fully integrated, continuous operation of all unit processes, from feed preparation to production of final metal products.

- 5-compartment, titanium-7 autoclave
- Continuous operation at 290°C and 9 Mpa
- Working volume of 65-75 L
- Feed rate is 10-20 kg/h
- Flowsheets can include hydroxide and sulphide precipitation
- Comprehensive distributed control system (DCS)
- Custom-designed, secure database (SQL/Access) for all operating and assay data links with other software (e.g., Excel) for accurate, rapid manipulation and reporting



There are a number of possible variations to the above basic flowsheet.

Other metals, such as copper and cobalt, can also be recovered by HiPAL.

THE HIPAL FACILITY

The HiPAL facility features the following main unit operations:

- Feed preparation
- Autoclave leaching
- Counter-current decantation (CCD) and neutralization
- Precipitation (mixed hydroxide) and re-leach
- QEMSCAN laterite feed and mineralogy characterization
- Assay and off-line testing
- Control, database and information technology

AUXILIARY EQUIPMENT

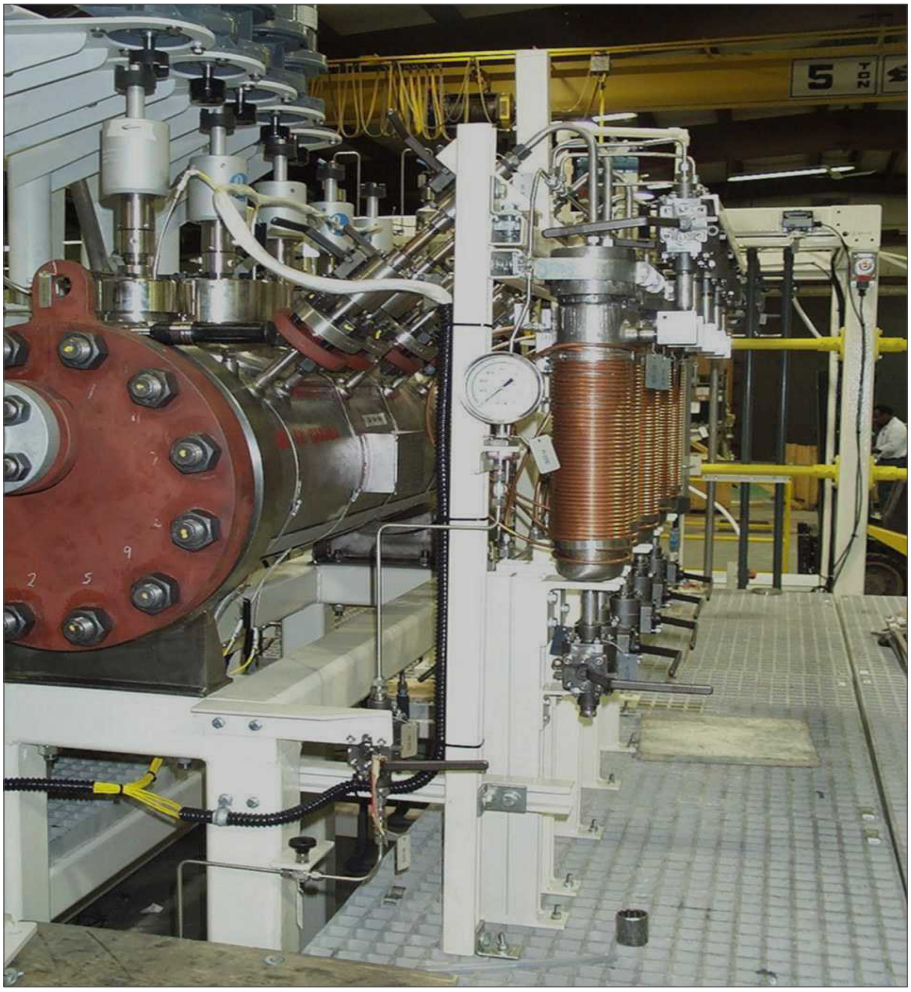
A range of auxiliary equipment is available including:

- A four-stage autoclave system in titanium-2, rated at 270°C and 7.5Mpa. (used for PAL or oxidative leaching)
- A six-stage submarine autoclave system in titanium-2, rated at 245°C and 5Mpa (used for oxidative leaching)
- High-pressure steam generator
- Belt filters
- Various other agitated tanks, reactors and thickeners
- Solvent extraction and electrowinning batch and pilot testing facilities
- Several batch autoclaves for off-line testwork.

SGS MINERALS SERVICES AUSTRALIA CREDENTIALS

The SGS Minerals Services' offers clients the flexibility to consider virtually any processing option as equipment and expertise is available for a full range of processes. These include crushing, grinding, ultra-fine milling, magnetic and electrostatic separation, bacterial oxidation, gravity separation, leaching, pressure oxidation and acid leaching, solvent extraction, electrowinning and reduction and oxidative roasting.

- World-class project reporting to full bankable feasibility standards
- Batch pressure acid leaching
- Continuous high-pressure acid leaching
- Batch solvent extraction
- Pilot solvent extraction
- Nickel electrowinning: several programs, including full-sized LME-grade cathode production
- Batch and continuous oxidative leaching



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