

# MILD TEMPERATURE & PRESSURE OXIDATIVE LEACHING

## SGS MINERALS SERVICES

SGS Lakefield Oretest Pty Ltd (SGS) was originally founded in 1993 as Oretest Pty Ltd. SGS has since developed into a major metallurgical services organisation located in a purpose-built laboratory in Perth, Western Australia.

The laboratory is dedicated to providing high quality metallurgical testing across the broad spectrum of the minerals industry including:

- Gold ores
- Nickel laterites
- Base metal
- Iron ore
- Mineral sands
- PGM ores
- Rare-earths and other exotics
- Diamond ores
- Environmental services

SGS provides a comprehensive range of test work capabilities including bacterial leaching, crushing, screening, grinding, ultra fine grinding, gravity, magnetic & electrostatic separation, solvent extraction, electrowinning, flotation, pressure leaching, pressure oxidation, pressure acid leach and cyanide speciation. Pre-feasibility studies, on-site diagnostic metallurgical services, environmental testing and analytical services are also included in our range of capabilities.



## INTRODUCTION

Pressure oxidative leaching is a well established technology which is used for processing base metal sulphides (eg nickel, copper and zinc) and for treating refractory gold ores and concentrates. Conventional pressure oxidation operates at temperatures exceeding 200°C with overpressures of 2200 kPa or more. The technology is robust and reaction rates are fast.

Mild temperature acid leaching is a form of pressure oxidation which operates at milder conditions of temperature and pressure; eg 95 – 100°C and 1000 kPa. The milder operating conditions simplify the engineering requirements and reduce costs, yet maintain the advantages of pressure oxidation.

## FACILITIES AT SGS

The main facilities at SGS for providing leaching testing are:

- **Fine Milling**, carried out using vertical stirred mills.
- **Pressure Leaching on a batch basis**, using two titanium autoclaves; these are each around 3.5 L capacity.
- **Pressure Leaching on a continuous basis** can be tested using SGS's state-of-the-art pressure autoclave pilot plant. This is a fully integrated facility consisting of feed control, four-stage autoclave (25 L), neutralisation, CCD circuit and downstream mixing/holding tanks. The plant is well instrumented for control and data logging purposes. The autoclave section has been specially designed to give accurate mass and heat balances and is extremely versatile with respect to testing various parameters like temperature profiles, retention times, oxygen flows, etc.

SGS carries a comprehensive range of other equipment, operated by experienced staff, to provide back up to mild leach test programmes, eg:

- Feed Preparation – crushing, milling, sampling etc;
- Concentrates Production – flotation (batch and continuous pilot), gravity, magnetic separation;
- Cyanide Leaching; batch and continuous;
- Solid/Liquid Separation - settling and filtration, batch and continuous;
- Solvent Extraction – batch and continuous mini-plant facilities;
- Electrowinning – small scale to large scale, both batch and continuous. A full-sized nickel cathode test facility has been operated.

## MILD LEACHING AND ASSOCIATED TESTWORK COMPLETED

- Batch leaching of a large range of concentrates has been carried out since 1992. SGS has built up valuable experience on how to optimise the oxidation and leaching of various sulphide minerals, including those containing copper, nickel, cobalt, zinc, arsenic and gold.
- Continuous pilot testing including leaching, neutralisation, CCD, precipitation, solvent extraction and electrowinning has been carried out on a number of nickel/cobalt ores.
- Solvent extraction programmes, both batch and continuous, have been carried out on copper, nickel and cobalt using various circuit designs and reagents

## MAJOR CLIENTS HAVE BEEN

- Dominion Mining Ltd
- Avmin (South Africa)
- Western Minerals Technology
- WMC Resources
- Straits Resources
- Newcrest Mining Ltd
- Kalgoorlie Consolidated Mines
- El Misti Mines (Peru)
- Anglo American Corporation
- Tati Nickel



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