

FLOTATION

SGS MINERALS SERVICES

SGS Lakefield Orestest Pty Ltd (SGS) was originally founded in 1993 as Orestest 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.



FACILITIES AT SGS

SGS runs a modern well-equipped testing facility and attaches great importance to quality, efficiency and housekeeping within the laboratory.

The dedicated batch flotation laboratory has four fully instrumented bench machines with stabilised voltage supply. A range of fresh reagents is kept in stock, whilst others can be obtained at relatively short notice.

A versatile pilot flotation plant is available with the capability of running continuously from 25 kg/h up to about 250 kg/h. One of the biggest challenges with pilot flotation (and indeed with some large flotation plants) is non-steady state operation, caused by surging in closed circuits. SGS has addressed this problem by using surge tanks and constant feed rate pumps where appropriate.

FLOTATION EQUIPMENT AVAILABLE

Bench-scale equipment:	Pilot equipment:	Auxillary equipment:
Agitar LA-500 Agitar LA-500 Denver D-12 Denver D-12	Agitar 8 litre - 2 * 8 cells Agitar 8 litre - 2 * 4 cells (with conditioner) Agitar 8 litre - 1 * 6 cells (with conditioner) Agitar 8 litre - 1 * 16 cells Agitar 8 litre - 1 * 10 cells (with conditioner) Agitar 27 litre - 3 * 4 cells Agitar 27 litre - 2 * 2 cells Agitar 27 litre - 1 * 6 cells Denver 27 litre - 1 * 2 cells	Denver 18 litre" - 1 * 2 cells Conditioner tanks * 8 Pump hoppers * 4 Attrioner 1 * 2 cell Conditioner tanks 500 mm * 1 Vertical spindle froth pumps * 6 Centrifugal pumps (1.5" * 1") * 2 Agitar 7 L - 1 * 2 cells Agitar 7 L - 2 * 4 cells Agitar 31 L - 2 * 2 cells

FLOTATION TESTWORK COMPLETED

SGS programmes have included process development, batch and pilot flotation programmes for not only the more common sulphide minerals, but also non-sulphide minerals including apatite, iron ores, rare earths, tantalum, talc, graphite, chromite, magnesite, cerrusite and fluor spar.

Significant Programmes:

- Roseby Copper native copper pilot flotation.
- A major programme of work on Yakabindie nickel sulphide ores, including extensive investigative flotation procedures including batch, locked-cycle and pilot programmes.
- Numerous flotation studies on arsenopyrite and pyrite gold bearing minerals for a range of gold mining companies.
- Batch and pilot plant flotation campaigns to recover rare earth oxides.
- Extensive batch tests on Telfer gold copper ore types, including a pilot differential flotation campaign.
- An extended three-year programme of check and optimal batch flotation tests on a complex Cu/Pb/Zn/Au ore body.
- Performance batch flotation tests on Kambalda Nickel Operation ores.
- A major programme on Cadia's low-grade gold copper sulphide ore, including batch and locked-cycle tests.
- Many miscellaneous small projects carried out; eg. Copper, Nickel, Lead, Zinc, Gold, and Cu/Pb/Zn.
- Extensive program on nickel sulphide ores for a major producer.
- WMC Mt Keith nickel flotation future orebody investigation.



SGS FLOTATION PERSONNEL SKILLS

The professional and technical people employed at SGS collectively, have a vast range and depth of experience. Whilst a majority of our people can lend their hand to a variety of tasks, we do encourage some specialisation. This is to ensure that we have people up to date on all the latest developments and applications in their particular field of interest.

In addition to being able to also call on a substantial flotation capability at Lakefield Research in Canada, the following personnel are the leaders of our present flotation programmes:

Gary Lonsdale, National Business Manager – Minerals Metallurgy, has 33 years of diverse technical and managerial experience in conjunction with base metal, gold and iron ore projects. He has extensive flotation experience at batch, pilot and production scale levels and has been involved in the testing and/or operation of the Spargoville nickel concentrator (WA), the Agnew nickel concentrator (Leinster, WA), the Yakabindie nickel project (WA), the Teutonic Bore copper-zinc concentrator (WA), the Browns lead-copper-cobalt-nickel project (NT), the Wiluna refractory gold ore project (WA) and the Woodcutters lead-zinc concentrator (NT).

Mr. Greg Jones, Senior Technologist. Greg has had over 20 years experience in all facets of laboratory test programmes. He has had during this time, in conjunction with a wide array of programmes conducted at SGS, extensive experience in the flotation of nickel sulphide (pentlandite et al) ores from a range of ore bodies; poly-metallic copper, lead, zinc, gold ores; copper-gold, gold and copper ores. Flotation schemes have included simple multi-stage roughing floats to complex differential floats including Controlled Potential Sulphidization (CPS), regrinding, multi-stage cleaning and scavenging, cleaners, re-cleaners, locked cycle and pilot campaigns. De-slime and classification steps have also been part of many of the programmes.

Mr. Paul Appleby, Senior Metallurgist. Paul has over 25 years experience in conjunction with the development, commissioning and operation of base metal flotation concentrators (nickel, copper, lead and zinc) and gold projects. He also has considerable expertise concerning: the development and implementation of operator training and safety programs; liaison with government agencies; the preparation of environmental impact statements, and mining industry accident investigations. Paul has worked in senior operational roles at Leinster (Ni), Teutonic Bore (Cu/Zn), Central Norseman (Au), Porphyry (Au), Woodcutters (Pb/Zn).

For more information, please contact us:

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