MSALABS

How representative is your data?

The relationship between sample size and reproducibility.

Reliable interpretation of any geochemical data is predicated on the assumption that what has been analysed accurately represents the geological system being studied.

Most geologists take great care to ensure that samples collected in the field are representative so that variations in the geochemical data are not caused by differences in the matrix of the material collected.

For rocks, this means accurately recording lithologies such that chemical data for each rock type can be compared separately. For soils and sediments this means ensuring consistent sampling of specific horizons. But the most diligent field work can be quickly undermined if the same considerations are not made when choosing how to analyse the samples that are sent to the laboratory.

ANALYTICAL USES

All analytical packages will define the mass of material that will be digested or processed, and the data obtained will reflect the composition of that subsample.

It is a geologist or geochemist's job to understand how the data will be used and whether the analytical subsample accurately represents what was collected in the field.

Economically recoverable lithium is rare and generally falls into three deposit types

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For most elements in the periodic table, a 0.5g gram analytical split will produce a representative result since most elements have a homogeneous distribution in a prepared sample pulp. A 0.5g analytical weight is therefore adequate when assessing base metal distributions or using trace elements as pathfinders for buried mineralisation. MSALABS offers a number of analytical packages in this category with element suites and detection limits suitable for a variety of matrices and commodity targets.

IMS-116	0.5g	39 elements, mid-range DLs
IMS-130	0.5g	51 elements, trace level DLs

There are, however, some elements that commonly have heterogeneous distributions that require special attention. The most common and economically important of these is gold (Au), with copper (Cu) being the second most common. Since Au and Cu can occur as native elements, several of their physical properties can lead to extreme segregation in a prepared sample pulp. Gold's very high density relative to the rest of the sample matrix means that physical segregation is possible, especially where prepared samples are transported or exposed to vibration during storage. Au and Cu also commonly occur as relatively large particles (in both rock and sediment) and the preparation process is not always effective at dealing with this problem.

For most geological materials, crushing and pulverising effectively reduce the particle size and produces a homogeneous material such that any single scoop contains a representative fraction. When free Au or Cu is present in a sample, their extreme malleability means that they often smear out into flattened plates during preparation rather than being broken down. This makes the effective size of the particles larger and also exacerbates the effect of any density based segregation. All of these factors mean that for Au and Cu, there is a larger than average chance that any given sub-sample taken for analysis may not be representative of the whole.

The primary tool employed to overcome this lack of representivity is to take a larger subsample for analysis. By analysing a large mass of sample, the chance of missing a representative number of larger grains is minimised. Larger sample masses also mitigate against spikes in the data associated with capturing an extra-large grain through an averaging effect. The larger the sample mass used for analysis, the smaller the effect of one additional native element particle and the closer the result will be to the true average of the entire sample collected.

For these reasons, MSALABS offers several packages designed specifically for projects with free Au or Cu. For early stage exploration, 20g analyses combine high quality trace element data with a good compromise between price and precision for nugget elements. We also offer 40g digestions to produce data with sample representivity that lies at the mid-point between 30g and 50g fire assay charge weights.

IMS-117	20g	39 elements, mid-range DLs
IMS-118	40g	39 elements, mid-range DLs
IMS-131	20g	51 elements, trace level DLs
IMS-132	40g	51 elements, trace level DLs

For situations where extremely coarse gold makes even a 50g fire assay charge insufficient to produce repeatable results, MSALABS offers metallic screen fire assays. In this process, a large (typically 500g to 1000g) sample is screened to 150 mesh after standard preparation. All of the coarse gold is captured in the plus fraction which is assayed to extinction to ensure that all large grains are captured in the analytical result. The minus fraction is assayed twice to demonstrate reproducibility before taking a weighted average of the plus and minus fraction data to determine the final result. A similar metallic screening process is available for Cu, with an acid digestion and analytical finish on the plus fraction that is appropriate for the overall grade.

MSC-530	500g pulp	30g Fire Assay Charge
MSC-550	1000g pulp	50g Fire Assay Charge
MSC-130	500g pulp	30g Fire Assay Charge
MSC-150	1000g pulp	50g Fire Assay Charge
-(Cu)	add −(Cu) to above codes for Cu metallic assays	

Legend:
- ● Hub
- ● Lab
- ● Prep
- ✻ Franchise / JV
- ○ Chrysos PhotonAssay™
- * Under Development

Note: Map current at January 25

Map locations:
- FAIRBANKS **ALASKA**
- GOLDEN TRIANGLE
- TERRACE **CANADA**
- SURREY **CANADA**
- LANGLEY **CANADA**
- PRINCE GEORGE **CANADA**
- TIMMINS **CANADA**
- ABITIBI GOLD BELT
- VAL D'OR **CANADA**
- CARLIN TREND
- ELKO **USA***
- NEVADA GOLD MINES **USA**
- STENSELE **SWEDEN**
- KEMPELE **FINLAND**
- ASTANA **KAZAKHSTAN***
- GEORGETOWN **GUYANA**
- QUITO **ECUADOR**
- CUENCA **ECUADOR**
- GUIANA SHIELD
- SAN JUAN **ARGENTINA**
- NOUAKCHOTT **MAURITANIA**
- TASIAST **MAURITANIA**
- MARSA ALAM **EGYPT**
- BAMAKO **MALI**
- JABAL SAYID **SAUDI ARABIA***
- BIRIMIAN GOLD BELT
- ABUJA **NIGERIA**
- KIBALI **DRC**
- KENYA
- YAMOUSSOUKRO **COTE D'IVOIRE**
- OBUASI **GHANA**
- GEITA **TANZANIA**
- SINGIDA **TANZANIA**
- BULYANHULU **TANZANIA**
- LINDI JUMBO **TANZANIA**
- LAKE VICTORIA GOLD FIELDS

DELIVERING A FULL RANGE OF GEOCHEMICAL LABORATORY SERVICES GLOBALLY

EXTENSIVE RANGE OF SERVICES

- PhotonAssay™ Analysis (Gold, Silver and Copper*)
- Sample preparation, storage and disposal
- Precious metals by Fire Assay
- Multi-element packages - Basic, Trace, Ultra-trace
- Fusion, ICP-OES and ICP-MS
- XRF
- Specialty Assay
- Biogeochemistry and Hydrogeochemistry
- Metallurgical Samples Analysis and Services
- Mineralogical Services

* Copper assay only available in select locations and is not currently available in Canada

STRINGENT QUALITY STANDARDS

Our company maintains the highest quality standards and follows the guidelines of ISO17025 accreditation and ISO9001, ISO14001 and ISO45001 certification. Certificates are available for download from our website.

Additionally, we participate in CDN Labs, Geostats, PTP-MAL, and Rockslabs Proficiency Testing Schemes (PTS), among others.

EXPERTISE IN SITE-BASED LABORATORY MANAGEMENT

We have extensive laboratory design, construction and management experience in a range of countries.

We implement a complete set of systems, training, software and procedures enabling ISO certification and complete regular audits.

Our laboratories are managed by experienced, highly qualified staff, who undertake regular training.

BROAD RANGE OF COMMODITIES

We operate across a broad range of commodities.

- Gold
- Silver
- Platinum Group Metals
- Copper
- Rare Earth Elements
- Cobalt
- Lithium
- Lead
- Zinc

TIER 1 CLIENTS

AGNICO EAGLE
Alamos Gold Inc.
ARTEMIS
BARRICK
ENDEAVOUR MINING
G2 Goldfields Inc.
IAMGOLD CORPORATION
KINROSS
NEVADA GOLD MINES
Perseus MINING LIMITED
NORTHERN STAR RESOURCES LIMITED

MSALABS

EVERY SAMPLE **SAFELY** MEASURED
EVERY RESULT **RELIABLY** DELIVERED

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