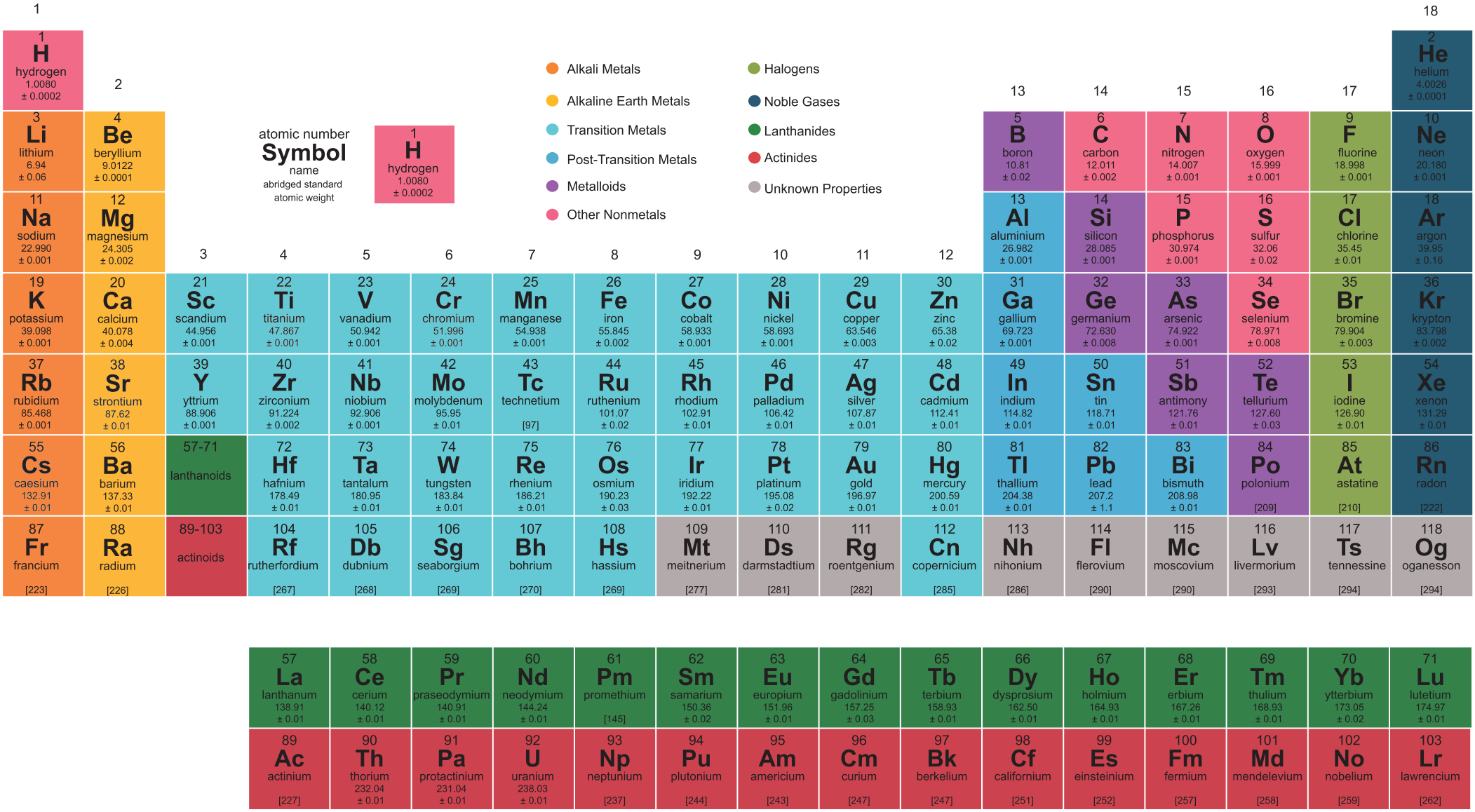
Periodic Table of the Elements



2024

QUALITY & RELIABILITY

PRICE LIST OF SERVICES

Geochemistry. Environment.
Metallurgy > USD

Stewart Assay and Environmental Laboratories LLC

Stewart Assay and Environmental Laboratories LLC

This edition of **Price List of Services** of Stewart Assay and Environmental Laboratories LLC (SAEL) lists a wide range of services.

For specific questions please contact the laboratory at the contacts below, and we will be happy to assist you. Prices listed here are in US dollars and do not contain local taxes. SAEL reserves the right to change the prices listed at any time.

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Tel.: +996 31333192534251
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E-mail: sael.karabalta@saelglobal.com

How to get to the laboratory: https://goo.gl/maps/DVvZjVwuZ8o
How to get to the sample delivery site:: https://goo.gl/maps/U7J6YVyTEAHiogEn7

Website: www.sael.kg


MINERALS
edition
PANalytical
ZETIUM

CONTENT

SAMPLE PREPARATION

SAMPLE SUBMISSION

To ensure complete traceability, your samples are logged into our own laboratory information management system LIMS and given a barcode at log-in. After logging your samples in our system, the main principles for storage are reliability and safety.

We can also advise you on sending your samples to our laboratory of your choice by land or air transport. Sample transportation can be arranged by contacting our laboratory.

DESCRIPTION	APPLICATION	CODE	PRICE PER SAMPLE ($)
Samples received with barcode labels attached to sample bag.	The raw sample is weighed and recorded in the global tracking system.	LOG-21	0.65
Samples received without barcode labels attached.		LOG-22	1.25
Pulps received without barcode labels attached. At least one out of every 50 samples is selected at random for routine pulp QC tests (LOG-QC). For routine pulps, the specification is 85% passing a 75 micron screen. Other specifications may be checked as per client requirements.		LOG-24	1.25
Workorder/administration fee applied per submittal.	Single charge for each batch of samples submitted.	BAT-01	27.80
Sample transportation services	All sample types.	PKP-21	By Quotation

SAMPLE STORAGE

Materials, submitted for analysis, are retained free of charge at our laboratory for a limited time, starting from the day we issue the final Certificate of Analysis. Prepared master pulps are stored for 90 days and reject fractions are stored for 45 days. Reasonable monthly charges will apply to samples archived for longer periods in our facilities. SAEL sample storage facilities provide a secure and organized environment protected from weather factors, and all sample archive locations are included in the laboratory tracking system. All of your samples across all your projects can be tracked at the place of storage in a warehouse.

DESCRIPTION	APPLICATION	CODE	PRICE PER SAMPLE ($)
Analyzed pulps.	90 days.	STO-PUL	0.05
Crushed samples.	45 days.	STO-REJ	0.20
Bulk samples in m^3, outside storage.	45 days.	STO-OUT	157.50

SAMPLE PREPARATION PACKAGES

The sample preparation process is designed to produce a small, representative and homogeneous sub-sample from the material you submit to the laboratory. Many variations on these packages are available, and sample preparation schemes can also be readily customized to suit any particular project requirement. We have a wide range of expertise available within the SAEL to help you with any questions you might have about sample preparation.

All sample preparation packages below include sample registration in the laboratory tracking system and weighing. Excessively wet samples may require additional drying for which additional charges may apply.

DRILL CORE, ROCK, AND CHIP SAMPLES

The packages described below illustrate the most common procedures used to prepare drill core, rock and chip samples for representative analysis. It is very helpful to advise us of mineralized samples that may require special equipment cleaning cycles to eliminate contamination of other samples that might follow in a batch.

DESCRIPTION	APPLICATION	CODE	PRICE PER SAMPLE ($)
Dry, crush -2mm to ≥90%, riffle split 250g, pulverize to ≥90%, -75 micron (200 mesh).	Drill core, rock and chip samples up to 3kg.	P5a	5.15 plus 0.80/kg
Dry, crush -2mm to ≥70%, riffle split 250g, pulverize to ≥85%, -75 micron (200 mesh).		P5a (250g)*	5.15 plus 0.80/kg
Dry, crush/combined rotary split -2mm to ≥70%, rotary split up to 250g, pulverize up to ≥85%, -75 micron (200 mesh).		P5a (250g)**	5.15 plus 0.80/kg
Dry, crush -2mm to ≥90%, riffle split 1000g, pulverize to ≥90%, -75 micron (200 mesh).		P5a (1000g)	5.90 plus 0.90/kg
Dry, crush -2mm to ≥70%, riffle split 1000g, pulverize to ≥85%, -75 micron (200 mesh).		P5a (1000g)*	5.65 plus 0.90/kg
Dry, crush/combined rotary split -2mm to ≥70%, rotary split up to 1000g, pulverize up to ≥85%, -75 micron (200 mesh).		P5a (1000g)**	5.65 plus 0.90/kg
Dry, crush -2mm to ≥90%, riffle split 250g		P5b	3.20 plus 0.80/kg
Riffle split of the crushed sample to 200g.		P5c	1.00
Pulverize up to 250g to ≥90%, -75 micron (200 mesh).		P5d	1.85
Dry, crush (-5mm), pulverize entire sample to ≥90%, -75 micron (200 mesh).	Total sample preparation (weight up to 2.0kg).	P7	9.40 plus 1.60/kg

SOIL AND SEDIMENT SAMPLES

Soil and sediment samples are commonly screened to remove large cobbles and organic material before analysis. The drying temperature can be reduced to 60°C to avoid loss of volatile elements.

DESCRIPTION	APPLICATION	CODE	PRICE PER SAMPLE ($)
Screen to 850 micron (20 mesh) and pulverize to -150 micron (100 mesh).	Soil or sediment samples (weight up to 1,000g).	P2	4.20
Dry, disaggregate, dry sieve -180 micron, (80 mesh) or other specified size.		P4a	1.70
Dry, disaggregate, dry sieve -180 micron (80 mesh), pulverize (100g) to -75 micron (200 mesh) ≥90%.		P4b	3.25
Dry, disaggregate, dry sieve -106 micron (150 mesh).		P4c	2.50
Dry, disaggregate, dry sieve -106 micron (150 mesh) pulverize (100g) to ≥90%, -75 micron (200 mesh).		P4d	4.20
Dry, disaggregate, dry sieve -2 mm.		P4e	1.60

INDIVIDUAL SAMPLE PREPARATION PROCEDURES

Before sample preparation, all samples, regardless of the visual degree of dryness, are dried. For samples with excess moisture (dripping or frozen samples), a multiplying factor of 2 can be applied to the cost calculation, as drying such samples may require additional drying or thawing time.

DRYING

Upon receipt of samples, laboratory managers, in consultation with the client, will determine the applicability of such procedures.

DESCRIPTION	APPLICATION	CODE	PRICE PER SAMPLE ($)
Drying of sample in drying oven at 105°C.	Default drying procedure for most rock chip and drill samples.	P8	0.95 plus 0.20/kg
Drying of sample in drying oven at 60°C.	Most soil and sediment samples that are analyzed for volatile elements.	P9	1.05 plus 0.25/kg
Air drying of sample.		P10	1.35 plus 0.30/kg

CRUSHING

Jaw crushers may be used to reduce sample particle size prior to pulverization. Very fine crushing may be desirable when nugget effect and sample representativeness is a concern. Other nominal sizes and fineness options are available on request.

DESCRIPTION	APPLICATION	CODE	PRICE PER SAMPLE ($)
Coarse jaw crushing to -5 mm.	Used if the material is too coarse for introduction into the pulverizing mill and as a preliminary step before fine crushing of larger samples.	P11	1.60 plus 0.20/kg
Fine jaw crushing to -2 mm.	Option for when a finer grind is desired.	P12	1.50 plus 0.20/kg

SPLITTING

After crushing, some samples may require splitting into representative sub-samples.

DESCRIPTION	APPLICATION	CODE	PRICE PER SAMPLE ($)
Split sample using riffle splitting.	Standard splitting procedure.	P13	0.95 plus 0.20/kg
Splitting by quartering.		P14	0.85 plus 0.20/kg
Splitting by cone-and-ring, above 50 kg.		P15	69.45 plus 1.40/kg
Split sample using rotary splitter.		P16	1.35 plus 0.25/kg

PULVERIZING

While larger pulps offer better sub-sample representation and are required for metallic screen assays, 250g pulps are routine for low-grade or non-mineralized rock. All pulverizing procedures make use of "flying disk" or "ring and puck" style low-chrome steel grinding mills unless otherwise specified. Please enquire if you are interested in non-metallic pulverization media such as agate, tungsten carbide or zirconia.

DESCRIPTION	APPLICATION	CODE	PRICE PER SAMPLE ($)
Pulverize to -75 micron (200 mesh) ≥90%.	Default procedure for samples that are finely crushed and split to 1 kg.	P17	4.10
Pulverize to -75 micron (200 mesh) ≥85%.	Default procedure for samples that are finely crushed and split to 1 kg.	P18	3.70
Pulverize to -106 micron (150 mesh) ≥90%.	-	P19	3.85
Pulverize to -180 micron (80 mesh) ≥90%.	-	P20	3.55

MISCELLANEOUS PROCEDURES

These procedures may be used when specialized preparation or sample compositing is required. An hourly labor charge may apply to time-intensive projects.

DESCRIPTION	APPLICATION	CODE	PRICE PER SAMPLE ($)
Homogenize.	According to the instructions	P1	0.95
Dry, pulverize.		P3	3.10
Dry, pulverize 100 g to ≥90%, -75 micron (200 mesh).		P6	5.50
Dry sieve to 75 micron (200 mesh).		P21	2.30 plus 2.40/kg
Dry sieve to 106 micron (150 mesh).		P22	1.60 plus 2.10/kg
Dry sieve to 180 micron (80 mesh).		P23	1.35 plus 1.70/kg
Wet sieve to 75 micron (200 mesh).		P24	3.55 plus 3.85/kg
Compositing.		P25	as per the rates
Preparation of duplicate -75 micron.		P26	1.00 plus 0.15/kg
Preparation of duplicate -2 mm.		P27	1.15 plus 0.25/kg
Weighing of sample.		P28	1.05 plus 0.20/kg
Cleaning the crusher with "barren" material after each or a specific sample as an additional cleaning step between mineralised samples.		WSH-21	3.15
Cleaning the crusher with "barren" material after each or a specific sample as an additional cleaning step between mineralised samples.		WSH-21	4.15

Portable XRF for Indicative Analysis

Portable XRF is useful for the rapid and cost-effective x-ray examination of large quantities of intermediate and ore grade elements prior to standard laboratory analyses. It can also be used for the determination of Si and acid-resistant Ti and Zr as a complement to multi-element methods and as an aid to rock characterization. For successful pXRF scanning, it is important that calibration is tailored to the specific sample sets in each individual project to minimize inaccurate results. SAEL offers custom calibration for pXRF on project-specific sample sets, with our strict quality standards and XRF expertise ensuring accurate and reliable results. The pXRF instrument is a standalone device and can be installed at a nearby sample preparation laboratory or on site if the project is located far from the main site.

ANALYTE & RANGE						CODE	PRICE PER SAMPLE ($)
As	50ppm	Fe	0.5%	S	0.1%	pXRF-30	6.35
Ca	0.5%	Mn	100ppm	Zn	50ppm		
Cr	100ppm	Ni	50ppm				
Cu	50ppm	Pb	50ppm				
Portable XRF scanning of non-mineralized crushed sample							
Si	0.5 - 47%	Ti	0.1 - 60%	Zr	5ppm - 0.1%	pXRF-34	4.75

*pXRF methods are only available as a complement to multielement analysis.

PRECIOUS METALS ANALYSIS

GOLD

Selection of the best fire assay method for the accurate determination of total gold content in a sample is highly dependent on the nature of the sample matrix, the grain size and distribution of the gold and the objective of the analytical result. A wide variety of minerals and metals in moderate to high concentrations (such as chromite, base metal sulfides and oxides, selenides, and tellurides) can interfere with the fire assay process, generally leading to low precious metal recoveries. SAEL uses an optimal flux recipe and rigorous quality control program to handle all but the highest concentrations of these problem materials. With prior knowledge of the presence of these minerals and metals, SAEL can further modify the flux constituents to improve recoveries.

ANALYTE	RANGE (PPM)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
TRACE LEVEL				
Au	0.002 - 10	Fire Assay with Atomic Absorption finish, 30 g nominal sample weight.	Au1	12.55
Au	0.002 - 10	Fire Assay with Atomic Absorption finish, 50 g nominal sample weight.	Au1-50	14.10
Au	0.005 - 10	Fire Assay with Atomic Absorption finish, 30 g nominal sample weight.	Au-AA23	11.80
Au	0.005 - 10	Fire Assay with Atomic Absorption finish, 50 g nominal sample weight.	Au-AA24	13.30
Au	0.010 - 10	Fire Assay with Atomic Absorption finish, 30 g nominal sample weight.	Au3	11.15
Au	0.010 - 10	Fire Assay with Atomic Absorption finish, 50 g nominal sample weight.	Au3-50	12.55
ORE GRADE				
Au	0.010 - 100	Fire Assay with Atomic Absorption finish, 30 g nominal sample weight.	Au-AA25	11.15
Au	0.010 - 100	Fire Assay with Atomic Absorption finish, 50 g nominal sample weight.	Au-AA26	12.55
Au	0.05 - 100	Fire Assay with Atomic Absorption finish, 30 g nominal sample weight.	Au4	11.15
Au	0.05 - 100	Fire Assay with Atomic Absorption finish, 50 g nominal sample weight.	Au4-50	12.55
Au	0.5 - 500	Fire Assay with Gravimetric finish, 30 g nominal sample weight.	Au5	12.55
Au	0.5 - 500	Fire Assay with Gravimetric finish, 50 g nominal sample weight.	Au5-50	14.10

When samples contain very high grade or coarse gold occurrences, the screen metallic procedure is recommended to help avoid over-or under-estimating gold grades. Custom method triggers can be set up for your project such that gold over a certain concentration will automatically be re-run using a higher-grade method, including screen gold analysis. SAEL can help you customize a gold assay program to meet your project needs.

PRECIOUS METALS ANALYSIS

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
Au	0.05 - 1,000	Au by 1,000 g screen fire assay, including sample preparation. Wet screening to 75 micron (200 meshes). Duplicate assays on undersize, and assay on entire oversize fraction. Our report includes values for plus and minus fraction and estimated total content of gold in sample.	Au7	46.40
Au	0.05 - 1,000	Au by screen fire assay for prepared 1,000 g sample to 75 micron. Analysis procedures are the same as for Au7.	Au8	39.65

CYANIDE LEACH

Bulk Leach Extractable Gold (BLEG) or cyanide leach procedures are used in grassroots exploration where cyanide extraction from a very large sample (500 g to 3 kg) can sometimes detect small gold anomalies that otherwise would go unnoticed. Cyanide leaching of samples 1 kg and greater is made by request.

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
ULTRA TRACE LEVEL				
Au	0.0005 - 10	BLEG test. Au by cyanide leach with ICP-MS finish 1,000-3,000 g nominal sample weight.	Au9	39.65
TRACE LEVEL				
Au	0.01 - 10	BLEG test. Au in liquor by ICP-AES 1,000 g nominal sample weight.	Au10	31.15
ORE GRADE				
Au	0.05 - 100	Au in liquor by AAS or ICP-AES 500 g nominal sample weight.	Au11	27.75
Au	0.01 - 100	Au in liquor by AAS or ICP-AES 1,000 g nominal sample weight.	Au12	30.45
Au	0.01 - 100	Au by accelerated cyanide leach using “Leachwell” reagent, analysis of gold in solution by ICP-AES 1,000 g nominal weight.	Au13	35.35

SILVER

Trace level and low-grade silver samples may be analyzed by acid digestion for maximum sensitivity and precision. Because silver, like gold, can suffer from nugget effect, occasional duplicate analysis of silver acid digestion methods may help detect sampling error at these low levels.

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
TRACE LEVEL				
Ag	0.5 - 10	Aqua-Regia digestion with AA finish.	Ag1	12.55
Ag	0.5 - 10	Multi-acid digestion ($HF+HNO_3+HCl+HClO_4$) with AA finish.	Ag2	9.70
ORE GRADE				
Ag	1 - 100	Aqua-regia digestion with AA finish.	Ag3	5.25
Ag	1 - 100	Multi-acid digestion ($HF+HNO_3+HCl+HClO_4$) with AA finish.	Ag4	8.30
Ag	10 - 1,000	Aqua-regia digestion with AA finish.	Ag5	8.70
Ag	10 - 1,000	Multi-acid digestion ($HF+HNO_3+HCl+HClO_4$) with AA finish.	Ag6	10.55

PLATINUM, PALLADIUM & OTHER PRECIOUS METALS

Platinum, palladium and gold can together be determined by standard lead collection fire assay with ICP-AES finish. To quantify the full list of platinum group elements, use the nickel sulfide assay with neutron activation.

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
TRACE LEVEL				
Pt	0.01 - 10	Fire Assay with ICP-AES finish, 30 g nominal weight.	PGM1	18.00 or 13.20 plus 2.40/element
Pd	0.01 - 10			
Au	0.005 - 10			
ORE GRADE				
Pt	0.05 - 100	Fire Assay with ICP-AES finish, 30 g nominal weight.	PGM2	18.65 or 14.35 plus 2.75/element
Pd	0.05 - 100			
Au	0.03 - 100			

MULTI-ELEMENT ANALYSIS

ULTRA TRACE LEVEL METHODS - AQUA REGIA DIGESTION FOR DRILL CORE AND ROCKS

Method selection can be key to achieving exploration success. Sample type, target commodity, and pathfinder elements should all be considered when selecting the most appropriate method for your project.

Aqua regia readily dissolves many sulfide, oxide and carbonate minerals quantitatively while leaving silicates and resistive oxides untouched. Many volatile pathfinder elements, particularly mercury, are preserved during digestion. These considerations make aqua regia an excellent exploration tool for various deposit types that involve gold, silver and base metals hosted in sulfide and carbonate minerals.

Native metals such as gold and silver may not be representatively characterized by the small sample sizes used in these methods (nugget effect), and some refractory minerals and elements such as molybdenum are not brought into solution in aqua regia. In these cases, fire assay may be used in combination with AR/UT, or a four acid digestion may be preferable.

Minimum sample size is 1g.

46 Elements by Aqua Regia, ICP-MS and ICP-AES

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Ag	0.1 - 100ppm	Cu	1ppm - 1%	Nb*	0.01 - 500ppm	Te*	0.2 - 1,000ppm	AR/UT	19.85 or 6.60 plus 0.95/element
Al*	0.01 - 5%	Fe	0.01 - 5%	Ni	1ppm - 1%	Th*	0.01 - 500ppm		
As	0.4ppm - 1%	Ga*	0.1 - 500ppm	P	10ppm - 1%	Ti*	10 - 1,000ppm		
B*	2 - 500ppm	Ge	0.2 - 500ppm	Pb	0.4ppm - 1%	Tl*	0.1 - 500ppm		
Ba*	0.1ppm - 1%	Hg	1 - 1,000ppm	Rb*	0.04 - 500ppm	U	0.01 - 1,000ppm		
Be*	0.5 - 100ppm	K*	0.01 - 5%	S*	0.01 - 5%	V	1ppm - 1%		
Bi	0.01ppm - 1%	La*	0.01ppm - 1%	Sb*	0.1ppm - 1%	W*	1 - 1,000ppm		
Ca*	0.01 - 5%	Li*	10 - 1%	Sc*	1ppm - 1%	Y*	0.5 - 1,000ppm		
Cd	0.2 - 500ppm	Mg*	0.01 - 5%	Se	1.5 - 1,000ppm	Zn	2ppm - 1%		
Ce	0.01ppm - 500	Mn	5ppm - 1%	Sn*	0.2 - 1,000ppm	Zr*	0.5 - 5,000ppm		
Co	0.1ppm - 1%	Mo	0.2ppm - 1%	Sr*	5ppm - 1%				
Cr*	0.5 - 5,000ppm	Na*	0.01 - 5%	Ta*	0.01 - 500ppm				

* Partially leached

ULTRA TRACE LEVEL METHODS - AQUA REGIA DIGESTION FOR DRILL CORE AND ROCKS

Four acid digestion quantitatively dissolves nearly all minerals in the majority of geological materials. However, it may sometimes be necessary to use even stronger dissolution techniques such as fusions in order to achieve fully quantitative results for refractory minerals. These may include barite, rare earth oxides, columbite-tantalite, and tin and tungsten minerals.

Four acid digestion can also volatilize certain exploration pathfinder elements, in particular mercury. Mercury may be added to the package at a special price detailed below, or a custom suite of elements can be added using the single-element aqua regia method on the opposite page as well. Four acid digestions are not recommended for gold analysis; the fire assay methods described on page 10 may be paired with MA/UT for exploration purposes.

46 Elements by Four Acid, ICP-MS and ICP-AES

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Ag	0.1 - 100 ppm	Fe	0.01 - 5%	Ni	1ppm - 1%	Te	0.2 - 1,000ppm	MA/UT	26.40 or 8.25 plus 1.05/element
Al	0.01 - 5%	Ga	0.1 - 500ppm	P	10ppm - 1%	Th	0.01 - 500ppm		
As	1.5ppm - 1%	Ge	0.2 - 500ppm	Pb	0.4ppm - 1%	Ti*	10 - 1,000ppm		
Ba*	0.1ppm - 1%	Hg	1 - 1,000ppm	Re	0.01 - 500ppm	Tl	0.1 - 500ppm		
Be	0.5 - 100ppm	K	0.01 - 5%	Rb	0.04 - 500ppm	U	0.01 - 1,000ppm		
Bi	0.01ppm - 1%	La	0.01ppm - 1%	S	0.01 - 5%	V	1ppm - 1%		
Ca	0.01 - 5%	Li	10 - 1%	Sb*	0.1ppm - 1%	W*	1 - 1,000ppm		
Cd	0.2 - 500ppm	Mg	0.01 - 5%	Sc	1ppm - 1%	Y*	0.5 - 1,000ppm		
Ce	0.01 - 500ppm	Mn	5ppm - 1%	Se	1.5 - 1,000ppm	Zn	2ppm -1%		
Co	0.1ppm - 1%	Mo	0.2ppm - 1%	Sn*	0.2 - 1,000ppm	Zr*	1 - 5,000ppm		
Cr*	0.5 - 5,000ppm	Na	0.01 - 5%	Sr	5ppm - 1%				
Cu	1ppm - 1%	Nb	0.01 - 500ppm	Ta*	0.01 - 500ppm				

* Partially leached

TRACE LEVEL METHODS BY AQUA REGIA

These methods are economical tools for first pass exploration geochemistry. In addition, despite the fact that some of the base metals are largely quantitatively dissolved, for most of the geological matrices, the data obtained during the aqua-regia digestion should be considered only as representing the leachable part of the specific element being analyzed.

36 Elements by Aqua Regia, ICP-AES

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Ag	1.0 - 100ppm	Cr*	0.5 - 5,000ppm	Na*	0.01 - 5%	Sr*	5ppm - 1%	AR/ES/G	11.00 or 4.60 plus 0.85/element
Al*	0.01 - 5%	Cu	1ppm - 1%	Ni	1ppm - 1%	Te*	5 - 1,000ppm		
As	1.5ppm - 1%	Fe	0.01 - 5%	P	10ppm - 1%	Ti	10 - 1,000ppm		
Ba*	10ppm - 1%	Hg	1 - 1,000ppm	Pb	3.5ppm - 1%	U	50 - 1,000ppm		
Be*	0.5 - 100ppm	K*	0.01 - 5%	S	0.1 - 5%	V	1ppm - 1%		
Bi	3.5ppm - 1%	La*	10ppm - 1%	Sb*	2.5ppm - 1%	W*	10 - 1,000 ppm		
Ca*	0.01 - 5%	Mg*	0.01 - 5%	Sc*	1ppm - 1%	Y*	1 - 1,000 ppm		
Cd	0.5 - 500ppm	Mn	5ppm - 1%	Se	1.5 - 1,000ppm	Zn	2ppm - 1%		
Co	1ppm - 1%	Mo	1ppm - 1%	Sn*	2.5 - 1,000ppm	Zr*	1 - 5,000 ppm		

* Partially leached

Individual Methods by Aqua Regia, ICP-AES

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Ag	1.0 - 100ppm	Co	1ppm - 1%	Ni	1ppm - 1%	Zn	2ppm - 1%	AR/BM/L	8.70 or 4.60 plus 0.85/element
As	1.5ppm - 1%	Cu	1ppm - 1%	Pb	3.5ppm - 1%				

* Partially leached

TRACE LEVEL METHODS BY FOUR ACID

Four acid digestions are able to dissolve most minerals and although the term "near-total" is used, not all elements are quantitatively extracted in some sample matrices.

37 Elements by Four Acid, ICP-MS and ICP-AES

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Ag	1.0 - 100ppm	Cu	1ppm - 1%	Ni	1ppm - 1%	Ti*	10 - 1,000ppm	MA/ES/G	14.65 or 6.55 plus 0.95/element
Al	0.01 - 5%	Fe	0.01 - 5%	P	10ppm - 1%	U	50 - 1,000ppm		
As	1.5ppm -1%	Hg	1 - 1,000ppm	Pb	3.5ppm - 1%	V	1ppm - 1%		
Ba*	10ppm -1%	K	0.01 - 5%	S	0.1-5%	W*	10 - 1,000ppm		
Be	0.5 - 100ppm	La	10ppm - 1%	Sb	2.5ppm -1%	Y	1 - 1,000ppm		
Bi	3.5ppm - 1%	Li	10 - 15	Sc	1ppm - 1 %	Zn	2ppm - 1%		
Ca	0.01 - 5%	Mg	0.01 - 5%	Se	1.5 - 1,000ppm	Zr*	1 - 5,000ppm		
Cd	0.5 - 500ppm	Mn	5ppm - 1%	Sn*	2.5 - 1,000ppm				
Co	1ppm - 1%	Mo	1ppm - 1%	Sr	5ppm - 1%				
Cr*	0.5 - 5,000ppm	Na	0.01 - 5%	Te	5 - 1,000ppm				

* Partially leached

LOW GRADE MINERALIZED MATERIALS

These packages can be used as an economical alternative to analyzing low grade ore or samples with known mineralization. The method precision is intermediate between exploration geochemistry and an assay procedure.

Data reported from an aqua regia digestion should be considered as representing only the leachable portion of the particular analyte.

Intermediate Geochemistry, 36 Elements by Aqua Regia, ICP-AES

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Ag	4.0 - 400ppm	Cr*	10ppm - 2%	Na*	0.05 - 20%	Sr*	10ppm - 1%	AR/ES/H	14.90 or 5.45 plus 0.85/element
Al*	0.05 - 10%	Cu	10ppm - 5%	Ni	5ppm - 5%	Te	20 - 4,000ppm		
As	10ppm - 5%	Fe	0.02 - 20%	P	0.02 - 1%	Ti	0.02 - 10%		
Ba*	20ppm - 2%	Hg	10ppm - 1%	Pb	20ppm - 5%	U	200 - 4,000ppm		
Be*	5 - 500ppm	K*	0.05 - 10%	S	0.5 - 25%	V	10ppm - 5%		
Bi	20ppm - 5%	La	40ppm - 5%	Sb*	10ppm - 1%	W*	50ppm - 1%		
Ca*	0.02 - 20%	Mg*	0.02 - 10%	Sc*	5ppm - 1%	Y	4 - 4,000ppm		
Cd	5 - 1,000ppm	Mn	10ppm - 5%	Se	10 - 1,000ppm	Zn	5ppm - 5%		
Co	5ppm - 5%	Mo	5ppm - 5%	Sn*	5 - 1,000ppm	Zr*	5ppm - 1%		

* Partially leached

Individual Methods by Aqua Regia, ICP-AES

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Ag	5.0 - 1,000ppm	Co	5ppm - 5%	Ni	5ppm - 5%	Zn	5ppm - 5%	AR/BM/H	9.35 or 5.35 plus 1.15/element
As	10ppm - 5%	Cu	5ppm - 5%	Pb	20ppm - 5%				

FOUR ACID "NEAR-TOTAL" DIGESTION

The four acid digestion package is suitable for low grade mineralized materials and provides improved accuracy and precision levels over geochemical method MA/ES/H.

Intermediate Geochemistry, 37 Elements by Four Acid, ICP-AES

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Ag	5.0 - 500ppm	Cu	0.001 - 10%	Ni	0.001 - 10%	Ti*	100 - 5,000ppm	MA/ES/H	18.00 or 8.10 plus 0.95/element
Al	0.05 - 25%	Fe	0.05 - 25%	P	0.010 - 10%	U	250 - 5,000ppm		
As	10ppm - 5%	Hg	5 - 5,000ppm	Pb	0.005 - 10%	V	5ppm - 5%		
Ba*	0.01- 5%	K	0.05 - 25%	S	0.5 - 25%	W*	50 - 5,000ppm		
Be	0.001 - 1%	La	50ppm - 5%	Sb*	12.5ppm - 5%	Y	5 - 5,000ppm		
Bi	0.005 - 5%	Li	0.003 - 40%	Sc	5ppm - 5%	Zn	10ppm - 5%		
Ca	0.05 - 25%	Mg	0.05 - 25%	Se	7.5 - 5,000ppm	Zr*	5ppm - 2.5%		
Cd	0.001 - 5%	Mn	25ppm - 5%	Sn*	12.5 - 5,000ppm				
Co	0.001 - 10%	Mo	10ppm - 5%	Sr	0.003 - 5%				
Cr*	0.001 - 10%	Na	0.05 - 25%	Te	25 - 4,000ppm				

* Partially leached

LITHIUM BORATE FUSION

A lithium borate fusion of the sample prior to acid dissolution and ICP-MS analysis provides the most quantitative analysis approach for a broad suite of trace elements. This technique solubilizes most mineral species, including those that are highly refractory.

28 Elements by Lithium Metaborate/Tetraborate Fusion, ICP-AES, ICP-MS

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Ba	20 - 20,000	Hf	0.4 - 2,000	Sm	0.3 - 2,000	W	5 - 2,000	BF/ES/MS	33.15 or 8.95 plus 1.05/element
Ce	0.1 - 2,000	Ho	0.1 - 2,000	Sn	2 - 2,000	Y	0.1 - 2,000		
Cs	0.3 - 2,000	La	0.1 - 2,000	Sr	2 - 2,000	Yb	0.3 - 2,000		
Dy	0.2 - 2,000	Lu	0.04 - 2,000	Ta	0.2 - 2,000	Zr	3 - 2,000		
Er	0.1 - 2,000	Nb	0.3 - 2,000	Tb	0.1 - 2,000				
Eu	0.1 - 2,000	Nd	0.7 - 2,000	Th	0.2 - 2,000				
Ga	1 - 2,000	Pr	0.1 - 2,000	Tm	0.04 - 2,000				
Gd	0.2 - 2,000	Rb	1 - 2,000	U	0.3 - 2,000				

INDIVIDUAL AND MISCELLANEOUS METHODS

SULPHUR AND CARBON

ANALYTE	RANGE (%)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
S (total)	0.01-50	Total sulphur by Leco analyzer.	SE/S1	10.45
S (total)	0.01-30	Total sulphur by gravimetric method.	SE/S2	14.90
S (sulphide)	0.01-50	Chemical treatment – Leco analyzer.	SE/S3	17.90
S (sulphate)	0.01-30	Gravimetric method.	SE/S4	8.30
S (total+sulphide+sulphate)	0.01-50	Chemical treatment – Leco analyzer	SE/S5	25.20
C (total)	0.01-50	Total carbon by Leco analyzer.	SE/C6	10.45
C (organic)	0.01-20	Chemical treatment – Leco analyzer.	SE/C7	13.40
C (inorganic)	0.01	Chemical treatment – Leco analyzer.	SE/C8	17.90
C (total+organic+inorganic)	0.01	Chemical treatment – Leco analyzer	SE/C9	25.20
SC (total sulphur+total carbon)	0.01-50	Leco Analyzer	SE/SC10	19.20
C (graphite)	0.05-40	Chemical treatment, roasting - Leco	SE/C11	25.20

COPPER

ANALYTE	RANGE (%)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
Cu	0.01 - 50	Cu by aqua regia digestion with AAS or ICP-AES finish.	SE/Cu1	7.55
Cu	0.01 - 50	Multiacid digestion ($HF+HNO_3+HCl+HClO_4$) with AAS or ICP-AES finish.	SE/Cu2	9.20
Cu	0.001 - 10	Sulphuric acid leach with AAS or ICP-AES finish.	SE/Cu3	10.10
Cu	0.01 - 10	Cyanide Leach with AAS or ICP-AES finish.	SE/Cu4	10.35
Cu	-	Copper sequential analysis. Cu results are reported for acid soluble, cyanide soluble and total.	SE/Cu5	25.00

WHOLE ROCK ANALYSIS BY XRF AFTER FUSION WITH LITHIUM BORATE

ANALYTE & RANGE (ppm)								CODE	PRICE PER SAMPLE ($)
Al_2O_3	0.02 - 77.5	Fe_2O_3	0.006 - 80	Na_2O	0.01 - 58	SrO	0.005 - 40	BF/XRF26	29.75 or 14.00 plus 1.50/element
BaO	0.005 - 40	K_2O	0.01 - 40	P_2O_5	0.004 - 40	TiO_2	0.003 - 10		
CaO	0.02 - 80	MgO	0.02 - 78	SO_3	0.02 - 58	LOI	0.01 - 100		
Cr_2O_3	0.005 - 10	MnO	0.004 - 80	SiO_2	0.05 - 80				

PHYSICAL PARAMETERS

Often the density and moisture content of ores are underestimated when determining the mass in tons and the class of the deposit. Incorrect predictions or inadequate determination of the parameters of these basic rock properties can lead to gross errors in determining the mass of the deposit in tons. Density is determined by weighing a sample in air and water, and is given as the ratio of the density of the sample to the density of water.

ANALYTE	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
Specific gravity of cores or rocks.	Parafin coat.	SE/SG1	10.45
Specific gravity of pulps.	Pycnometer.	SE/SG2	14.90
Loss on ignition (LoI).	Ignition at 600-1,000°C, gravimetry.	SE/LOI	8.20
Moisture content.	Drying at 105°C, gravimetry.	SE/MC	7.55

URANIUM

URANIUM ANALYSIS

Analytical packages for uranium in environmental and biological samples cover needs of appropriate industry for pollution control of uranium. Only samples with radioactivity below permissible limit of Kyrgyz Republic are accepted to analysis.

There are several procedures for uranium analysis in various sample types. Following analytical packages utilize ICP-AES and ICP-MS instrumentation to monitoring uranium concentration in environmental objects and biological tissues. These packages were designed to provide support for uranium mines specifically.

NATURAL & GROUND WATER

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
U	0.0001	ICP-MS.	U1	30.05

SOIL, SEDIMENTS, WASTE ROCK

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
U	0.001	Aqua Regia digestion, ICP-MS reading.	U2	54.90
U	0.05	4-acid ($HF+HClO_4+HNO_3+HCl$) digestion, ICP-MS reading.	U3	60.85
U	1	Lithium borate fusion, ICP-MS reading.	U4	73.65

VEGETATION

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
U	0.01	Microwave digestion, ICP-MS	U5	60.65

BIOLOGICAL TISSUES

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
U in urine	0.005	Microwave digestion, ICP-MS.	U6	71.20
U in blood	0.005	Microwave digestion, ICP-MS.	U7	by request
U in tissue	0.1	Microwave digestion, ICP-MS.	U8	by request

METALLURGY

METHODS FOR METALLURGICAL SAMPLES

Analysis of mine metallurgical samples is critical for the purchase and sale of commodities as well as the optimization of the recovery process. With so much riding on a correct result, control assays require meticulous work by highly trained technicians. The results must be of the highest caliber for reliability, accuracy and precision.

SAEL maintains wide range of methods for metallurgical materials of gold mines in order to offer full range services. Metallurgical materials include ores, concentrates, bullions, activated carbon, and cyanide liquors. Chemical analysis and metallurgical test methods are used for these materials.

ACTIVATED CARBON

Carbons from loaded to barren and reactivates are covered by these methods. Minimum samples weight for chemical analysis is 5g and for test is 100g.

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
Activated Carbon				
Au	5-10,000	Au by ashing, aqua regia digestion with AAS finish.	Au-AA44	29.80
Ag	5-10,000	Ag by ashing, aqua regia digestion with AAS finish.	Ag-AA44	29.80
Bi, Pb, Sb, Se, Te, Cd, Be, Fe, Cu, Ni, Zn	20ppm-10%	Ashing, acid digestion with ICP-AES finish.	M3	52.10
Ca		Extraction by acids and ICP-AES scan.	M4	7.45
Kinetic activity (simplified procedure)		Gold sorption by carbon from a liquor of given concentration for 2 hours. Analysis of liquors by ICP-AES. % determination of gold to carbon recovery.	M5	38.70
Kinetic activity		Determination of semi-recovery time in liquors of given concentrations.	M6	52.10
Abrasion index		Rotation of perforate bowl with carbon and steel rod within set time. Weighing spilling carbon fines.	M7	22.35
Apparent density		Free filling of carbon into calibrated volume. Weighing.	M8	18.70
Moisture content	0.01-30%	Determination of moisture content by gravimetric procedure	M9	6.30

CONCENTRATES

Analysis of concentrate used only for optimization of recovery process and to support our metallurgical tests. Minimum sample weight is 50 g.

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
CONCENTRATES				
Au	0.1 - 50%	Au by Fire Assay with gravimetric finish, 10-30g nominal weight.	M10	67.05
Bi, Pb, Sb, Se, Te, Cd, Be, Fe, Cu, Ni, Zn	0.001 - 20%	Aqua Regia digestion with ICP-AES finish.	M11	15.35 or 5.95 plus 1.50/element

BULLIONS

Analysis of bullion for gold and silver is performed/can be performed upon special request by classical fire assay technique in duplicate at least. Bullion impurities including penalty elements are performed by ICP-AES following aqua regia digestion.

Minimum sample weight is 1 g.

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
GOLD&SILVER & IMPURITIES IN BULLIONS				
Au	30 - 90%	Au by Fire Assay with gravimetric finish, 0.1-0.2g nominal sample weight.	M12	119.60
Ag	0.5 - 40%		M13	119.60
Bi, Pb, Sb, Se, Te, Cd, Be, Fe, Cu, Ni, Zn	5ppm - 5%	Aqua Regia digestion with ICP-AES finish.	M14	67.25

MILL SOLUTIONS

Metals including gold and silver in cyanide liquors performed by ICP-AES.

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
CYANIDE LIQUORS				
Au Ag	0.01 - 10	Analysis of aqueous cyanide solutions by ICP-AES method.	M15	7.45 4.10
As, Bi, Pb, Sb, Se, Te, Cd, Be, Fe, Cu, Ni, Zn	0.01 - 1,000		M16	14.80 or 7.45 plus 1.50/element
34 elements	0.01 - 100		M17	44.60 or 7.45 plus 1.50/element

ANALYTE	RANGE (ppm)	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
ACID LIQUORS				
Au Ag	0.01 - 10	Analysis of aqueous acid solutions by ICP-AES method.	M18	7.80 4.30
As, Bi, Pb, Sb, Se, Te, Cd, Be, Fe, Cu, Ni, Zn	0.01 - 1.000		M19	14.05 or 4.60 plus 1.60/element
34 elements	0.02 - 1.000		M20	43.80 or 6.25 plus 1.60/element

METALLURGICAL TESTS

The laboratory has facilities for metallurgical testing including cyanide leaching using bottle roll and percolation leaching in columns, gravity concentration testing using Knelson concentrator and flotation testing using laboratory flotation equipment by Svedala.

CYANIDE LEACHING OF ORE

CODE BR. BOTTLE ROLL TESTS

Test for cyanide leaching using bottle roll with the analysis of solutions received for gold usually is the first test for cyanide leachability of gold, which is to be carried out for ore. As a rule, testing is carried out during 72 hours, but if necessary it can be carried out during more shorter or longer period of time.

Test can be carried out for ores of any size, which fits the test bottle. However, the first test for cyanidation is recommended to carry out on pulverized -0.075 mm (≥90%) homogenized portion of the initial sample, to determine cyanide leachable gold presence, and in the case of positive results, to make a decision on the further testing program. These tests can be carried out on the same pulverized pulps, which were used for fire assay. Weight of each sample for test should be not less than 100g.

Total content of cyanide leachable gold, determined in the initial bottle roll test, can be used later for monitoring of following column tests or for detailed research on the determination of metallurgical characteristics of ore.

Particle size analysis should be carried out on the part of ore, which will be used for bottle roll cyanide leaching test in order to have information about distribution and recovery of gold by size fractions.

BASIC TEST STAGES

BR1. Ore preparation

- crushing and splitting of initial ore, pulverizing sub-sample for analysis
- analysis of initial ore for gold, including analysis of impurities (base metals, total sulfur, sulphide sulphur, total carbon, organic carbon)

BR2. Determination of distribution of gold by size fractions in the initial ore

- screening to 5 fractions
- crushing, splitting, pulverizing of each ore fraction
- analysis of gold in each ore fraction

Br3. Determination of physical properties of ore

- determination of moisture
- determination of density

BR4. Primary estimation of leaching parameters

Kinds of work:

- preparation of sample for testing
- analysis of initial ore
- leaching
- preparation for analysis and analysis of solution, leach residue (cake)

Test conditions:

- ore sample: 500g
- size of the material: ≥90% 200 mesh
- sodium cyanide concentration: 1 g/L
- pH of the pr
  ocess: 10.5-11
- cyanidation time: 72 hours

Determined parameters of cyanydation:

- sodium cyanide consumption
- lime consumption
- gold recovery
- gold dissolution kinetics

The presence of cyanide leachable gold and its recovery is estimated according to test results

Br5. Evaluation of the main leaching parameters depending on the ore size

We offer 5 size classes:-25,-15,-10,-5 and -1 mm, and also on the Client's request.

Kinds of work:

- preparation of sample for study
- analysis of initial ore
- leaching
- preparation for analysis and analysis of solution, leach residue (cake)

Test conditions:

- ore weight of the given size: 500 g
- size of the material: -25, -15, -10, -5 and -1 mm
- concentration of sodium cyanide: 1 g/L
- pH of the process: 10.5-11
- cyanidation time: 72 hours

Determined leaching parameters:

- gold recovery
- gold dissolution kinetics
- sodium cyanide consumption
- lime consumption

Based on the results we offer the Customer to choose material size for column leaching.

Br6. Study of leaching parameters depending on concentration of sodium cyanide in solution

Studies are carried out on the material with the chosen size.

For study we offer the concentrations of sodium cyanide in solution: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 g/L

Kinds of work:

- preparation of sample for analysis
- analysis of the initial ore
- leaching
- preparation for analysis and analysis of solutions, leach residue

Test conditions:

- ore weight: 500g
- concentration of sodium cyanide: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 g/L
- pH of the process: 10.5-11
- cyanidation time: 72 hours

Determined leaching parameters:

- sodium cyanide consumption
- lime consumption
- gold recovery
- gold dissolution kinetics

On the test results the optimal concentration and consumption of sodium cyanide is determined.

Br7. Natural gold sorbents presence study (Preg Robbing)

Kinds of work:

- sample preparation for study
- analysis of the initial ore
- Preg Robbing test
- preparation for analysis and analysis of solutions and cakes

On the test results the presence of natural gold sorbents and their effect to gold recovery determined.

Any test from the program can be carried out by the Customer's request or, the test can be carried out by the Customer's procedure subject to discussion and adjustment.

Total sum for the whole package of bottle roll tests, including report, can amount 6,090 – 10,710$.

Prices to be agreed with Customer after approval of test program

PERCOLATION LEACHING IN COLUMNS

Percolation column tests are carried out for determination of precious metals recovery; extraction rates and reagents requirement in conditions, imitating heap leaching. Tests on column leaching sometimes are carried out on ore samples of different size. These data, together with the screen test results of the initial sample and tailings, determine the optimal ore size for heap leaching. Tests in column are usually carried out on ore, which is crushed to the size determined by bottle roll cyanidation test. Very often it is an ore with the size from 25 mm to 10 mm.

If the ore is slimy (loamy) and the solution penetration rate is low, than the ore is agglomerated and after then it loaded into columns.

EQUIPMENT

For carrying out the tests we offer the following equipment:

GLASS COLUMNS FOR ORE SIZE 15 MM AND LESS

- size	105 x 1100 mm
- quantity	3 pieces
- ore loading	13-15kg
- size	105 x 2100 mm
- quantity	9 pieces
- ore loading	25-30kg

GLASS COLUMNS FOR ORE SIZE 25 MM AND LESS

- size	148 x 1600 mm
- quantity	3 pieces
- ore loading	35-40kg

PLASTIC COLUMNS FOR ORE SIZE 35 MM AND LESS

- size	200 x 1900 mm
- quantity	6 pieces
- ore loading	80-90kg

Peristaltic pumps for dosed supply of solutions into columns.

THE MAIN TESTINF STAGES

CT1. SAMPLE PREPARATION

- initial ore crushing, splitting with separation of metallurgical duplicate, sub-sample pulverizing for analysis
- analysis of initial ore for gold, including analysis impurities (base metals, total sulfur, sulfide sulfur, total carbon, organic carbon)
- moisture determination
- density determination
- screening of initial ore to fractions and analysis of each ore fraction

CT2. LEACHING

- maintenance of the required conditions of gold leaching and absorption from the solutions on activated carbon
- solutions analysis
- preparation for analysis and analysis of carbon after gold absorption, leach tailings, including screening of tailings on fractions and fractions analysis

Provisional data on ore leaching (such as estimated gold recovery, based on the solution analysis), as a rule, will be available approximately after in three weeks after test beginning. Tests are usually should last for 60 days, so the final information will be available not earlier than three months after samples arrival in the laboratory, and the final report will be given a month later.
Usually when testing each ore sample we offer to carry out leaching in parallel not less than in two columns.

Cost of test on leaching in columns depends on ore type, ore mass loaded in columns, the quantity of parallel tests, kind and quantity of analysis that will be carried out and also on leaching process duration.

Total cost on leaching test of ore sample of one size in columns, including the report, can amount 10,500 – 21,000$.

Prices are agreed with the Customer after approval of the testing program.

ENVIRONMENT

ENVIRONMENTAL ANALYSIS

SAEL offers environmental analyses for mining industry to support their monitoring program before starting operation, during operation, and at reclamation stage. Environmental analyses utilize classic wet chemistry method as well as modern ICP-AES, ICP-MS, IC methods. ARD prediction tests include static methods like ABA and NAG tests..

WATER ANALYSIS

The analyses offered in this section are suitable for the analysis of ground and surface waters, but not for effluent or metal-carrying technical solutions. For the analysis of highly mineralized waters, waste waters or technical solutions an extra charge will be taken.

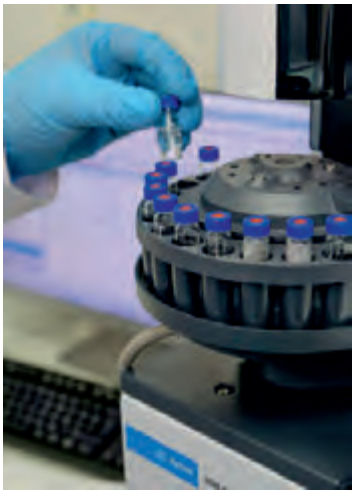
CODE	ANALYTE	DETECTION LIMIT	METHOD	PRICE ($)	
W1	PHYSICAL PARAMETERS				65.70
1	pH	0.1	SAEL-WA-21	5.85	
2	Turbidity		SAEL-WA-23	11.05	
3	Specific Conductivity		SAEL-WA-21	5.85	
4	Dissolved oxygen	1	SAEL-WA-52	13.85	
5	Total Dissolved	1	SAEL-WA-19	14.55	
6	Total Suspended	1	SAEL-WA-13	14.55	
W2	INORGANIC (MAJOR) IONS				114.70
1	Calcium (Ca)	0.05	SAEL-W-6	2.20	
2	Magnesium (Mg)	0.05	SAEL-W-6	2.20	
3	Potassium (K)	0.09	SAEL-W-6	2.20	
4	Sodium (Na)	0.05	SAEL-W-6	2.20	
5	Bicarbonates (HCO3)/Carbonate (CO3)	1	SAEL-WA-10	11.70	
6	Chloride (Cl)	0.5	SAEL-WA-18	13.05	
7	Chloride (Cl)-IC	0.1	SAEL-WA-47	13.05	
8	Fluoride (F)	0.01	SAEL-WA-20	7.25	
9	Fluoride (F) -IC	0.1	SAEL-WA-47	7.25	
10	Sulphate (So4)	1	SAEL-WA-17	13.05	
11	Sulphate (SO4) -IC	0.1	SAEL-WA-47	13.05	
12	Total Hardness (as CaCO3)	1	SAEL-WA-25	14.45	
13	Total Alkalinity (as CaCO3)	1	SAEL-WA-10	13.05	
W3	NUTRIENTS				93.10
1	Nitrogen, ammonia (Nh3)	0.04	SAEL-WA-26	16.00	
2	Nitrogen, total Kjeldahl (TKN)	0.04	SAEL-WA-30	20.40	
3	Nitrate (NO3) as N	0.1	SAEL-WA-16	13.05	
4	Nitrate (NO3) -IC as N	0.1	SAEL-WA-47	13.05	
5	Nitrite (NO2) as N	0.001	SAEL-WA-14	13.05	
6	Phosphorus, total as P	0.01	SAEL-WA-30	17.55	
W4	TOXIC				80.30
1	Cyanide Total	0.005	SAEL-WA-5	20.40	
2	Cyanide WAD	0.005	SAEL-WA-5	25.60	
3	Cyanide Free	0.2	SAEL-WA-5	8.70	
4	Thiocyanate (SCN)	0.05	SAEL-WA-22	25.60	
W5	ADDITIONAL ANALYSIS				69.15
1	Chemical oxygen demand (COD)	10	SAEL-WA-51	29.15	
2	Biochemical oxygen demand, 5 days (BOD5)	-	-	40.00	
3	Chromium (III/VI)	0.005	-	25.00	

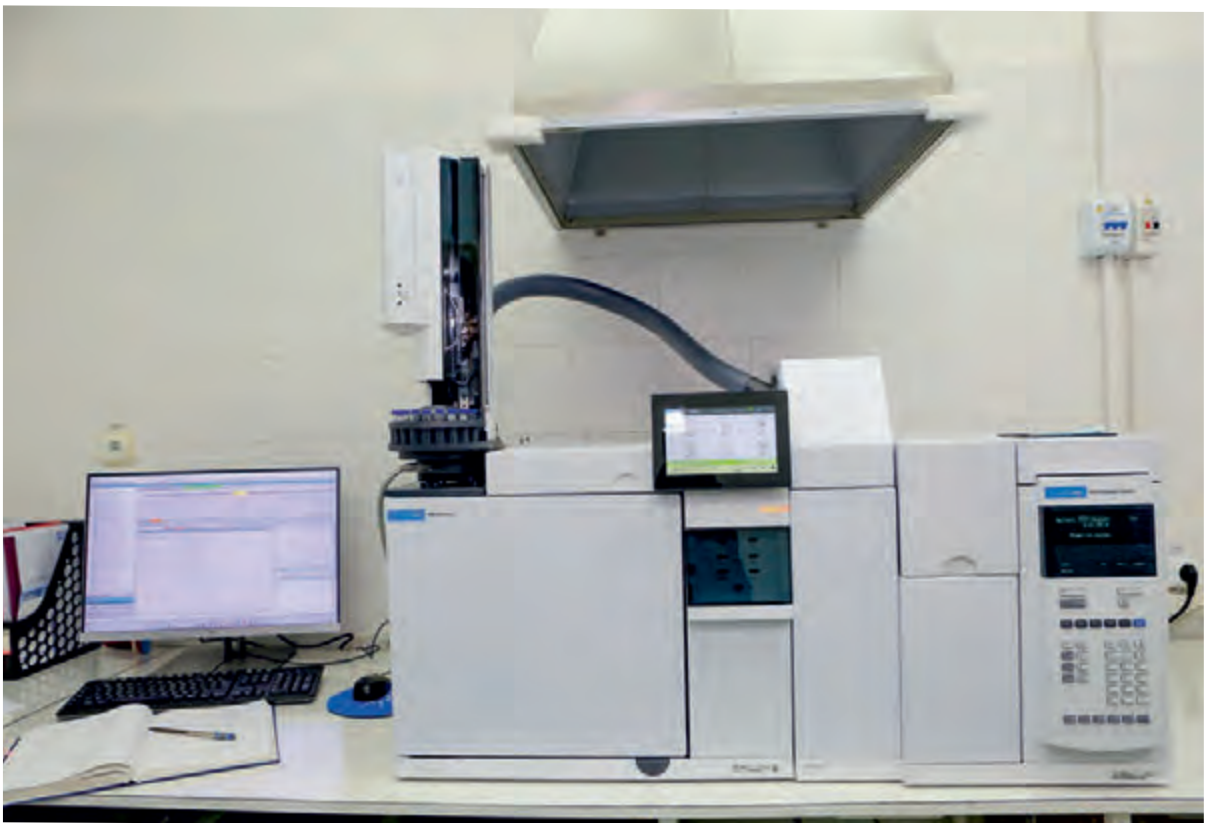
CODE	ANALYTE	DETECTION LIMIT	METHOD	PRICE ($)
W6	DISSOLVED METALS (FILTERING, ANALYSIS ON ICP-AES)			64.30+3.05*
1	Antimony (Sb)	0.02	SAEL-W-6	1.45
2	Barium (Ba)	0.002	SAEL-W-6	1.45
3	Beryllium (Be)	0.0002	SAEL-W-6	1.45
4	Cadmium (Cd)	0.002	SAEL-W-6	1.45
5	Chromium (Cr)	0.008	SAEL-W-6	1.45
6	Cobalt (Co)	0.004	SAEL-W-6	1.45
7	Silver (Ag)	0.003	SAEL-W-6	1.45
8	Manganese (Mn)	0.003	SAEL-W-6	1.45
9	Molybdenum (Mo)	0.005	SAEL-W-6	1.45
10	Selenium (Se)	0.04	SAEL-W-6	1.45
11	Vanadium (V)	0.006	SAEL-W-6	1.45
12	Mercury (Hg)	0.02	SAEL-W-6	1.45
13	Silicon (Si)	0.05	SAEL-W-6	1.45
14	Arsenic (As)	0.04	SAEL-W-6	2.20
15	Copper (Cu)	0.005	SAEL-W-6	2.20
16	Lead (Pb)	0.02	SAEL-W-6	2.20
17	Nickel (Ni)	0.005	SAEL-W-6	2.20
18	Zinc (Zn)	0.004	SAEL-W-6	2.20
19	Aluminum (Al)	0.03	SAEL-W-6	2.20
20	Iron (Fe)	0.004	SAEL-W-6	2.20
21	Uranium (U)**	0.0001	SAEL-W-6	30.05

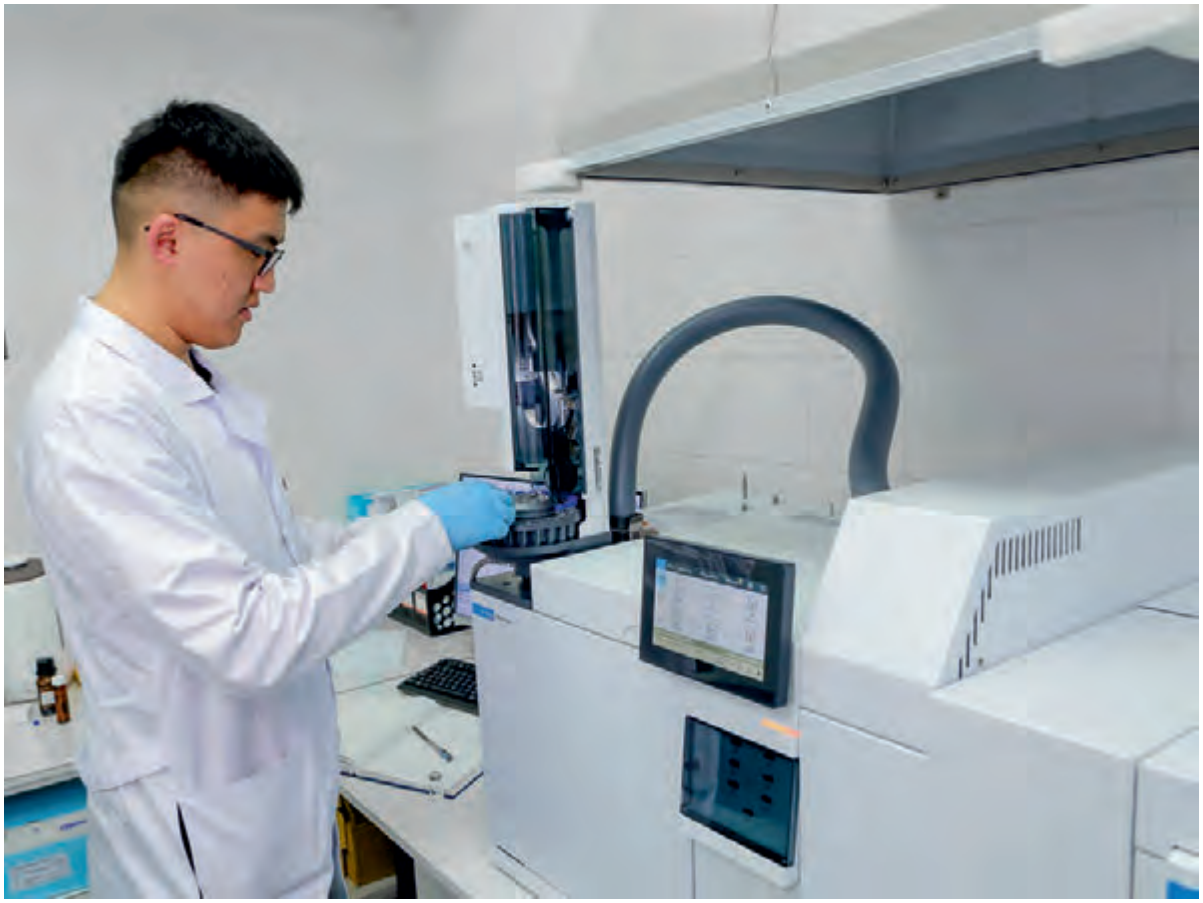
Additional charge: * filtering 3.05$; ** analysis by ICP-MS

CODE	ANALYTE	DETECTION LIMIT	METHOD	PRICE ($)
W7	TOTAL METAL (ACID DIGESTION-ANALYSIS ON ICP-AES)			64.30+7,25*
1	Antimony (Sb)	0.02	SAEL-W-6	1.45
2	Barium (Ba)	0.002	SAEL-W-6	1.45
3	Beryllium (Be)	0.0002	SAEL-W-6	1.45
4	Cadmium (Cd)	0.002	SAEL-W-6	1.45
5	Chromium (Cr)	0.008	SAEL-W-6	1.45
6	Cobalt (Co)	0.004	SAEL-W-6	1.45
7	Silver (Ag)	0.003	SAEL-W-6	1.45
8	Manganese (Mn)	0.003	SAEL-W-6	1.45
9	Molybdenum (Mo)	0.005	SAEL-W-6	1.45
10	Selenium (Se)	0.04	SAEL-W-6	1.45
11	Vanadium (V)	0.006	SAEL-W-6	1.45
12	Mercury (Hg)	0.02	SAEL-W-6	1.45
13	Silicon (Si)	0.05	SAEL-W-6	1.45
14	Arsenic (As)	0.04	SAEL-W-6	2.20
15	Copper (Cu)	0.005	SAEL-W-6	2.20
16	Lead (Pb)	0.02	SAEL-W-6	2.20
17	Nickel (Ni)	0.005	SAEL-W-6	2.20
18	Zinc (Zn)	0.004	SAEL-W-6	2.20
19	Aluminum (Al)	0.03	SAEL-W-6	2.20
20	Iron (Fe)	0.004	SAEL-W-6	2.20
21	Uranium (U)**	0.0001	SAEL-W-6	30.05

Additional charge: * acid digestion 7.25$ *** analysis by ICP-MS







WATER – METHODS FOR TRACE LEVELS

CODE	ANALYTE	DETECTION LIMIT	PRICE ($)
W11	DISSOLVED METSAEL (FILTERING, ANALYSIS ON ICP-MS)		31.50+3.05*
1	Antimony (Sb)	0.001	5.25
2	Arsenic (As)	0.001	5.25
3	Cadmium (Cd)	0.0003	5.25
4	Mercury (Hg)	0.0005	5.25
5	Lead (Pb)	0.002	5.25
6	Selenium (Se)	0.001	5.25
7	Lithium (Li)	0.002	5.25

Additional charge: * filtering $3.05;

DUST ANALYSIS IN FILTERS

ANALYTE	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
TDP	Total deposited particulate, gravimetric determination	D1	12.75
Ag	Chemical digestion of filter, ICP-AES measurement	D2	35.25
Pb	Chemical digestion of filter, ICP-AES measurement	D3	26.30
SiO_2	Fusion, leaching, ICP-AES measurement	D4	44.30

SOIL ANALYSIS

ANALYTE	CODE	PRICE PER SAMPLE ($)
Dried solids (105 °C)	S1	27.15
Fixed solids (600 C)	S2	39.55
pH	S3	25.00
Cation-exchange capacity	S4	54.85
Exchange cations	S5	54.85
Nitrate, Nitrite, and Ammonia	S6	86.05
Cyanide, total	S7	65.25
ICP-AES metal scan Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, V, Zn	S8 C	65.25 or 33.65 plus 2.20/element

PETROLEUM HYDROCARBONS IN WATER BY GC-FID

Minimum sample volume - 1 L

ANALYTE	DETECTION LIMIT, µg/l	CODE	PRICE PER SAMPLE ($)
Fraction C6-C10	100	W12	36.40
Fraction C10-C19	250		
Fraction C19-C32	250		
Fraction C6-C32	250		

POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) IN WATER BY GC-MS (16 ANALYTES)

ANALYTE	DETECTION LIMIT, µg/l	CODE	PRICE PER SAMPLE ($)
Acenaphthene	0.01	W13	79.65
Acenaphthylene	0.01		
Anthracene	0.02		
Benzo(a)anthracene	0.01		
Benzo(a)pyrene	0.02		
Benzo(b)fluoranthene	0.01		
Benzo(k)fluoranthene	0.01		
Benzo(g,h,i)perylene	0.01		
Chrysene	0.01		
Dibenzo(a,h)anthracene	0.01		
Fluoranthene	0.03		
Fluorene	0.02		
Indeno(1,2,3-cd)pyrene	0.01		
Naphthalene	0.1		
Phenanthrene	0.03		
Pyrene	0.06		

BIOLOGICAL SAMPLES

Biological samples includes vegetation, animal tissues, human biological liquids such as blood and urine, and human tissues (hair, nail).

ANALYTE	DETECTION LIMIT	DESCRIPTION	CODE	PRICE PER SAMPLE ($)
VEGETATION				
Cd	0.003	Microwave digestion, ICP-MS	BIO-VEG	29.75 plus 3.15/element
Co	0.003			
Pb	0.005			
Ni	0.003			
Sb	0.003			
URINE				
Cd	0.003	Microwave digestion, ICP-MS	BIO-URI	31.25 plus 3.15/element
Co	0.003			
Pb	0.005			
Ni	0.003			
Sb	0.003			
BLOOD				
Cd	0.003	Microwave digestion, ICP-MS	BIO-BLO	31.25 plus 3.15/element
Co	0.003			
Pb	0.005			
Ni	0.003			
Sb	0.003			
TISSUE				
Cd	0.003	Microwave digestion, ICP-MS	BIO-TIS	31.25 plus 3.15/element
Co	0.003			
Pb	0.005			
Ni	0.003			
Sb	0.003			

ACID ROCK DRAINAGE – STATIC TESTS

NET ACID GENERATION (NAG TEST)

This is simple and fast procedure for determination of the balance between the acid producing and acid consuming components of a mine waste without the need for sulphur analyses.

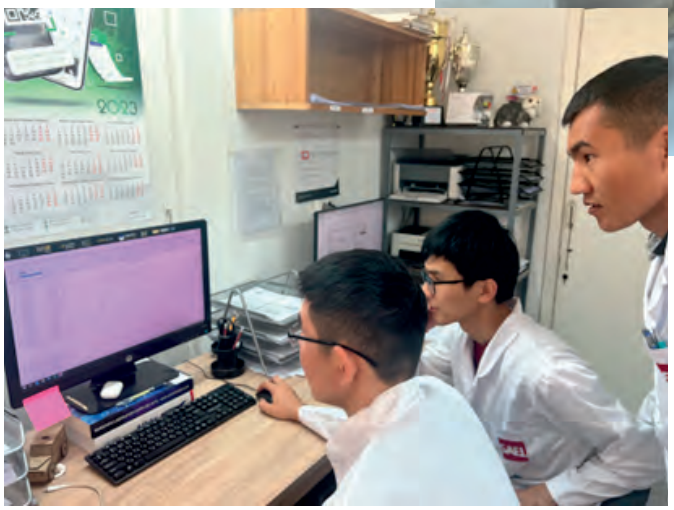
CODE	PARAMETER	PRICE PER SAMPLE ($)
ARD1	NAG pH, NAG	24.55

BALANCE BETWEEN ACID EXTRACTION & ACID ABSORPTION (ABA TEST)

This procedure gives a figure known as Net Neutralization Potential (NNP), which indicates whether a particular sample is expected to generate acidity over time. In addition to the NNP the Acid Potential (AP) for that reason content of sulphur compounds is measured. Neutralization Potential (NP) is reported by measuring the amount of alkaline material present in the sample.

CODE	PARAMETER	PRICE PER SAMPLE ($)
ARD2	Total Sulphur, Sulphide Sulphur, AP, NP, NNP, Paste pH	119.30

COMMITMENT TO QUALITY



QUALITY MANAGEMENT SYSTEMS

SAEL believes that one of the foremost requirements of our business is providing exceptional quality assays to our clients. We achieve this through designed processes and quality management system that meets all requirements of International Standards ISO/IEC 17025:2005.

Accredited as a type "A" control body in accordance with the international standard ISO/IEC 17020:2012 (GOST ISO/IEC 17020:2013)

The SAEL quality program includes monitoring sample preparation and analytical quality control data generated by laboratories, inter-laboratory test programs, and regular internal audits. It is an integral part of day-to-day activities, involves all levels of SAEL staff and is monitored at top management levels.

Accreditation

ОсОО «Stewart Assay and Environmental Laboratories»

ilac-MRA KCA
ISO/IEC 17020
#KG 417/КЦА.ОК.082
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на сайте: www.kca.gov.kg

SELECTED TERMS & CONDITIONS

1. Terms and Conditions

Complete Terms and conditions of service are included with each service quotation provided to clients. The following lists some of the key terms and conditions that will be applicable to every quotation for work.

2. Provision of Services

a) If the Client requires the Services to be performed by specific test method, or requires detection limits and/or confidence intervals different to those inherent in SAEL's standard testing methodology, then the Client must instruct SAEL of such variation prior to SAEL performing the Services.

b) If the Client requires the Services to be performed by specific test method, or requires detection limits and/or confidence intervals different to those inherent in SAEL's standard testing methodology, then the Client must instruct SAEL of such variation prior to SAEL performing the Services.

3. Fees and Payment

a) SAEL reserves the right to review prices at any time if significant changes to SAEL's costs are incurred that are beyond SAEL's control. Such changes may include, but are not limited to, changes in legislative requirements, Client variations to sample numbers, analytes requested, turnaround required, or reporting requirements.

b) Payment terms are 30 days from the date of invoice (Due Date), unless negotiated otherwise prior to the placement of an order or submission of samples. Any such variance from the standard payment terms must be stipulated separately in writing in the Agreement.

c) All prices quoted by SAEL are exclusive of taxes unless stated otherwise.

d) All fees due and payable after the Due Date (Outstanding Amount) will be subject to the payment of interest at a rate of 1.5% per month of the Outstanding Amount from the Due Date up to and including the date of payment, unless SAEL and the Client otherwise agree in writing.

e) The Client will indemnify SAEL for any fees incurred by SAEL to recover the Outstanding Amount, including any solicitor fees, or collection agency fees.

4. Limitation of Liability

a) To the full extent permitted by law, SAEL excludes all warranties, terms, conditions or undertakings (Terms), whether expressed or implied, in relation to the Services, the SAEL Report, or its contents. Where any legislation implies any Terms in this Agreement that cannot be modified or excluded then, such Terms shall deem to be included. However, to the full extent permitted by law, SAEL's liability to the Client for any breach of any Terms that cannot be excluded by law is limited at SAEL's option to the re- performance of the Services or the refund of the fee for the Services.

b) Notwithstanding any other provision in this Agreement, the cumulative liability of SAEL under this Agreement to the Client and any third party is limited for any claim for loss or damage whatsoever, whether arising in tort or contractor any other cause of action, to the value of the Services provided by SAEL to the Client.

c) Without limiting the generality of clauses 4.a) and 4.b), it is agreed that, to the full extent permitted by any applicable laws having jurisdiction, SAEL will not be liable to the Client or any other person for any special, indirect or Consequential Loss arising from the Client's use of, reliance on, or benefit of, the Services or any SAEL Report.

d) The Client acknowledges that during the performance of the Services, any samples supplied by, or on behalf of, the Client or parts thereof may be altered, lost, damaged or destroyed. SAEL will not be liable whatsoever to the Client or any third party for any samples so altered, lost, damaged or destroyed.

5. Termination

a) SAEL may suspend or terminate its obligations under this Agreement if (a) monies payable to SAEL by the client are outstanding 60 days or more (unless otherwise agreed) after the date of invoice, (b) other substantial breach by the Client of their obligations under the Agreement, which breach is not remedied within 30 days of written notice from SAEL requiring the breach to be remedied, (c) by giving the Client 60 days written notice of SAEL's intention to terminate.

b) The Client may terminate its obligations under this Agreement in the event of a substantial breach by SAEL of its obligations under the Agreement, which breach has not been remedied within 30 days of written notice from the Client to SAEL requiring the breach to be remedied.

c) If SAEL, acting reasonably, suspects that the Client is insolvent or is having difficulties paying its debts as and when they become due, or the Client is insolvent, SAEL may give written notice to the Client of SAEL's intention to immediately suspend or terminate is obligations under the Agreement.

d) In the event of termination, SAEL is entitled to be paid for all work performed before the date of termination and for any unavoidable commitments entered into by SAEL before the date of termination.

6. Confidential Information

a) Neither SAEL nor the Client will disclose Confidential Information of the other party to any third party without the prior written consent of the other party, unless required by law or the rules of a relevant stock exchange.

b) SAEL and the Client will only use Confidential Information of the other party for the purpose of the supply of the Services.

REFERENCE INFORMATION

FREQUENTLY REQUESTED EQUALENTS					
%	g/t (gram/m.ton)	mg/kg	µg/kg	ppm parts per million	ppb part per billion
1	10,000	10,000	10,000,000	10,000	10,000,000
0.1	1,000	1,000	1,000,000	1,000	1,000,000
0.01	100	100	100,000	100	100,000
0.001	10	10	10,000	10	10,000
0.0001	1	1	1000	1	1000

TROY OUNCE CONVERSION RATES			
	metric ton	short ton	long ton
1 gram/MT	0.03215	0.02917	0,0327
1 tr. ounce/ short ton	1.1023	1	1,12

COEFFICIENTS FOR CONVERSION OF ELEMENTS INTO OXIDES					
Element	Coef cient	Oxide	Element	Coef cient	Oxide
Al	1.8895	Al_2O_3	Mo	1.5003	MoO_3
As	1.3203	As_2O_3	Na	1.3480	Na_2O
Ba	1.6995	$BaSO_4$	Nb	1.4305	Nb_2O_5
Ba	1.1165	BaO	Ni	1.2725	NiO
Be	2.7758	BeO	P	2.2916	P_2O_5
C	3.6641	CO_2	Pb	1.15474	PbS
Ca	1.3992	CaO	Rb	1.0936	Rb_2O
Ca	2.4973	$CaCO_3$	S	2.4972	SO_3
Cr	1.4615	Cr_2O_3	Si	2.1392	SiO_2
Cu	1.25228	Cu_2S	Sr	1.1826	SrO
F	2.0548	CaF_2	Ta	1.2211	Ta_2O_5
Fe	1.2865	FeO	Ti	1.6681	TiO_2
Fe	1.4297	Fe_2O_3	V	1.7852	V_2O_5
K	1.2046	K_2O	W	1.2610	WO_3
Li	2.1525	Li_2O	Y	1.2699	Y_2O_3
Mg	1.6582	MgO	Zn	1.2448	ZnS
Mg	3.46908	$MgCO_3$	Zr	1.3508	ZrO_2
Mn	1.2912	MnO			

FOR NOTES

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