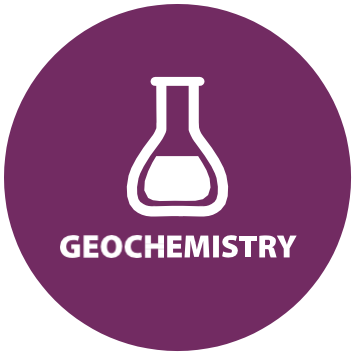
GEOANALYTICAL LABORATORIES

SERVICES SCHEDULE

EFFECTIVE January 1, 2023



src.sk.ca/geoanalytical

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ABOUT THE SASKATCHEWAN RESEARCH COUNCIL AND GEOANALYTICAL LABORATORIES

The Saskatchewan Research Council (SRC) has provided science and technology solutions to clients around the world for over 75 years. Throughout this time, SRC has seen many changes, but the drive to grow and strengthen Saskatchewan's economy in a socially and environmentally responsible manner has never changed.

SRC's Mining and Energy Division and Environment and Biotech Division work together to help clients solve technology problems, make improvements, seize opportunities, maintain competitiveness, increase productivity and develop new markets.

We provide services that meet industry needs across the mining cycle for a wide range of minerals, including:

- Diamonds
- Uranium
- Potash
- Lithium
- Base Metals
- Precious Metals
- Rare Earth Elements
- Industrial Minerals

SRC GEOANALYTICAL LABORATORIES

PREPARATION TECHNIQUES USED:

- Aqua Regia ($HCl:HNO_3$)
- Partial Digestion ($HNO_3:HCl$)
- Total Digestion ($HF:HNO_3:HClO_4$)
- Lithium Borate Fusion
- Sodium Carbonate and Sodium Peroxide Fusion
- Special digestions (if required)

Both the aqua regia leach and the partial digestion will not dissolve all the elements completely. Some elements such as Ag, As, Bi, Cd, Co, Cu, Hg, Mo, Mn, Ni, P, Pb, U, V and Zn will be very "near" to total dissolution. Other elements are more refractory in nature and will only be partially dissolved.

The tri-acid digestion will completely dissolve most elements since the crystalline matrix of the sample is destroyed. Occluded minerals in the matrix are exposed and dissolved by the acids. Only those elements found in refractory minerals may not be dissolved.

INSTRUMENTS USED:

- Perkin Elmer ICP-OES (Models: Optima 5300DV, 8300DV and Avio 500DV)
- Perkin Elmer Sciex Elan DRC II ICP-MS and NEXION 2000
- Perkin Elmer PinAAcle 900F Absorption Spectrometer
- LECO Combustion Furnace
- ELTRA HELIOS Resistance Furnace and ELTRA Induction Furnace
- Claisse TheOx® Electric Fusion Instrument

We strive to meet your individual needs. Contact us if you require further assistance in the selection of packages or if you have any special requests.

SRC Geoanalytical Laboratories is continually expanding its facilities to match the growth and changes in the exploration and mining industry sectors and to meet the needs of our clients. Over the years, we have added these leading-edge facilities and services to our operations in Saskatoon, Saskatchewan:

- Dedicated Radioactive Sample Preparation Facility
- Dedicated Potash Preparation and Analysis Facility
- Expanded Precious Metal Fire Assay Facility
- Kimberlite Indicator Mineral (KIM) Processing and Recovery Facility, including Macro and Micro Diamonds
- Dense Media Separation (DMS) Facility
- Automated Mineralogy Services, including XRD and XRF Facility, Electron Microprobe, QEMSCAN® Analysis, Petrographic Services
- Mineral Characterization for Sensor-Based Sorting

CONTACT US

Contact us to learn more about our services. We invite you to tour our lab to see what makes us stand out from the rest.

SRC Geoanalytical Laboratories

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Quality Assurance

QUALITY MANAGEMENT SYSTEM

The quality management system at SRC Geoanalytical Laboratories operates in accordance with ***ISO/IEC 17025:2017***, *General Requirements for the Competence of Testing and Calibration Laboratories*, and is also compliant to *SCC Requirements and Guidance for the Accreditation of Testing Laboratories* (RG-Lab) and the *SCC Requirements and Guidance for the Accreditation of Mineral Analysis Testing Laboratories* (RG-MA). The management system and selected methods are accredited by the Standards Council of Canada (SCC File #15675; Scope of Accreditation #537).

The laboratory is assessed on a regular basis, both internally and externally, to ensure that it continues to meet these requirements.

QUALITY POLICY:

It is the purpose of the Management System at the Geoanalytical Laboratories of the Saskatchewan Research Council to provide a high standard of service to all its Customers through good professional practice and Management's commitment to quality: by continually assessing, monitoring and evaluating risk and opportunities to improve all aspects of the Management System with compliance to ISO/IEC 17025 and RG-MA.

QUALITY ASSURANCE COMPONENTS

There are many components to the Quality Assurance Program at SRC Geoanalytical Laboratories. The following list reflects the minimum requirements of the ISO/IEC 17025 Standard:

○ **Management commitment** and **annual review** of Quality Management System (QMS)	○ Participation in **proficiency and inter-laboratory testing** programs
○ **Customer feedback** procedures, including systematic review and follow Up	○ Equipment **inspection**, **calibration** and preventive **maintenance**
○ **Internal quality audits** (against the ISO/IEC 17025:2017 Standard)	○ **Risk identification** and mitigation
○ Personnel **training** and **competence** assessments	○ **Non-conformance reporting** and corrective action plans, for continual improvement
○ Annual supplier and service provider **evaluations**	○ Commitment to c**onfidentiality** and i**mpartiality** throughout the laboratory

AUDIT PROGRAM

As part of our commitment to continually assess the effectiveness of the services we offer our customers, all processes are subject to internal, second-party and third-party audits.

- Accredited processes performed at the laboratory are subject to a strict audit program, which is performed by approved, trained professionals. These methods are also assessed by the accrediting body on an annual basis.
- All methods performed at the laboratory are part of the Quality Management System and adhere to principles of the ISO 17025 standard.

QUALITY CONTROL

The quality control processes at the laboratory are continuously monitored to assure the quality of the results generated.

These processes include:

- Sample preparation QC checks
- Analysis of Certified Reference Materials (CRMs)
- Analysis of in-house reference materials and standards
- Traceable calibration standards for instrumentation
- Equipment calibration and maintenance
- Analysis of duplicate and blind QC samples
- Sample spiking to monitor process recoveries
- Proficiency Testing and Interlaboratory Comparisons

The quality control measures applied to all methods within the laboratory have been established to ensure they are compliant with the requirements of ISO/IEC 17025. The quality control measures that are applied may vary from method to method and are selected on their suitability.

All quality control measures applied at SRC Geoanalytical Laboratories are checked by supervisory and/or quality assurance personnel prior to reporting results. If results are found to be outside quality control limits, actions are taken to ensure that the samples are re-processed and the required quality limits are met.

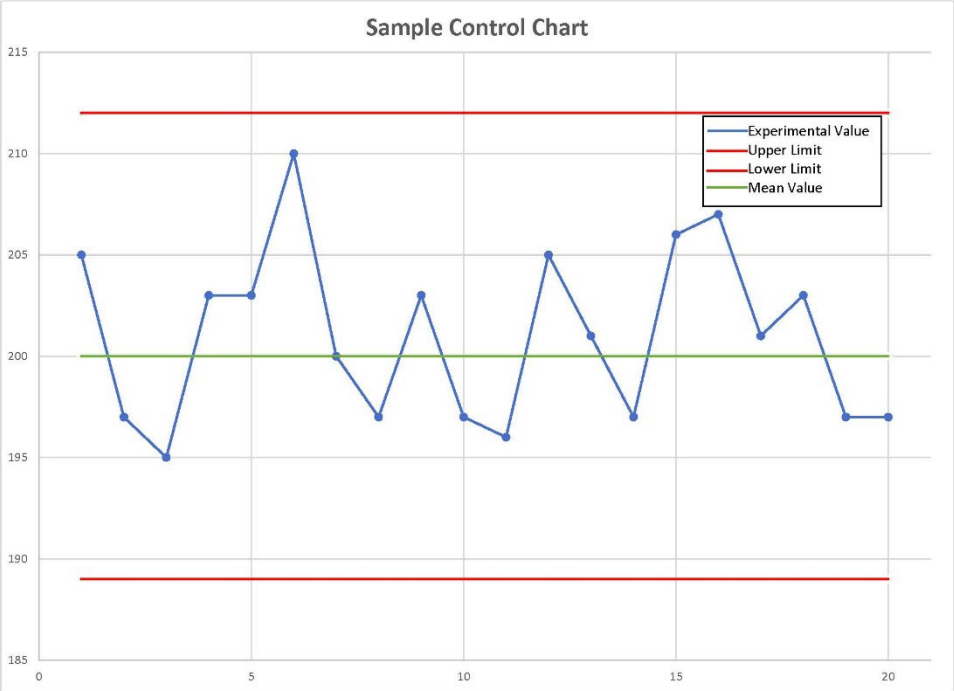
Refer to the package/analysis description for a breakdown of specific QC protocols used in individual analyses. **Customers inserting their own quality control samples are advised to review our Quality Control Policy.**

MONITORING QUALITY

To ensure the long-term quality of each process is maintained, the results from all quality control measures and internal quality control testing for each method are monitored.

Control charting is used to determine the continued suitability of the process and to monitor for bias within the results.

Slight changes in quality control results are continually analyzed to ensure there are no underlying problems with the method that may reduce confidence in the results.



Ethics and Security

Customer confidentiality and security is of utmost importance to SRC. We take the appropriate steps to protect the integrity of sample processing at all stages, from sample receipt, storage and handling to preparation and analysis of samples to the transmission of results.

All electronic information is password protected and backed up daily. Electronic results are transmitted with additional security features. Access to SRC Geoanalytical Laboratories' premises is restricted by an electronic security system. The facilities at the main lab are regularly patrolled by security guards 24 hours a day.

CODE OF CONDUCT AND ETHICS

SRC assists all its customers in a professional manner. A strict Code of Conduct and Ethics policy is enforced at SRC for both employees and subcontractors to ensure high-integrity service is applied to sample processing. SRC and its employees abide by applicable laws and regulations. We also conduct our business in an ethical manner and follow SRC policies. The Code of Conduct and Ethics is based on the following:

- Confidentiality
- Conflict of interest, including trading
- Use of SRC's assets, services and time
- Intellectual property
- Protection of personal information
- Professional liability
- Fraud
- Corporate Social Responsibility
- Gifts
- Online conduct, including social media
- After-hours conduct
- Criminal record check

Laboratory Safety

SAFETY IN THE WORKPLACE IS THE OVER-RIDING PRIORITY AT SRC

The different processes performed at SRC Geoanalytical Laboratories are strictly monitored to ensure the safety of personnel in that area. Depending on requirements, customers may be working on site as part of a project. Our goal is to ensure that all personnel are given the required tools to keep them safe.

SAFETY TRAINING

As with most laboratory environments, hazards pose a potential health and safety risk to personnel in the area. All personnel employed by SRC Geoanalytical Laboratories, all subcontractors and all on-site customers are informed of the potential hazards in our facilities and are provided with the appropriate personal protective equipment and training prior to entering hazardous areas. SRC promotes safety training and development programs for laboratory personnel.

RADIATION SAFETY

SRC is a Canadian Nuclear Safety Commission (CNSC) licensed facility for processing radioactive samples. In some areas of the laboratory, additional radiation safety training is required, as well as the provision of a personal dosimeter to monitor the exposure to radioactive materials.

Personnel working at the radioactive sample preparation facility and laboratory are classified as Nuclear Energy Workers (NEW) and have their exposures closely monitored by regulatory agencies.

TRANSPORTATION SAFETY

Select personnel at our facilities have training in the Transportation of Dangerous Goods (TDG). This skill is vital for the transport of hazardous materials for testing and the chemicals needed to process samples.

MONITORING SAFETY AND CONTINUAL IMPROVEMENT

SRC Geoanalytical Laboratories has an active safety audit program and is also monitored by SRC and external bodies to ensure the continued safety of its employees and personnel on site. Through audits and risk assessments, we strive for continual safety improvements for all our processes.

Environmental Management

SRC's Mining and Energy Division has a multi-step environmental management system for a variety of sample types.

Radioactive Materials

- Monitoring
- Storage
- Disposal of materials and waste products back through mine site
- Facilitates disposal of RA materials and garbage of customers
- Provides certified barrels for RA material
- CNSC-licensed facility

Pb (NPRI Reporting)

- Monitoring of Pb usage and disposal
- Fully reportable to Environment Canada

Water Usage/Disposal

- Water monitoring program
- Water is tested before released into the sewage system
- Contaminated water is disposed of through a specialized hazardous waste management company

Chemicals

- Scrubbers eliminate emissions from fume hoods
- Neutralized before disposal
- Supplies monitoring
- Specialized disposal through a hazardous waste management company

Electricity Usage

- Staged ramp-up of kilns reduces surges to the local electrical grid to enable control of electrical consumption

Shipping and Receiving

- Transportation of Dangerous Goods (TDG) trained personnel

SOLID SAMPLE PREPARATION

SAMPLE PREPARATION

Samples are prepared in facilities specifically designed for each method or process. Key preparation areas are separated from each other to reduce the possibility of cross matrix contamination:

- Sandstone preparation area
- Basement preparation area (low radioactivity)
- Radioactive preparation area (high radioactivity)
- Potash preparation area

The primary purpose of sample preparation is to produce homogeneous sub-samples that are representative of the material submitted to us for analysis. Therefore, preparation is very important to obtain quality, meaningful results from the analysis.

All samples received at the main lab will be checked upon receipt for radioactivity levels and sorted accordingly. Sample processing is dependent on radioactivity and will be automatically prepared according to defined SRC Geoanalytical Laboratories' procedures.

Sample Preparation Packages

SANDSTONE ROCK / CORE

Description	Code
Non-Radioactive - Crush, Split, Agate Grind	C/S/A
Non-Radioactive - Crush, Split, Mild Steel Grind	C/S/G

BASEMENT / MINERALIZED ROCK / CORE

Description	Code
Non-Radioactive - Crush, Split, Agate Grind	C/S/A
Non-Radioactive - Crush, Split, Mild Steel Grind	C/S/G
Radioactive – Crush, Split, Agate Grind* (low level RA ONLY)	RA/C/S/A
Radioactive – Crush, Split, Mild Steel Grind*	RA/C/S/G
*Radioactive Decontamination Costs (average 4 hours)	RA/DC

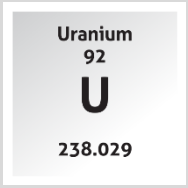
SOIL AND SEDIMENT

Description	Code
Dry, Mortar, Sieve – 180 µm	
Dry Screen – per size fraction (price based on 500 g sample)	
Dry, Grind	
Wet Sieve – 106 µm	
Roller pinning @ -2 mm	

OTHER

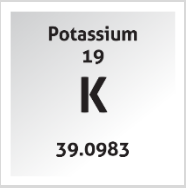
Description	Code
Clay Separation Centrifuge	
Diamond Services	DIA
Extra Split	
Potash - Crush, Split, Mild Steel Grind	

ANALYTICAL PACKAGES BY COMMODITY



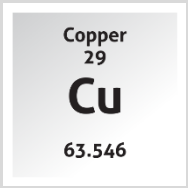
Uranium

As a result of the first major uranium find in Saskatchewan at Rabbit Lake in 1969, SRC established its geoanalytical laboratory in 1973, specializing in geochemical analysis.



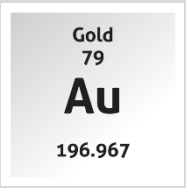
Potash

SRC has a dedicated, standalone potash assay laboratory and has developed the standards for potash analysis that are used worldwide.



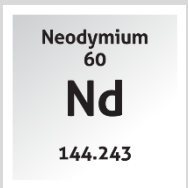
Base Metals

SRC has established a dedicated sensor-based sorting facility to help add value to base metals projects.



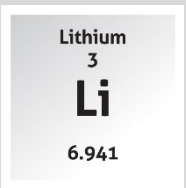
Precious Metals

SRC has expanded their current fire assay facilities to better service the precious metals industry.



Rare Earth Elements

SRC is building a Rare Earth Processing Facility—the first of its kind in Canada—laying the foundation for a rare earth element (REE) supply chain in the province and beyond.



Specialty Commodities

SRC has the capability to produce demonstration quantities of marketing products for clients of industrial minerals and other specialty commodities such as lithium.

Multi-Element Packages

Multi-Element Package (code ICP1)

Total Digestion ICP-OES

Total digestions are performed on an aliquot of sample pulp for the analysis of the requested elements by ICP-OES. The aliquot is digested to dryness in a Teflon tube within a hot block digestion system using a mixture of concentrated HF:HNO_3:$HClO_4$. The residue is dissolved in dilute HNO_3.

DETECTION LIMITS (DL)

Element	Sandstone Det. Limit	Basement Det. Limit	Element	Sandstone Det. Limit	Basement Det. Limit
Ag (Silver)	0.2 ppm	0.2 ppm	Na_2O (Sodium)	0.01%	0.01%
Al_2O_3 (Aluminum)	0.01%	0.01%	Nb (Niobium)	1 ppm	1 ppm
Ba (Barium)	1 ppm	1 ppm	Nd (Neodymium)	1 ppm	1 ppm
Be (Beryllium)	0.2 ppm	0.2 ppm	Ni (Nickel)	1 ppm	1 ppm
CaO (Calcium)	0.01%	0.01%	P_2O_5 (Phosphorus)	0.002%	0.01%
Cd (Cadmium)	0.2 ppm	1 ppm	Pb (Lead)	1 ppm	1 ppm
Ce (Cerium)	1 ppm	1 ppm	Pr (Praseodymium)	1 ppm	1 ppm
Co (Cobalt)	1 ppm	1 ppm	S (Sulfur)	10 ppm	10 ppm
Cr (Chromium)	1 ppm	1 ppm	Sc (Scandium)	1 ppm	1 ppm
Cu (Copper)	1 ppm	1 ppm	Sm (Samarium)	0.5 ppm	1 ppm
Dy (Dysprosium)	0.2 ppm	0.2 ppm	Sn (Tin)	1 ppm	1 ppm
Er (Erbium)	0.2 ppm	0.2 ppm	Sr (Strontium)	1 ppm	1 ppm
Eu (Europium)	0.2 ppm	0.2 ppm	Ta (Tantalum)	1 ppm	1 ppm
Fe_2O_3 (Iron)	0.01%	0.01%	Tb (Terbium)	0.3 ppm	1 ppm
Ga (Gallium)	1 ppm	1 ppm	Th (Thorium)	1 ppm	1 ppm
Gd (Gadolinium)	0.5 ppm	1 ppm	TiO_2 (Titanium)	0.002%	0.01%
Hf (Hafnium)	0.5 ppm	1 ppm	U (Uranium)	2 ppm	2 ppm
Ho (Holmium)	0.4 ppm	1 ppm	V (Vanadium)	1 ppm	1 ppm
K_2O (Potassium)	0.002%	0.01%	W (Tungsten)	1 ppm	1 ppm
La (Lanthanum)	1 ppm	1 ppm	Y (Yttrium)	1 ppm	1 ppm
Li (Lithium)	1 ppm	1 ppm	Yb (Ytterbium)	0.1 ppm	0.1 ppm
MgO (Magnesium)	0.002%	0.01%	Zn (Zinc)	1 ppm	1 ppm
MnO (Manganese(II))	0.001%	0.01%	Zr (Zirconium)	1 ppm	1 ppm
Mo (Molybdenum)	1 ppm	1 ppm			

Partial Digestion ICP-OES

Partial digestions are performed on an aliquot of sample for the analysis of the requested elements by ICP-OES. An aliquot of pulp is digested in a test tube in a mixture of HNO_3:HCl, in a hot water bath and then diluted using deionized water.

DETECTION LIMITS

Element	Sandstone Det. Limit	Basement Det. Limit	Element	Sandstone Det. Limit	Basement Det. Limit
Ag (Silver)	0.1 ppm	0.2 ppm	Ni (Nickel)	0.1 ppm	1 ppm
As (Arsenic)	0.2 ppm	1 ppm	Pb (Lead)	0.02 ppm	1 ppm
Bi (Bismuth)	0.2 ppm	1 ppm	Sb (Antimony)	0.2 ppm	1 ppm
Co (Cobalt)	0.1 ppm	1 ppm	Se (Selenium)	0.2 ppm	1 ppm
Cu (Copper)	0.1 ppm	1 ppm	Te (Tellurium)	0.2 ppm	1 ppm
Ge (Germanium)	0.2 ppm	1 ppm	U (Uranium)	0.5 ppm	1 ppm
Hg (Mercury)	0.2 ppm	1 ppm	V (Vanadium)	0.1 ppm	1 ppm
Mo (Molybdenum)	0.1 ppm	1 ppm	Zn (Zinc)	0.1 ppm	1 ppm

ICP-MS Package

ICP-MS Package

Generally, samples analyzed by this package are non-radioactive, non-mineralized sandstones or basements.

CODES

Sandstone Exploration Package	**ICP-MS1**
Basement Exploration Package	**ICP-MS2**

The detection limits achievable by ICP-MS for sandstone samples are lower than that for regular ICP-OES analyses. A detection limit of at least 10 times more sensitivity than that from ICP-OES can be achieved for elements such as As, Co, Cu, Mo, Ni, Pb, U, and V. To aid in the sensitivity of the analysis, ultra-pure acids are used for the ICP-MS digestions. This ensures that potential contamination for incompatible elements is reduced and leads to a greater sensitivity during analysis.

The package consists of three separate analyses:

- One ICP-MS analysis on the partial digestion
- One ICP-OES analysis for major and minor elements on the total digestion
- One ICP-MS analysis for trace elements on the total digestion

The ICP-MS detection limits for total analysis will include all elements except the following:

- Al_2O_3, CaO, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, TiO_2, Ba, Ce, Cr, La, Li, Sr, S, V and Zr
- These elements will be analyzed only by ICP-OES on the total digestion.

As, Ge, Hg, Sb, Se and Te will be done on the partial digestion only; these elements are not suited to the total digestion analysis.

In addition, the package includes several extra elements analyzed by ICP-MS on both the partial and total digestions:

- Lead isotopes (^{204}Pb, ^{206}Pb, ^{207}Pb, and ^{208}Pb), Cs and Rb

TOTAL DIGESTION

Total digestions are performed on an aliquot of sample pulp. The aliquot is digested to dryness in a Teflon tube within a hot block digestion system using a mixture of concentrated HF:HNO_3:$HClO_4$. The residue is dissolved in dilute HNO_3.

PARTIAL DIGESTION

Partial digestions are performed on an aliquot of sample pulp. The aliquot is digested in a mixture of concentrated nitric: hydrochloric acid (HNO_3:HCl) in a test tube in a hot water bath, then diluted using deionized water.

TOTAL DIGESTION

Element	Sandstone Det. Limit	Basement Det. Limit	Element	Sandstone Det. Limit	Basement Det. Limit
Ag (Silver)	0.02 ppm	0.02 ppm	Nb (Niobium)	0.1 ppm	0.1 ppm
Al_2O_3 (Aluminum)	*0.01%	*0.01%	Nd (Neodymium)	0.1 ppm	0.1 ppm
Ba (Barium)	*1 ppm	*1 ppm	Ni (Nickel)	0.1 ppm	0.1 ppm
Be (Beryllium)	0.1 ppm	0.1 ppm	P_2O_5 (Phosphorus)	*0.002%	*0.002%
Bi (Bismuth)	0.1 ppm	0.1 ppm	Pb (Lead)	0.02 ppm	0.02 ppm
CaO (Calcium)	*0.01%	*0.01%	^{204}Pb (Lead^{204})	0.01 ppm	0.01 ppm
Cd (Cadmium)	0.1 ppm	0.1 ppm	^{206}Pb (Lead^{206})	0.02 ppm	0.02 ppm
Ce (Cerium)	*1 ppm	*1 ppm	^{207}Pb (Lead^{207})	0.02 ppm	0.02 ppm
Co (Cobalt)	0.02 ppm	0.02 ppm	^{208}Pb (Lead^{208})	0.02 ppm	0.02 ppm
Cr (Chromium)	*1 ppm	*1 ppm	Pr (Praseodymium)	0.1 ppm	0.1 ppm
Cs (Cesium)	0.1 ppm	0.1 ppm	Rb (Rubidium)	0.1 ppm	0.1 ppm
Cu (Copper)	0.1 ppm	0.1 ppm	S (Sulfur)	10 ppm	10 ppm
Dy (Dysprosium)	0.02 ppm	0.02 ppm	Sc (Scandium)	0.1 ppm	0.1 ppm
Er (Erbium)	0.02 ppm	0.02 ppm	Sm (Samarium)	0.1 ppm	0.1 ppm
Eu (Europium)	0.02 ppm	0.02 ppm	Sr (Strontium)	*1 ppm	*1 ppm
Fe_2O_3 (Iron(III))	*0.01%	*0.01%	Ta (Tantalum)	0.1 ppm	0.1 ppm
Ga (Gallium)	0.1 ppm	0.1 ppm	Tb (Terbium)	0.02 ppm	0.02 ppm
Gd (Gadolinium)	0.1 ppm	0.1 ppm	Th (Thorium)	0.02 ppm	0.02 ppm
Hf (Hafnium)	0.1 ppm	0.1 ppm	Sn (Tin)	0.02 ppm	0.02 ppm
Ho (Holmium)	0.02 ppm	0.02 ppm	TiO_2 (Titanium)	*0.002%	*0.002%
K_2O (Potassium)	*0.002%	*0.002%	U (Uranium)	0.02 ppm	0.02 ppm
La (Lanthanum)	*1 ppm	*1 ppm	V (Vanadium)	0.1 ppm	0.1 ppm
Li (Lithium)	*1 ppm	*1 ppm	W (Tungsten)	0.1 ppm	0.1 ppm
MgO (Magnesium)	*0.002%	*0.002%	Y (Yttrium)	0.1 ppm	0.1 ppm
MnO (Manganese(II))	*0.001%	*0.001%	Yb (Ytterbium)	0.02 ppm	0.02 ppm
Mo (Molybdenum)	0.01 ppm	0.01 ppm	Zn (Zinc)	1 ppm	1 ppm
Na_2O (Sodium)	*0.01%	*0.01%	Zr (Zirconium)	*1 ppm	*1 ppm

*Analysis carried out on ICP-OES

PARTIAL DIGESTION

Element	Det. Limit ICPMS1 & 2	Element	Det. Limit ICPMS1 & 2	Element	Det. Limit ICPMS1 & 2
Ag (Silver)	0.01 ppm	Hg (Mercury)	0.01 ppm	Se (Selenium)	0.1 ppm
As (Arsenic)	0.01 ppm	Ho (Holmium)	0.01 ppm	Sm (Samarium)	0.01 ppm
Be (Beryllium)	0.01 ppm	Mo (Molybdenum)	0.01 ppm	Sn (Tin)	0.01 ppm
Bi (Bismuth)	0.01 ppm	Nb (Niobium)	0.01 ppm	Ta (Tantalum)	0.01 ppm
Cd (Cadmium)	0.01 ppm	Nd (Neodymium)	0.01 ppm	Tb (Terbium)	0.01 ppm
Co (Cobalt)	0.01 ppm	Ni (Nickel)	0.01 ppm	Te (Tellurium)	0.01 ppm
Cs (Cesium)	0.01 ppm	Pb (Lead)	0.001 ppm	Th (Thorium)	0.01 ppm
Cu (Copper)	0.01 ppm	^{204}Pb (Lead^{204})	0.001 ppm	U (Uranium)	0.01 ppm
Dy (Dysprosium)	0.01 ppm	^{206}Pb (Lead^{206})	0.001 ppm	V (Vanadium)	0.1 ppm
Er (Erbium)	0.01 ppm	^{207}Pb (Lead^{207})	0.001 ppm	W (Tungsten)	0.1 ppm
Eu (Europium)	0.01 ppm	^{208}Pb (Lead^{208})	0.001 ppm	Y (Yttrium)	0.01 ppm
Ga (Gallium)	0.01 ppm	Pr (Praseodymium)	0.01 ppm	Yb (Ytterbium)	0.01 ppm
Gd (Gadolinium)	0.01 ppm	Rb (Rubidium Rubidium)	0.01 ppm	Zn (Zinc)	0.1 ppm
Ge (Germanium)	0.01 ppm	Sb (Antimony)	0.01 ppm	Zr (Zirconium)	0.01 ppm
Hf (Hafnium)	0.01 ppm	Sc (Scandium)	0.1 ppm		

*Gold can be added by request to this package.

Whole Rock Analysis and Trace Elements

Whole Rock* and Trace Element by Lithium Borate Fusion with ICP-OES and ICP-MS analysis (WR/TR1)

This package offers analysis of 13 analytes by ICP-OES and 48 analytes by ICP-MS. The Trace Element analysis can be carried out as a stand-alone analysis.

Method Summary

An aliquot of sample is fused with lithium borate flux in the Claisse TheOx® fusion instrument. The bead is then dissolved in dilute HNO_3 for analysis by ICP-MS and ICP-OES.

DETECTION LIMITS

Lithium Metaborate Fusion by ICP-OES

Element	Det. Limit	Element	Det. Limit	Element	Det. Limit
Al_2O_3 (Aluminum)	0.01%	MgO (Magnesium)	0.01%	Sc (Scandium)	2 ppm
CaO (Calcium)	0.01%	MnO (Manganese)	0.01%	SiO_2 (Silica)	0.1%
Cr (Chromium)	2 ppm	Na_2O (Sodium)	0.01%	TiO_2 (Titanium)	0.01%
Fe_2O_3 (Iron)	0.01%	P_2O_5 (Phosphorous)	0.01%	V (Vanadium)	2 ppm
K_2O (Potassium)	0.01%				

*This Whole Rock lithium borate fusion analysis forms part of the Whole Rock and Trace Element package.

Trace Elements by ICP-MS

Element	Det. Limit	Element	Det. Limit	Element	Det. Limit
Ag (Silver)	0.1 ppm	Hf (Hafnium)	0.1 ppm	Sb (Antimony)	1 ppm
As (Arsenic)	0.1 ppm	Hg (Mercury)	0.1 ppm	Se (Selenium)	1 ppm
Ba (Barium)	1 ppm	Ho (Holmium)	0.01 ppm	Sm (Samarium)	0.01 ppm
Be (Beryllium)	0.1 ppm	La (Lanthanum)	1 ppm	Sn (Tin)	0.1 ppm
Bi (Bismuth)	0.1 ppm	Lu (Lutetium)	0.01 ppm	Sr (Strontium)	1 ppm
Cd (Cadmium)	0.1 ppm	Mo (Molybdenum)	0.1 ppm	Ta (Tantalum)	0.01 ppm
Ce (Cerium)	1 ppm	Nb (Niobium)	1 ppm	Tb (Terbium)	0.01 ppm
Co (Cobalt)	0.1 ppm	Nd (Neodymium)	0.1 ppm	Te (Tellurium)	0.1 ppm
Cs (Cesium)	0.1 ppm	Ni (Nickel)	1 ppm	Th (Thorium)	0.01 ppm
Cu (Copper)	0.1 ppm	Pb (Lead)	0.02 ppm	Tm (Thulium)	0.01 ppm
Dy (Dysprosium)	0.01 ppm	^{204}Pb (Lead^{204})	0.01 ppm	U (Uranium)	0.01 ppm
Er (Erbium)	0.01 ppm	^{206}Pb (Lead^{206})	0.02 ppm	W (Tungsten)	1 ppm
Eu (Europium)	0.01 ppm	^{207}Pb (Lead^{207})	0.02 ppm	Y (Yttrium)	0.01 ppm
Ga (Gallium)	0.1 ppm	^{208}Pb (Lead^{208})	0.02 ppm	Yb (Ytterbium)	0.01 ppm
Gd (Gadolinium)	0.01 ppm	Pr (Praseodymium)	0.01 ppm	Zn (Zinc)	1 ppm
Ge (Germanium)	0.1 ppm	Rb (Rubidium)	0.1 ppm		

LOSS ON IGNITION (LOI)

An aliquot of pulp is heated to 1000°C and the weight loss is calculated.

DETECTION LIMIT

	Detection Limit
Loss on Ignition (LOI)	0.1%

Trace Elements ONLY (TR1)

Specialty Assays

Lithium Assay

Method Summary

TOTAL DIGESTION

An aliquot of pulp sample is digested to dryness in a Teflon tube within a hot block digestion system using a mixture of concentrated HF:HNO_3:$HClO_4$. The residue is dissolved in dilute HNO_3.

	Detection Limit
Li	1 ppm

The following analyses may also be selected as part of a comprehensive exploration package:

Boron

Method Summary

An aliquot of pulp is fused in a mixture of Na_2O_2/$NaCO_3$ flux in a muffle oven. The fused melt is dissolved in deionized water. The fusion solution is analyzed by ICP-OES.

	Detection Limit
Boron	2 ppm

In addition to our regular packages offered to the exploration industry, we provide a wider range of analyses that address specific project needs:

- Carbon (%) analysis (total, graphite, organic and inorganic)
- Sulfur (%) analysis (total, sulfate, sulfide)
- Ferrous iron content
- Density measurements (pyknometer, dry bulk and volume displacement)
- Loss On Ignition (LOI) and moisture determinations (wt%)
- Lead (Pb) isotope analysis ($^{208/206}$Pb, $^{207/206}$Pb, $^{206/204}$Pb, $^{207/204}$Pb, $^{208/204}$Pb)

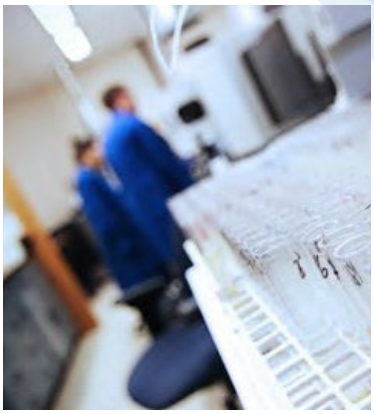
SRC Geoanalytical Laboratories is always exploring new ways in which to serve its customers. Please contact us if you have any special requirements.

CODE	Element	Symbol	Method	Det. Limit
C%	Carbon**	C	LECO Induction Furnace	0.01%
GC%	Graphite Carbon	GC	LECO Induction Furnace	0.01%
OC%	Organic Carbon	C	LECO Induction Furnace	0.01%
FeO%	Ferrous Iron	FeO	HF/H_2SO_4 titration	0.1%
LOI%	Loss on Ignition	LOI	1000°C	0.1%
DEN1	Density	DEN1	Pyknometer method	0.01
DEN2	Density	DEN2	Volume Displacement	0.01
DEN3	Density	DEN3	Dry Bulk method	0.01
DEN4	Density	DEN4	Wax & Oven Dry method	0.01
S%	Sulfur**	S	LECO Induction Furnace	0.01%
SO_4%	Sulfate	SO_4^{2-}	LECO Induction Furnace	0.01%
S_2%	Sulfide	S^{2-}	LECO Induction Furnace	0.01%
PbICPMS	Pb Isotopes ^{204}Pb ^{206}Pb ^{207}Pb ^{208}Pb	PbISO	ICP-MS	*

*SRM 981 precision available upon request
**Carbon and Sulfur (combined)

SRC Geoanalytical Laboratories offers additional analyses that address specific project needs:

- Carbonate analysis (Ca and Mg)
- Sand, silt and clay fractionation
- Conductivity testing



CODE	Analyte	Symbol	Method	Det. Limit
CaMg%	Carbonates	Ca, Mg	Dilute HCl, ICP	0.01%
SSC	Sand, Silt, & Clay	SSC	Pipette Method	0.10%
			EEM (5 extra sand fractions)	0.10%
COND			Conductivity Testing	

ASSAYS

Subject to availability, we offer single analyte assays for specialized geochemical analysis. The methods used for the assays may vary. Contact us for more information.

Element	Det. Limit	Element	Det. Limit	Element	Det. Limit
Ag (Silver)	0.2 ppm	Ga (Gallium)	0.01%	S (Sulfur Total)	0.01%
Al_2O_3 (Aluminum)	0.01%	Ge (Germanium)	0.01%	Sb (Antimony)	0.01%
As (Arsenic)	0.001%	K_2O (Potassium)	0.01%	Se (Selenium)	0.01%
B (Boron)	0.01%	La (Lanthanum)	0.01%	SiO_2 (Silicon)	0.01%
Ba (Barium)	0.01%	Li (Lithium)	0.01%	Sn (Tin)	0.01%
Be (Beryllium)	0.01%	MgO (Magnesium)	0.01%	Sr (Strontium)	0.01%
Bi (Bismuth)	0.01%	MnO (Manganese)	0.01%	Ta (Tantalum)	0.01%
C (Carbon Total)	0.01%	Mo (Molybdenum)	0.01%	Te (Tellurium)	0.01%
CaO (Calcium)	0.01%	Na_2O (Sodium)	0.01%	Th (Thorium)	0.01%
Cd (Cadmium)	0.01%	Nb (Niobium)	0.01%	Ti (Titanium)	0.01%
Ce (Cerium)	0.01%	Nd (Neodymium)	0.01%	V (Vanadium)	0.01%
Co (Cobalt)	0.001%	Ni (Nickel)	0.001%	W (Tungsten)	0.01%
Cr (Chromium)	0.01%	P_2O_5 (Phosphorous)	0.01%	Y (Yttrium)	0.01%
Cu (Copper)	0.001%	Pb (Lead Total)	0.001%	Zn (Zinc Total)	0.001%
Fe_2O_3 (Iron Total)	0.01%	Rb (Rubidium)	0.01%	Zr (Zirconium)	0.01%

Uranium

U_3O_8 wt% Assay

U_3O_8 Assay

This analyte may also be selected for high uranium samples as part of a comprehensive exploration package. Arsenic (ICP-OES finish) and selenium (ICP-MS finish) may be added to this assay.

The laboratory also offers an **ISO/IEC 17025 accredited method** for the determination of U_3O_8 wt% in geological samples. The U_3O_8 assay was developed by our team to deliver quality assay results for the uranium industry. We are one of only a few laboratories in the world that can provide this service.

Element	Detection Limit
U_3O_8	0.001 Wt%

Method Summary

An aliquot of sample pulp is digested in a concentration of $HCl:HNO_3$.

The digested volume is then made up with deionized water for analysis by ICP-OES.

QUALITY CONTROL

QC measures and data verification procedures applied include the preparation and analysis of reference materials, duplicates and blanks. The selection of reference material is based on the radioactivity level of the samples to be analyzed. An additional certified Fe_2O_3 standard is analyzed to correct for interference of iron in the analysis. Instruments are recalibrated after every 20 samples; multiple standards are analyzed before and after each recalibration.

The reference materials used are:

- BL-4a (CANMET)
- BL-2a (CANMET)
- BL-5 (CANMET)
- SRC U02 (SRC in-house prepared material)
- CUP-2 (CANMET)

This method is **ISO/IEC 17025** accredited by the Standards Council of Canada.

Arsenic and Selenium Assays may be added to the U_3O_8 Assay package.

Element	Detection Limit
As (ICP-OES)	0.001 wt%
Se (ICP-MS)	1 ppm

Uranium by ICP-MS

Method Summary

TOTAL DIGESTION

An aliquot of pulp sample is digested to dryness in a Teflon tube within a hot block digestion system using a mixture of concentrated HF:HNO_3:$HClO_4$. The residue is dissolved in dilute HNO_3.

PARTIAL DIGESTION

An aliquot of pulp sample is digested in a mixture of concentrated HNO_3:HCl acid in a test tube in a hot water bath, then diluted using deionized water.

Code	Detection Limit
U-ICPMS$_1$ (Total)	0.01 ppm
U-ICPMS$_2$ (Partial)	0.01 ppm

Rare Earth Elements and Rare Earth Metals

Ore-Grade Rare Earth Element Trace Analysis by Lithium Borate Fusion and ICP-OES Finish (REE1)

This package offers 21 analytes and is designed for the analysis of refractory REE ores.

Method Summary

An aliquot of sample is fused with lithium borate flux in the Claisse TheOx® fusion instrument. The bead is then dissolved in dilute HNO_3 for analysis by ICP-OES.

DETECTION LIMITS

Element	Det. Limit	Element	Det. Limit	Element	Det. Limit
Ce (Cerium)	0.002%	Ho (Holmium)	0vcx.002%	Sm (Samarium)	0.002%
Dy (Dysprosium)	0.002%	La (Lanthanum)	0.002%	Tb (Terbium)	0.002%
Er (Erbium)	0.002%	Lu (Lutetium)	0.002%	Th (Thorium)	0.002%
Eu (Europium)	0.002%	Nb (Niobium)	0.002%	Tm (Thulium)	0.002%
Ga (Gallium)	0.002%	Nd (Neodymium)	0.002%	U (Uranium)	0.002%
Gd (Gadolinium)	0.002%	Pr (Praseodymium)	0.002%	Y (Yttrium)	0.002%
Hf (Hafnium)	0.002%	Sc (Scandium)	0.002%	Yb (Ytterbium)	0.002%

Trace-Grade Rare Earth Analysis (REE2)

Method Summary

An aliquot of sample is fused with lithium borate flux in the Claisse TheOx® fusion instrument. The bead is then dissolved in dilute HNO_3 for analysis by ICP-MS.

DETECTION LIMITS

Element	Det. Limit	Element	Det. Limit	Element	Det. Limit
Ce (Cerium)	1 ppm	Lu (Lutetium)	0.01 ppm	Th (Thorium)	0.01 ppm
Dy (Dysprosium)	0.01 ppm	Nb (Niobium)	1 ppm	Tl (Thallium)	0.01 ppm
Er (Erbium)	0.01 ppm	Nd (Neodymium)	0.1 ppm	Tm (Thulium)	0.01 ppm
Eu (Europium)	0.01 ppm	Pr (Praseodymium)	0.01 ppm	U (Uranium)	0.01 ppm
Gd (Gadolinium)	0.01 ppm	Sm (Samarium)	0.01 ppm	Yb (Ytterbium)	0.01 ppm
Ho (Holmium)	0.01 ppm	Ta (Tantalum)	0.01 ppm	Y (Yttrium)	0.01 ppm
La (Lanthanum)	1 ppm	Tb (Terbium)	0.01 ppm		

ADDITIONAL ANALYSIS

The following additional analyte may be selected as part of a comprehensive package:

Scandium by Whole Rock Fusion and ICP-OES

An aliquot of sample is fused with lithium borate flux in the Claisse TheOx® fusion instrument. The bead is then dissolved in dilute HNO_3 for analysis by ICP-OES.

DETECTION LIMIT

Element	Symbol	Detection Limit
Scandium	Sc	2 ppm

Potash Packages

SRC Geoanalytical Laboratories has a potash preparation and analysis laboratory.

We offer an **ISO/IEC 17025 accredited method** for the determination of water soluble CaO, K_2O Na_2O, and MgO (wt%) in addition to other analytes that are of interest in potash exploration.

The Potash Assay was developed by the laboratory to deliver quality assay results for the potash industry. We are one of only a few laboratories in the world that can provide this service.

SCC Accredited LAB™

Potash Assay Grade (ICP2 Assay)

Soluble and Insoluble Digestion and ICP-OES Analysis

An aliquot of pulp is placed in a volumetric flask with DI water; the volumetric flask is placed in a water bath. The sample is shaken and then vacuum filtered. The filters are dried in a low-temperature oven then cooled in a desiccator and weighed. The soluble solution is then analyzed by ICP-OES.

DETECTION LIMITS

Element	Det. Limit	Element	Det. Limit	Element	Det. Limit
Ag (Silver)	0.2 ppm	Hf (Hafnium)	1 ppm	Sc (Scandium)	1 ppm
Al_2O_3 (Aluminum)	0.01%	Ho (Holmium)	1 ppm	Sm (Samarium)	1 ppm
Ba (Barium)	1 ppm	K_2O (Potassium)	0.01%	Sn (Tin)	1 ppm
Be (Beryllium)	0.2 ppm	La (Lanthanum)	1 ppm	Sr (Strontium)	1 ppm
CaO (Calcium)	0.01%	Li (Lithium)	1 ppm	Ta (Tantalum)	1 ppm
Cd (Cadmium)	1 ppm	MgO (Magnesium)	0.01%	Tb (Terbium)	1 ppm
Ce (Cerium)	1 ppm	MnO (Manganese (II))	0.01%	Th (Thorium)	1 ppm
Co (Cobalt)	1 ppm	Mo (Molybdenum)	1 ppm	TiO_2 (Titanium)	0.01%
Cr (Chromium)	1 ppm	Na_2O (Sodium)	0.01%	U (Uranium)	2 ppm
Cu (Copper)	1 ppm	Nb (Niobium)	1 ppm	V (Vanadium)	1 ppm
Dy (Dysprosium)	0.2 ppm	Nd (Neodymium)	1 ppm	W (Tungsten)	1 ppm
Er (Erbium)	0.2 ppm	Ni (Nickel)	1 ppm	Y (Yttrium)	1 ppm
Eu (Europium)	0.2 ppm	P_2O_5 (Phosphorus)	0.01%	Yb (Ytterbium)	0.1 ppm
Fe_2O_3 (Iron)	0.01%	Pb (Lead)	1 ppm	Zr (Zirconium)	1 ppm
Ga (Gallium)	1 ppm	Pr (Praseodymium)	1 ppm	Zn (Zinc)	1 ppm
Gd (Gadolinium)	1 ppm	S (Sulfur)	10 ppm		

	Detection Limit
Insoluble	0.1%

MOISTURE (WT%)

An aliquot of sample is placed into a pre-weighed crucible and heated overnight. The sample is then reweighed and the moisture is calculated as wt%.

	Detection Limit
Moisture	0.01%

ADDITIONAL ANALYSIS

The following analyses may also be selected as part of a comprehensive exploration package:

- Total Digestion with ICP-OES finish
- Chloride and Bromine by ICP-MS
- Sulfate by Ion Chromatography

DETECTION LIMITS

Element	Detection Limit
Chloride	0.01%
Bromine	0.01%

POT Total ICP Only
Cl and Br by ICP-MS
Sulfate by Ion Chromatography

For potash samples outside of Canada, please contact us for details.

PRECIOUS METALS AND PGMs

Fire Assay Techniques

Method Summary

An aliquot of sample pulp is mixed with our standard fire assay flux in a clay crucible and a silver inquart added prior to fusion.

After the mixture is fused, the melt is poured into a form which is cooled. The lead bead is then recovered and cupelled until only the precious metal bead remains. The bead is then parted in dilute HNO_3. The precious metals are dissolved in aqua regia and then diluted for analysis by ICP-OES and/or Atomic Absorption Spectrometry (AAS).

SRC Geoanalytical Laboratories participates in CANMET (CCRMP/PTP-MAL) and ITAK proficiency testing for elements assayed using this method. Certificates are available on our website.

GOLD BY FIRE ASSAY

CODE	Grade	Weight	Detection Limit	Finish
AU1	Low	15 g	2 ppb	ICP-OES / AAS
AU2	Low	30 g	1 ppb	ICP-OES / AAS
AU3	High	1 AT	0.01 g/tonne	Gravimetric

GOLD, PLATINUM AND PALLADIUM BY FIRE ASSAY

CODE	Weight	Detection Limit			Finish
		Au	Pt	Pd	
AU5	30 g	1 ppb	1 ppb	1 ppb	Axial ICP

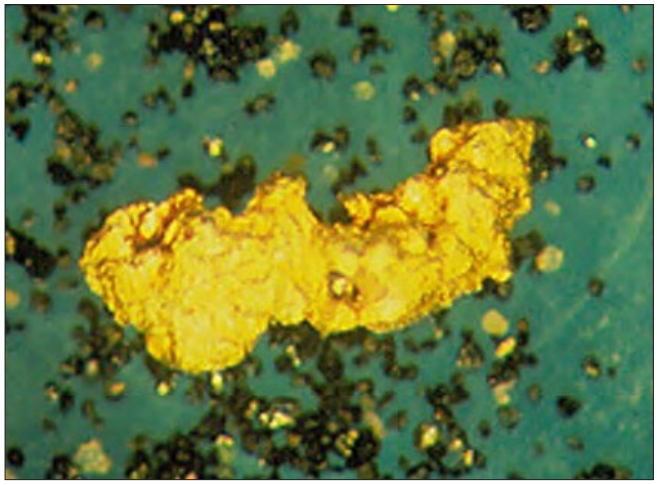
RHODIUM BY FIRE ASSAY

CODE	Weight	Detection Limit	Finish
RHFA1	15 g	2 ppb	Axial ICP
RHFA2	30 g	1 ppb	Axial ICP

SILVER BY AQUA REGIA OR FIRE ASSAY

CODE	Method	Grade g/ton	Weight	Detection Limit	Finish
AGAR	Aqua Regia	<100	1 g	0.2 ppm	ICP-OES
AGFA	Fire Assay	>100	30 g	1 g/tonne	Gravimetric

Gold Grain Recovery



Gold prospecting by recovering, counting and examining the metallic gold grain in till samples has proven to be several magnitudes more sensitive than typical gold analysis of soils. Till samples are subject to the various gravity and magnetic processes that will extract gold grains as small as 10 µm. Gold grains are identified using a binocular microscope.

CODE	Analysis
AU6	Tills ~ 7 Kg
AU7	Gold Grain Documentation

FINE GOLD DETERMINATION

Till samples may contain very fine gold (<10 µm) or absorbed gold. For this procedure, till are wet sieved at ±106 µm. The -106 µm fraction is then fire assayed for gold.

CODE	Analysis
AU8	Tills wet sieved ±106 µm
AU1	Au Fire Assay 15 g sub sample

METALLIC GOLD ASSAYING

Method Summary

The sample is completely crushed, ground, blended and split in half. One half is archived and the other is sieved at +/- 106 µm.

All the +106 µm material is fire assayed. Two 30 g replicates are fire assayed from the -106 µm fraction.

All weights, assays and calculations are reported.

CODE	Analysis
AU9	Metallic Gold Assay

*Quotes for various sample sizes are available. Please contact us for more details.

Base Metals Packages

Base Metals Exploration Package (ICP3)

This package was specifically designed for the gold/base metals exploration industry.

The package includes a total of 35 analytes by ICP-OES or ICP-MS. When combined with a Fire Assay technique, this will produce an effective exploration tool.

Please inform us of any requested changes from the original ICP3 package.

Method Summary - Aqua Regia Digestion ICP-OES/ICP-MS

Partial digestions are performed on an aliquot of sample for the analysis of the requested elements by ICP-OES or ICP-MS. An aliquot of pulp is digested in a test tube in a mixture of HCl:HNO_3, in a hot water bath and then diluted to 15 ml using deionized water.

DETECTION LIMITS (ICP-OES)

Element	Det. Limit	Element	Det. Limit	Element	Det. Limit
Al_2O_3 (Aluminum)	0.01%	La (Lanthanum)	1 ppm	Na_2O (Sodium)	0.01%
Sb (Antimony)	1 ppm	Pb (Lead)	1 ppm	Sr (Strontium)	1 ppm
As (Arsenic)	1 ppm	MgO (Magnesium)	0.001%	S (Sulfur)	10 ppm
Ba (Barium)	1 ppm	MnO (Manganese)	0.002%	Sn (Tin)	1 ppm
Be (Beryllium)	0.5 ppm	Hg (Mercury)	1 ppm	TiO_2 (Titanium)	0.01%
Bi (Bismuth)	1 ppm	Mo (Molybdenum)	1 ppm	W (Tungsten)	1 ppm
Cd (Cadmium)	1 ppm	Ni (Nickel)	1 ppm	U (Uranium)	1 ppm
CaO (Calcium)	0.01%	P_2O_5 (Phosphorous)	0.002%	V (Vanadium)	1 ppm
Cr (Chromium)	1 ppm	K_2O (Potassium)	0.01%	Y (Yttrium)	1 ppm
Co (Cobalt)	1 ppm	Sc (Scandium)	1 ppm	Zn (Zinc)	1 ppm
Cu (Copper)	1 ppm	Se (Selenium)	1 ppm	Zr (Zirconium)	1 ppm
Fe_2O_3 (Iron)	0.01%	Ag (Silver)	0.2 ppm		

DETECTION LIMITS (ICP-MS)

Element	Det. Limit	Element	Det. Limit	Element	Det. Limit
Al_2O_3 (Aluminum)	0.01 %	La (Lanthanum)	1 ppm	Na_2O (Sodium)	0.01 %
Sb (Antimony)	0.01 ppm	Pb (Lead)	0.001 ppm	Sr (Strontium)	1 ppm
As (Arsenic)	0.01 ppm	MgO (Magnesium)	0.001 %	S (Sulfur)	10 ppm
Ba (Barium)	1 ppm	MnO (Manganese)	0.002 %	Sn (Tin)	0.01 ppm
Be (Beryllium)	0.01 ppm	Hg (Mercury)	0.01 ppm	TiO_2 (Titanium)	0.01 %
Bi (Bismuth)	0.01 ppm	Mo (Molybdenum)	0.01 ppm	W (Tungsten)	0.1 ppm
Cd (Cadmium)	0.01 ppm	Ni (Nickel)	0.01 ppm	U (Uranium)	0.01 ppm
CaO (Calcium)	0.01 %	P_2O_5 (Phosphorous)	0.002%	V (Vanadium)	0.1 ppm
Cr (Chromium)	1 ppm	K_2O (Potassium)	0.001 %	Y (Yttrium)	0.01 ppm
Co (Cobalt)	0.01 ppm	Sc (Scandium)	0.1 ppm	Zn (Zinc)	0.1 ppm
Cu (Copper)	0.01 ppm	Se (Selenium)	0.1 ppm	Zr (Zirconium)	0.01 ppm
Fe_2O_3 (Iron)	0.01 %	Ag (Silver)	0.01 ppm		

Multi-Element Heavy Minerals Package (code ICP4)

Total Digestion ICP-OES

Total digestions are performed on an aliquot of sample pulp for the analysis of the requested elements by ICP-OES. The aliquot is digested to dryness in a Teflon tube within a hot block digestion system using a mixture of concentrated $HF:HNO_3:HClO_4$. The residue is dissolved in dilute HNO_3.

DETECTION LIMITS

Element	DL	Element	DL	Element	DL
Al_2O_3 (Aluminum)	0.01%	Fe_2O_3 (Iron)	0.01%	Na_2O (Sodium)	0.01%
Ba (Barium)	1 ppm	La (Lanthanum)	1 ppm	Sr (Strontium)	1 ppm
Be (Beryllium)	0.2 ppm	Pb (Lead)	1 ppm	S (Sulfur)	10 ppm
Cd (Cadmium)	1 ppm	Li (Lithium)	1 ppm	Ta (Tantalum)	1 ppm
CaO (Calcium)	0.01%	MgO (Magnesium)	0.01%	Tb (Terbium)	1 ppm
Ce (Cerium)	1 ppm	MnO (Manganese)	0.01%	Th (Thorium)	1 ppm
Cr (Chromium)	1 ppm	Mo (Molybdenum)	1 ppm	Sn (Tin)	1 ppm
Co (Cobalt)	1 ppm	Nd (Neodymium)	1 ppm	TiO_2 (Titanium)	0.01%
Cu (Copper)	1 ppm	Ni (Nickel)	1 ppm	W (Tungsten)	1 ppm
Dy (Dysprosium)	0.2 ppm	Nb (Niobium)	1 ppm	U (Uranium)	2 ppm
Er (Erbium)	0.2 ppm	P_2O_5 (Phosphorous)	0.01%	V (Vanadium)	1 ppm
Eu (Europium)	0.2 ppm	K_2O (Potassium)	0.01%	Yb (Ytterbium)	0.1 ppm
Gd (Gadolinium)	1 ppm	Pr (Praseodymium)	1 ppm	Y (Yttrium)	1 ppm
Ga (Gallium)	1 ppm	Sm (Samarium)	1 ppm	Zn (Zinc)	1 ppm
Hf (Hafnium)	1 ppm	Sc (Scandium)	1 ppm	Zr (Zirconium)	1 ppm
Ho (Holmium)	1 ppm	Ag (Silver)	0.2 ppm		

Aqua Regia Digestion ICP-OES

Partial digestions are performed on an aliquot of sample for the analysis of the requested elements by ICP-OES. An aliquot of pulp is digested in a test tube in a mixture of HCl:HNO_3, in a hot water bath and then diluted using deionized water.

DETECTION LIMITS

Element	Det. Limit	Element	Det. Limit	Element	Det. Limit
Ag (Silver)	0.2 ppm	Hg (Mercury)	1 ppm	Se (Selenium)	1 ppm
As (Arsenic)	1 ppm	Mo (Molybdenum)	1 ppm	Te (Tellurium)	1 ppm
Bi (Bismuth)	1 ppm	Ni (Nickel)	1 ppm	U (Uranium)	1 ppm
Co (Cobalt)	1 ppm	Pb (Lead)	1 ppm	V (Vanadium)	1 ppm
Cu (Copper)	1 ppm	S (Sulfur)	10 ppm	Zn (Zinc)	1 ppm
Ge (Germanium)	1 ppm	Sb (Antimony)	1 ppm		

ICP-MS Base Metals Package

ICP-MS Package

Generally, samples analyzed by this package are non-radioactive, non-mineralized sandstones or basements.

CODES

Basement Exploration Package **ICP-MS4AT**

The detection limits achievable by ICP-MS for sandstone samples are lower than that for regular ICP-OES analyses. A detection limit of at least 10 times more sensitivity than that from ICP-OES can be achieved for elements such as As, Co, Cu, Mo, Ni, Pb, U and V. To aid in the sensitivity of the analysis, ultra-pure acids are used for the ICP-MS digestions. This ensures that potential contamination for incompatible elements is reduced and leads to a greater sensitivity during analysis.

The package consists of three separate analyses:

- One ICP-MS analysis on the partial digestion
- One ICP-OES analysis for major and minor elements on the total digestion
- One ICP-MS analysis for trace elements on the total digestion

The ICP-MS detection limits for total analysis will include all elements except the following:

- Al_2O_3, CaO, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, TiO_2, Ba, Ce, Cr, La, Li, Sr, S, V and Zr
- These elements will be analyzed only by ICP-OES on the total digestion

As, Ge, Hg, Sb, Se and Te will be done on the partial digestion only; these elements are not suited to the total digestion analysis.

In addition, the package includes several extra elements analyzed by ICP-MS on both the partial and total digestions:

- Lead isotopes (^{204}Pb, ^{206}Pb, ^{207}Pb, and ^{208}Pb), Cs and Rb

TOTAL DIGESTION

Total digestions are performed on an aliquot of sample pulp. The aliquot is digested to dryness in a Teflon tube within a hot block digestion system using a mixture of concentrated HF:HNO_3:$HClO_4$. The residue is dissolved in dilute HNO_3.

TOTAL DIGESTION

Element	Sandstone Det. Limit	Basement Det. Limit	Element	Sandstone Det. Limit	Basement Det. Limit
Ag (Silver)	0.02 ppm	0.02 ppm	Mo (Molybdenum)	0.01 ppm	0.01 ppm
Al_2O_3 (Aluminum)	*0.01%	*0.01%	Na_2O (Sodium)	*0.01%	*0.01%
Ba (Barium)	*1 ppm	*1 ppm	Nb (Niobium)	0.1 ppm	0.1 ppm
Be (Beryllium)	0.1 ppm	0.1 ppm	Nd (Neodymium)	0.1 ppm	0.1 ppm
Bi (Bismuth)	0.1 ppm	0.1 ppm	Ni (Nickel)	0.1 ppm	0.1 ppm
CaO (Calcium)	*0.01%	*0.01%	P_2O_5 (Phosphorus)	*0.002%	*0.002%
Cd (Cadmium)	0.1 ppm	0.1 ppm	Pb (Lead)	0.02 ppm	0.02 ppm
Ce (Cerium)	*1 ppm	*1 ppm	Pr (Praseodymium)	0.1 ppm	0.1 ppm
Co (Cobalt)	0.02 ppm	0.02 ppm	Rb (Rubidium)	0.1 ppm	0.1 ppm
Cr (Chromium)	*1 ppm	*1 ppm	S (Sulfur)	10 ppm	10 ppm
Cs (Cesium)	0.1 ppm	0.1 ppm	Sc (Scandium)	0.1 ppm	0.1 ppm
Cu (Copper)	0.1 ppm	0.1 ppm	Sm (Samarium)	0.1 ppm	0.1 ppm
Dy (Dysprosium)	0.02 ppm	0.02 ppm	Sr (Strontium)	*1 ppm	*1 ppm
Er (Erbium)	0.02 ppm	0.02 ppm	Ta (Tantalum)	0.1 ppm	0.1 ppm
Eu (Europium)	0.02 ppm	0.02 ppm	Tb (Terbium)	0.02 ppm	0.02 ppm
Fe_2O_3 (Iron(III))	*0.01%	*0.01%	Th (Thorium)	0.02 ppm	0.02 ppm
Ga (Gallium)	0.1 ppm	0.1 ppm	Sn (Tin)	0.02 ppm	0.02 ppm
Gd (Gadolinium)	0.1 ppm	0.1 ppm	TiO_2 (Titanium)	*0.002%	*0.002%
Hf (Hafnium)	0.1 ppm	0.1 ppm	U (Uranium)	0.02 ppm	0.02 ppm
Ho (Holmium)	0.02 ppm	0.02 ppm	V (Vanadium)	0.1 ppm	0.1 ppm
K_2O (Potassium)	*0.002%	*0.002%	W (Tungsten)	0.1 ppm	0.1 ppm
La (Lanthanum)	*1 ppm	*1 ppm	Y (Yttrium)	0.1 ppm	0.1 ppm
Li (Lithium)	*1 ppm	*1 ppm	Yb (Ytterbium)	0.02 ppm	0.02 ppm
MgO (Magnesium)	*0.002%	*0.002%	Zn (Zinc)	1 ppm	1 ppm
MnO (Manganese(II))	*0.001%	*0.001%	Zr (Zirconium)	*1 ppm	*1 ppm

*Analysis carried out on ICP-OES

Base Metals Assay (ICP3 Assay)

Base Metals wt% Assay

This assay was developed for the exploration of base metals.

Analyte	Detection Limit	Analyte	Detection Limit
As	0.001 wt%	Ni	0.001 wt%
Co	0.001 wt%	Pb	0.001 wt%
Cu	0.001 wt%	Zn	0.001 wt%

Method Summary

An aliquot of sample pulp is digested in a concentration of HCl:HNO_3.

The digested volume is then made up with deionized water for analysis by ICP-OES.

ADVANCED MICROANALYSIS CENTRE™

SRC's Advanced Microanalysis Centre™ is operated and maintained by a group of specialized scientists and technicians dedicated to providing high quality data and services to the mining industry and other sectors.

International customers using the Advanced Microanalysis Centre™ represent several mineral sectors, including diamonds uranium, gold, base metals, potash, rare earth elements and petroleum.

The equipment and services at the Advanced Microanalysis Centre™ include:

- Electron microprobe analysis (Cameca SX-100)
- QEMSCAN®
- SEM (FEI Quanta 650 field-emission)
- Laser-ablation (NewWave UP213)
- High-resolution ICP-MS (Nu Attom)
- XRD (Bruker D4 Endeavor)
- Polished thin sectioning
- Radioactive thin section preparation
- Digital electron
- Core splitting and polishing

Electron Probe Micro-Analyzer (EPMA)

SERVICES, FEATURES AND EQUIPMENT

The Cameca SX-100 electron microprobe is equipped with five wavelength dispersive spectrometers and fitted with a variety of large area diffraction crystals. This provides the greatest possible sensitivity for quantitative analysis, from boron to uranium.

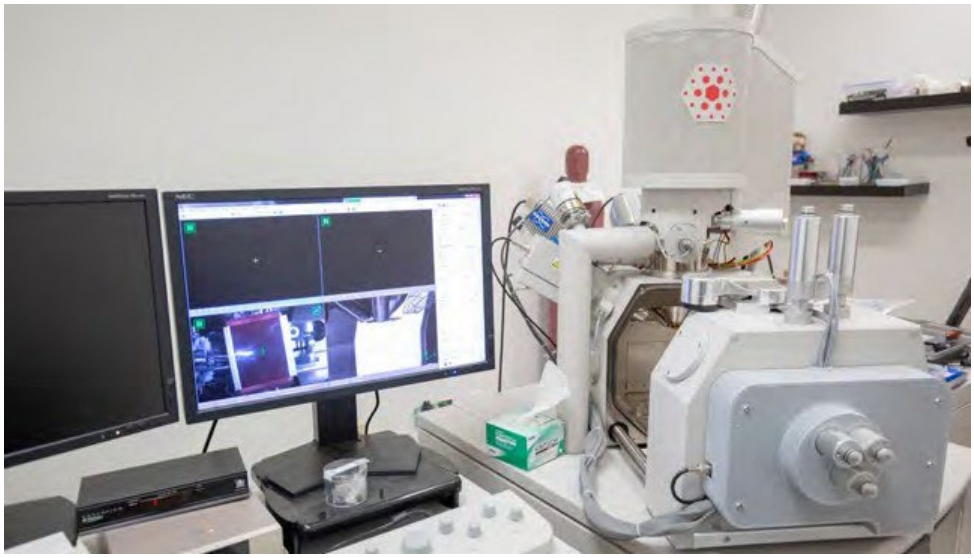
Typical uses include:

- Diamond indicator mineral chemistry
- Minor and trace gold in sulfide minerals (cryptic gold)
- Purity of metal alloy catalysts
- Quantification of deleterious elements in high-purity materials
- Rare earth element (REE) analysis of heavy mineral concentrates
- Element diffusion profiles in metals and minerals
- Forensic analysis of process contaminants (e.g., Pb in plumbing solder)
- U-Th-Pb analysis for chemical dating of uranium minerals

EPMA available on a fee-for-service basis

A minimum fee for kimberlite indicator minerals may apply.

QEMSCAN® Analysis



QEMSCAN® is used in mineral processing to assess the key characteristics of targeted minerals in order to design efficient recovery processes. In mineral exploration, QEMSCAN® can be used to provide quantitative modal analysis and virtual petrography on thin sections and core for target prioritization.

QEMSCAN® analysis in oil and gas exploration can be used to quantify and characterize the porosity of fine-grained reservoir rocks as part of virtual petrography and modal mineralogical analysis.

SERVICES AVAILABLE

- Sample preparation
  - 30-mm diameter (metallurgical) block mount preparation
  - Pseudo-core preparation (for very coarse-grained samples)
- Analytical
  - Mineral database localization
  - Proprietary mineral database development
  - Rapid modal mineral abundance
  - Quantitative modal mineralogy
  - Elemental deportment
  - Grain size distribution
  - Target mineral liberation and associations
  - Grade recovery prediction
  - Digital petrography of thin sections and core
  - Quantitative mineral chemical composition by electron microprobe analysis
  - Data compilation and report preparation

QEMSCAN® Mineralogy/Metallurgy Analysis

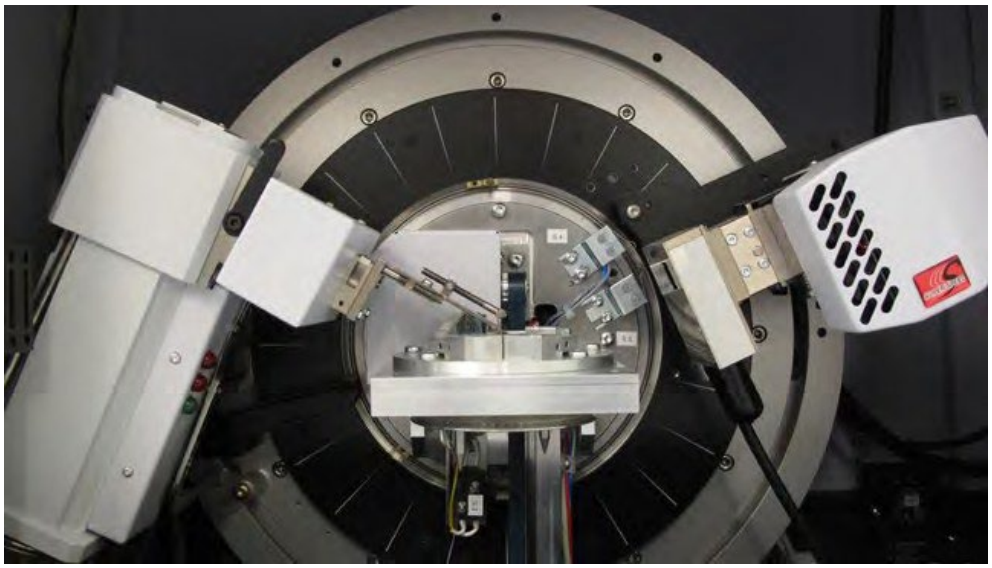
	Mineralogy	Mineralogy+	Rapid Mineralogy
Analysis Mode	Particle	Particle	Particle
Sample Type	30 mm Ø	30 mm Ø	30 mm Ø / Thin Section
Particles Analyzed	100 k	100 k	100 k
Spot Spacing (µm)	2 – 5	2 – 5	5
Line Spacing (µm)	-	-	50
X-ray Data Points	1 M	1 M	1 M
Data Reported			
Modal Mineralogy	✔	✔	✔
Porosity	✔	✔	-
Mineralogy Images	✔	✔	-
Analytical Statistics	✔	✔	✔
Particle Grain Size Distribution (PSD)	✔	✔	-
Mineral Grain Size Distribution (GSD)	✔	✔	-
Target Mineral Associations	-	✔	-
Target Mineral Liberation	-	✔	-
Grade-Recovery Curve	-	✔	-
Element Deportment	-	✔	-

Scanning Electron Microscope (SEM) Analysis

The FEI Quanta 650 scanning electron microscope fitted with a field emission gun (9 nm resolution) and dual Bruker X-Flash 5030 energy dispersive spectrometers are used in SEM analysis.

We can take Back Scattered Electron (BSE) and Secondary Electron (SE) images and provide qualitative EDS analysis.

X-ray Diffraction (XRD) Analysis



The X-ray diffraction (XRD) system is a powerful tool used to characterize crystalline materials. It permits both qualitative and quantitative analysis of minerals or other crystalline compounds present in samples.

FEATURES

- Effective method for determining bulk/clay mineralogy using random or semi-oriented mounts
- Automatic sample changer with three types of sample holders for powder and clay samples (back-packed, vacuum filtered and zero background)
- Data analyses and interpretation using algorithms in MDI Product JADE v.9 software, including search/match and whole pattern fitting plug-ins
- Reference data from the American Mineralogist Crystal Structure Database with empirically derived relative intensity ratios

XRD Services

Service	Description
Quantitative XRD	***Analysis*** – This technique is used to determine the abundance of minerals in a sample. Minerals present in low abundance (<2%) may not be reliably identified or quantified. Amorphous material cannot be quantified. ***Sample*** – Requires a minimum sample of 25 g

Note: Hand samples, picked chips or ground powders can be submitted. Some sample types may require lengthy preparation and/or clean-up procedures. In such cases, an additional sample preparation charge may be applied.

Petrographic Services

SRC's Advanced Microanalysis Centre™ provides a range of petrographic services, from preparing premium polished and standard thin sections to complete petrographic reporting.

Thin sections are prepared to high standards with an emphasis on preparations involving difficult-to-work-with geologic materials, such as:

- Clay-altered samples
- Uranium ore and other radioactive materials (CNSC-licensed facility)
- Kimberlite
- Base metal sulfide ores

All thin sections and grain mounts are highly polished for reflected light microscopy, SEM, EPMA and laser ablation ICP-MS analysis.

Digital Petrography

Petrographic analyses are done by QEMSCAN® using an FEI Quanta 650 scanning electron microscope fitted with a field emission gun (9 nm resolution) and dual Bruker X-Flash 5030 energy dispersive spectrometers giving a maximum throughput of 1.5 Mbps.

PETROGRAPHIC SERVICES

Grain Mount Preparation (Submicron Finish)

Description
ADD7 – Kimberlite indicator minerals (per 100 grains)
Detrital zircon (per 100 grains)

Petrographic Thin Section (30 µm thick)

Description	Size
Non-Radioactive	27 x 46 mm
Radioactive	27 x 46 mm

Samples Requiring Special Processing

Description
Surface epoxy treatments
Extra cutting (oversized samples)

Additional Laboratory Services

Description
Polished slabs *
Polish core *

QEMSCAN® Petrographic Analysis

	Coarse	Fine	Ultra-Fine
Analysis Mode	Field	Field	Field
Sample Type	Thin section/core	Thin section/core	Thin section/core
Size (mm)	40 x 20	10 x 10	5 x 5
Spot Spacing (µm)	20	10	3
X-ray Data Points	2.6 M	1 M	2.8 M
Data Reported			
Modal Mineralogy	✔	✔	✔
Porosity	✔	✔	✔
Mineralogy Map	✔	✔	✔
Average Grain Size	✔	✔	✔
Rock Classification	✔	✔	✔
Analytical Statistics	✔	✔	✔

DIAMOND SERVICES

SRC Geoanalytical Laboratories Diamond Services has provided the international diamond industry with dependable kimberlite exploration services for over 25 years, including:

- Micro diamond extraction by caustic fusion
- Mini-bulk sample processing, recovery and secure sorting of macro diamonds
- Indicator mineral processing and observation

Building on our core expertise, the lab is continually improving services and expanding its capacity. We offer an extensive range of services that are unique to the Canadian market, which provides convenient processing for diamond companies. Our lab is the only place in Canada that characterizes diamonds for recovery attributes.

QUALITY

SRC Geoanalytical Laboratories is accredited to the ISO/IEC 17025 standard by the Standards Council of Canada as a testing laboratory for specific tests.

SECURITY

All diamond work is carried out in a high-security facility monitored by 24-hour video surveillance and security personnel. Access to this facility is limited and controlled, and prior arrangements are required for any viewings.

SERVICES

- **Diamond Recovery and Grade Assessment**
  - Processing mini-bulk samples from exploration or mine sites
  - Processing concentrates from dense media separation
  - Diamond recovery using comminution, DMS, X-rays, grease, magnetics, caustic fusion and hand-sorting
  - Sieve classification by square mesh, DTC and Pierres sieves
  - Rough stone descriptions based on a standardized classification scheme
- **Digital Photography**
  - High-resolution macro photography of diamond parcels
  - Geologic groupings, diamond parcel layouts and recovery comparisons
- **Breakage Studies**
  - Examination of diamond surfaces by microscope and SEM
  - Diamond reconstruction from matching fragments
  - Estimation of original diamond size and percent loss

- **Diamond Typing, Color and Shape Classification**
  - Nitrogen, boron, hydrogen contaminant analysis by microscope FT-IR
  - Diamond typing from N-data (IaA, IaB, IaAB, Ib or II)
  - Objective gemological colour classification
  - Diamond shape classification

- **Diamond Sorting and Valuation**
  - Rough diamond parcel sorting including, but not limited to, colour, shape, quality and clarity
  - Price estimates of individual diamonds and diamond parcels by a certified diamond valuator
  - Certification of rough and cut and polished diamonds

- **Diamond Inclusion and Xenolith Studies**
  - Analysis of silicate/oxide and sulfide inclusions
  - FT-IR analysis of host diamond
  - Xenolith thin sectioning for major- and trace-elements
  - Texture imaging and mineral associations using QEMSCAN®

- **Size Frequency Distribution**
  - Estimation of largest diamond size for a kimberlite facies
  - Calculation of large diamond sizes for equipment selection

- **X-ray Luminescence Measurements**
  - Luminescence intensity response of diamonds and minerals
  - Luminescence decay times of diamonds and minerals
  - Determination of X-ray recovery parameter settings

- **Densimetric Analysis**
  - Heavy liquid separations
  - Calculating percent sinks at various densities and sizes
  - Quantifying misplaced material of dense media separation
  - 3-Curve density analysis of dense media separation

- **Magnetic Concentration**
  - Evaluation of magnetic material in a process stream
  - Verification of the occurrence of any magnetic diamonds
  - Magnetic susceptibility measurements

- **Grease Recovery**
  - Evaluation of diamonds recovered on grease for each size fraction
  - X-ray characterization of grease recovered diamonds

- **Liberation Analysis**
  - Assess non-liberated diamonds for different comminution parameters using caustic fusion
  - Granulometry for each liberation process; jaw crushing, cone crushing, High-Pressure Grinding Rolls, scrubbing
- **Audits**
  - Technical audit of process equipment and operations
  - Audit of plants for overall recovery efficiency
- **Environmental Support**
  - Characterization of kimberlite composition for stockpile leaching
  - Process water analysis for recycling and containment planning
  - Determination of percentage clays and grits produced per kimberlite facies
  - Settling tests of -1 mm material and clay analysis by XRD
- **Heavy Mineral Analysis**
  - Preparing a heavy mineral concentrate using a range of techniques (Sweco, micro DMS, Shaker Table, magnetic separation)
  - Heavy liquid separations at a range of densities
  - Ferromagnetic and paramagnetic separations
  - Mineral observations and descriptions using high resolution microscopes
  - Confirmation of grains using a bench top Scanning Electron Microscope (SEM)
  - Digital photography of individual grains and background concentrates

Diamond Services Laboratory

Saskatchewan Research Council
Geoanalytical Laboratories - Diamond Services
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S7K 0X8

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Facsimile: 1-306-933-7197
E-mail: diamonds@src.sk.ca
Website: www.src.sk.ca/diamonds

Laboratory Manager

Mike McCubbing
E-mail: mike.mccubbing@src.sk.ca

MINERAL PROCESSING

SRC's Mineral Processing team provides leading-edge research, development and demonstration services for a variety of commodities and mineral processing technologies. We help maximize your resource and improve productivity at every stage of the mining cycle, from exploration to closure.

We work in all commodities including potash, uranium, lithium, rare earth elements, base metals and precious metals.

Our team of engineers and scientists can customize testing and design to meet the unique needs of mining companies.

SERVICE CAPABILITIES

- Testing
  - Bench
  - Pilot
  - Field
- Evaluation
  - Mineralogy
  - Process
  - Equipment
- Design
- Optimization and Troubleshooting Product Manufacture

TECHNOLOGIES

- **New Technologies**
  - Particle ore sorting and sensor-based sorting technologies
  - In-situ recovery, particularly for potash and uranium applications
  - Novel lithium and rare earth recovery technologies
- **Comminution and Milling**
  - Indices (crushing, abrasion, ball mill, rod mill)
  - SAG Design test for semi- autogenous mill design
  - Attrition scrubbing, desliming, screening and cyclone testing
- **Physical Separation**
  - Magnetic separation (dry, wet, high intensity, low intensity)
  - Electrostatic separation (free-fall and drum)
  - Gravity separation (shaking tables, Knelson concentrator, DMS, heavy liquid separation)
  - Liberation analysis (floats and sinks)
  - Ore sorting: Radiometric sorting and XRT

- **Hydrometallurgical Processes at Bench or Pilot-Scale**
  - Leaching (acid leaching, alkaline leaching, cyanidation – agitated and column, hot leaching, cold leaching)
  - Crystallization, evaporation, precipitation, simulated solar pond evaporation
  - Flotation (mechanical flotation, hydroflotation, column flotation, pneumatic flotation)
  - Solvent extraction, fractional precipitation
  - Ion exchange
- **Slurry Flow, Thickening and Solid-liquid Separation Testwork**
  - Pipe flow modelling for slurries, viscosity measurements for slurries in pipelines and MBI clay analysis (from SRC's Pipe Flow Technology Centre™)
  - Filtration (vacuum filtration and pressure filtration, lab and pilot filter press and centrifuge)
  - Settling (static settling, flocculant screening, dynamic settling, pilot thickening)
  - Hydroclassifiers
- **Tailings and Effluent**
  - Tailings flow and deposition (bench and pilot-scale from SRC's Pipe Flow Technology Centre™)
  - Mine water treatment
  - Tailings treatment
  - Paste backfilling tests
  - Acid generation potential

Mineral Processing

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Laboratory Manager

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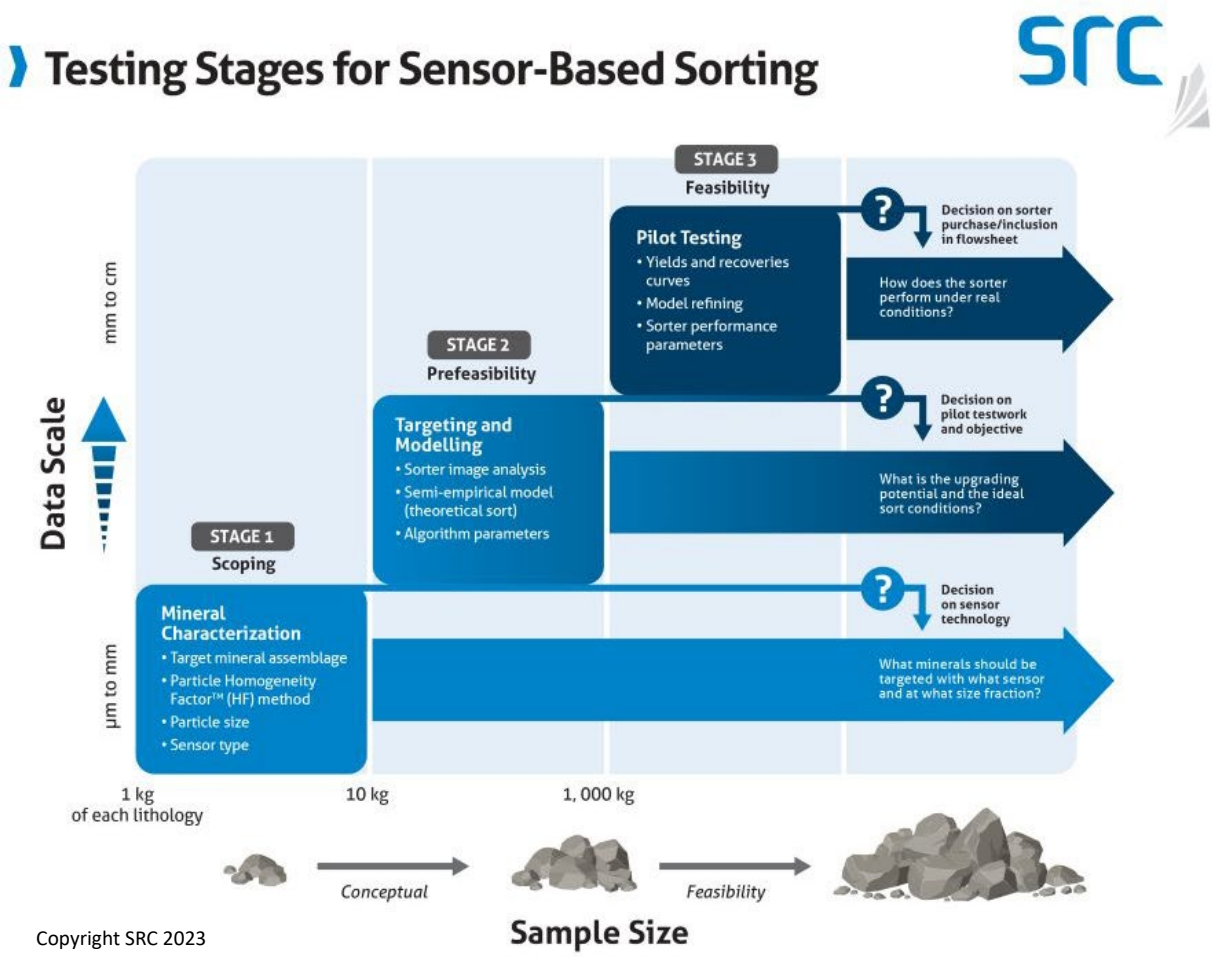
SORTING

SRC's experts in its Minerals Liberation Sorting Centre apply their understanding of sensor performance, mineral characterization and processing to help assess the economic viability of sorting options. We have experience with sorting technologies and equipment and offer sensor-based sorting process development, testing and piloting as part of our full suite of mining services.

TESTING STAGES FOR SENSOR-BASED SORTING

SRC has designed a testing regime to assist industry clients with choosing the right sensor-based sorting technology for their needs. The regime starts with sensor-based mineral characterization, then targeting and modelling, and finishes with pilot-scale testing.



STAGE 1: SENSOR-BASED MINERALOGICAL CHARACTERIZATION – A NOVEL TEST FOR ORE AMENABILITY TO XRT SORTING

X-ray transmission (XRT) is a common sensor-based sorting technology and is often used by mining companies who are in the early stages of evaluating sorting use in their operation. Other technologies include colour, laser, near infra-red (NIR) and optical.

SRC has developed non-destructive tests that combine high-resolution X-ray micro-computed tomography (micro-CT) scanning with QEMSCAN® analysis to help determine an ore's amenability to XRT sorting. These tests also provide important information on upgrading potential and reference parameters for sorting equipment and processing, such as:

- Particle size
- Associated X-ray attenuation coefficients
- Desired mineral presence
- Mineralogical information related to associated minerals and clays to assist with developing sorting algorithms

Combining micro-CT and QEMSCAN® analysis can address many limitations of the current method to determine whether XRT sorting technology is appropriate for particular ores. Mineralogy information from QEMSCAN® analysis can identify incidences of mineral encapsulation, problematic clays and detrimental minerals, as well as calibrate the greyscale values of CT data. Additional 3-D micro-CT imaging carried out on cores provides spatial information of the minerals within the ore and mineral grades.

Micro-CT and QEMSCAN® analysis together provide a powerful tool to help mine operators understand the mineralogical differences that micro-CT scanning can detect and the basis for the mineralogical separation through X-ray.

HOMOGENEITY FACTOR™

SRC developed the Homogeneity Factor™ method as part of our mineral characterization consulting service for clients in mineral and ore processing to determine the appropriate sorting technology for their ore and the potential benefits from the technology application. Our unique homogeneity factor formula describes the complexity of an ore fragment, which helps our team determine if a rock's mineralogy is homogenous – a key factor to determine amenability and types of appropriate sorting technologies.

Homogeneity factor values range from 100 to negative 100 (-100) or less. The higher the homogeneity factor value (e.g., 100 means the rock fragment is 100 per cent homogenous) for a given particle size, the easier the ore fragment is to identify and sort with a sensor-based sorter. A value of -100 implies a complex rock fragment with many minerals that is generally more difficult to sort with a sensor-based sorter.

STAGE 2: TARGETING AND MODELLING

In this stage, clients choose the sorting strategy (i.e., which mineral, which size and which sensor) that best fits their operation. Our team creates a semi-empirical model with sorter data and starts scaling up the testwork to develop.

Clients can use the valuable modelling information to test out various scenarios in the design phase for their operation. The model is developed by SRC experts through sorting first and includes inspection tests, models and algorithms.

STAGE 3: PILOT TESTING

In this final stage, clients obtain refined algorithms and gain an understanding of sorting yields and recoveries, as well as general performance of the full circuit.

This stage is important in determining the feasibility and capital costs of a sorting project.

SENSOR TECHNOLOGY CAPABILITIES

At SRC we can also provide amenability information for a wide range of sensor and detector technologies on a bench scale, such as:

- X-ray transmission (XRT)
- Near infra-red (NIR)
- Colour
- Electromagnetic induction
- X-Ray induced luminescence (XRL)
- Laser scattering

SAMPLE SHIPMENT

Request for analysis forms are available on our website (Request for Analysis). Please ensure that all samples are clearly marked with waterproof ink.

- **Please identify matrix type of samples (e.g., sandstone or basement)**
- All international shipments must be clearly marked: ***"Test samples for analysis. No commercial value."***

CHAIN OF CUSTODY

If required, a chain of custody can be established with SRC Geoanalytical Laboratories to ensure the integrity of sample handling. Please contact us for further information or complete the Chain of Custody form available on our website.

RADIOACTIVE SHIPMENTS

We receive samples from various parts of Canada and from around the world. If you require information on shipping radioactive samples, please contact us for broker information.

SRC Geoanalytical Laboratories is licensed by the Canadian Nuclear Safety Commission (CNSC) to receive, process and store radioactive materials. Please contact us for more information on our licensing.

SAMPLING SUPPLIES

We purchase large quantities of sampling supplies and provide these to our customers at cost. Contact us for sampling supplies pricing.

The following sampling supplies are available:

- Plastic bags - 6 mil 8 x 13 and 12 x 20
- Tyvek bags - 5.5 X 10.5
- Bar-coded sample tags*
- Plastic pails - 5 gallon
- Pre-addressed shipping labels*
- Kraft paper bags

*Provided at no charge. Custom sample tags are available.

SAMPLE AND DATA HANDLING

SAMPLE HANDLING AND ARCHIVING

SRC Geoanalytical Laboratories appreciates that samples can be costly to obtain, so it has documented procedures to ensure the safe, confidential handling of samples throughout the process. Chain of Custodies are available if required.

All samples must be labelled clearly with the sample number and SRC group number or shall be clearly traceable to this.

SAMPLE STORAGE AND LONG-TERM SAMPLE ARCHIVING

Samples are very expensive to collect but storing them is relatively inexpensive. Individual geologists within a company are generally responsible for looking after their own samples. As technology improves, archived samples can become an important resource when extra analysis may provide additional valuable information pointing to mineral deposits.

SRC Geoanalytical Laboratories can also archive radioactive samples to comply with safety and regulatory requirements.

Contact us for storage and archiving prices.

Please refer to the Terms and Conditions section at the back of this document for current sample handling procedures.

REPORTING AND DATA HANDLING

All reporting and data handling is done using our Laboratory Information Management System (LIMS) to ensure consistency. The raw data generated by the laboratory for the analysis is stored in a secure location for easy retrieval. The raw data is disposed of in a regulated timeframe according to designated laboratory practices.

All final official reports are approved by the area supervisor prior to the report being released to the customer. All signed hard copies of final reports are mailed or couriered to customers. Our liabilities will be limited to this certified report for the samples analyzed.

The report can also be presented to customers electronically by e-mail or fax in Excel or CSV spreadsheet and/or PDF format. Please contact us if you have any special reporting requests.

SRC uses password encryptions to protect the electronic transmission of sensitive data. Please contact us to find out more.

If additional e-mail recipients are required, please e-mail the laboratory with the authorization to release the results. SRC Geoanalytical Laboratories will only release confidential reports to approved personnel.

Submit samples using the Request for Analysis form available on our website.

TERMS AND CONDITIONS

The terms and conditions below apply to the services requested by the Customer and together with Requisition for Analysis, Request for Diamond Services & Chain of Custody Form or the Chain of Custody Form, as applicable, shall become the agreement between SRC and the Customer (the "**Agreement**").

1. **Provision of Services**: SRC shall carry out the services promptly, diligently and in a professional manner in accordance with generally accepted analytical laboratory principles and practices. SRC shall comply with all applicable federal, provincial and municipal laws in relation to the services.

2. **Sample Submission**: Samples should be stored and preserved by the Customer in accordance with the guidelines set out in SRC's current price guide. Failure to adhere to SRC's current guidelines for the storage and preservation of samples may mean that SRC is unable to provide the services. Samples must be submitted to SRC via prepaid delivery unless prior arrangements have been made. A completed and executed Requisition for Analysis, Request for Diamond Services & Chain of Custody Form or the Chain of Custody Form, as applicable, must accompany all samples. Failure to complete and execute such forms may result in delay in the service.

3. **Payment Terms**: The Customer agrees to pay to SRC the applicable fees for all services the Customer has requested. A minimum fee for service may be applicable. Fees may be subject to change without notice. The Customer will pay all invoices in Canadian funds without any deduction or set off. Amounts payable by the Customer to SRC shall be grossed-up to the extent necessary so that the net amount paid by the Customer to SRC, after the deduction of withholding taxes or such other amounts as the Customer may be required to deduct, is equal to the amount charged by SRC prior to any such deductions. Payment is due upon receipt of invoice. Interest will be charged at the rate of 1.5% per month (18.00% per annum) on all invoices overdue thirty (30) calendar days or more from the invoice date. All applicable taxes, both federal and provincial, will be automatically added to invoices. SRC may not release test results or work product unless all fees have been paid in full.

4. **Confidentiality**: All data, reports and other information relating to the services shall be treated by SRC as the confidential property of the Customer., The obligation of confidentiality set out in this section shall not apply to any information that: (i) is required by law to be disclosed; (ii) was in SRC's possession prior to receipt from the Customer; (iii) was lawfully obtained by SRC from a third party under no obligation of confidentiality to the Customer; or (iv) is or becomes part of the public domain through no act or failure of SRC.

5. **Reports**: All reports provided by SRC to the Customer regarding the results of the services are the confidential property of the Customer. SRC shall be entitled to retain a copy of all data and reports relating to the services provided always that the obligations of confidentiality set out in this Agreement shall continue to apply for so long as SRC retains a copy of such data or reports.

6. **Publicity**: The Customer shall not use SRC's name, logo, or other identifying marks in any news release, public statement, or announcement or in connection with any sale, offer for sale, advertisement or promotion of any article, product, or company**,** except with the prior written consent of SRC.

7. **No Warranty**: SRC makes no representations or warranties, express, implied, statutory or otherwise, as to any matter, including, but not limited to, the quality, merchantability or fitness for any purpose of any goods, services or products to be delivered pursuant to this Agreement. Test results are dependent on the quality of samples submitted by the Customer and Customer's compliance with the submission procedure instructed to the Customer by SRC. The Customer accepts the results of the services as is and acknowledges that any use or interpretation of the information contained in any report provided by SRC is at the Customer's own risk.

8. **Limitation of Liability**: Prior to acceptance of delivery by SRC, SRC shall not be responsible for the Customer's samples. In particular, SRC shall not be responsible for any consequences arising from the Customer's failure to properly collect, handle, store, preserve, transport, mark and/or identify a sample which is submitted to SRC for services. SRC's liability shall be limited to, at SRC's option, repayment of the amount paid by the Customer for the services that are proven to be defective or re-performance of the services claimed by the Customer to be defective. IN NO EVENT SHALL SRC BE LIABLE TO THE CUSTOMER FOR LOST PROFITS, PUNITIVE DAMAGES OR OTHER INDIRECT OR CONSEQUENTIAL DAMAGES.

9. **Force Majeure**: Either Party shall be excused from performance of any obligations under this Agreement when and to the extent that performance is delayed or prevented by any cause, except lack of finance, beyond its reasonable control.

10. **Sanctions**: The Customer confirms that neither the Customer nor any of its affiliates, directors, officers, shareholders, employees, agents or representatives is directly or indirectly owned or controlled by an individual or legal entity subject to any sanctions currently imposed by a government authority (the "**Sanctions**"). Sanctions may include restrictions under any Applicable Trade Control Laws (defined below), including those designated under the Canadian United Nations Act or Special Economic Measures Act, the U.S. List of Specially Designated Nationals and Blocked Persons, Foreign Sanctions Evaders List, Entity List, Denied Persons List, Debarred List, the UK Consolidated List and the EU Consolidated List of Persons, Groups, and Entities Subject to EU Financial Sanctions. Applicable Trade Control Laws means any sanctions, export control, or import laws, or other regulations, orders, directives, designations, licenses, or decisions relating to the trade of goods, technology, software and services which are imposed, administered or enforced from time to time by Canada, the United States, the United Kingdom, the EU, EU Member States, Switzerland, the United Nations or United Nations Security Council and also includes Canadian and U.S. anti-boycott laws and regulations. If the Customer becomes aware of any Sanctions, the Customer shall immediately inform SRC and SRC shall have the right to terminate this Agreement immediately and transfer to any third party any Customer property in the possession of SRC. The Customer acknowledges that the imposition of Sanctions may obligate SRC to report confidential and other information to the Royal Canadian Mounted Police and other public and government entities. The Customer further acknowledges that any breach of this section is a material breach of this Agreement.

11. **Termination**: This Agreement may be terminated by either party by giving two (2) calendar days prior written notice, at which time any services completed to the date of termination will become due and payable together with any other costs incurred by SRC in respect of the services, including, but not limited to, the costs of any materials purchased specifically for the services.

12. **Governing Laws and Jurisdiction**: This Agreement shall be governed by and interpreted in accordance with the laws of the Province of Saskatchewan and the laws of Canada as applicable and the parties shall attorn to the exclusive jurisdiction of the Courts of the Province of Saskatchewan and all courts competent to hear appeals therefrom.

13. **Dispute Resolution**: If any dispute should arise between SRC and the Customer, the parties shall settle such dispute by arbitration in Saskatoon, Saskatchewan in accordance with the *Arbitration Act (Saskatchewan)* or the *International Commercial Arbitration Act (Saskatchewan)* where applicable.

14. **On-Site Requirements**: If the Customer and/or its employees, agents or representatives attend on-site at SRC's premises, the Customer and/or its employees, agents or representatives, while on SRC's premises, agree to abide by SRC's code of ethics and its health and safety and security policies and procedures. If the Customer and/or its employees, agents or representatives are given access to SRC's network or information technology resources, the Customer and/or its employees, agents or representatives agree to abide by SRC's information technology policies and procedures.

15. **Sample Ownership, Storage and Archiving**: All samples provided to SRC by the Customer shall remain the property of the Customer. The Customer shall provide SRC with instructions regarding the return, disposal or archiving of samples, reject materials and pulp materials. If the Customer requests that samples reject materials or pulp materials be archived, returned or disposed of, the Customer shall pay to SRC the applicable archival fees or any costs incurred by SRC for the return or disposal of such samples, reject materials or pulp materials. The following rules apply to the archiving and disposal of samples, reject materials and pulp materials unless alternate instructions are received by SRC from the Customer.

a) All samples, other than those arising from potash exploration activities, will be stored by SRC for two calendar years following the services (the "**Sample Storage Period**") and are subject to archival fees. Following the Sample Storage Period, samples may be disposed of at SRC's discretion. SRC will not store samples arising from potash exploration activities and such samples may be disposed of at SRC's discretion.

b) Uranium, gold or potash reject material and pulp material will be stored by SRC until January of the calendar year following the services (the "**Uranium/Gold/Potash Storage Period**") and are subject to archival fees. Following the Uranium/Gold/Potash Storage Period, uranium, gold or potash reject material and pulp material may be disposed of at SRC's discretion.

c) DMS tailings, Flow Sort tailings and any stones recovered through diamond processing will be stored by SRC indefinitely and are subject to archival fees. Caustic residues will be stored by SRC for two calendar years following the services (the "**Caustic Storage Period**") and are subject to archival fees. Following the Caustic Storage Period, caustic residues may be disposed of at SRC's discretion.

d) The archival fees set out in paragraphs (a), (b) and (c) above shall apply upon thirty (30) calendar days following provision by SRC of the report regarding the results of the services.

Equivalences

Selected Weights, Measures and Conversion Factors used in the Precious Metals Industry.

parts per million (ppm)
parts per billion (ppb)
1 assay ton (A.T.)

1 ppm	=	1 g/tonne	=	1000 ppb = .0001 %
10,000 ppm	=	1 %		
1 Short ton	=	2000 pounds	=	29,166.7 Troy ounces
1 Troy ounce	=	31.1035 grams		
1 Metric tonne	=	1000 Kilograms	=	2204.6 pounds

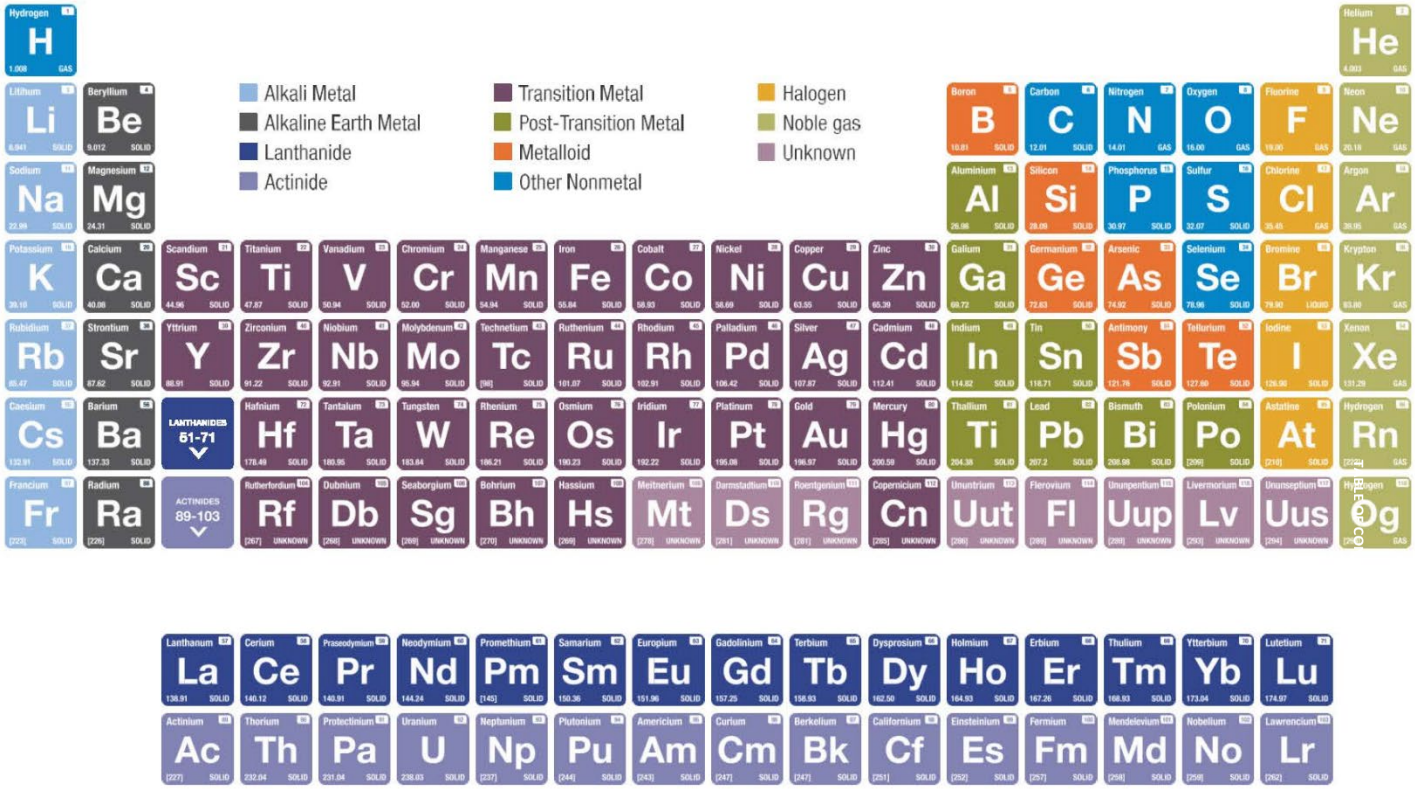
Conversion Chart

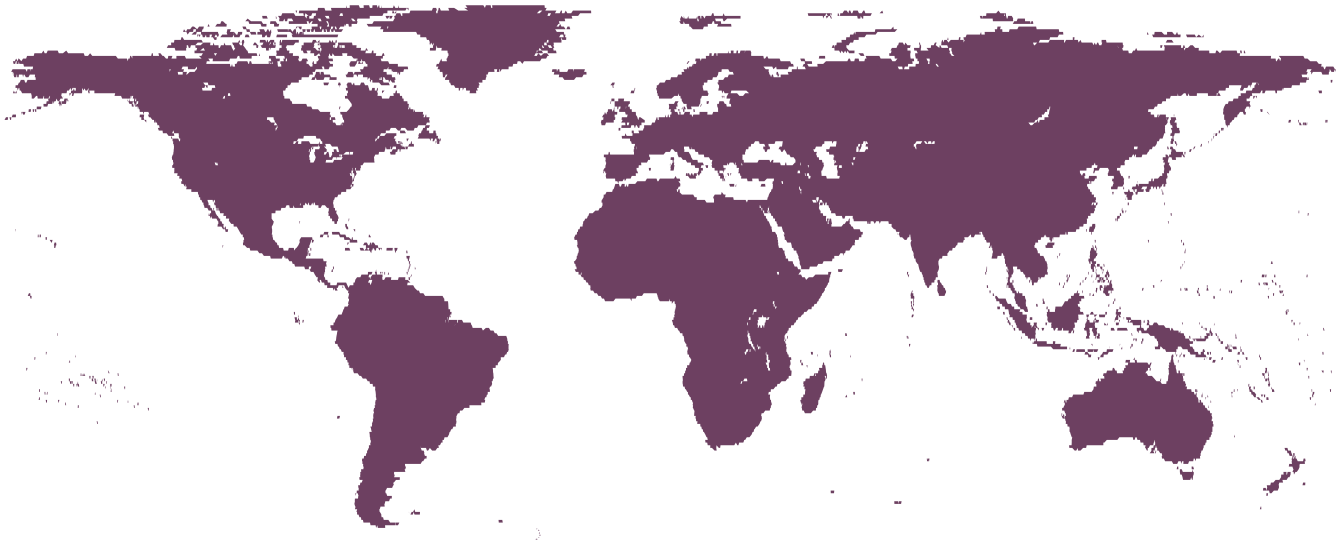
$$\frac{1 \text{ ppm}}{34.285714} = \text{Troy ounces per ton}$$

ppb	oz/ton
5	0.00015
10	0.00029
20	0.00058
30	0.00088
40	0.00117
50	0.00146
60	0.00175
70	0.00204
80	0.00233
90	0.00263
100	0.0029
200	0.0058
300	0.0088
400	0.0117
500	0.0146
600	0.0175
700	0.0204
800	0.0233
900	0.0263
1000	0.0292

ppm org/tonne	oz/ton	%
1	0.029	0.0001
2	0.058	
3	0.088	
4	0.117	
5	0.146	
6	0.175	
7	0.204	
8	0.233	
9	0.263	
10	0.292	0.001
100	2.92	0.01
1000	29.2	0.1
10000	292	1

PERIODIC TABLE OF ELEMENTS





Serving the Global Mining Industry

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