GEO LABS
GEOSCIENCE LABORATORIES

PRECISE ANALYSIS
ACCURATE RESULTS

Schedule of Fees and Services

Issue 5: Effective April 1, 2009

Table of Contents

Geoscience Laboratories (Geo Labs)

History
The Geoscience Laboratories (Geo Labs) was established in 1898, and was housed in Toronto before moving to the Willet Green Miller Centre in 1991 as part of the Ministy of Northern Development and Mines (MNDM) relocation to Sudbury.

Vision
To be a world-class, full service inorganic geoanalytical facility providing research quality analyses and services.

Mission Statement
To ensure that all clients are consistently provided with the highest level of service and quality of work, by delivering, in a timely manner, high-quality, research grade mineralogical and inorganic chemical analysis of rocks, minerals and other material, that meet method-specific precision and accuracy quality tolerances.

Quality Policy
It is the quality policy of the Geoscience Laboratories (Geo Labs) to consistently provide clients with the highest level of service and quality of work. Management and employees at the Geo Labs accomplish this by:

- Delivering high-quality inorganic chemical and mineralogical analyses and services meeting method-specific precision and accuracy quality tolerances.
- Committing to good professional practice and to the quality of its testing.
- Meeting or surpassing client priority and turnaround time requirements.
- Continuously improving the quality system through annual audits and reviews.
- Complying with the ISO 9001:2000 and ISO/IEC 17025:2005 International Standards by the adoption and implementation of a documented system of policies and procedures.
- Maintaining the culture that “at the Geoscience Laboratories quality is the responsibility of all staff”.

Quality Assurance Program
The Geo Labs has a comprehensive Quality Assurance (QA) program to ensure the reliability and validity of all analytical results provided to clients. The goal is to provide results with precision and accuracy better than ±10% when that element’s concentration is more than 10 times the limit of quantification for the method in question. Since the data objectives are tempered by the capabilities of each method, as well as by the client’s requirements, some methods can have less stringent quality levels.

The QA program at the Geo Labs covers approximately 20% of all work completed. One sample for every 10 is duplicated, in either the sample preparation or analytical preparation stages. One reference material (RM) and one blank (if appropriate) are included with every 20 samples. A variety of reference materials is available for matrix matching. The Geo Labs uses a combination of certified reference materials and in-house reference materials. A specific RM may be available upon request. The Geo Labs regularly participates in many national and international proficiency testing programs including CALA, PTP-MAL, NWRI, and IAG.

The Geo Labs Quality Management System has been certified to ISO 9001:2000 by QMI-SAI Global.

The Canadian Association for Laboratory Accreditation (CALA) has accredited the Geo Labs to ISO/IEC 17025:2005 for specific test methods. A copy of the Geo Labs’ Scope of Accreditation is available upon request.

Certified System™
ISO 9001
QMI-SAI Global
#1034403

Sample Submission

Sample Submission and Shipping Instructions

Every effort is made to ensure that data produced are accurate and will be representative of the sample submitted. The client is requested to provide as much information about their samples as possible, such as rock type, types and amounts of sulphides, alterations, and any other unusual characteristics. If submitting potentially mineralized samples, or samples likely to contain high concentrations of any element to be analyzed, please consult with the Geo Labs prior to sample submission. Clients may be subject to a decontamination charge to clean areas of the Geo Labs contaminated by submitted samples with unreported mineralization or high concentrations of any element to be analyzed. It is the client's responsibility to disclose all hazardous materials. The Geo Labs reserves the right to refuse samples that are hazardous. The samples will be returned, and it is the client's responsibility to dispose of the hazardous materials.

Samples can be shipped to:

Sample Receiving
c/o Geoscience Laboratories
Ministry of Northern Development and Mines
Willet Green Miller Centre
933 Ramsey Lake Road
Sudbury, Ontario P3E 6B5 CANADA

Your name and address must be clearly marked on each shipment package. Individual samples should be properly numbered or identified and accompanied by a copy of our *Sample Submission – Request for Analysis* form. Samples that are poorly labelled and unorganized will increase turnaround time and will be subject to a sample sorting charge. Samples will not be processed until adequate written instructions are received from the client.

All samples shipped from outside Canada should be labelled "GEOLOGICAL SAMPLES FOR ANALYSIS ONLY – NO COMMERCIAL VALUE"

Sample Storage

Samples are retained for a minimum of 30 days following the issue of the final Certificate of Analysis. After 30 days, samples are discarded. If requested at the time of submission, samples can be returned at the client's cost.

Data Release (Certificate of Analysis)

Data will only be released to those who are designated on the Geo Lab's *Sample Submission – Request for Analysis* form. Written authorization will be required from the primary contact person if data are to be released to a second or third party.

The Geo Labs will provide electronic and hard copies of data, upon request, for up to one year from the date of issue of the Certificate of Analysis. Retrieval of archived data after one year will be subject to a $50.00/hour charge.

Liability

Any analysis, testing, investigating or service in connection with any work performed by the Geo Labs shall be conducted in accordance with recognized professional analytical standards. Neither the Geo Labs, nor its subcontractors, consultants, agents, officers, nor employees shall be held responsible for any loss or damage resulting directly or indirectly from any default, negligence, error or omission. Geo Labs' liability, if any, shall be limited to the cost of performing the analyses.

Terms and Conditions

Results are for samples received. Client will be notified prior to performing any analytical work if non routine analyses are required

All prices are in Canadian funds and are subject to GST. Payment is due 30 days from the invoice date. Anything over 30 days is deemed overdue. All overdue accounts are subject to interest charges unless governed by legislation or approved exemption, or due from federal or provincial governments and agencies. The Ontario Ministry of Finance determines the interest rate. Payment can be made by certified cheque, money order, or major credit card.

Sample Preparation

The preparation of samples represents the single most important step in the analysis of geological materials. The Geo Labs uses a variety of sample preparation procedures on a routine basis for assay and geochemical analysis. While processing rock samples, the procedure uses a small jaw-crusher with steel plates, a riffle to split the sample, and different grinding media to pulverize the sample.

Assay Preparation

Assay preparation is employed when there is an indication of precious metal in the sample. The assay preparation uses high chrome steel mills. Approximately 150 ppm Cr and 0.1% Fe contamination may be expected.

Method Code	Minimum Sample Size	Mesh Size	Price
SAM-SPA	150 g	100 mesh (149 microns)	$6.00/sample

Geo Preparation

The preparation technique is applied whenever detailed whole-rock geochemical analysis is required. The samples are pulverized in a 99.8% pure Al_2O_3 planetary ball mill. A minor amount of Al is added to the sample.

Method Code	Minimum Sample Size	Mesh Size	Price
SAM-SPG	150 g	170 mesh (88 microns)	$8.00/sample

Agate Mill Preparation

Sample preparation using the agate mill significantly reduces the amount of contamination (Cr, Fe, Al) compared to the SAM-SPA and SAM-SPG methods. Minor amounts of Si will be added to the sample.

Method Code	Minimum Sample Size	Mesh Size	Price
SAM-AGM	150 g	170 mesh (88 microns)	$10.00/sample

Chittick Sample Preparation

This technique is used when a chittick determination is required. Samples are disseminated using a mortar and pestle. The minus 200 mesh (<74 µm fraction) is used for analysis.

Method Code	Minimum Sample Size	Mesh Size	Price
SAM-CTK	100 g	200 mesh (74 microns)	$8.00/sample

Particle Size Sample Preparation

This technique is used when PSA is required. Samples are sieved through a 10 mesh screen. The minus 10 mesh (<2000 µm fraction) is used for the analysis.

Method Code	Minimum Sample Size	Mesh Size	Price
SAM-PSA	100 g	10 mesh (2000 microns)	$8.00/sample

Sediment Sample Preparation

This technique is used to prepare sediment samples for analysis. Samples are processed using a zirconium mill for 10-20 seconds. The material is sieved through a 60 mesh screen. The minus 60 mesh (<250 µm fraction) is used for analysis.

Method Code	Minimum Sample Size	Mesh Size	Price
SAM-SSP	100 g	60 mesh (250 microns)	$6.00/sample

Mercury Sample Preparation

Rock samples submitted for mercury analysis are crushed using a jaw crusher and sieved to 80 mesh. The minus 80 mesh (<177 µm fraction) is used for analysis.

Method Code	Minimum Sample Size	Mesh Size	Price
SAM-MER	100 g	80 mesh (177 microns)	$6.00/sample

Sample Drying

Wet samples received at the Geo Labs that require drying will be subject to a drying charge.

Method Code	Price
ADM-DRY	$2.00/sample

Oversized Samples

The Geo Labs is equipped to handle samples up to 3 kg in size. Anything over that will be subject to an oversized sample charge.

Method Code	Price
ADM-OVER	$1.00/sample/ kg over

Precious Metals

Lead Fire-Assay with Gravimetric Finish

Gold and silver are determined using the classical lead fire-assay method. The precious metals are dissolved and extracted using a lead based flux. The lead and precious metals are then separated in a secondary process called cupellation. Finally the gold and/or silver content of the precious metals collected in the fire-assay process is determined by gravimetric finish.

Method Code	Elements		LDL (oz/ton)	Price
GFA-PBG	Gold	Au	0.01	$19.00/sample
	Silver	Ag	0.10	

Sample Size: Minimum 30 g

Lead Fire-Assay with ICP-MS Finish

Following pre-concentration into a silver bead by the classical lead fire-assay method, the silver bead is dissolved in nitric acid. The silver is then precipitated while the gold, platinum, and palladium are dissolved in aqua regia prior to analysis by the ICP-MS.

Method Code	Elements		LDL (ppb)	UDL (ppb)	Price
IMP-101	Gold	Au	6	5000	$20.00/sample
	Platinum	Pt	0.4	11000	
	Palladium	Pd	1.3	5000	

Nickel Sulphide Fire-Assay (ISO/IEC 17025 Accredited)

Nickel Sulphide Fire-Assay (NiS FA) with an ICP-MS finish is considered the foremost method for the determination of Au and the Pt-group elements (PGEs) in geological samples. The sample is fused with a mixture of Ni and S to produce a nickel sulphide button. Dissolution of the button is followed by co-precipitation with Te that produces a concentrate containing all six precious metals that is dissolved in aqua regia prior to analysis. Because the efficiency of the fusion process is dependant on the knowledge of the Ni, Cu, and S contents of the sample, it is recommended that samples containing >1% base metal sulphides also be submitted for base metal (AAF-100) and total sulphur analysis (IRC-100).

Method Code	Elements		LDL (ppb)	UDL (ppb)	Price
IMP-200	Gold	Au	0.22	3600	$140.00/sample
	Platinum	Pt	0.17	4700	
	Palladium	Pd	0.12	4800	
	Rhodium	Rh	0.02	970	
	Ruthenium	Ru	0.08	8000	
	Iridium	Ir	0.01	1900	

Sample Size: Minimum 15 g

In order to maintain the low detection limits and high quality data offered by this technique, samples expected to contain >500 ppb of any individual precious metal (or 100 ppb Rh) should be flagged during submission. In addition, samples expected to be elevated in organic carbon, chromite, or zinc should also be flagged at sample submission.

Solution Preparation

Open Vessel Multi-Acid Digest

This method is employed for the preparation of samples being analyzed by ICP-MS, ICP-AES, and AAS-Flame, and is designed to dissolve most silicate phases present in rock samples. Samples are digested in an open beaker using a combination of up to four acids (hydrofluoric, hydrochloric, nitric, and perchloric). Although the method achieves a near total digestion of the sample, some resistant mineral phases may not be dissolved.

Method Code	Analytical Method	Price
SOL-OAIO	ICP-MS / ICP-AES	$15.00/sample
SOL-OT3	ICP-AES / AAS-Flame	$12.00/sample
SOL-OT1	AAS-Flame (Ag only)	$12.00/sample

Closed Vessel Multi-Acid Digest

This method is employed for the preparation of samples being analyzed by ICP-MS and ICP-AES, and is designed for the thorough dissolution of silicate rock samples. This method uses the same four acids as the SOL-OAIO open vessel digest, however, the digestion is carried out in a closed vessel to promote total dissolution. This method is preferred for the determination of the rare earth elements (REE: La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu), the high field strength elements (HFSE: Zr, Nb, Hf, Ta), and large ion lithophile elements (LILE: Rb, Sr, Cs, Ba) plus Y, U, and Th.

Method Code	Analytical Method	Price
SOL-CAIO	ICP-MS / ICP-AES	$20.00/sample

Aqua Regia Digest

The method is employed for the preparation of samples being analyzed by ICP-MS and ICP-AES and is designed to dissolve labile elements from silicate, sulphide, and oxide matrices, in particular base and precious metals, using a modified aqua regia leach. Samples are leached overnight using a combination of cold concentrated hydrochloric and nitric acid followed by a 1 hour digestion at 100^{O}C. This method is most commonly applied to the analysis of soils, unconsolidated sediments, and humus samples.

Method Code	Analytical Method	Price
SOL-ARD	ICP-MS / ICP-AES	$15.00/sample

Hydride Generation Digest

This procedure uses concentrated acids (hydrofluoric, hydrochloric, nitric, and perchloric) to prepare samples containing low concentrations of Se and Te for hydride-generation ICP-MS analysis. Owing to the coincident formation of H_2S and signal suppression by base-metals, this technique is not suitable for the analysis of sulphide-rich samples (S >1 wt%).

Method Code	Analytical Method	Price
SOL-SED	ICP-MS (Se, Te only)	$11.00/sample

Sodium Carbonate Fusion (Fluoride Determination)

Pulverized geological samples are fused at 900^{O}C in a sodium carbonate flux, solubilized and acidified in preparation for the determination of fluoride (F^-) by automated titration and direct-measure ion selective electrodes. This technique is not suitable for the analysis of sulphide-rich samples (S >0.5 wt%) due to a chemical incompatibility with the flux.

Method Code	Analytical Method	Price
SOL-FDI	ISE-R01	$15.00/sample

Rock Analysis

ICP-MS

The ICP-MS (Inductively Coupled Plasma-Mass Spectrometry) IMO-100 and IMC-100 methods are designed for the analysis of minor and trace elements in non-mineralized geological samples prepared using either a closed or open vessel multi-acid digestion. For both methods, sample calibration is carried out using a combination of synthetic multi-element solutions and certified reference materials (CRMs). Owing to the greater efficiency of the closed vessel digestion, data obtained from the IMC-100 method are considered to be more accurate for elements contained in acid-resistant phases (e.g., chromite, zircon, monazite, xenotime, and/or garnet).

Method Code	LDL (ppm)	UDL (ppm)	Price
IMO-100	See chart next page		$25.00/sample
IMC-100	See chart next page		$25.00/sample

ICP-MS – Se and Te

Low concentrations of Se and Te are determined using hydride-generation/ICP-MS. Owing to interferences from S and base metals, this method is best suited to samples with low S contents (S <1 wt%). For higher S content, an aqua regia digest may be used.

Method Code	Element		LDL (ppb)	UDL (ppb)	Price
IMH-100	Selenium	Se	3.5	1000	$25.00/sample
	Tellurium	Te	1.0	50	

ICP-AES – Open Vessel Digest (add-on package to IMO-100)

This ICP-AES (Inductively Coupled Plasma-Atomic Emission Spectroscopy) method offers major and trace element analysis of conventional geological samples digested using the open vessel digest technique. The validated working range for certain elements is broad and complements the IMO-100 package. **This method is not suitable for the analysis of ore-grade material.**

Method Code	LDL (ppm)	UDL (ppm)	Price
IAO-100	See chart next page		$7.75/sample

ICP-AES – Closed Vessel Digest (add-on package to IMC-100)

This method offers major and trace element analysis of conventional geological samples digested using the closed vessel digest technique. The validated working range for certain elements is broad and complements the IMC-100 package.
This method is not suitable for the analysis of ore-grade material.

Method Code	LDL (ppm)	UDL (ppm)	Price
IAC-100	See chart next page		$7.75/sample

ICP-AES – Open Vessel Digest

This method offers major and trace element analysis of conventional geological and base metal ore-grade material digested using the open vessel digest technique. This method supplements the AAS-Flame package with additional elements and a broad validated working range.

Method Code	LDL (ppm)	UDL (ppm)	Price
IAT-100	See chart next page		$7.75/sample

AAS-Flame (ISO/IEC 17025 Accredited)

The atomic absorption (AA) method is designed for the determination of base metals in mineralized geological samples. Although not as sensitive as the ICP-MS or ICP-AES, it can accommodate higher concentration than can be routinely determined using the ICP techniques.

Method Code	Element		LDL (ppm)	UDL (ppm)	Price
AAF-100	Cadmium	Cd	5	100	$9.50/one element
	Cobalt	Co	30	20000	$1.50/each add.
	Copper*	Cu	3	250000	
	Lead*	Pb	12	40000	
	Lithium	Li	5	400	
	Nickel*	Ni	6	475000	
	Zinc	Zn	6	275000	
AAF-200	Silver	Ag	2	75	$9.50/sample

* Elements accredited for ISO/IEC 17025

Method Code		IMO-100 / IMC-100	
Element		LDL (ppm)	UDL (ppm)
Antimony†	*Sb*	*0.04*	*28*
Barium	Ba	0.8	1740
Beryllium†	*Be*	*0.04*	*360*
Bismuth†	*Bi*	*0.15*	*47*
*Cadmium**	*Cd*	*0.013*	*4*
Cerium	Ce	0.12	2420
Cesium	Cs	0.013	600
Chromium	Cr	3	4500
Cobalt	Co	0.13	187
Copper	Cu	1.4	2900
Dysprosium	Dy	0.009	135
Erbium	Er	0.007	87
Europium	Eu	0.0031	19
Gadolinium	Gd	0.009	118
Gallium	Ga	0.04	58
Hafnium	Hf	0.14	29
Holmium	Ho	0.0025	29
Indium	In	0.0018	1.9
Lanthanum	La	0.04	1380
Lead	Pb	0.6	700
Lithium†	*Li*	*0.4*	*207*
Lutetium	Lu	0.002	9
*Molybdenum**	*Mo*	*0.08*	*44*
Neodymium	Nd	0.06	760
Nickel	Ni	1.6	4100
Niobium	Nb	0.028	277
Praseodymium	Pr	0.014	240
Rubidium	Rb	0.23	3800
Samarium	Sm	0.012	128
Scandium	Sc	1.1	63
Strontium	Sr	0.6	1560
Tantalum	Ta	0.023	320
Terbium	Tb	0.0023	21
*Thallium**	*Tl*	*0.005*	*20*
Thorium	Th	0.018	109
Thulium	Tm	0.0019	13
*Tin**	*Sn*	*0.16*	*14*
Titanium	Ti	7	25000
Tungsten	W	0.05	141
Uranium	U	0.011	1620
Vanadium	V	0.8	370
Ytterbium	Yb	0.009	70
Yttrium	Y	0.05	740
Zinc	Zn	7	9100
Zirconium	Zr	6	1450

† Accuracy better than ± 10 – 20%
** Accuracy better than ± 10 – 30%.*
Data for information purposes only.

Method Code		IAO-100		IAC-100	
Element		LDL (ppm)	UDL (ppm)	LDL (ppm)	UDL (ppm)
Aluminum	Al	120	100000	210	110000
Barium	Ba	5	1500	1	2000
*Beryllium**	*Be*	*1*	*30*	*1*	*30*
*Cadmium**	*Cd*	*n/a*	*n/a*	*1*	*140*
Calcium	Ca	15	270000	70	100000
Chromium	Cr	2	400	2	1300
Cobalt	Co	2	60	1	300
Copper	Cu	1	800	6	14400
Iron	Fe	45	94000	90	95000
Lead	Pb	n/a	n/a	15	6100
Lithium	Li	1	200	1	130
Magnesium	Mg	15	60000	30	300000
Manganese	Mn	1	8000	1	7500
*Molybdenum**	*Mo*	*n/a*	*n/a*	*1*	*15000*
Nickel	Ni	2	200	2	4000
Phosphorus	P	15	4200	15	6400
Potassium	K	40	45000	70	45000
Scandium	Sc	1	50	1	60
Sodium	Na	300	31000	500	31000
Strontium	Sr	2	1100	2	1400
*Sulphur**	*S*	*n/a*	*n/a*	*60*	*16000*
Titanium	Ti	3	17000	5	16400
*Tungsten**	*W*	*n/a*	*n/a*	*6*	*3600*
Vanadium	V	1	400	1	530
Yttrium	Y	1	70	1	120
Zinc	Zn	5	3000	5	2900

**Non-validated Elements. Data for information purposes only.*

Method Code		IAT-100	
Element		LDL (ppm)	UDL (ppm)
Aluminum	Al	20	110000
Barium	Ba	1	1500
Calcium	Ca	25	95000
Chromium	Cr	2	500
Cobalt	Co	1	500
Copper	Cu	1	15000
Iron	Fe	40	380000
Lead	Pb	35	45000
Lithium	Li	1	200
Magnesium	Mg	20	59000
Manganese	Mn	1	8000
Nickel	Ni	2	12000
Potassium	K	65	45000
Scandium	Sc	1	100
Sodium	Na	45	31000
Strontium	Sr	1	1200
Titanium	Ti	1	17000
Vanadium	V	1	400
Yttrium	Y	1	200
Zinc	Zn	4	190000

Water Analysis

ICP-MS

Innovations in sensitivity and the removal of spectroscopic interferences during ICP-MS analysis have permitted the determination of almost the entire periodic table of elements in waters to very low concentrations, even in samples possessing previously difficult matrices (e.g., high Cl or CO_3^{+2}).

Although the ICP-MS water package is designed to take full advantage of the new technologies to analyze a wide spectrum of elements, it is optimized for the determination of trace element concentrations in natural fresh water with low total dissolved solid (TDS <0.01 wt%) contents. Samples with high TDS will require dilution prior to analysis (with a concomitant increase in detection limits). Owing to the high sensitivity of the ICP-MS instrument, it is recommended that, if major elements (Na, Mg, K, and Ca) are required, they can be determined by custom analysis on the ICP-AES. The minimum sample size is 100 mL and the samples are expected to be received as filtered acidified solutions containing 1% v/v HNO_3. Unfiltered or under acidified samples need to be flagged at sample submission and may be subject to filtration and acidification charges.

Method Code	LDL (ppm)	UDL (ppm)	Price
IMW-100	See chart next page		$25.00/sample

ICP-AES

The ICP-AES (Inductively Coupled Plasma-Atomic Emission Spectrometry) method determines major and trace element concentrations in freshwater samples. Sample solutions should be acidified to 1% v/v HNO_3 and maintained at cool temperatures to preserve the sample composition. Unfiltered or under acidified samples need to be flagged at sample submission and may be subject to filtration and acidification charges.

Method Code	LDL (ppm)	UDL (ppm)	Price
IAW-200	Please contact the Geo Labs for more information		$7.75/sample

Ion Chromatography

Ion chromatography (also known as High Pressure Liquid Chromatography (HPLC)) is used for the determination of several anions of geological and environmental importance in unacidified waters. For best results, samples should be unpreserved (unacidified) and kept refrigerated at 4°C. The minimum sample size is 30 mL and may be subject to filtration charges.

Method Code	Anion		LDL (mg/L)	Price
ICW-100	Bromide	Br^-	0.01	$80.00/sample
	Chloride	Cl^-	0.03	
	Fluoride	F^-	0.01	
	Total Nitrogen	$NO_2^- + NO_3^-$	0.01	
	Nitrite	NO_2^-	0.01	
	Nitrate	NO_3	0.03	
	Phosphate	PO_4^{-3}	0.10	
	Sulphate	SO_4^{-2}	0.04	

Mercury by Atomic Fluorescence Spectroscopy

The cold-vapour atomic fluorescence spectroscopy determines part-per-trillion (ppt) concentrations of total mercury in water samples after a bromochloride digestion for the release of organomercury and other mercury compounds into solution. For best results, samples should be preserved in either 2% v/v HNO_3 or 2% v/v HCl and kept refrigerated at 4°C. The minimum sample size is 100 mL.

Method Code	Element		LDL (ppt)	UDL (ppt)	Price
HGW-100	Mercury	Hg	1.5	100	$30.00/sample

*Samples with concentrations of mercury above the upper limit of the method, please contact the Geo Labs for more information

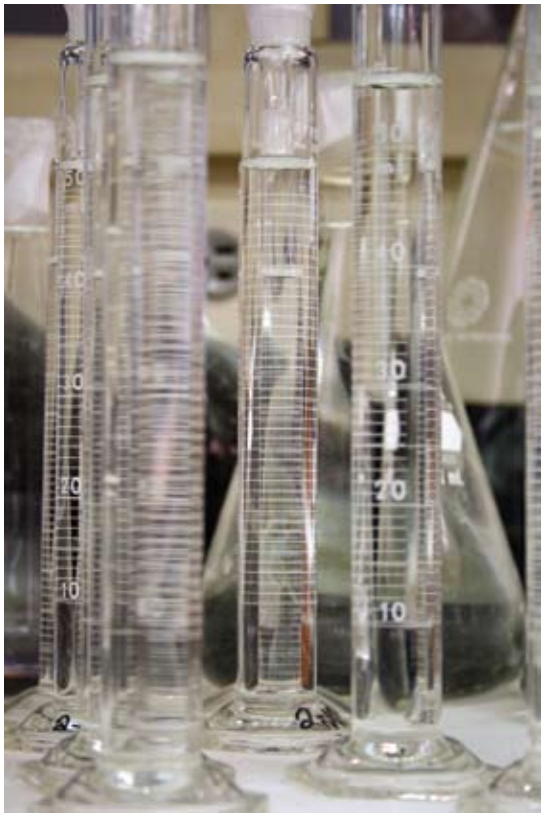
Water Filtration / Preservation

No treatment of water samples is carried out at the Geo Labs prior to analysis. Sample filtration and preservation is the responsibility of the client prior to submitting the samples. The conventional method of preservation is the addition of ultra-pure nitric acid to a concentration 1% v/v. Samples with matrices containing nitric acid up to this level can be accommodated at the Geo Labs providing the request is made at the sample submission stage.

Method Code	Price
SOL-FILT	$8.00/sample
SOL-ACD	$8.00/sample

Method Code		IMW-100	
Element		LDL (ppb)	UDL (ppb)
Aluminum	Al	5	350
Antimony	Sb	0.01	400
Arsenic	As	0.03	1500
Barium	Ba	0.02	1250
Beryllium	Be	0.01	6000
Bismuth	Bi	0.002	200
Cadmium	Cd	0.01	1100
Calcium	Ca	25	200000
Cerium	Ce	0.002	100
Cesium	Cs	0.0005	80
Chromium	Cr	0.02	120
Cobalt	Co	0.005	200
Copper	Cu	0.2	1000
Dysprosium	Dy	0.001	450
Erbium	Er	0.001	600
Europium	Eu	0.0004	200
Gadolinium	Gd	0.001	550
Gallium	Ga	0.002	300
*Gold**	*Au*	*0.004*	*5000*
*Hafnium**	*Hf*	*0.004*	*900*
Holmium	Ho	0.0001	125
Iron	Fe	3	1700
Lanthanum	La	0.001	90
Lead	Pb	0.05	225
Lithium	Li	0.01	2000
Lutetium	Lu	0.0001	160
Magnesium	Mg	1	4000
Manganese	Mn	3	150
Molybdenum	Mo	0.01	800
Neodymium	Nd	0.003	650
Nickel	Ni	0.1	1200
Niobium	Nb	0.001	125
Praseodymium	Pr	0.0004	80
Rubidium	Rb	0.005	150
Samarium	Sm	0.001	550
Scandium	Sc	0.1	200
*Selenium**	*Se*	*1*	*200*
Silver	Ag	0.005	225
Strontium	Sr	0.1	1000
*Tantalum**	*Ta*	*0.0003*	*225*
Terbium	Tb	0.0001	110
Thallium	Tl	0.001	180
Thorium	Th	0.001	175
Thulium	Tm	0.0001	140
Tin	Sn	0.01	300
Titanium	Ti	0.1	1500
Tungsten	W	0.01	800
Uranium	U	0.0002	130
Vanadium	V	0.003	175
Ytterbium	Yb	0.001	450
Yttrium	Y	0.0005	900
Zinc	Zn	1	1500
*Zirconium**	*Zr*	*0.1*	*300*

**For information purposes only.*



Soil, Humus, Sediments, and Mineralized Rocks

ICP-MS (ISO/IEC 17025 Accredited)

The ICP-MS package for the analysis of soils, humus, and unconsolidated sediments produces minor and trace element data for samples prepared by aqua regia digest. Because the sample is incompletely digested during sample dissolution, the data produced by this package represent the composition of only the more easily acid-soluble components in the sample.

Method Code	LDL (ppm)	UDL (ppm)	Price
IML-100	See chart next page		$25.00/sample

ICP-MS – Mineralized Rocks (ISO/IEC 17025 Accredited)

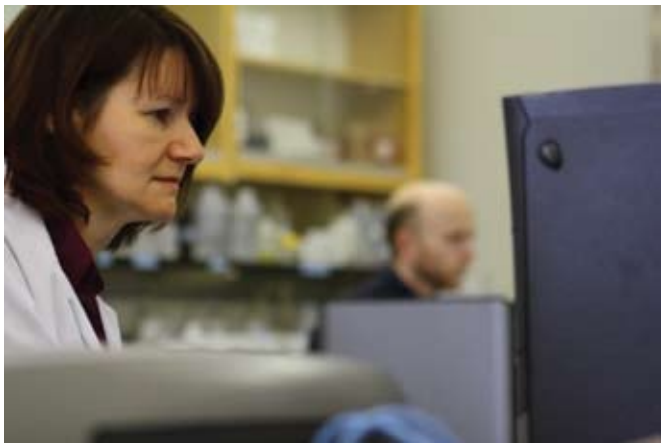
The ICP-MS package for the analysis of mineralized rocks produces minor and trace element data for samples prepared by aqua regia digest followed by an additional dilution in order to remain within the operating range of the instrument. At present, only six elements have been validated by this technique. Because the sample is incompletely digested during sample dissolution, the data produced by this package represent the concentrations of only the more easily acid-soluble components in the sample.

Method Code	Element		LDL (ppm)	UDL (ppm)	Price
IML-101	Cobalt	Co	0.4	1000	$25.00/sample
	Copper	Cu	3	10000	
	Lead	Pb	3.1	1000	
	Nickel	Ni	3	10000	
	Silver	Ag	0.15	130	
	Zinc	Zn	13	40000	

ICP-AES

The ICP-AES package for the analysis of soils, humus, and unconsolidated sediments produces major and minor element data for samples prepared by aqua regia digest. Because the sample is incompletely digested during sample dissolution, the data produced by this package represent the composition of only the more easily acid-soluble components in the sample.

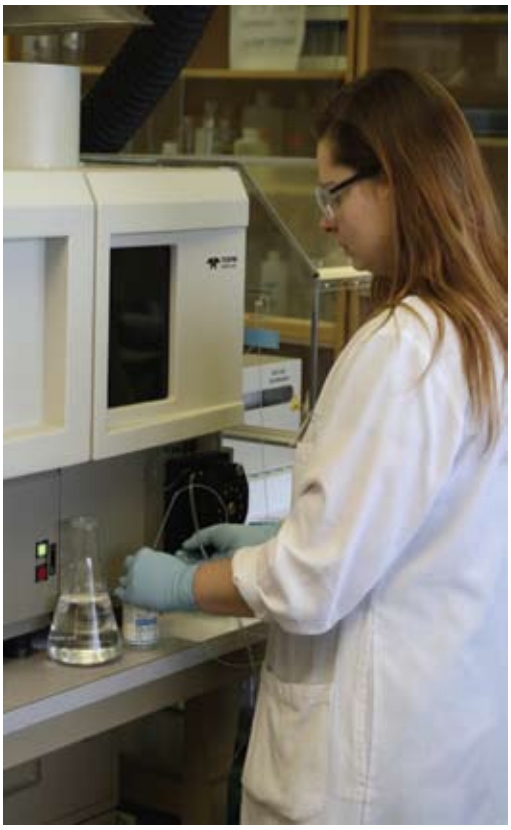
Method Code	LDL (ppm)	UDL (ppm)	Price
IAL-100	See chart next page		$7.75/sample



Method Code		IML-100	
Element		LDL (ppm)	UDL (ppm)
Antimony*	Sb	0.06	50
Arsenic*	As	0.8	500
Barium*	Ba	0.1	800
Beryllium*	Be	0.04	10
Bismuth	Bi	0.01	50
Cadmium*	Cd	0.02	40
Cerium	Ce	1.9	70
Cesium	Cs	0.023	30
Chromium*	Cr	1	120
Cobalt*	Co	0.03	200
Copper*	Cu	0.7	500
Dysprosium	Dy	0.06	100
Erbium	Er	0.011	100
Europium	Eu	0.03	50
Gadolinium	Gd	0.15	150
Gallium	Ga	0.004	125
Gold	Au	0.002	100
Hafnium	Hf	0.05	70
Holmium	Ho	0.013	25
Indium	In	0.002	35
Lanthanum	La	0.8	50
Lead*	Pb	0.2	150
Lithium	Li	0.03	200
Lutetium	Lu	0.003	20
Mercury	Hg	0.01	350
Molybdenum	Mo	0.03	350
Neodymium	Nd	0.6	200
Nickel*	Ni	0.7	3000
Niobium	Nb	0.02	60
Platinum	Pt	0.003	150
Praseodymium	Pr	0.2	25
Rubidium	Rb	0.15	90
Samarium	Sm	0.06	160
Scandium	Sc	0.5	20
Selenium	Se	0.4	4500
Silver	Ag	0.01	100
Strontium*	Sr	1.6	600
Tantalum	Ta	0.004	25
Tellurium	Te	0.01	750
Terbium	Tb	0.02	25
Thallium	Tl	0.003	30
Thorium	Th	0.07	20
Thulium	Tm	0.004	25
Tin*	Sn	0.04	140
Titanium	Ti	7.4	2250
Tungsten	W	0.02	90
Uranium*	U	0.01	20
Vanadium	V	4	80
Ytterbium	Yb	0.02	65
Yttrium	Y	0.3	70
Zinc*	Zn	3	600
Zirconium	Zr	0.2	90

* Elements accredited for ISO/IEC 17025

Method Code		IAL-100	
Element		LDL (ppm)	UDL (ppm)
Aluminum	Al	10	38000
Barium	Ba	1	1300
Beryllium	Be	1	30
Calcium	Ca	8	65000
Chromium	Cr	1	90
Cobalt	Co	1	30
Copper	Cu	1	250
Iron	Fe	3	50000
Lithium	Li	1	30
Magnesium	Mg	3	14000
Manganese	Mn	1	3700
Nickel	Ni	3	260
Phosphorus	P	21	1700
Potassium	K	35	2850
Scandium	Sc	1	10
Sodium	Na	14	670
Strontium	Sr	1	150
Sulphur	S	70	16000
Titanium	Ti	1	1700
Vanadium	V	1	60
Yttrium	Y	1	30
Zinc	Zn	1	1500



X-Ray Fluorescence (XRF)

Major Element Analysis

This package is designed for the analysis of major elements in geological samples. The samples are first run for loss on ignition (LOI) (100^{O}C under nitrogen atmosphere, 1000^{O}C under oxygen atmosphere until a constant weight% is determined) and then fused with a borate flux to produce a glass bead.

Method Code	Major Oxides	LDL (wt %)	UDL (wt %)	Price
XRF-M01	Al_2O_3	0.01	59.63	$29.50/sample
	CaO	0.01	74.66	
	Fe_2O_3	0.01	99.99	
	K_2O	0.01	16.89	
	MgO	0.01	49.19	
	MnO	0.01	4.90	
	Na_2O	0.01	11.65	
	P_2O_5	0.01	36.28	
	SiO_2	0.01	99.99	
	TiO_2	0.01	7.69	
	LOI	0.05	n/a	

Trace Element Analysis

This package is designed for the analysis of trace elements of geological samples. A 10 - 13 gram sample is compressed into a 40 mm pressed pellet. The pressed pellet is then excited by X-rays from a Rh target and analyzed using optimum parameters for each element.

Method Code	Element		LDL (wt %)	UDL (wt %)	Price
XRF-T01	Antimony	Sb	5	1000	$8.75/one element
	Arsenic	As	1	4000	$2.50/add. element
	Barium	Ba	20	10000	
	Bismuth	Bi	3	1380	
	Cesium	Cs	7	1000	
	Chromium	Cr	4	25000	
	Cobalt	Co	6	1400	
	Copper	Cu	1	7000	
	Gallium	Ga	3	900	
	Lead	Pb	3	5600	
	Manganese	Mn	6	10000	
	Molybdenum	Mo	1	1000	
	Nickel	Ni	1	13400	
	Niobium	Nb	2	1000	
	Phosphorus	P	5	12134	
	Potassium	K	6	110000	
	Rubidium	Rb	1	8500	
	Scandium	Sc	6	1000	
	Selenium	Se	1	100	
	Silver	Ag	5	1650	
	Sodium	Na	25	71000	
	Strontium	Sr	2	5000	
	Tantalum	Ta	7	800	
	Thorium	Th	4	1003	
	Tin	Sn	5	6100	
	Titanium	Ti	8	20000	
	Tungsten	W	12	500	
	Uranium	U	3	1000	
	Vanadium	V	4	1000	
	Yttrium	Y	1	1000	
	Zinc	Zn	3	7000	
	Zirconium	Zr	1	11000	

Whole Rock Additions

Carbon and Sulphur

Total carbon and sulphur can be measured in a variety of materials such as rock, soil, cement, limestone, and coal. Combustion of a sample in an oxygen rich environment oxidizes carbon and sulphur which is then measured by infrared absorption.

Method Code	Element		LDL (wt %)	UDL (wt %)	Price
IRC-100	Carbon Dioxide	CO_2	0.03	48.3	$19.00/two elements
	Total Sulphur	S	0.01	28.87	$13.50/one element
IRC-101	Sulphur Trioxide	SO_3	0.01	2.36	$13.50/sample

Moisture Content

Free crystalline (hydrated water) and total moisture can be determined from rock samples and other materials. Free water (H_2O^-) is driven off at 105^{O}C and crystalline water (H_2O^+) at 1000^{O}C. The moisture is then measured by infrared absorption.

Method Code	Element		LDL (wt %)	Price
IRW-H2O	Water - Crystalline	H_2O^+	0.03	$20.00/sample
	Free - Moisture	H_2O^-	0.01	

Ferrous Iron

Samples are dissolved in an aggressive, non-oxidizing acidic mix. The solubilized ferrous iron is quantified by potentiometric titration with standardized permanganate. Samples rich in Mn are not suitable for this method.

Method Code	Element		LDL (wt %)	Price
FEO-ION	Ferrous Iron	FeO	0.06	$14.00/sample

Loss on Ignition

The Geo Labs offers four Loss On Ignition (LOI) programs.

Method Code	Description	Program	Price
LOI-2ST	2 Step LOI	Nitrogen 100^{O}C Oxygen 500^{O}C Total LOI	$5.00/sample
LOI-3ST	3 Step LOI	Nitrogen 100^{O}C Oxygen 500^{O}C Oxygen 1000^{O}C Total LOI	$6.50/sample
LOI-4ST	4 Step LOI	Nitrogen 105^{O}C Oxygen 371^{O}C Oxygen 538^{O}C Oxygen 900^{O}C Total LOI	$6.50/sample
LOI-LK1	Lake Sediment LOI	Oxygen 500^{O}C Total LOI	$5.00/sample

Other Services

Total Suspended Solids

An aliquot of well-mixed sample is passed through a 0.45 µm filter paper in order to determine the total mass of suspended solids.

Method Code	Price
TSS-100	$17.50/sample

pH Determination

Samples are tested for their acidity or alkalinity by direct measurement with an electronic pH meter.

Method Code	Description	Price
PHP-100	pH Paste Determination	$15.00/sample
PHS-200	pH Solution Determination	$5.50/sample

Acid Base Accounting

Standard acid base accounting is used to determine the balance between the acid producing and acid consuming components of samples. All values are expressed in units of tonnes $CaCO_3$ equivalent per 1000 tonnes.

Method Code	Price
ABA-200	$10.00/sample

Particle Size Analysis

Detailed knowledge of the physical characteristics and structural properties of soils is essential in helping engineers determine soil behaviour and performance in a variety of construction conditions. Grain-size analysis is widely used in the engineering classification of soil and in assessing soil permeability and capillarity. The Geo Labs can provide analysis of grain sizes between 0.025 to 2816 microns.

Method Code	Grain Sizes	Price
PSA-100	0.025 - 2816 microns	$42.00/sample

Specific Gravity

Specific gravity is the measure of the density of a material. It is dimensionless, equal to the density of the material divided by the density of water. The technique records the dry weight of an irregular object in air and when suspended in water. The difference between these weights is equal to the weight of the displaced water and hence the volume of the object. Specific gravity of powders can not be measured at the Geo Labs.

Method Code	Sample Size Limitations	Price
SGT-R01	>100 g to <4.0 kg	$15.00/sample

Calcite and Dolomite by Chittick Apparatus

The determination of the carbonate content and calcite/dolomite ratio of sedimentary rock and till, provides valuable information to classify the materials and determine their suitability as materials for the use in the construction industry.

Method Code	Description	LDL (%)	Price
CTK-100	% Dolomite	0.01	$25.00/sample
	% Calcite	0.01	
	Calcite/Dolomite Ratio	0.01	
	% Total Carbonate	0.01	

Fluoride by Ion Select Electrode

Pulverized geological samples that have been fused at 900^{O}C in a sodium carbonate flux (SOL-FDI), solubilized and acidified are analyzed for fluoride (F^-) by automated titration and direct-measure ion selective electrode analysis. This technique is not suitable for the analysis of sulphide-rich samples (S >0.5 wt%) due to chemical incompatibility with the flux.

Method Code	Element	LDL (ppm)	UDL (ppm)	Price
ISE-R01	Fluoride (F^-)	30	110000	$15.00/sample

X-Ray Diffraction (XRD)

Mineral Identification Without Interpretation

Qualitative XRD provides an analysis of powdered rock samples. The interpretation of the XRD pattern is the responsibility of the client

Method Code	Price
XRD-100	$35.00/sample

Mineral Identification With Interpretation

Qualitative XRD provides an analysis of powdered rock samples with interpretation of the mineral phases present. The method is intended to provide the client with a summary of the major mineral phases (> 5%) present in the sample. The ability to properly identify all of the phases may be limited somewhat by the complexity of the sample. Note that routine XRD analysis is only intended to provide classification of general structural groups and cannot provide detailed compositional information.

Method Code	Price
XRD-101	$95.00/sample

XRD Rental Without Operator

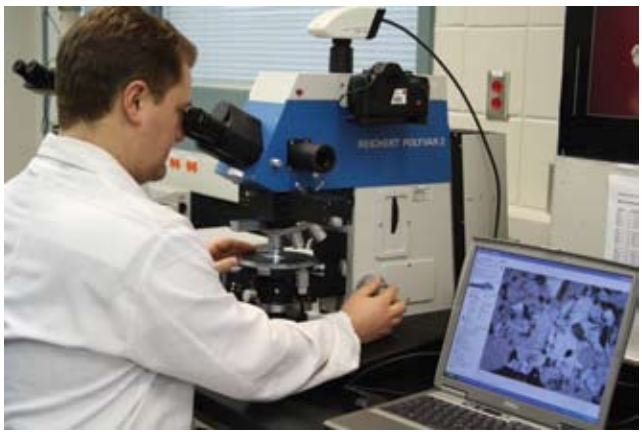
The XRD equipment is available for rent on an hourly basis. The client should contact the Geo Labs for further information and scheduling. Charges for equipment training will be applicable.

Method Code	Price
XRD-102	To Be Quoted

Phyllosilicate Mineral Identification (Clay Speciation)

This package is intended to provide the client with a comprehensive list of clay mineral species present in a sample. This process is labour intensive and requires that the clay mineral fraction is separated from the bulk sample followed by multiple treatments prior to XRD analysis. The amount of sample required for this method depends to a large extent on the particle size distribution in the sample. Please contact the Geo Labs prior to sample submission for advice regarding sample size requirements.

Method Code	Description	Price
XRD-103	Mineral Separation	$555.00/sample
	Mg^{2+} saturation	
	Mg^{2+} glycol, Mg^{2+} glycerol	
	K^{+} saturation, K^{+} 550^{O}C	



Mineralogy

Scanning Electron Microscopy (SEM)

The Geo Labs currently operates a Zeiss EVO-50 Scanning Electron Microscope (SEM). This instrument is equipped with a thin window energy dispersive (ED) spectrometer that allows for light element detection (Z>4). This capability together with fully integrated back scattered electron (BSE), secondary electron (SE), and cathodoluminescence (CL) detection makes this an ideal set-up for reconnaissance work on geological materials where high quality quantitative mineral analysis is not essential. Routine capabilities of this instrumentation include qualitative mineral identification, X-ray mapping, modal analysis, and general SE/BSE/CL imaging including montage generation.

SEM Rental

The SEM may be rented on an hourly basis with or without an operator. The client should contact the Geo Labs for further information regarding the scheduling of SEM rental time. Charges for equipment training will be applicable.

Method Code	Description	Price
SEM-101	SEM Rental With Operator	$140.00/hour
SEM-102	SEM Rental Without Operator	$85.00/hour

Electron Microprobe Analysis

The Geo Labs currently operates a Cameca SX-100 Electron Probe Micro Analyzer (EPMA). This instrument is equipped with 5 wavelength dispersive (WD) spectrometers that utilize an array of large area diffraction crystals that are needed to produce the best possible sensitivity during quantitative mineral analysis.

The mineralogy section currently uses a number of different analytical packages that are optimized for various mineral species. Our strategy is to employ dual analytical conditions (low and high beam current settings) for minerals that are not susceptible to decomposition in order to produce the best possible sensitivity. Routines may be customized to suit the needs of the client to include any combination of elements, counting times, and analytical conditions.

The Cameca SX-100 is well suited to jobs that require large numbers of high quality analyses for research applications where trace and/or light element analyses are required. For routine analysis of mineral grains such as kimberlite indicator minerals (KIMs), the client may opt to submit the grains for analysis on a cost per grain basis (note that a minimum fee applies). Other options include the rental of the instrument on an hourly basis with or without an operator. The client should contact the Geo Labs for further information regarding scheduling of jobs and access to the instrument. Charges for equipment training will be applicable.

Microprobe Analysis/Grain

Method Code	Description	Price
EMP-100*	Analysis/Grain	$13.50/grain

* Minimum of 50 grains. For KIMs the price includes mounting and photography

Microprobe Rental

Method Code	Description	Price
EMP-101**	Microprobe Rental With Operator	$175.00/hour
EMP-102**	Microprobe Rental Without Operator	$110.00/hour

** Minimum of ½ day (4 hours)

Diamond Services

Kimberlite Indicator Minerals (KIMs)

One important aspect of a diamond exploration program is the recovery of kimberlite indicator minerals (KIMs). KIMs are a group of dense, visually distinctive minerals that can be isolated from exploration samples using high density liquids. These minerals represent disaggregated fragments of both mantle xenoliths (source rocks for diamonds) and megacrysts (believed to be high pressure cognate phases formed from 'protokimberlitic' melts). Important KIMs derived from mantle xenoliths include: Cr-pyrope garnet, chromite and Cr-diopside from the peridotite assemblage, and orange pyrope-almandine garnets from the eclogite assemblage.

Studies of mineral inclusions in diamond have identified unique compositional signatures in peridotitic Cr-pyrope garnets and chromites as well as in eclogitic garnets. This has led to the use of simple discriminant diagrams that can be used to identify regions in any exploration program that may be associated with diamond bearing kimberlites.

The most important KIMs associated with the megacryst group include Mg-ilmenite and Cr-poor pyrope. While megacrysts do not have any genetic relationship with diamonds, the relative proportion of these minerals in kimberlite concentrates can be high, and as such this group can play an important role in exploration programs, particularly while tracking distal dispersal halos in alluvium or glacial till.

Analytical Procedure

Mineral separates submitted to the Geo Labs are mounted in 1 inch epoxy plugs that are then exposed, polished and photographed prior to analysis on the Cameca SX-100. Please note that the Geo Labs does not perform either the heavy mineral separation or hand picking of indicator minerals.

The analytical routines have been optimized so that key elements associated with the various indicator mineral groups are analyzed in an appropriate fashion. This involves the use of dual analytical conditions (low and high beam current settings) in order to produce appropriate counting statistics for both major and minor elements thereby ensuring the best precision possible.

Detection Limits

The following table lists the current analytical schemes and associated limits of detection for the KIM suite.

	Lower Detection Limit (wt%)			
Analyte	**Garnets**	**Pyroxenes**	**Ilmenite & Chromite**	**Olivines**
SiO_2	0.026	0.025	0.005	0.025
TiO_2	0.007	0.008	0.020	0.007
Al_2O_3	0.021	0.020	0.025	0.004
V_2O_3	0.006	n/a	0.006	n/a
Cr_2O_3	0.012	0.012	0.018	0.005
Nb_2O_3	n/a	n/a	0.010	n/a
MgO	0.021	0.020	0.028	0.018
CaO	0.011	0.013	0.004	0.005
MnO	0.008	0.009	0.024	0.008
FeO	0.018	0.019	0.046	0.021
CoO	n/a	n/a	n/a	0.009
NiO	n/a	0.006	0.007	0.006
ZnO	n/a	n/a	0.011	n/a
Na_2O	0.006	0.007	n/a	n/a
K_2O	0.003	0.003	n/a	n/a

* Note that the Lower Detection Limit may vary depending on the service status of the spectrometers.

Sample Submission

KIM grains should be submitted to the Geo Labs in clearly labelled vials that are mineral specific. Individual batches must contain a minimum of 50 grains. For high volume jobs (>2000 grains) please contact the Geo Labs for alternate sample submission protocols and scheduling information.

Reference Materials (RMs)

Reference Materials (RMs)

The Geo Labs has a fully-equipped facility with specialized equipment to produce reference materials in batches from 1 kg up to 500 kg (depending on the specific gravity of the material).

The Geo Labs reference material program focuses on three aspects:

- Production of reference materials for in-house use
- Production of reference materials to meet specific individual client requirements
- Production of reference material for purchase by clients

Production of Reference Materials for In-house Use

The Geo Labs has produced over 40 in-house reference materials since 1970 for internal use with a focus on material collected from various geological sites in Ontario, Canada. Materials are crushed, pulverized to -200 mesh, screened, blended, and bottled. Currently, reference materials produced at the Geo Labs undergo in-house homogeneity testing to determine the provisional composition and to ensure within-bottle and between-bottle consistency.

Production of Reference Materials to Meet Specific Individual Client Requirements

The Geo Labs currently produces reference materials to meet specific individual client requirements. Clients include major and junior mining companies and government agencies. The client can supply their own material or it can be sourced by the Geo Labs. The final product can be bottled or packaged in any size aliquot to meet specific requirements. Silica gel packs can be inserted in each package and nitrogen purging is available to remove oxygen from the package before it is sealed. Prices vary depending on the client requirements. Please contact the Geo Labs for further information and pricing.

Reference Materials in Production for Purchase

OPEG is an evolved pegmatite collected 45 km north of Kenora, Ontario, Canada. The bulk material was collected from the locality known as Lou's Pegmatite. It consists of quartz, feldspar, tantalite, fassiderite, beryl, and petalite.

ORCA is a calc-alkalic rhyolite collected from Pontiac Township, 35 km northeast of Kirkland Lake, Ontario, Canada. This massive fine-grained slightly porphyritic grey rock contains minor amounts of feldspar phenocyrts and locally quartz eyes.

Reference Material Available for Purchase

OKUM is an ultramafic komatiite collected at Serpentine Mountain in McArthur Township, 25 km south of Timmins, Ontario, Canada. The sample consists of black massive rocks composed of randomly oriented spinifex blades 5-10 cm long. See chart on next page for provisional in-house data.

Two PGE standards from the Lac des Iles PGE deposit representing low (LDI-1) and high (LDI-3) grades were collected early in 2001. The Lac des Iles PGE deposit is hosted by a gabbro located 85 km north of Thunder Bay, Ontario, Canada. See the chart on next page for provisional in-house data.

PJV-1, PJV-2, and PJV-3 are three reference materials from the Porcupine Joint Venture project in Timmins, Ontario, Canada. See the chart on the next page for provisional in-house data.

LK-NIP-1 is a diabase collected from a Nipigon diabase sill in Kitto Township, south of the town of Beardmore, Ontario, Canada. See the chart on the next page for provisional in-house data.

Provisional Composition of In-house Reference Materials

Element	Unit	OKUM	LDI-1	LDI-3	LK NIP-1
Al_2O_3	wt %	8.05	17.36	10.50	15.84
CaO	wt %	8.06	10.16	7.17	10.46
Fe_2O_3	wt %	12.14	7.69	12.51	13.79
K_2O	wt %	0.04	0.21	0.24	0.47
MgO	wt %	22.37	10.87	15.94	7.38
MnO	wt %	0.18	0.13	0.20	0.20
Na_2O	wt %	1.15	1.89	0.79	2.43
P_2O_5	wt %	0.02	<0.01	<0.01	0.1
SiO_2	wt %	43.57	48.77	48.51	49.65
TiO_2	wt %	0.40	0.12	0.19	1.18
LOI	wt %	4.66	2.74	4.02	0.17
S	wt %	0.02	0.12	0.15	0.02
CO_2	wt %	n/a	n/a	0.09	0.04
FeO	wt %	8.40	5.46	9.03	9.90
H_2O^+	wt %	5.71	3.25	5.07	0.61
H_2O^-	wt %	n/a	0.15	0.11	0.16
Au*	ppb	1.49	83.9	103	4.63
Ba	ppm	7	55	36	142.3
Ce	ppm	1.4	2.5	2.5	20.59
Co	ppm	84	52	84	60.6
Cr	ppm	2120	n/a	343	183
Cs	ppm	0.19	1.07	1.08	0.0690
Cu	ppm	45	413	456	165.3
Dy	ppm	1.5	0.39	0.48	4.238
Er	ppm	1.02	0.28	0.36	2.553
Eu	ppm	0.3	0.18	0.17	1.174
Ga	ppm	8.4	10	9	19.8
Gd	ppm	1.14	0.32	0.39	4.072
Hf	ppm	0.60	0.2	0.2	2.5
Ho	ppm	0.38	0.09	0.12	0.888

Element	Unit	OKUM	LDI-1	LDI-3	LK NIP-1
Ir*	ppb	0.99	0.08	0.17	0.19
La	ppm	0.47	1.2	1.2	9.27
Li	ppm	3.7	18	25	n/a
Lu	ppm	0.15	0.05	0.07	0.352
Mo	ppm	<1	<1.0	<1	1.42
Nb	ppm	0.4	0.22	0.27	4.9
Nd	ppm	1.5	1.2	1.3	12.50
Ni	ppm	780	656	657	160.5
Pb	ppm	n/a	2.6	4.6	3.3
Pd*	ppb	11.7	834	4820	17.96
Pr	ppm	0.27	0.30	0.33	2.776
Pt*	ppb	11.0	98.2	290	13.43
Rb	ppm	1.14	7.8	9.5	14.04
Rh*	ppb	1.40	0.70	1.79	0.90
Ru*	ppb	4.25	0.32	0.82	0.44
Sc	ppm	23	24.5	37.8	34.9
Sm	ppm	0.69	0.28	0.32	3.33
Sr	ppm	16	183	88	176.9
Ta	ppm	<0.5	<0.3	<0.3	0.30
Tb	ppm	<0.5	0.06	0.07	0.682
Th	ppm	<0.5	0.12	0.12	1.65
Tl	ppm	<0.5	<0.03	<0.3	0.11
Tm	ppm	<0.3	0.05	0.06	0.368
U	ppm	<0.03	0.04	0.05	0.485
V	ppm	166	93	135	306
Y	ppm	10.3	2.4	3.1	23.37
Yb	ppm	0.97	0.31	0.41	2.36
Zn	ppm	52	n/a	86	98
Zr	ppm	19	n/a	7	84

* Analysis by Nickel Sulphide Fire-Assay with ICP-MS Finish
Note: Results are based on the average of 12 randomly selected bottles

Element	Unit	PJV-1	PJV-2	PJV-3
Au	oz/ton	0.23	0.28	0.95
Ag	ppm	1.12	1.28	3.98
Cu	ppm	180	210	150
Ni	ppm	83	81	108
S	wt %	1.15	1.29	0.76
CO_2	wt %	3.52	4.04	9.61

Geoscience Laboratories
Ontario Ministry of Northern Development and Mines
Willet Green Miller Centre
933 Ramsey Lake Road
Sudbury, Ontario P3E 6B5 Canada
Tel: (705) 670-5637 Toll Free: 1-866-5227
Fax: (705) 670-3047
E-mail: geoscience.labs.ndm@ontario.ca
Website: www.ontario.ca/geolabs

For Geo Labs Use Only
Date Sample Submitted:_____
Quote Number:_____
Price Code:_____

Geo Labs Job Number:_____

Date: _____
Submitted By: _____
Company: _____
Address: _____

Phone Number: _____
Fax Number: _____
E-mail:

Data Report To: _____
Company: _____
Address: _____

Phone Number: _____
Fax Number: _____
E-mail: _____

Additional Report To: _____
Company: _____
Address: _____

E-mail: _____

Invoice To: _____
Company: _____
Address: _____

Phone Number: _____
Purchase Order No.: _____
Quote No.: _____

SAMPLE SUBMISSION FORM – REQUEST FOR ANALYSIS

No. of Samples	Sample Numbers	Sample Description	Sample Prep Code	Solution Prep Code	Method Codes / Elements			

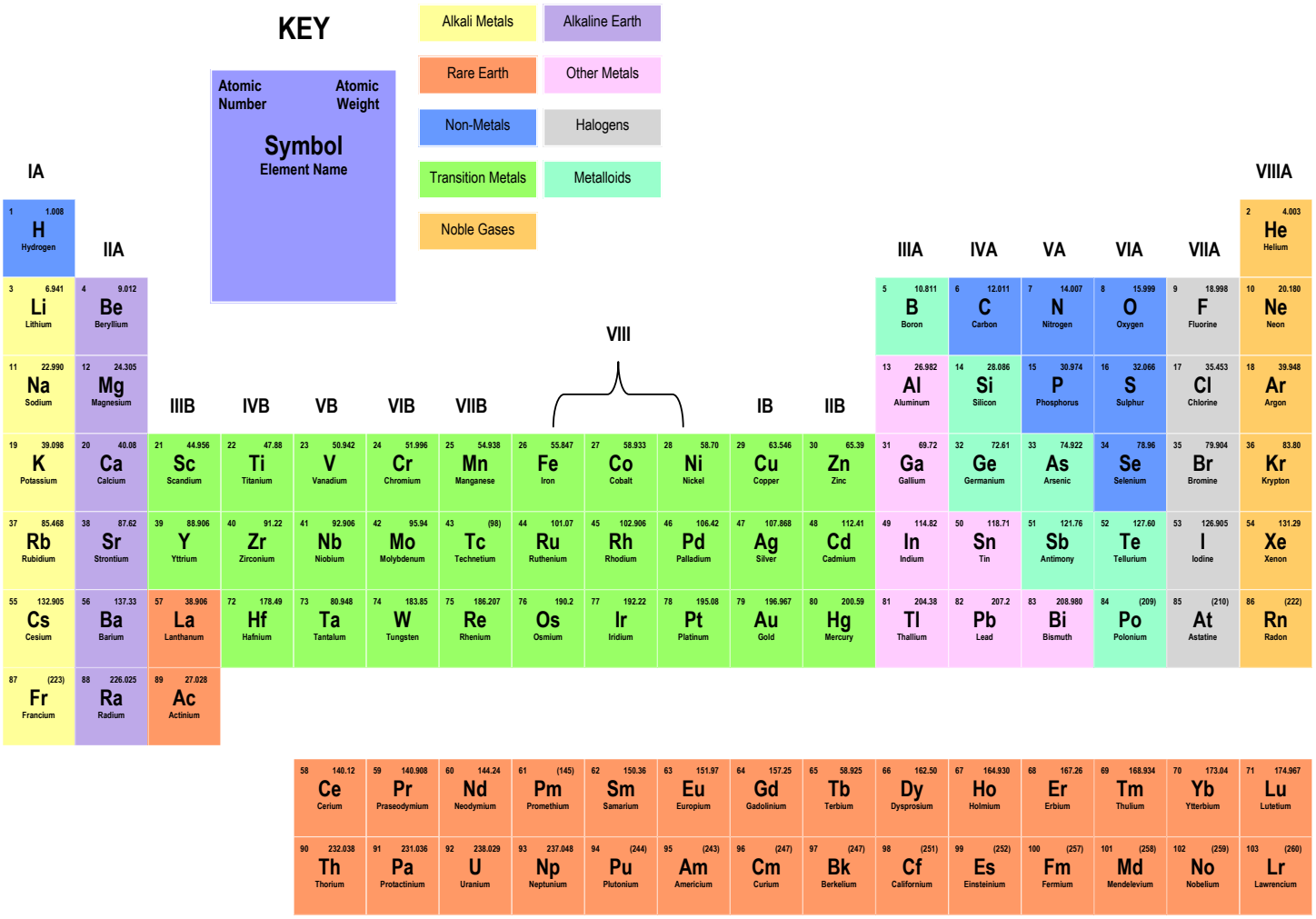
Comments / Special Instructions

Sample Management: Rejects (90 Days Free) Pulps (30 Days Free) Solutions (90 Days Free)
Discard ( ) ( ) ( )

Return (collect) ( ) ( ) ( )

Samples will be discarded if instructions are not provided

DISCLAIMER:
Values are reported as achieved on each instrument. If values are above or below the working limit, it is the responsibility of the client to request another type of analysis for conclusive results at the expense of the client.



For More Information Contact:
Geoscience Laboratories (Geo Labs)
Ontario Geological Survey
Ontario Ministry of Northern Development and Mines
Willet Green Miller Centre
933 Ramsey Lake Road
Sudbury, Ontario P3E 6B5 Canada
Tel: (705) 670-5637
Toll Free: 1-866-436-5227
Fax: (705) 670-3047
E-mail: geoscience.labs.ndm@ontario.ca
Website: www.ontario.ca/geolabs

GEO LABS
GEOSCIENCE LABORATORIES

Precise Analysis
Accurate Results

Ontario

Ontario Ministry of Northern Development and Mines
Ontario Geological Survey