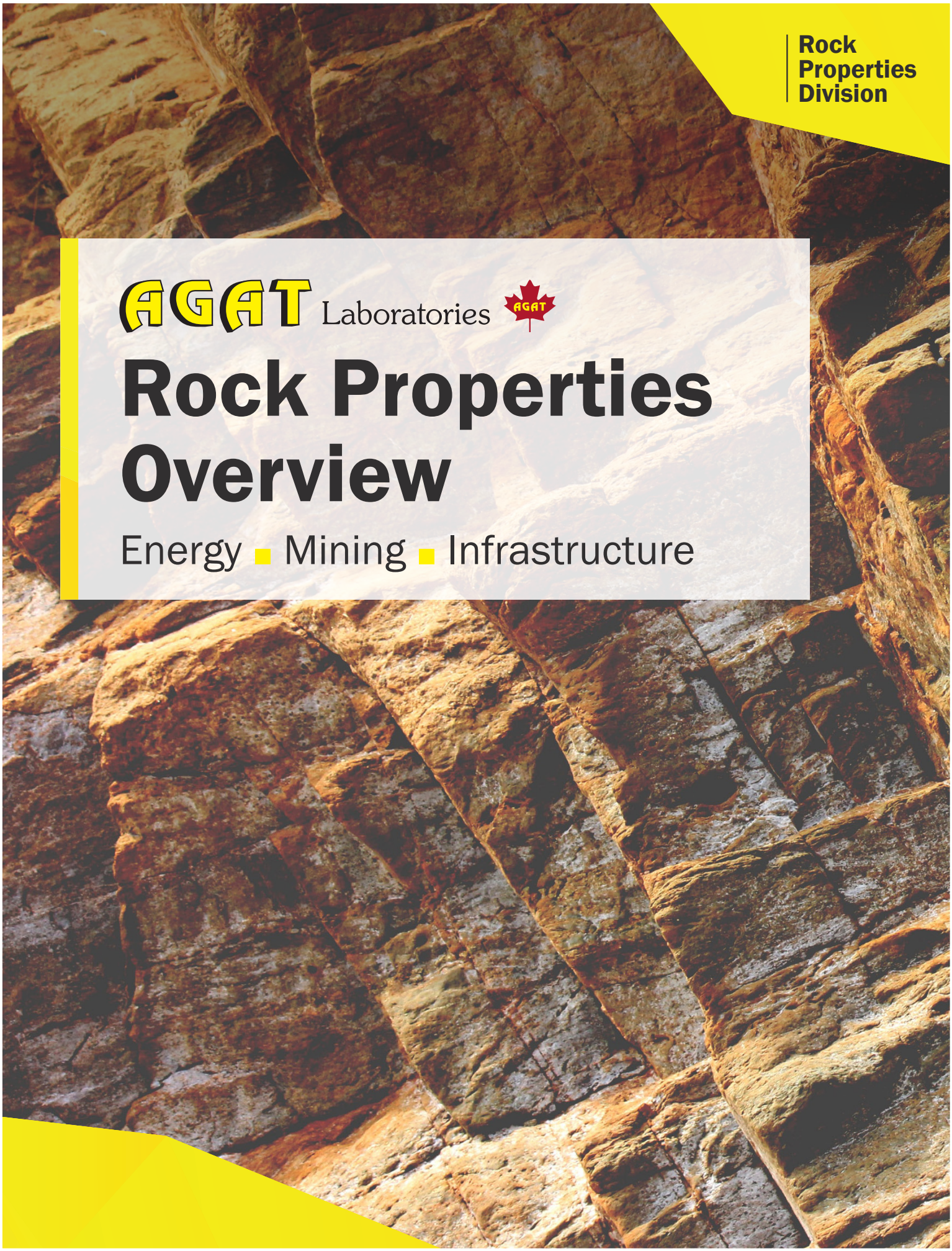


Rock Properties Division

AGAT Laboratories

Rock Properties Overview

Energy ▪ Mining ▪ Infrastructure

Table of Contents

Table of Contents

Corporate Overview

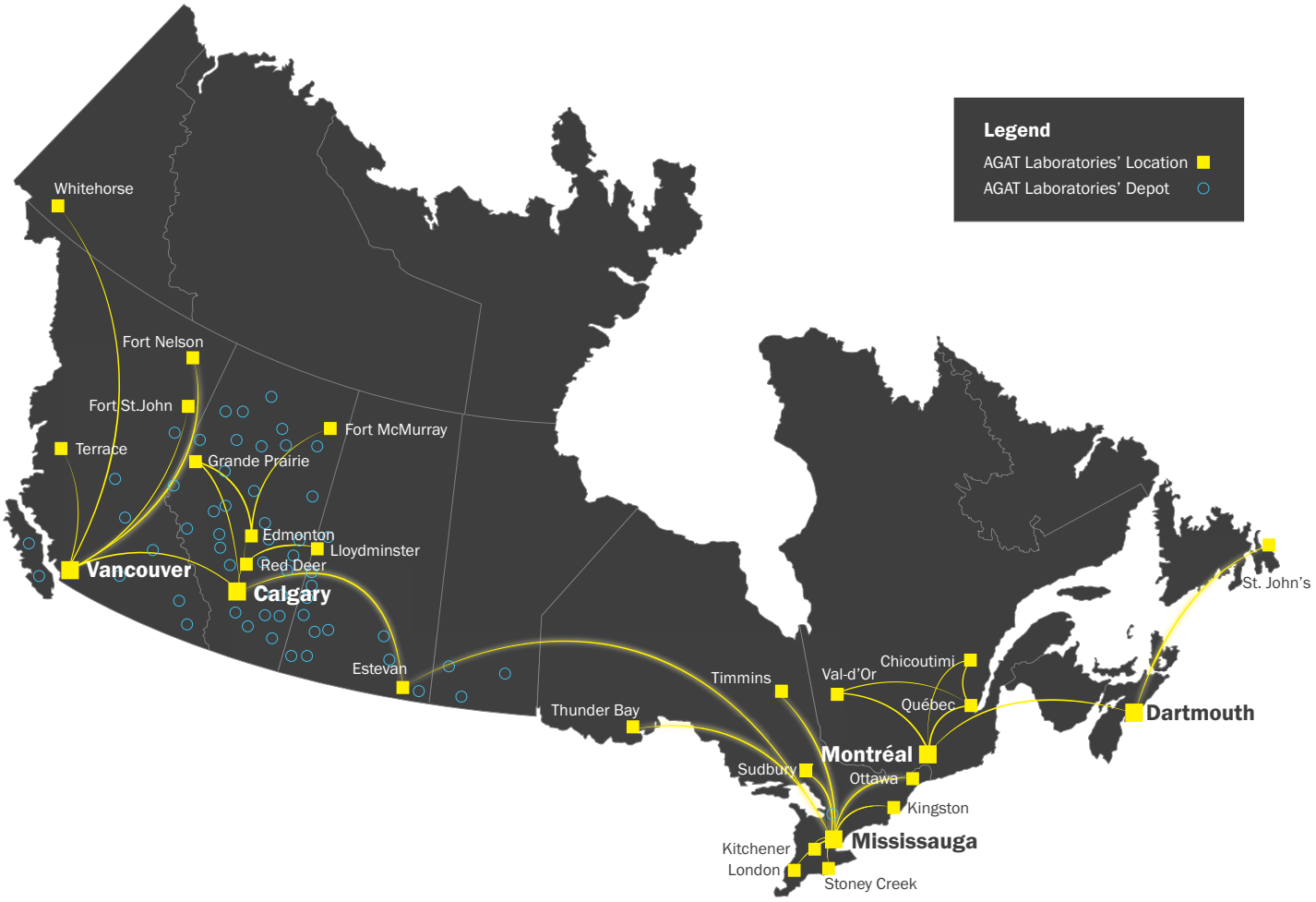
Who We Are

AGAT Laboratories' is a highly specialized, Canadian-based company that provides laboratory services worldwide. With 40 years' experience, locations coast-to-coast and 1,200 employees Canada-wide, AGAT Laboratories' is the most geographically and technically diversified commercial testing laboratory in Canada. Committed to local communities, AGAT Laboratories' aims to maintain our mission statement to deliver "Service Beyond Analysis".

Our laboratory operations offer full-service solutions for a wide range of industries, including Mining, Environmental, Energy, Industrial, Transportation, Agriculture and Food, Forensic Science, and the Life Sciences sectors.

AGAT Laboratories' network of laboratory facilities and depots provides extensive geographic coverage in Canada. We are proud to set high standards in the laboratory industry with our mandate to provide timely, accurate and defensible solutions for our clients' analytical needs with services ranging from basic testing to extremely complex technical projects.

When you choose AGAT Laboratories', you will experience "Service Beyond Analysis". We provide quality data and unsurpassed service through our client-focused approach to accomplish and deliver on your specific needs. We understand the importance of providing accurate and timely results with consistently great service. Our methodologies, operating procedures and instrumentation are selected to provide suitable analytical techniques to produce the most precise and accurate analytical results possible. Our cutting edge technical expertise and innovations enable us to provide you with service excellence.



Proudly Canadian

We are proud to be a Canadian-based business. AGAT Laboratories' continues to invest in our company and the interests of Canada's communities. Our management team values and fosters continued development, diversification and innovation in science and technology which enables us to continually support and invest in local communities.

AGAT Laboratories' Ltd.
International Corporate Headquarters
Calgary, Alberta. Canada

"Home-Grown and Proud to be Canadian"

Mine Life Services

AGAT Laboratories' is the only service provider with the capability to offer full analytical solutions to both the mineral and petroleum resource industries.
Our Mining Division was built to support both exploration and mining activities through all stages of prospecting, production, and development.
Our Environmental Division can also service the requirements associated with environmental monitoring and restoration of mine sites. Our state-of-the-art facilities, advanced analytical and processing equipment and decades of expertise allow AGAT Laboratories' to deliver routine and specialty analytical services for mineral exploration and development.
AGAT Laboratories' multi-divisional services and extensive technical capabilities allow our team to service the mining industry from cradle to grave.

Exploration

- AGAT Laboratories' offers trace level geochemical analyses down to the ppb level by utilizing industry leading state of the art equipment. AGAT Laboratories offers a wide variety of multi-element packages that meets the varied needs of each unique exploration project. At AGAT Laboratories, we pride ourselves on providing expert advice to help you decide which package is most appropriate for your specific mineral project.

  Along with advanced geochemistry analysis, AGAT also offers a full service environmental laboratory dedicated to mine exploration work and baseline environmental studies. Utilizing the expertise and experience within our different divisions, AGAT has the unique capability of providing all mining services together in one team.

Production

- AGAT Laboratories' is able to customize a wide variety of packages focusing on the specific element(s) of interest. We also have a variety of techniques that can be utilized given your requirements and preferences. When it comes to production testing, time is of the essence and AGAT Laboratories' takes pride in providing optimal turn-around times, allowing our clients to make informed decisions as quickly as possible.

- AGAT Laboratories' is constantly investing in state of the art equipment which allows our highly skilled teams to efficiently handle large volumes of samples.

- AGAT Laboratories' has a specially designed tracking and monitoring system which gives our team the ability to constantly monitor and efficiently prioritize work throughout our labs. This system allows us to monitor and change the priority level of projects to ensure that no sample gest left behind and all programs are completed within the required turn-around time.

Closure and Reclamation

- AGAT Laboratories' provides a full suite of analytical environmental services that are required for closure and reclamation of a mine. Using our e-services, AGAT Laboratories can help monitor and track sample analysis as well as highlight any outlying results. Utilizing AGAT Laboratories services throughout the life cycle of a mineral exploration and production program, allows for complete integration and consistency of data.

- AGAT Laboratories' provides all the sampling equipment required for your entire environmental program. Working with our team, you can ensure your site has sufficient supplies to sample where and when required. AGAT Laboratories experts can help ensure all necessary regulations for mine maintenance and closure are met.

Additional Supporting Divisions

AGAT Laboratories' prides its self in being a full service laboratory which can integrate into all aspects of a mine lifecycle. AGAT Laboratories' has built a network of facilities across Canada designed to offer the most technical and advanced analytical services.

Advanced Exploration Services

- Offering a wide range of in-house services, our Advanced Exploration Services go beyond geochemistry to incorporate core handling and layout, geological analysis and interpretation as well as geotechnical and geomechanics testing.

- Geological, petrographic and micron scale imaging provides data to determine mineral compositions, assemblages and distributions to support exploration, drilling, excavation and mining activities. Understanding the geology from hand specimen scale to microscopic scale, aids the geology team in understanding the rock fabric and the nature of mineralization.

Coolants and Lubricants for Preventive Maintenance

- Lubricant testing is used to optimize and extend the life of equipment within a mine. By incorporating a proper maintenance plan, clients can ensure the long life and functionality of all equipment. A properly scheduled and performed maintained plan can reduce downtimes and associated expenses. Our e-services track and trend the data analyzed to highlight any changes that may be occurring within a piece of equipment.

- Analytical methods investigate the testing of coolants, lubricants, hydraulic and transmission fluids for diagnosis of wear and tear on engines and process equipment, including full oil quality assessment profiling.

Environmental Impact and Ecotoxicity Testing

- Analyzing and interpreting the environmental impact of mining operations is essential for mine site development and execution. AGAT Laboratories' analytical services allow clients to perform baseline testing and follow up testing to ensure there is no contamination occurring within or around the site of interest.

- An expansive array of chemical, biological and ecotoxicity testing of water, groundwater, wastewater, soil, sediment, sludge and solid waste is available to assist with environmental assessments, monitoring, disposal and treatment.

Air Quality and Industrial Hygiene Monitoring

- Airborne contaminants and source emissions testing and analysis are key in the assessment of particulate, gases, fumes, and vapors that are contained in ambient air or released by an industrial process. Contaminant exposure monitoring and analysis of hazardous substances are also available for workplace environments to support health and safety programs and compliance to occupational health and safety standards and regulations.

Excellence at AGAT Laboratories'

At AGAT Laboratories' we are grounded in the statement of "Service Beyond Analysis". Our company is built on this principle and we devote many value-added services to ensure this statement is a reality. AGAT Laboratories' expensive network of technical experts across our multiple divisions allows us to assist in the planning and support of any project through its duration. Utilizing dedicated Client Project Manager's, we are able to carefully monitor and execute all projects. The attention that each project receives ensures we maintain our industry leading turn-around time and unmatched quality.

As part of AGAT Laboratories' commitment to "Service Beyond Analysis", we offer a range of in-house IT solutions that assist with sample flow, project management and reporting. Our Laboratory Information Management System (LIMS) allows staff to login samples and assign the appropriate analytical packages. The system partners with our Work Order System that allows for the monitoring and prioritization of samples within our lab. To compliment these systems, a variety of e-services are also provided to allow clients to manage and access their data through secure online portals. Each AGAT Laboratories' division has their own dedicated portal to allow clients to access their data.

Technical Services

AGAT Laboratories' strives to provide our clients with the highest quality service by continually investing in technical resources, project management innovations, research, development and laboratory enhancements. Our goal is to invest technically and personally in each project in order to optimize the business partnership with your company.

Research and Development

At AGAT Laboratories', research and development is an integral part of our operations. Since our inception, our innovations have set industry standards for new and creative solutions to complex industry problems. Through our research and development programs, AGAT Laboratories' is committed to the advancement of science and technology. AGAT Laboratories' research and development team includes a diverse group of extensively trained scientists and professionals. Strong research and development efforts are essential for technological advancement, optimization, and cost effectiveness for our clients and their companies

AGAT Laboratories' research and development program spans all of our laboratory divisions and is designed to improve internal processes and develop new services. By deploying a strong research and development program, AGAT Laboratories' ensures that it remains on the cutting edge of the laboratory industry.

Local Client Support

Client Project Managers

AGAT Laboratories' assigns a Client Project Manager (CPM) to every customer account. CPM's are thoroughly trained in analytical operations and quality control to better support each of our clients. Each CPM serves as a key link to the laboratory, and by utilizing our Jobs in Progress (JIPs) tracking system, they can report on the status of samples as required.

AGAT Laboratories' CPMs act as the main point of contact for all inquiries or concerns. As well, to create consistency, simplicity and transparency for our clients, our CPMs oversee all aspects of sample coordination, tracking, QC, and data delivery. The CPM duties also extends to ensuring that all AGAT Laboratories' invoices meet client specifications and requirements.

Technical Service Managers

Technical Service Managers are dedicated to working with our clients for both routine and specialized custom projects and are located throughout all AGAT Laboratories' divisions. Technical Service Managers work collaboratively with our clients to assess their needs throughout the life of their business. Clients can rely on our Technical Service Managers to assist with complex projects and provide advice on laboratory services and regulations.

Business Development Representatives

AGAT Laboratories' offers an enhanced customer experience through direct contact with our Business Development Representatives (BDR). Our BDRs service clients throughout all of our locations and are responsible for developing long-term business relationships with your personnel. Your designated BDR is responsible for all aspects of the client account and is a key focal point in the customer service experience. BDRs are there to connect you with subject matter experts as well as to coordinate daily project specifics such as quotations and project updates. Additionally, a BDR will oversee your account to ensure you are able to maximize your customer experience through technical seminars, workshops, e-services, bulletins and research and development opportunities. Finally, your BDR is responsible for coordinating Master Service Agreements and communicating all contract requirements to the laboratory operations.

Industry Wide Technical Events

AGAT Laboratories' is committed to advancing knowledge and discussion in the industries in which we operate. As leaders in laboratory services, we feel that it is important to contribute to the different sectors we service by hosting events that offer opportunities for industry professionals to collaborate, network, share new innovations, discuss policy and more.
We regularly host events across Canada where we invite our clients to join us in presenting their recent work, findings and/or insights on government regulations. Professionals from all industries are invited to register to attend these events in an effort to promote integrated work collaboration.

Seminar Series and Workshops

AGAT Laboratories' is pleased to provide group-focused technical information sessions as a value-added service to our clients. These technical and training seminars are designed to provide the most recent technical information in each line of our business in an effort to maintain the highest levels of service and transfer of knowledge. In addition to having an extensive database of technical presentations available, AGAT Laboratories' can tailor a presentation for specific client or department requirements. AGAT Laboratories' seminars can be delivered in our state-of-the-art auditorium, directly at the client's office or through web based platforms.

To promote collaboration between AGAT Laboratories' and our clients, we host interactive hands-on sampling workshops which are designed to assist in understanding best practices for sampling and quality optimization in the field. Laboratory tours and in-house presentations can be arranged to help our clients better understand the internal workings of our laboratory facilities. We also offer training courses that include both classroom style teaching and hands-on workshops.

Information Management System

Information Technology is crucial for any business in operation today. The ability to collect, manage and communicate information efficiently and globally is key to improving productivity, profit performance and data accuracy. AGAT Laboratories' has an internal Information Systems (IS) department dedicated to improving overall client experience and creating easier access to data. The IS department is staffed with the best hardware and software specialists available. As a result, we have the best custom-designed Laboratory Information Management System (LIMS) that integrates data capture, real-time statistical process control, standard and custom report generation, data integrity verification and more.

AGAT Laboratories' uses internal control and management systems that constantly monitor all AGAT Laboratories' operations. These systems have ensured AGAT Laboratories' continues to be one of the most reliable and effective labs. AGAT Laboratories' LIMS system is an integrated lab management program, which has the capability of generating several key reports which include; sample analysis turnaround times (TAT), total company spend by division, company spend by area, and analysis quantity breakdowns. We utilize these reports to improve efficiency and customize our approach to each client.

AGAT Laboratories' LIMS uses an Oracle database which is customized to meet the needs of our clients. Our unique systems have been designed through extensive user consultation including both internal and external sources.

AGAT is continually updating this system to meet client requirements. Using in-house programming staff allows us to promptly respond to client's data handling and reporting requirements.

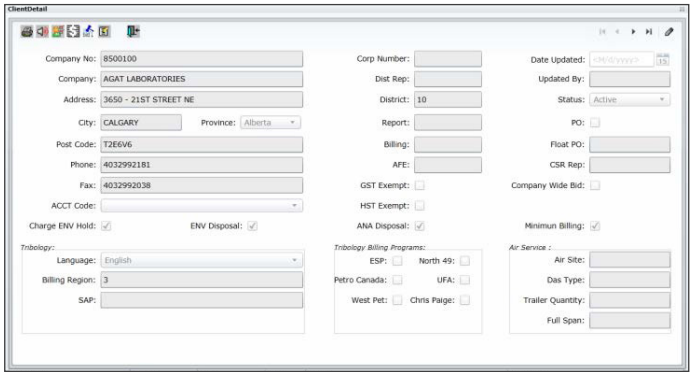
Modules of LIMS being used in-house by AGAT include four main programs:

- Client Master File (CMF)
- Work Order Generation
- Work Load Control
- Invoicing

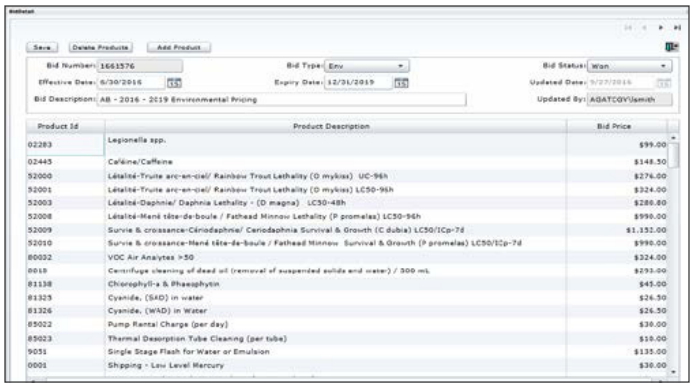
The CMF module allows secure internal access to all specific information pertaining to any client including multiple contacts within one organization. AGAT Laboratories' logistics control group, upon receipt of samples, uses the work order module to access specific work instructions, turnaround time and other lab specifications. Both of these modules then transmit information directly to the invoicing system to ensure accurate invoicing. The workload control system creates daily sample tracking and workload reports for management review.

Client Master File

The Client Master File (CMF) is the facet of LIMS that ensures AGAT Laboratories' retains key client information for efficient processing of laboratory analyses and client communication. Client contact information is kept in a secure centralized database which ensures communication in a timely and cost-effective manner. Client approved pricing is entered into the CMF making invoicing seamless.



Key Client information is stored in the Client Master File ensuring consistent work assignment and invoicing for the duration of the contract. The CMF includes addresses, contact names and phone numbers and email addresses.



- Each Client Master File contains specific set pricing to ensure there are no erroneous invoices generated. When samples are received it is click and point to the relevant product ID and the information feeds the Work Order Module. There is no handwriting of information.

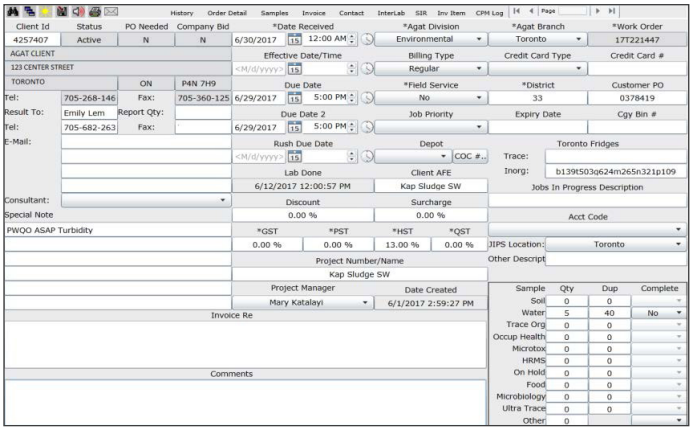
Work Order System

Upon receipt of samples to AGAT Laboratories', they are logged into our Laboratory Information Management System (LIMS) using our work order system module. This module imports all the information from the Client Master File automatically. This therefore ensures that when a new work order is generated all contact information, pricing and special instructions are included.

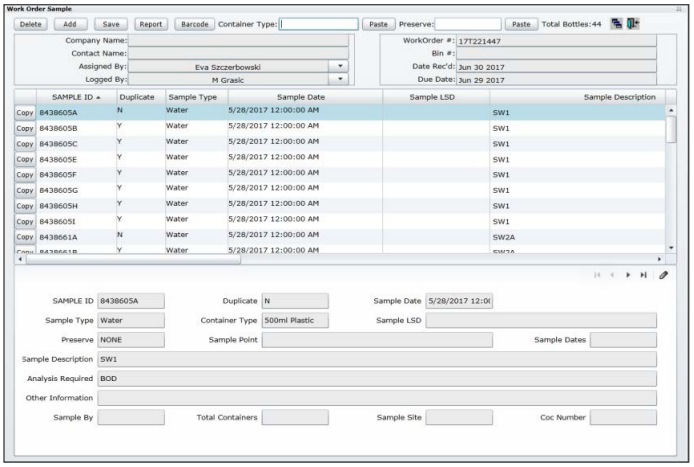
Once client information is imported from the CMF, samples are assigned to a bin number that indicates where they are stored pre- and post- analysis which allows the analyst to locate the samples quickly. Sample priorities and rush turn-around times are flagged in the work order system to ensure proper handling and prioritization.

Work Load Control

AGAT Laboratories' Work Load Control module of LIMS generates a Jobs in Progress Report allowing Lab Managers and Supervisors to monitor and track work-in-progress as well as to prioritize jobs. Rush jobs appear first on the report, alerting lab management and personnel. Additional reports used are:



- Client and contact information as well as special instructions are imported from the Client Master File. This screen is where Client Projects Managers can view the status of analyses and make changes or updates to the project.

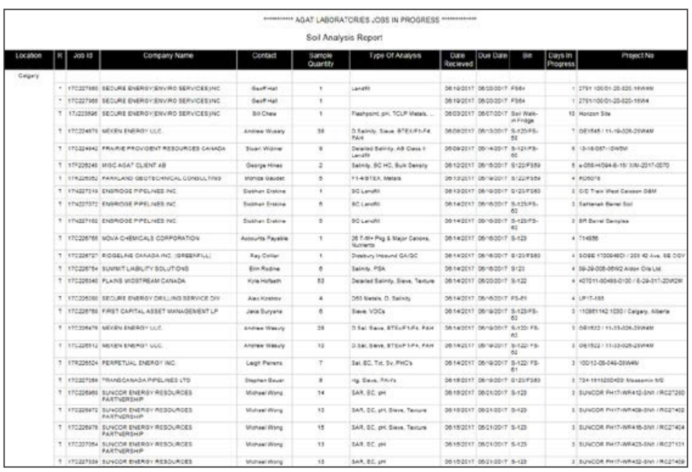


- Every sample is logged into the system individually and given a Laboratory number that allows for easy tracking throughout the lab. Every sample is logged in under the client specified sample identification, which is the same sample ID that will ultimately appear on the CoA.

Workload Control

AGAT Laboratories' workload control module of LIMS generates a jobs in progress report that allows lab managers and supervisors to prioritize, monitor and track work-in-progress. Rush jobs appear first on the report, alerting Lab Management and personnel. Additional reports used are:

- LIMS Operations Report: tracks staff saturation, thereby eliminating slowdowns.
- Instruments Auto-Export: data is automatically input to the reporting database, vastly improving turnaround time.
- Instrument Workflow Report: automatically updated for "up to the minute" progress reports. Different colors indicate different stages of completion for each individual instrument and test. The workflow report is closely monitored to ensure that bottlenecks in processing do not occur.



********** AGAT LABORATORIES JOBS IN PROGRESS **********

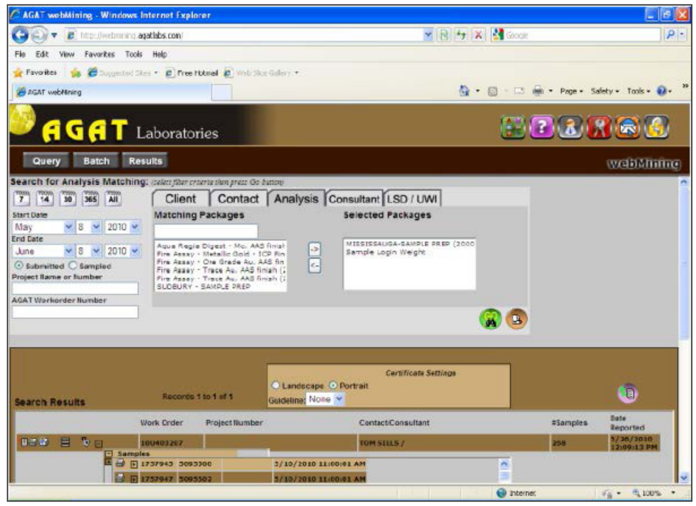
Soil Analysis Report

Location	R	Job Id	Company Name	Contact	Sample Quantity	Type Of Analysis	Date Recieved	Due Date	Bin	Days In Progress	Project No
Calgary											
	1	17C227980	SECURE ENERGY (ENVIRO SERVICES) INC	Geoff Hall	1	Landfill	06/19/2017	06/20/2017	FS64	1	2791 100/01-20-020-16W4M
	1	17C227988	SECURE ENERGY (ENVIRO SERVICES) INC	Geoff Hall	1		06/19/2017	06/20/2017	FS64	1	2791/100/01-20-020-16W4
	1	17J223896	SECURE ENERGY (ENVIRO SERVICES) INC	Bill Chew	1	Flashpoint, pH, TCLP Metals, ...	06/03/2017	06/07/2017	Soil Walk-in Fridge	10	Horizon Site
	1	17C224979	MEXEN ENERGY ULC	Andrew Wusaty	38	D.Salinity, Sieve, BTEX/F1-F4, PAH	06/08/2017	06/13/2017	S-120/FS-58	7	0E1545 / 11-19-026-20W4M
	1	17C224942	PRAIRIE PROVIDENT RESOURCES CANADA	Stuart Widmer	8	Detailed Salinity, AB Class II Landfill	06/09/2017	06/14/2017	S-121/FS-60	6	13-16-057-10W5M
	1	17F226248	MISC AGAT CLIENT AB	George Hines	2	Salinity, SC HC, Bulk Density	06/12/2017	06/15/2017	S122/FS59	5	[illegible]
	1	17R226052	PARKLAND GEOTECHNICAL CONSULTING	Monica Gaudet	5	F1-4/BTEX, Metals	06/13/2017	06/19/2017	S122/FS59	4	PO5078
	1	17N227219	ENBRIDGE PIPELINES INC.	Siobhan Erskine	1	SC Landfill	06/13/2017	06/19/2017	S120/FS60	3	[illegible]
	1	17N227372	ENBRIDGE PIPELINES INC.	Siobhan Erskine	6	SC Landfill	06/14/2017	06/16/2017	S-123/FS-63	3	[illegible] Barrel Soil
	1	17N227160	ENBRIDGE PIPELINES INC.	Siobhan Erskine	5	SC Landfill	06/14/2017	06/16/2017	S-123/FS-63	3	BR Barrel Samples
	1	17C226766	NOVA CHEMICALS CORPORATION	Accounts Payable	1	36 T-Mn Pkg & Major Cations, Nutrients	06/14/2017	06/16/2017	S-123	4	714858
	1	17C226727	RIDGELINE CANADA INC. (GREENFILL)	Ray Collier	1	Didsbury Inbound QA/QC	06/14/2017	06/16/2017	S120/FS60	4	[illegible]
	1	17C226754	SUMMIT LIABILITY SOLUTIONS	Erin Rodine	6	Salinity, PSA	06/14/2017	06/16/2017	S123	4	[illegible]
	1	17C226040	PLAINS MIDSTREAM CANADA	Kyle Hofbeth	53	Detailed Salinity, Sieve, Texture	06/14/2017	06/20/2017	S-122	4	[illegible]
	1	17C226080	SECURE ENERGY DRILLING SERVICE DIV	Alex Kostov	4	D50 Metals, D. Salinity	06/14/2017	06/16/2017	FS-61	4	LP17-185
	1	17C226780	FIRST CAPITAL ASSET MANAGEMENT LP	Jana Suryana	6	Sieve, VOCs	06/14/2017	06/19/2017	S-123/FS-63	3	[illegible] / Calgary, Alberta
	1	17C226476	MEXEN ENERGY ULC	Andrew Wasuty	28	D.Sal, Sieve, BTEX/F1-F4, PAH	06/14/2017	06/19/2017	S-122/FS-62	3	[illegible]
	1	17C226912	MEXEN ENERGY ULC	Andrew Wasuty	10	D.Sal, Sieve, BTEX/F1-F4, PAH	06/14/2017	06/19/2017	S-122/FS-62	3	[illegible]
	1	17R226524	PERPETUAL ENERGY INC.	Leigh Perrens	7	Sal, SC, Txt, Sv, PHC's	06/14/2017	06/19/2017	S-122/FS-61	3	[illegible]
	1	17C227288	TRANSCANADA PIPELINES LTD	Stephen Bauer	8	Hg, Sieve, PAH's	06/15/2017	06/19/2017	S120/FS60	3	[illegible]
	1	17C226960	SUNCOR ENERGY RESOURCES PARTNERSHIP	Michael Wong	14	SAR, SC, pH	06/15/2017	06/21/2017	S-123	3	SUNCOR [illegible]
	1	17C226972	SUNCOR ENERGY RESOURCES PARTNERSHIP	Michael Wong	10	SAR, SC, pH, Sieve, Texture	06/15/2017	06/21/2017	S-123	3	SUNCOR [illegible]
	1	17C226978	SUNCOR ENERGY RESOURCES PARTNERSHIP	Michael Wong	15	SAR, SC, pH, Sieve, Texture	06/15/2017	06/21/2017	S-123	3	SUNCOR [illegible]
	1	17C227054	SUNCOR ENERGY RESOURCES PARTNERSHIP	Michael Wong	13	SAR, SC, pH	06/15/2017	06/21/2017	S-123	3	SUNCOR [illegible]
	1	17C227038	SUNCOR ENERGY RESOURCES	Michael Wong	13	SAR, SC, pH	06/15/2017	06/21/2017	S-123	3	SUNCOR [illegible]

- The Work Load module of AGAT's LIMS system generates a Jobs in Progress Report to track samples through the lab. The system allows lab managers to prioritize jobs and easily identify samples that require a faster than normal turnaround time.

WebMINING

Our WebMINING database is AGAT Laboratories' proprietary interactive web database for our mining clients. This program enables our clients to view their analytical results online as they are completed, giving our clients secure access to review necessary analytical results for all their operations from anywhere with an internet connection.



WebMINING works with our Laboratory Information Management System (LIMS). It can be securely accessed via the internet using an approved monthly rotating username and password.

Highlights of the WebMINING Program Include:

- View/print signed Certificates of Analysis.
- Search by various criteria.
- Compare results from multiple samples and work orders.
- Export results to Microsoft Excel and other spreadsheet and database formats.
- Graph trends related to specific concentrations and elements.

Mining Geochemistry

AGAT Laboratories' offers specialized geochemical and assaying services for mineral exploration and production. Our mining geochemistry laboratory is accredited to ISO 17025 by the Standards Council of Canada (SCC). Our advanced instrumentation and experienced professionals are essential to AGAT Laboratories' analytical quality and fast turn-around times. Results can be incorporated into development and exploration programs in near real time. Every analytical package and laboratory service is customizable to each client's specific needs.

We offer the following geochemical services:

- Precious metals analysis
- Base metals, uranium and rare earth elements (REE)
- Geochemistry spectroscopy
- Selective leaches
- Lanthanide analysis
- Lithogeochemistry
- Sulfide/laterite analysis
- Classical assays
- Acid-base accounting (ABA)

Our experienced team of professionals is available to assist with any geochemical data interpretation, method development, project planning, design and management of each project.

Sample Preparation

All samples received by AGAT Laboratories' are carefully assessed and processed through our sample preparation department. AGAT Laboratories' recognizes that the quality of all analyses is dependent on the quality of sample preparation and therefore, an intense quality control process is utilized. The process ensures only the most homogeneous and representative sub-samples are used for analysis. Depending on type and size of the sample, common preparation procedures may include drying, crushing, pulverizing or screening. Our experts are available to help you select the best sample preparation procedures based on sample type, mineralogy and overall program requirements. We specialize in the following sample preparation services:

- Mineral sample preparation (drying, crushing, splitting, pulverizing and screening).
- Core handling and cutting.
- Sample storage and management.

Mineral Sample Preparation

During mineral sample preparation, geological material is crushed to client specified sizing before subsampling occurs. Proper sample preparation is crucial to ensure that the target elements are liberated from the rock for decomposition and further analysis. Quality protocols are strictly adhered to during all stages of sample preparation and include; proper handling, safety and sample tracking. Every sample is uniquely identified utilizing real-time tracking that provides up to date progress of each sample as it is received and processed through the laboratory.

- Drying of mineral samples is dependent on sample type, mass, moisture and matrix. For quality and repeatability, it is important to remove moisture from samples to ensure particles do not adhere to the preparation equipment.
- Crushing of samples is performed to reduce the particle size, ensuring that the appropriate amount of sample meets the requirements for percent passing through a specified sieve size.
- Splitting is performed to reduce the sample to client specifications while obtaining a representative sub-sample. To ensure a proper representative sample is obtained, careful consideration is taken when choosing the size of the splitter and the contact with the sample in order to split the rock without bias.
- Pulverizing of samples creates a fine homogeneous powder which allows for a representative sub-sample to be taken for analysis. Low chrome steel bowls are utilized, as any trace contaminants from the equipment is negligible when compared to the content in the sample. For special projects, AGAT Laboratories' can also select specialized bowl materials to avoid contamination minerals when targeting certain elements.
- Screening is performed on samples to determine the mass distribution of various size fractions. Mesh sizes can be customized for multiple screening processes.

AGAT's Sample Reduction Facilities have tremendous capacity to process a large number of samples with high speed and efficiency.

Sample Decomposition

In order to prepare solid samples for instrumental analysis, AGAT Laboratories' offers a number of techniques including:

- Acid digestion for target elements.
- Flux fusions for vigorous decomposition of difficult-to-dissolve minerals.
- Selective leaches to dissolve specific trace elements.

Precious Metals Analysis

Precious metals such as gold, silver and platinum are in high demand in worldwide. Whether the demand is for ore-grade analysis or high volume baseline fire assay exploration work, AGAT Laboratories' has extensive expertise in gold, silver and PGE determinations.

There are many techniques that can be used for precious metals analysis and it is important to consider the sampling matrix when choosing the methods for detection. Procedures for precious metal analysis include a combination of lead collection fire assay and either an ICP-OES, ICP-MS, AAS or gravimetric finish. Precious metal determination is available for exploratory work in soils using Aqua Regia Digestion and ICP-MS finish. Cyanide leaches can also be effective in grassroots exploration to detect trace levels of gold fragments in large samples, determining fine gold fractions or predicting the potential gold cyanide extraction capacity.

Precious Metals Services (selected):

- Fire Assay Lead Collection with ICP, AAS or Gravimetric Finish
- Aqua Regia Digestion
- Cyanide Leaches
- Metallic Screen with Fire Assay Finish

Ore Grade Analysis

As accuracy and precision is required when analyzing ores, concentrates and high grade material, AGAT Laboratories' offers a number of base metal analyses and fusion techniques for this type of dissolved analysis. Spectroscopy analyses are based on specialized aggressive metaborate and sodium peroxide fusion techniques required for more detailed analysis of sulphide/laterite and lithogeochemistry sampling projects.

- Sodium Peroxide Fusion oxidizes samples at high temperatures. This powerful reaction is effective in dissolving high grade sulfides, laterites and other resistant minerals. After fusion, the sample is dissolved in a diluted nitric acid solution that contains tartaric acid prior to being submitted for final analysis.

- Lithium Borate Fusion is a strong fusion technique consisting of adding a mixture of lithium metaborate and tetraborate to the sample. After the sample is heated, the resulting molten bead is digested in a weak nitric acid solution. Lithium borate fusion is suitable for the dissolution of acidic oxides such as silicate rocks, silica-titanium, silica-aluminum refractories and related samples. Lithium borate fusion is also used in kimberlite exploration work.

Geochemical Analysis

AGAT Laboratories' offers a variety of geochemical approaches and packages that are customizable to your specific project requirements. These analyses are initiated with a digestion or decomposition technique and then conducted and completed using state-of-the-art instrumentation for the most accurate results.

Our multi-elemental geochemical packages and specialty analysis include:

- Sample decomposition by single and multi-acid digests
- Geochemical analysis packages by AAS, ICP-OES, ICP-MS, XRF
- Rare earth elements and lanthanide analysis
- Leach technology
- Hydrogeochemistry
- LECO analysis for sulphur and carbon
- Acid-base accounting

Rare Earth Elements and Lanthanide Analysis

Rare earth elements are determined using ICP mass spectrometry with the choice of three dissolution techniques. We can use either a four-acid "near-total" digestion, aqua regia or a lithium borate fusion for a more aggressive approach. The same lithium borate fusion can also be used for whole rock analysis using ICP finish. Along with these packages, chondrite plot is provided with lithium borate packages.

Leach Technology

AGAT Laboratories' offers a wide range of selective and sequential leaches. We offer non-proprietary methods that include, but are not limited to, cold and hot hydroxylamine hydrochloride, sodium pyrophosphate, sodium acetate and EDTA leaches.

By focusing on powerful technology, AGAT Laboratories' offers unparalleled detection limits and results free of common interferences. This can be crucial when requiring Cu and Cr in sodium pyrophosphate leaches or As and Se in hydroxylamine hydrochloride digestions. Additionally, AGAT Laboratories' is proud to offer access to the powerful XANES technology to fully explore and identify speciation in specific samples.

Hydrogeochemistry

Water geochemistry can be a significant tool in mineral exploration. When water interacts with rocks containing valuable ore deposits, minerals dissolve in the water, reflecting the chemical composition of the rock. Groundwater that comes into contact with mineral deposits will reveal chemically distinct water zones around ore deposits. Groundwater analysis is conducted using ICP-MS and detection limits are based on "clean" samples. Samples submitted for hydrogeochemistry that are high in total dissolved solids, will be diluted prior to analysis and results will reflect this dilution.

LECO Analysis

Carbon and sulfur analysis can easily be added to geochemical analyses. We operate leading- edge LECO instrumentation which combines combustion and infrared technology to deliver high precision results.

Acid-Base Accounting

AGAT Laboratories' also offers Acid-Base Accounting (ABA) and kinetic cell testing on all sample types. ABA testing provides important information on the potential of sites to produce or consume acid and provides important information when making treatment or environmental decisions for mine site design.

Sample and Service Capabilities

AGAT Laboratories' has a number of facilities dedicated to mining in Ontario as well as Quebec which is a testament of our commitment to provide unsurpassed services to the mining industry. We continue to strategically expand our portfolio of locations and services across Canada. Clients can look forward to our future Western Canada laboratories' located in British Columbia and Alberta. In total, AGAT Laboratories' has over 170 000 sq. ft. of dedicated Rock Properties work space. This allows our team to provide a large number of clients with the best and most diverse Rock Properties analysis in the industry.

Advanced Exploration Services

In conjunction with AGAT Laboratories' Rock Properties Division, AGAT offers advanced exploration services, including:

- High resolution core photography
- Core handling and cutting
- Lithological examination
- Particle size determination (PSD)
- Quantitative evaluation of materials by scanning electron microscopy (QEMSCAN)
- X-Ray diffraction (XRD) analysis
- Energy dispersive and wavelength dispersive XRF
- Scanning electron microscopy (SEM)
- Thin section analysis
- Geomechanical analysis

High Resolution Core Photography

AGAT Laboratories' offers high resolution core photography under both ambient and ultra-violet lighting conditions. Photo images are acquired using state-of-the-art digital cameras. Each frame is programmed to have the well name, location, cored interval, core number, recovery, sample numbers, scale and top and bottom interval indicated. Photo images can be available as prints or on a digital media include as FTP site for instant remote viewing.

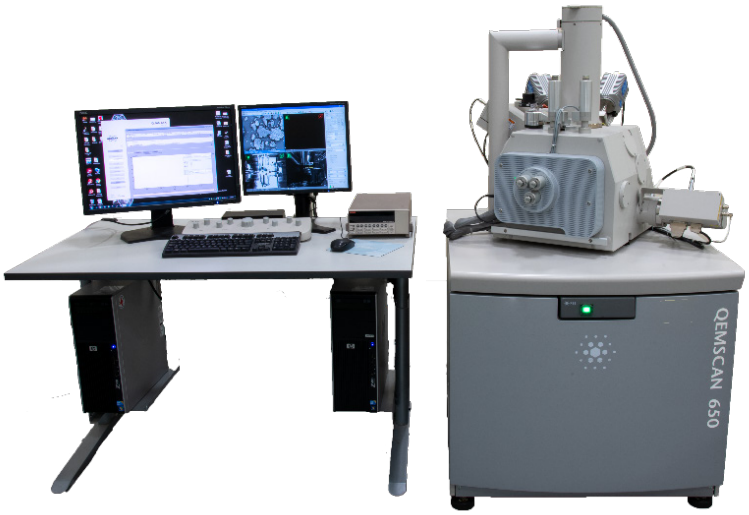
Core Handling and Cutting

AGAT Laboratories' is experienced in core handling and our state-of-the-art automated core saws enable us to process core with extreme precision while maintaining optimum safety and productivity. Our capabilities include core slabbing, boxing, splitting and secure storage for archiving core samples. Key geological, mineral and geotechnical data can be determined through core analysis and description.

Core slabbing splits the core into representative portions that can be used as references for analysis. Through our Advanced Exploration Services, we also offer high resolution core photography and proprietary software for viewing core as a continuous down-hole image and strip-log. These are used for identifying key geological markers directly on the images.

Lithological Examination

Lithological examination includes the description of rocks on a basis of such characteristics as color, mineral content, primary structures, grain/crystal size and other physical properties. AGAT Laboratories' geologists will describe each interval of core (visually and with a microscope) to provide descriptive interpretations of mineralogy, fabric and textural relationships.



Particle Size Distribution

Determining the particle size distribution of geological material can be utilized in determining the effectiveness of grinding processes on rock samples. AGAT Laboratories' can use either laser diffraction or the mechanical sieve shaker method.

- Laser Diffraction The degree to which light is scattered from the sample relates to the particle size distribution. A continuous scale can be obtained from micron to millimeter size.

- Mechanical Sieve Shaker Method The sample is passed through a series of screens with different aperture, progressively becoming smaller at the bottom layers. The samples are weighed at each level and a particle size distribution can be determined.

Quantitative Evaluation of Materials by Scanning Electron Microscopy (QEMSCAN®)

Drawing from the back-scattered electron (BSE) signal intensity and an Energy Dispersive Spectra (ED) signal, mineral identities are assigned to each measurement point by comparing the BSE signal and EDS spectrum against a mineral species database or species identification program. QEMSCAN provides a powerful tool for interpreting mineralogy, mineral phase relationships and elemental distributions.

X-Ray Diffraction (XRD) Analysis

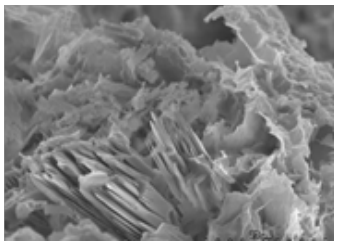
XRD analysis provides semi-quantitative identification of mineralogical composition analysis of the bulk rock composition and the clay-sized fraction. XRD diffractograms are analyzed using Reitveld refinement methods to quantify mineralogy.

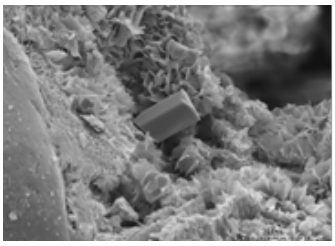
Energy Dispersive and Wavelength Dispersive XRF

XRF provides a precise and effective means to evaluating elemental compositions within rock samples. AGAT utilizes both handheld (ED-XRF) and full scale (WD-XRF) instruments to provide options for field testing, core profiling and high resolution elemental determinations.

Scanning Electron Microscopy (SEM)

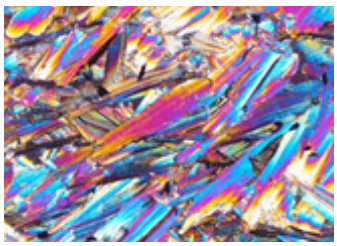
SEM microphotography allows for a high resolution microscopic, three-dimensional examination of the rock surfaces. SEM imaging assists in quantifying mineral composition and size along with providing information regarding textures, grain boundaries and mineral phase relationships. AGAT utilizes three SEM instruments to provide a range of services and capabilities.

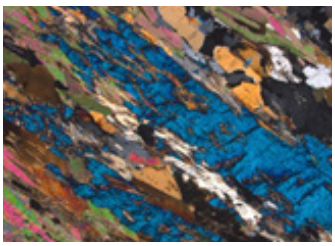




Thin Section Petrology

Thin section petrology provides one of the most accurate and repeatable means of evaluating the mineralogy and fabric of any rock sample. Two types of epoxy, normal blue or rhodamine-B for fluorescence under ultra-violet light, are impregnated into the rock to highlight the pore system. Carbonate stains (alizarin Red-S for calcite and potassium ferricyanade for ferroan carbonate) and/or feldspar stain is applied to mounted thin sections which are ground down to 30µm. Ultra-thin or wedged sections can be prepared if required. Prepared thin sections are viewed under plane-polarized, cross- polarized and/or ultra-violet light to examine the mineralogy, texture and diagenesis, morphology, bioclasts, crystals habit and fabric. Detailed reports including point counting, descriptions and high resolution images are provided as a final product.





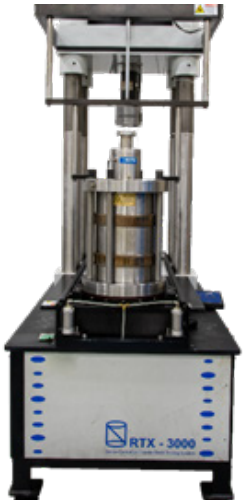
Geomechanics

The Geomechanics Services Group provides data that is used extensively in different aspects of mine planning and operating phases. AGAT offers both interpretation and rock-based analytical programs that are designed to accurately evaluate elastic parameters (Young's, Shear, Bulk modulus, Poisson's ratio) both statically and dynamically. Geomechanical testing provides a means to evaluate failure mechanisms and attributes such as cohesion and internal friction angle along with Mohr-Coulomb envelopes. Testing programs can be customized to determine stress dependence, anisotropy, thermal and poroelastic parameters.

Uniaxial Compression Testing: In an unconfined compressive strength (UCS) test, a cylindrical of rock core is subjected to axial stress in a controlled manner until the sample fails. Acoustic velocity and stress/strain measurements are made continually during testing so that compressive strength and various static and dynamic elastic parameters can be calculated. The sample is affixed with two axially-oriented variable differential transducers (LVDT) and one radially-oriented LVDT that directly measure sample deformations. Top and bottom platens have piezoelectric crystals inside which when excited allow for measurement of P- and S-waves through the pulse-transmission technique.

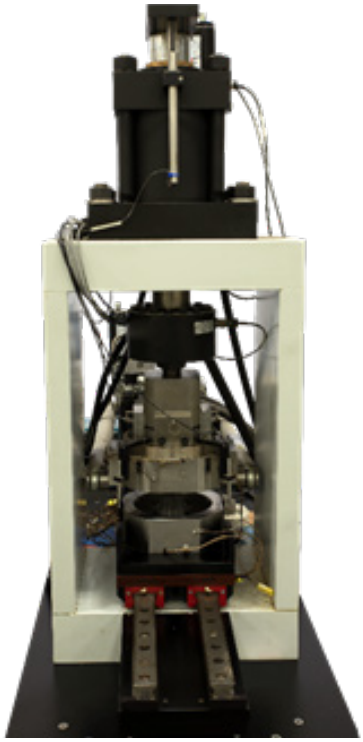
Triaxial Compression Testing: Similar to the uniaxial compression test, the triaxial compression test measures sample deformation relative to induced axial and radial strains until sample failure. Axial stress is applied through a piston load normal to sample orientation while radial stress is applied through mineral oil which is then pressurized around the core. The use of both axial and radial loading allows for elastic parameters that can be related closely to the in-situ environment. During a triaxial test, the first step is to conduct a hydrostatic loading cycle which allows for determination of the bulk modulus and also compresses micro-cracks which could have formed from expansion of the sample after core retrieval.

In doing so; non-linear effects are reduced during the triaxial loading portion of the test. Immediately following the hydrostatic cycling, the sample is held at a constant confining pressure while the axial load increases until failure. During both phases, ultrasonic P- and S-waves are acquired to give information on the stress dependence of the velocity as well as dynamic elastic parameters throughout the duration of the test. AGAT's GCTS RDS-3000 triaxial instrument used for large diameter core testing also has the capability to capture acoustic emission measurements to better define crack initiation and damage stresses.



AGAT Laboratories

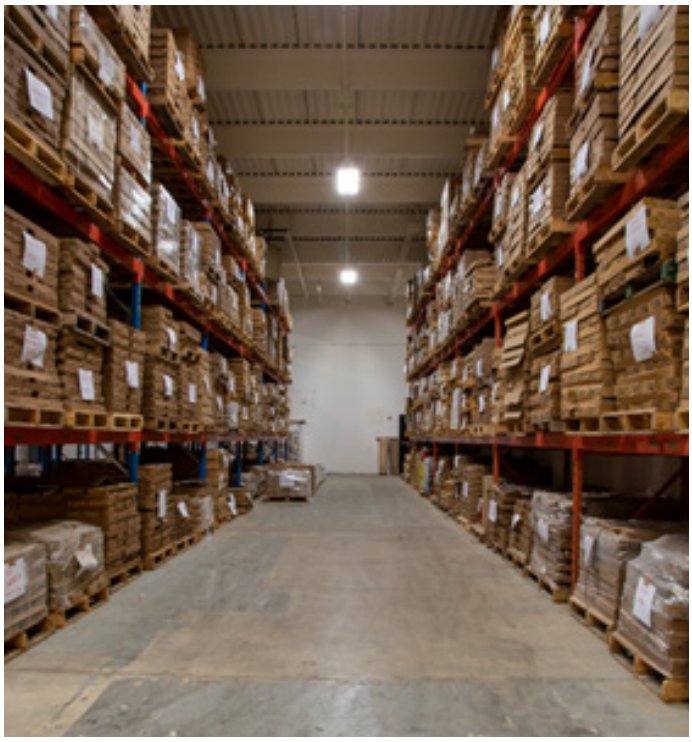
Indirect Tensile Strength (Brazilian) Testing: Tensile strength of rock is an important parameter for engineering work in many fields. Direct measurement of the tensile strength in rocks by pull testing is difficult and expensive for routine application. The indirect (Brazilian) testing method offers a desirable alternative by determining the splitting tensile strength of rock specimens. An incremental compressive line force using an indirect tension or Brazilian apparatus is applied on the circumferential surface of a cylindrical specimen until the sample fails or splits. The splitting tensile strength is then deduced from the maximum line force applied at which the sample fails.



Direct Shear Strength Testing: In a direct shear strength test, a sample encased in a cementing compound is loaded into a shear box and is then subjected to normal and shear forces. The shear box is affixed with four normally oriented linear variable differential transducers and one shear oriented LVDT, which measure the displacements of the shear box as forces are applied. The direct shear technique allows for specialized measurement of shear strength along areas of rock with interesting characteristics such as joints or veins as well as bedding features.
Regular intervals of core can be tested as well to see shear strength characteristics of cementation or matrix-grain interaction.

Sample Disposal, Storage and Management

AGAT Laboratories' offers both long and short term storage options for core, pulps and bulk rejects. Special storage requirements may be arranged with your designated AGAT Client Project Manager. Your samples may be easily retrieved for further analysis, returned to you, or properly disposed of upon request. All samples are stored for a predetermined period of time as per project specifications after the "Certificate of Analysis" (CoA) is issued. Unless otherwise directed by the client, samples will be disposed of by the laboratory after 90 days. If requested, samples may be held beyond these retention periods by contacting your Client Project Manager who will place samples on "Special Hold" for storage in our warehouse; storage fees will apply.



- AGAT's sample warehouses provide for secure, short-term and long-term storage. Samples are retrieved quickly, processed and analyzed with due care to meet your requested turnaround time.

AGAT Laboratories' facilities have provisions for dedicated storage of samples in our warehouse. This space offers our client's peace of mind knowing samples can be stored as long as required. We offer appropriate climate controlled storage for all types of samples we receive which can be especially useful when performing long-term projects. Samples stored on site can easily be retrieved when and if such a request is made. Having quick and easy access to samples retained in long-term storage allows AGAT Laboratories' to provide fast retrieval, processing and analysis of samples with quick turnaround time of results.

Turn Around Times

AGAT Laboratories' is highly efficient in anticipating and responding to our clients' needs. We maintain regular turnaround times (TATs) of 15 days following receipt of samples. Rush turnaround times are available when required.

AGAT Laboratories' utilizes multiple different in-house software programs to help track and ensure the required TAT is met. In order to ensure the lab is moving as efficiently as possible sample prioritization is adjusted as required to enable the staff to maintain a consistent workflow through the lab and ensure no samples pass their designated TAT. By delivering clients their high quality results as within their required TAT always our clients to keep their projects moving forward with no delay in analytical results. Client Project Managers are available on- call to make the necessary arrangements.

AGAT Laboratories' Expertise

AGAT Laboratories' offers the most diverse selection of services of any analytical service provider. AGAT's long history and area expertise allows our personnel to draw on the technical resources of scientists in all Divisions including the technical knowledge of: Geologists, Biochemists, Biologists, Chemists, Engineers, Environmental Scientists, Petrophysicists and Agronomists, all from one source. This strength is unique to our company, and one that we are happy to be able to provide as part of our value-added services.

Our People – Your Team

AGAT Laboratories' Mining Division management team has well over 200 years of combined industry experience and expertise. Our project organization encompasses personnel with the necessary technical knowledge, skills, and project management expertise to ensure we meet your performance expectations for quality and service deliverables.

Accreditation and Commitment to Quality

AGAT Laboratories' Quality Assurance Program follows consistent methodologies and processes across Canada and it meets provincial regulations and international standards of accreditation. AGAT Laboratories' uses appropriate methods and procedures for all tests within its scope. All areas of the handling and analytical process are factored in include; handling, transport, storage and preparation of items to be analyzed.

AGAT Laboratories' Quality Assurance Officers and Laboratory Managers continually review standard references to ensure that current and appropriate test methods are used. All test methods undergo rigorous validations and routine verifications to ensure quality data.

AGAT Laboratories' provides extensive training for all employees. All key management and laboratory staff are trained and cross-trained using available training and educational resources specific to their positions. Training is always focused on enhancing their knowledge and skills necessary to provide consistent high-level quality of service. In all of our laboratory operations, our technical personnel understand how critical quality control is to the overall success of any project.

Accreditations

AGAT Laboratories' is committed to maintaining the highest level of quality. Our quality assurance and quality control systems ensure that we provide precise and accurate analytical determinations to meet or exceed our client's requirements.

AGAT Laboratories' is accredited or approved for specific analyses by the following agencies:

- Canadian Association for Laboratory Accreditation (CALA).
- Standards Council of Canada (SCC).
- Canadian Council of Ministers of the Environment (CCME).
- British Columbia Ministry of Environment and Climate Change Strategy.
- Alberta Environment and Parks (AEP).
- Ontario Ministry of the Environment and Climate Change Resources.
- Ontario Ministry of Environment Drinking Water Testing License.
- Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC).
- Nova Scotia Ministry of the Environment and Labor.

AGAT Laboratories' is accredited by the International Organization for Standardization for ISO 9001 and ISO/IEC 17025 standards.

We are proud to have one of the largest scopes of accreditation in the industry. AGAT Laboratories' Mining Division – including all of our sample preparation branch locations – has received ISO 17025 accreditation with the Standards Council of Canada (SCC). To achieve this level of accreditation, AGAT Laboratories' must, at a minimum, provide evidence of:

- Internal and external audits.
- A quality system.
- Proper control of documents and records.
- Analytical traceability.
- Proven competence of personnel.
- Ensure method validation.
- Evidence of maintenance and calibration of equipment.
- Regular, successful proficiency testing.

Analytical Methods

All analytical procedures are subject to various quality checks and data reviews. The measured parameters of these checks are control-charted to monitor on-going performance of the analytical procedure. They are subject to the implementation of blind and double-blind samples to ensure validity and accuracy of our methodologies. Additionally, analytical procedures and management practices are subject to internal audits, international and Canadian accreditation body standards or to published methodologies.

AGAT Laboratories' Quality Assurance Division follows consistent methodologies and processes across Canada that meets Provincial regulations and international standards of accreditation. AGAT Laboratories' uses appropriate methods and procedures for all tests within its scope. These include handling, transport, storage and preparation of items to be tested and, where appropriate, an estimation of the measurement uncertainty, as well as statistical techniques for analysis of test data.

AGAT's Quality Assurance Officers and Laboratory Managers review current literature references to ensure that the most effective and appropriate test methods are used. There may be occasions where improvements to reference methods are identified, or a special request is received from the client. In these cases, all deviations from the reference method are thoroughly reviewed and verified in-house prior to use. A thorough assessment is carried out by the accrediting body prior to acceptance and inclusion of the test method in our scope of accreditation. All test methods undergo rigorous validation and verifications to ensure quality data outputs.

Data Quality

AGAT Laboratories' goal is to provide the highest quality data to our clients. In order to meet this goal we have established quality control procedures for monitoring the validity of tests undertaken. The resulting data are recorded so trends are detectable and, where practicable, statistical techniques are applied to the reviewing of the results. This monitoring plan and review includes, but are not limited to certified reference materials, proficiency-testing programs, replicate tests using the same or different methods, retesting of retained items, and correlation of results for different characteristics of an item.

Quality control data is analyzed and, where they are found to be outside predefined criteria, planned action is taken to correct the problem and to prevent incorrect results from being reported.

Quality Control Checks: Analytical procedures are subject to various quality checks, which include checks for linearity of calibration, accuracy of calibration, precision of analytical systems and interferences to the analytical systems. The parameters, which are the measure of these checks, are control-charted to monitor on-going performance of the analytical procedure. Reference standards, and blind check samples, including client check samples are routinely processed and analyzed through our laboratories as part of our company quality control protocols.

Control Charts: Analytical procedures are subject to various quality checks and data review. The measurement data for control check samples are charted to monitor on-going performance of the analytical procedure. They are subject to implementation of blind and double-blind samples to ensure validity and accuracy of our methodologies. Additionally, analytical procedures and management practices are subject to internal audits, International and Canadian accrediting bodies' standards or to published reference methods.

Data Integrity Reports: Data integrity checks are automatically performed when all parameters have been entered into the reporting system. A Data Integrity Report is printed indicating whether the results are within acceptable limits. Any data that appears to be out of the ordinary are investigated and verified by the lab. An explanation and signature are added to the Data Integrity Report before the results are released to the client. The lab informs the assigned Client Project Manager (CPM) of the status so they are able to keep the client updated on the analysis progress of their samples.

Internal Quality Audits: These are periodically conducted to evaluate effectiveness of our processes and procedures. Both analytical testing and management practices are subject to internal audits and compared to the best practices outlined by international and Canadian accreditation bodies or to published methodologies.

Continuous Improvement: Several processes of AGAT's quality management system work together to define specific goals in our commitment to continued improvement and advance innovations. These processes include, but not limited to, third party audits, internal audits, investigation procedures, non-conformance reporting, improvement suggestions and corrective and preventive actions. Quality is a top priority at AGAT Laboratories' as we focus on continuous improvement. This outlook allows us to discover and facilitate better ways of doing business, resulting in a stronger vendor-client relationship with mutually beneficial results.

Best Available Technologies: AGAT Laboratories' believes that no analytical service is complete unless it offers the best available analytical technology. We invest heavily in instrumentation and continually address advancements and new developments in each field of expertise. Our investments are considered carefully and always consider our clients' needs and expectations. We further demonstrate our knowledge, skills and abilities by creating custom built instruments and equipment to meet our clients' specialized needs. These co-operative efforts create cost savings, efficiencies and value-added services for the benefit our clients, and are testament to AGAT's commitment to deliver "Service Beyond Analysis".

Quality Control

AGAT Laboratories' takes pride in providing high quality data to our clients, and applies strict quality control procedures in ensuring data is accurate and precise. The following details the methods in which AGAT Laboratories' maintains quality of sample data for the most accurate analysis possible.

Method Blank: Every 20 samples or once per digestion set, a blank is included (containing no sample).

Certified Reference Material (CRM): A certified reference material must be weighed at least once for every 20 samples or once per digestion set. AGAT Technicians use two or three different CRM chosen at random and weighed and digested in replicate. Sample duplicates are analyzed as regular samples as they are produced during the sample preparation stage.

QC Solution: is run randomly once in every group of up to 20 samples for Calibration Verification.

Health, Safety, and Environment

At AGAT Laboratories', Health and Safety is a philosophy that is integrated into all of our operations. Our Health and Safety Policy is posted in the reception area of all AGAT Laboratories' facilities. This policy is reviewed annually at the Management Review Meeting to ensure that all of its mandates remain an accurate reflection of the company's initiatives in health and safety.

AGAT Laboratories' Health and Safety Program provides guidelines for all of our employees as well as to our clients. This program is designed to ensure compliance with legislative standards as well as for continuous improvements to our safety initiatives. We maintain a safe work environment with proper procedures, training, equipment and programs to ensure that work is performed to accepted standards and in compliance with government regulations. All of our employees share the responsibility to work in a manner that safeguards themselves with equal concern for co-workers, public and the environment.

Our Health and Safety Program not only provides guidelines to our employees, but also to our affiliated contractors. Signed agreements must be completed by each individual working for or with AGAT Laboratories', stating that they will conduct all activities in accordance with our health and safety guidelines. By enforcing these contracts, all work procedures and operations are in accordance with current mandated laws and regulations within the industry.

AGAT Laboratories' Health and Safety Program covers all aspects required of our industry. The following is a brief summary of the main areas covered in this program and our Health and Safety Manual.

Management Leadership and Company Commitment

The purpose of AGAT Laboratories' Health and Safety Program is to provide its employees with active support and involvement to ensure their health and safety is continuously maintained. AGAT Laboratories' provides all personnel with the required training and resources to ensure they carry out their jobs in a safe manner at all times. It is the responsibility of all employees to adhere to the policies and procedures set forth by the company in order to maintain their health and safety. AGAT Laboratories' Health and Safety Program is only as strong as its participants' dedication to its initiatives.

All employees are required to participate in orientations on health and safety to become familiar with the Health and Safety Program and its objectives prior to commencing work. All new employees attend this orientation, which covers the following:

- Security policies and company rules.
- Employer responsibilities on providing a safe workplace.
- Applications of safe work procedures.
- Employee rights and responsibilities.
- Refusing unsafe work procedures.
- Specific job hazards.
- Evacuation and emergency procedures.
- Disclosure of hazard and incidents.
- WHMIS.
- TDG.
- H2S Alive.
- Fall protection.
- Confined spaces.
- First Aid.
- Lock out/tag out.
- Personal Protective Equipment (PPE).

New employees are given appropriate safety training relevant to their work. Regular security assessments and the retraining of personnel are also included to ensure excellence in safety performance.

AGAT Laboratories' Safety Responsibilities

The responsibility of AGAT Laboratories' to its employees includes the following:

- Provide the necessary resources for all employees to perform their work safely.
- Insist on safe performance throughout operations by ensuring contractors and employees are competent, trained and conduct their work appropriately.
- Properly implement effective health and safety program initiatives.
- Ensure that our Health and Safety Program complies with contractual and regulatory requirements.
- Allow sufficient operation timeframes for employees to carry out their jobs properly and at the highest standard.

Hazard Identification

The identification of hazards is an important part of AGAT Laboratories' Health and Safety Program.

AGAT's goal is to identify hazards before they become an incident. To ensure the safety of all of our employees, hazards are assessed to provide the appropriate protection for workers. Job site hazards are identified for any new positions and are reassessed in the event that the roles of the position change. This reassessment may require the use of the Hazard Identification Form. It is important to ensure that all workers and subcontractors, if applicable, are involved in hazard identification. The manager or delegate in each area carries out the hazard identification process at least annually and must sign each report upon completion before the findings are communicated to the Health and Safety Division for review.

All employees are responsible for and encouraged to report potential hazards using a Pre-Job Hazard Assessment Form, Hazard Identification Form, or a Hazard/Near Miss reporting form. Hazard assessments are recorded for all tasks in order to assign appropriate health and safety control measures. Worker input is vitally important to ensuring a safe work environment. Managers continually tour the work sites to enforce and ensure that company safety policies and procedures are being followed.

The responsibilities of managers, supervisors and employees are clearly defined in our Health and Safety Manual.

Manager Responsibilities

- Making funds and processes available to effectively accommodate health and safety needs;
- Ensuring that performance and behavior meet the requirements of the health and safety program;
- Setting and communicating annual goals for improvement and constructively analyzing the results;
- Encouraging employee and contractor involvement in the safety process;
- Ensuring that all operations, including those of contractors and subcontractors, meet government safety requirements
- Ensuring that all incidents are reported and, where necessary, investigated and that corrective action is taken to prevent a recurrence;
- Ensuring that workers are adequately qualified to perform their work;
- Ensuring that training needs are identified and met;
- Taking the necessary action to correct any unsafe working conditions brought to their attention by workers;

- Understanding, implementing and enforcing applicable acts, regulations, codes, Codes of Practice, Standard Operating Procedures, associated Safe Work Practices, and Safety Rules;
- Providing appropriate and adequately qualified supervision at work sites;
- Ensuring the health, safety and welfare of all employees, clients, contractors and the public;
- Preventing instances of harassment and violence in the workplace;
- Consulting and cooperating with any joint occupational health and safety committees
- Providing appropriate and well-maintained safety equipment for each task;
- Evaluating and monitoring the Substance Abuse and Violence/Harassment in the Workplace Programs on an ongoing basis; and
- Completing a risk assessment at least every year for all job positions.

Supervisor Responsibilities

Supervisors are ultimately responsible for all actions of the workers under their supervision. To prevent workplace accidents, supervisors shall:

- Ensuring that they are competent to supervise every worker under their supervision;
- Understanding what is expected of them;
- Ensuring that their direct employees are “fit for duty” as related to their assigned tasks;
- Having accountability for all activities within their area of responsibility and job scope;
- Identifying and meeting safety and operational training needs;
- Identifying and correcting hazards and unsafe working conditions;
- Correcting unsafe acts in a proactive, positive manner;
- Clearly understanding their respective annual health and safety goals and working diligently towards achieving them each year;
- Understanding, implementing and enforcing all applicable acts, regulations, codes, Codes of Practice, Standard Operating Procedures, associated Safe Work Practices, and Safety Rules;
- Ensuring that appropriate and well-maintained equipment is available and utilized to perform the work activity;
- Meeting regulatory compliance and AGAT Laboratories’ conformance requirements;
- Ensuring that none of the workers under their supervision are subjected to, or participate in, harassment or violence at the work site;
- Ensuring that workers are informed about job hazards and are prepared to deal with any site-specific hazards on the work site;
- Ensuring that workers apply all hazard controls to the workplace as specified in each applicable hazard assessment;
- Ensuring that personal protective equipment is readily available at the work site, correctly used, stored, maintained, and replaced when necessary; and
- Reporting all incidents. This may include conducting investigations into the facts leading up to and including the incident and determining the root cause to prevent a recurrence.

Worker Responsibilities

Workers are primarily responsible for ensuring their actions do not create hazards for themselves, other workers or the public. They shall:

- Reporting for work “fit for duty” and/or notifying their direct supervisor of any mental or physical conditions that may impact the performance of their assigned work tasks;
- Adhering to regulations, guidelines, and safety standards as required by government regulatory agencies and those communicated by management and supervisor (in particular, applying all hazard controls as specified by applicable hazard assessments);

- Following all appropriate Codes of Practice, Safe Operating Procedures, associated Safe Work Practices, and Safety Rules contained in the Health and Safety Manual;
- Taking reasonable care to protect the health and safety of themselves and of other persons at, or in the vicinity of, the work site while they are working;
- Cooperating with supervisors and managers for the purposes of protecting all personnel's health and safety, including those not engaged at work but are present at the worksite;
- Refraining from causing or participating in harassment or violence;
- Reporting any hazardous or unsafe working conditions to their immediate supervisor and, if possible, correcting the unsafe condition;
- Observing activities of fellow employees and contractors to ensure their safety and the safety of those around them and correcting unsafe acts in a proactive, positive manner to prevent an incident from occurring
- Refusing to perform work that:
  - They believe presents an imminent danger to the health or safety of themselves or their fellow workers; and
  - They are not competent to perform;
- Reporting all incidents, injuries, and illnesses to their supervisor;
- Participating in, and using, all training offered by AGAT Laboratories'; and
- Using the required Personal Protective Equipment.

Hazard Controls

Many instruments and equipment have safety devices or features installed by the manufacturer. The employee must review these features and be familiar with the safety applications prior to starting any work with the instrumentation or equipment. No instrument/equipment is to be operated without safeguards and safety devices in place. If removal of a safeguard is necessary, for example for maintenance or adjustments, the safeguard must be replaced and checked for proper functioning before the instrument/equipment is put back into service. If the safeguard no longer functions effectively, the instrument/equipment must be locked out and tagged "out of control".

Safety Procedures Check: Each worker, prior to commencing work, must be familiar with AGAT Laboratories' relevant safety procedures. Entrance to all locations should be through the main or secondary entrances, which are non-hazardous. All hazardous areas not intended to be accessible to workers must be secured and must not be entered without authorization. Signs must be used to identify high hazard areas such as; suspended platforms or other overhead work, high-voltage areas, areas with excessive noise, or areas where toxic substances may be encountered. No worker may enter a signed area without authorization from a manager or supervisor.

All hallways, stairways, ramps and areas frequented by workers are kept clear of obstacles and in good condition to prevent injuries. Any repairs needed are reported to management as soon as they are spotted.

Personal Protective Equipment

All Standard Operating Procedures (SOPs) contain a safety section indicating the required Personal Protective Equipment (PPE) and training on the selection, use and care of PPE provided to all employees.

Management ensures that the appropriate PPE is available for all job tasks that its use will not endanger the employee, that it meets recognized standards, is compatible with other required PPE and is provided at no cost to the employee (where applicable). PPE must be maintained in good condition, cleaned before re-use after being contaminated and reviewed at least annually.

Ongoing Inspections

An important part of AGAT Laboratories' Health and Safety Program is to make sure the hazard control measures continue to be effective. This can be done by way of formal inspections or informal/routine inspections. Inspections must be conducted by managers and supervisors on a regular basis to ensure workers are following safety procedures. Regular communication with workers provides them with critical information about the jobs being performed.

Committed to Continuous Improvement

Each of our locations has a Joint Health and Safety Committee (JHSC) that is composed of a designated safety representative, managers and supervisors from each area of operations. This group meets monthly to ensure that the highest standards of safety are being met in all areas of operations and service. These meetings are meant to review or discuss any concerns to the Health and Safety Division. Upper management can then act on these concerns to prevent incidents before they happen. The JHSC discusses:

- Auditing the program and developing an action plan for improvement.
- Conducting hazard reviews and implementing controls to reduce or eliminate hazards.
- Reviewing safety statistics and looking for relevant trends.
- The annual facility inspection completed by the JHSC.

Emergency Response

At AGAT Laboratories', the life and well-being of each employee is highly valued. To ensure that every employee is safe and secure, managers make every effort to monitor employee safety. Taking precautions and educating their team members on all safety procedures, managers are responsible for the successful implementation of AGAT Laboratories' safety initiatives. In the event of an emergency, AGAT Laboratories' has implemented an Emergency Response Plan to reduce the risk of loss for the company and for all of its employees.

Incident/Accident Investigation

Incident/accident investigation and follow-up allow the company to determine why incidents and accidents occurred and how to prevent them from recurring in the future. Without these investigations, the company can only guess at the causes and their solutions. From the investigations' findings, recommendations can be made for our work procedures, worksite conditions, training programs, communication systems or equipment. The Incident Investigator and the appropriate manager will determine whether an incident will be investigated (depending on severity and/or frequency of occurrence). This decision will be indicated on the Incident/Accident Reporting Form.

All incidents are recorded and evaluated for trends by the Health and Safety Officer. Each incident is discussed at corporate health and Safety meetings, where identified trends are evaluated for root causes in order to provide necessary and effective corrective actions. A proactive approach, using trend analysis, is used to identify potential incidents before they occur.

Alcohol and Drug Abuse

AGAT Laboratories' maintains and enforces an Alcohol and Drug Abuse policy. We strive to maintain a workforce that is free from drug and alcohol abuse and is committed to ensuring the health and safety of both AGAT employees and the clients that AGAT serves. AGAT Laboratories' recognizes that substance abuse problems can pose an enormous risk to health and safety, and can have substantial social/economic costs and consequences in the community. The problems of drug and alcohol abuse in the workplace environment can decrease productivity, and also increase accidents, absenteeism, product defects, medical and insurance costs, and employee theft. Therefore, employers and employees have a large stake and a legitimate role to play in the prevention of substance abuse in the workplace environment.

If any AGAT employee is suspected of violating the Alcohol and Drug Abuse policy, through reasonable cause, testing will be conducted. Testing will be conducted on any AGAT employee involved in a significant incident, unless there is clear evidence that the acts or omissions of the employee could not have been a potential contributing factor.

Drug and alcohol testing will be conducted by a third party laboratory that is recognized by the Standards Council of Canada Laboratory Accreditation Program for Substance Abuse (LAPSA) or the Substance Abuse and Mental Health Services Administration of the U.S. Department of Health and Human Services (DHHS), in accordance with standard procedures.

Statistics

Our Health and Safety Department maintains statistics on health and safety. These are available upon request for any AGAT manager. These statistics cover internal incidents and accidents as well as WCB- claimed incidents and accidents. The WCB numbers include the number of lost workdays, medical aid, restricted work and lost-time accidents. AGAT posts incident trends on several contractor auditing websites, depending on client specifications. This allows for a transparent flow of information regarding AGAT's safety record to our clients. AGAT also provides our safety statistics, upon request, to clients who may not subscribe to an Internet database.

Audits and COR Programs

AGAT Laboratories' conducts regular internal and external audits performed by certified auditors. Our audits cover all aspects of our Health and Safety Program with the goal of ensuring that all components are effective and properly implemented. Our auditors use standard tools when conducting their audits and conclude their investigation by assigning a numerical score. The percentage of this score is used as a measure of performance for that particular operation. Any deficiencies or opportunities for improvement are thus identified and recommendations are made to management to provide solutions to these issues.

In the event that an issue is found, a reassessment will be completed by the auditor three months after the initial audit to ensure that the recommendations have been implemented and that the issue has been corrected. Health and Safety Certificate of Recognition (COR) Program is awarded to Employers who have well established health and safety policies and established safety standards. This is evaluated on a regular basis as detailed below:

- Annual internal audit of Health and Safety Program by certified internal auditors.
- External audit of Health and Safety Program by third party every three years.

Please note: All findings from internal and external assessments are reviewed by Health and Safety department and a follow-up of all items is conducted. Root cause investigation is used to aid in the prevention of further occurrences. Audit findings are communicated at annual Management Review Meetings and at monthly laboratory meetings, where employees are encouraged to give feedback or suggestions to further improve our system.

The Environment

Committed to environmentally friendly initiatives, AGAT Laboratories' conducts all activities in accordance with current environmental regulations and standards. We recognize that in order to make our environmental goals a reality, there must be active participation and support from all employees within the organization. To ensure that our environmental programs are followed, we regularly communicate and reinforce all related objectives to our employees so that our goals and requirements are understood and followed by all levels within the organization.

AGAT Laboratories' has an effective Waste Management System designed to prevent spills and for the identification, segregation and disposal of hazardous materials. Prior to disposal, waste is analyzed to ensure it is correctly disposed of according to provincial and federal environmental regulations. AGAT Laboratories' follow all provincial guidelines in regards to storage and the disposal of waste. Samples are held for a determined length of time depending on the type of sample and the client-specific requirement. Once released by our Laboratory Information Management System (LIMS), any hazardous waste generated is stored in appropriate waste berms/sheds in the correct containers. Containers of hazardous waste are taken off-site for disposal by a certified, third-party company.

Through these management systems, AGAT Laboratories' continues its commitment to sound environmental practices and the observance of applicable environmental laws and regulations.

Our Experience

AGAT Laboratories' is proud to work with many different operators in North America. We have experience working with different organizations ranging from Junior Exploration companies to Major Producers. This wide variety of clientele highlights the diversity of the samples we can handle within the lab. Projects of all sizes are easily managed by our team to ensure we meet all the necessary demands of our clients.

Goldcorp Inc.

Goldcorp is a senior gold producer focused on mining and exploration in Northern Ontario. AGAT provides analytical services for a variety of their projects including multiple production and exploration sites. AGAT provides quick turn-around times for samples which are needed for the production of the mine as well as the advanced testing required for their exploration side. Using the in-house IT systems AGAT is able to monitor and track the priority of samples coming from many different sites as well as adjusting that priority based on client requirements. AGAT provides different methods such as Fire Assay and 4-acid digestion while utilizing ICP-OES, ICP-MS and AAS Finish.

GLENCORE Canada Corp.

GLENCORE'S interests in mining and exploration include base metals, copper, zinc, lead and nickel, gold, silver. AGAT Laboratories' provided analysis on samples from their Mattagami site as well as their Bracemac operations. Analytical methods provided were Fire Assay, 4-Acid Digestion, Base Metal Package utilizing ICP-OES, ICP-MS, and AAS Finish.

United States Geological Survey (USGS)

The United States Geological Survey (USGS) is a scientific agency of the United States government. The USGS studies the landscape of the United States, its natural resources, and the natural hazards that threaten it. There are four major areas of interest: biology, geography, geology, and hydrology. In 2016, AGAT Laboratories' was awarded all of USGS's analytical work for geochemistry analysis, which includes rock, mineral, soil and water analysis. The analytical work provided is partially made up of routine geochemistry work, Fire Assay, Acid Digestion, and Fusion. Special projects, which require additional non-conventional tests, are also provided by AGAT's Geochemistry Division.

Alexandria Minerals

Alexandria Minerals is a Canadian gold exploration and development company. They currently have projects in the following areas: Val d'Or, Quebec, Red Lake, Ontario and Snow Lake, Manitoba. As of 2017, AGAT provides Alexandria Minerals with geochemical analysis for gold using Fire Assay, Acid Digestion and Gold Metallic.

DNI Metals Inc.

DNI Metals currently operates mines in central Madagascar, Vohitsara Graphite property. Their main compound of interest is graphite. AGAT provides high-grade graphitic carbon analysis for DNI Metals on an ongoing basis.

Suncor Energy Inc.

Suncor Energy owns and operates oil sands mines and in-situ projects in the Athabasca Oil sands region in Alberta, Canada. They are one of Canada's largest petroleum producers with the current capability of producing approximately 750,000 BOE/D from their various in-situ and mined sites in Canada. Their sites of notable mention include Millennium Mine, Syncrude Mine, Firebag (in-situ), and most recently the Fort Hills Mine which opened in January, 2018. AGAT currently provides analytical services for all of the Suncor operated oil sands properties inclusive of exploration, production, environmental, and onsite analyses at two locations with a roster of 60 full-time AGAT employees.

Notes:

Notes:

AGAT Laboratories

Visit us at

www.agatlabs.com

and learn more about our wide range
of laboratory services.