



43rd Annual Canadian Mineral Analysts (CMA) Conference and Exhibition

PROGRAM AND ABSTRACTS

**Sudbury, Ontario
September 12 - 15, 2011**





43rd Annual CMA Conference and Exhibition
Sudbury, Ontario
September 12-15, 2011

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Welcoming Messages



**Deputy Minister
Ministry of Northern Development, Mines and Forestry**

On behalf of the Province of Ontario, I would like to welcome delegates to the 43rd Annual Canadian Mineral Analysts Conference and Exhibition being held in Sudbury, one of the world's greatest mining regions.

Ontario is undoubtedly Canada's leading mining jurisdiction and a major global player. For more than a decade, Ontario has led our nation in mineral exploration spending and remains among the top ten mineral investment jurisdictions in the world. About 30 per cent of all exploration and mineral deposit appraisal dollars invested in Canada will be spent in this province. And, the trend continues as Ontario exploration spending is forecast to reach a record \$939 million in 2011. Over the last decade, more new mines opened here than anywhere else in Canada.

With 40 mines currently operating in the province, Ontario is the country's largest producer of non-fuel minerals. We rank among the top ten world producers of platinum, nickel and cobalt and among the top 20 producers of gold, silver, copper and zinc. We are also in the select group of jurisdictions that produce, process and market diamonds. More recently, exciting discoveries in the Ring of Fire area in Northern Ontario hold the promise of Canada's first potential world-class chromite deposit. All told, Ontario accounted for 19 per cent of the country's non-fuel mineral production in 2010 with a value of about \$7.7 billion.

Ontario's mineral cluster stands out globally for its strengths in all areas of mining -- exploration, mine development and rehabilitation, environmental technology, engineering and consulting contracts and project management, as well as health and safety. An exceptional mineral analysis industry and our commitment to excellence in analytical standards are essential elements of our vibrant mineral sector. Established in 1898, the Ministry of Northern Development, Mines and Forestry's Geoscience Laboratories (Geo Labs) is a high-quality, full service, inorganic materials analytical facility providing analytical services in geochemistry, mineralogy, and reference materials. Its primary focus is on research grade analyses for academic institutions and government geological surveys.

The mining sector is a dynamic element of the provincial economy. Our government continues to work diligently on building today's success to ensure the vitality of the industry in the future

I wish you all a successful conference.

David O'Toole
Deputy Minister



**Her Worship Marianne Matichuk
Mayor
City of Greater Sudbury**

As Mayor of the City of Greater Sudbury, I am pleased to welcome delegates to the 43rd Annual Canadian Mineral Analysts Conference and Exhibit hosted by the Geoscience Laboratories of the Ministry of Northern Development, Mines and Forestry. While in our city, be sure to take the time to enjoy our northern hospitality and unique attractions.

I know that as delegates to this conference, you will enjoy productive and informative sessions which will address topics and issues relevant to your areas of expertise such as geological and environmental analysis.

On behalf on City Council, I wish to thank the organizers of this event for their hard work in bringing this event to Greater Sudbury. Best wishes for a successful and enjoyable conference!

Yours Sincerely,

Marianne Matichuk
Mayor



**The Honorable Glenn Thibeault
Member of Parliament for Sudbury**

Dear Delegates,

It is a pleasure to welcome you to our fine city for the 43rd edition of the Canadian Mineral Analysts Conference and Exhibition.

As you are well aware, Sudbury has a rich tradition in mining and environmental technology.

We are often viewed as a world leader when it comes to technological advancement in the mining sector.

I hope everyone enjoys the conference and I also urge you to take some time to experience our warm Northern hospitality.

Best regards!!

Glenn Thibeault, Sudbury MP



**Ed Debicki, Conference Chairperson
43rd Annual Canadian Mineral Analysts Conference and Exhibition**

The Geoscience Laboratories (Geo Labs) is pleased to be your host for the 43rd Annual Canadian Mineral Analysts (CMA) Conference and Exhibition. This is the fourth time that Sudbury has hosted the Conference since its inception in 1969 when the first CMA Conference was held in Noranda, QC. We welcome you to Sudbury, and we are certain that your time at the CMA Conference will be rewarding and enjoyable both from a technical and social perspective.

It was a pleasure being the Conference Chairperson of the Organizing Committee which planned and organized the workshops, technical sessions, tours and social events. Volunteers drive an event such as the 2011 CMA Conference, and the Organizing Committee members are to be thanked for their commitment and hard work during the past year. A special thank you is extended to our sponsors who have provided their very generous support to make the 2011 CMA Conference a great success.

The CMA promotes close liaisons between analytical laboratories, the mining industry, suppliers and manufacturers of analytical equipment, and suppliers of products and services. The Annual CMA Conference and Exhibition is CMA's showcase event. It is hosted in a different Canadian city each year. Proceeds from the annual conference and CMA memberships are used to fund scholarships for students in chemical or environmental science programs at Canadian colleges and universities. We hope you will continue to support future CMA Conferences, and please don't forget to keep your CMA membership in good standing.

Thanks for attending the 2011 CMA Conference and Exhibition in Sudbury, and we will see you in Quebec City in 2012.



Workshops

Workshop #1 - Sampling Theory

Instructor: Ed Paski, Consultant
Date: Monday, September 12, 2011
Time: 8:30 a.m. to 4:30 p.m.
Location: North Palladium Room, Radisson Hotel
Included: Continental breakfast, coffee breaks, lunch, and course notes

Topics Covered:

The Seven Sampling Sins:

1. Fundamental Error
2. Grouping and Segregation Error
3. Long-range Non-periodic Heterogeneity Fluctuation Error
4. Long-range Periodic Heterogeneity Fluctuation Error
5. Delimitation Error
6. Extraction Error
7. Preparation Error

Pierre Gy's Model – A Simplified Approach for Assay Laboratories:

The Horowitz Curve
Gy's Sampling Equation
Estimating Subsampling Variance

Sampling Uncertainty:

Importance of Sampling Uncertainty
Estimating Sampling Uncertainty in Assay Laboratories

Workshop #2 - Overview of Internal Auditing

Instructors: Cathy Wylie, CALA and Margaret Smetny-Sowa, CALA
Date: Monday, September 12, 2011
Time: 8:30 a.m. to 4:30 p.m.
Location: Notre Dame Room, Radisson Hotel
Included: Continental breakfast, coffee breaks, lunch, and course notes

The Canadian Association for Laboratory Accreditation Inc. (CALA) 'Overview of Internal Auditing' will examine how to plan and conduct internal audits within laboratories. Participants will learn what is involved in planning and conducting internal audits, how to follow up after an audit is complete, and how to integrate internal audits into existing continual improvement processes. This course will combine lectures with hands on practice.

Topics Covered:

- Planning for an internal audit
- Auditor responsibilities
- Conducting the audit
- Reporting findings
- Following up for impact
- Using the internal audit to prepare for an external assessment
- Internal audit cycles and continual improvement



Conference Overview

Social Events

Welcoming Reception

A wine and cheese reception will be available for all registered delegates and guests. This will be held on Monday from 6:00 p.m. to 8:00 p.m. in the exhibit hall area. Use this opportunity to network and socialize with vendors and colleagues.

Continental Breakfasts

Registered delegates and guests can enjoy a continental breakfast on Tuesday and Wednesday in the exhibit hall area starting at 8:00 a.m. while viewing the exhibits and visiting with vendors.

Tuesday Buffet Lunch

A stand-up buffet lunch will be served in the exhibit hall area. This will provide delegates and guests with the opportunity to visit booths, talk to vendors, and mingle with colleagues.

Happy Hour

Following the close of the technical sessions on Tuesday, enjoy some light refreshments and snacks in the exhibit hall area from 4:00 p.m. to 5:00 p.m. before attending the banquet dinner and dance.

Banquet Dinner and Dance

Enjoy this wonderful evening of great food and entertainment on Tuesday evening in the Grand Paris Ballroom. Cocktails will be available from 6:00 p.m. to 7:00 p.m. Dinner will be served at 7:00 p.m. with a dance to follow at 8:30 p.m.

Luncheon Followed by the CMA Business Meeting

Lunch will be served in the Grand Paris Ballroom at 12:30 p.m. Door prizes will be drawn and awards for the Best Technical Paper and the Best Exhibit Booth will be presented. The annual CMA business meeting will follow lunch at 2:00 p.m. in the North Palladium Room.

Casino Night

Catch the thunder at Sudbury Downs and OLG Slots on Wednesday night. Enjoy an evening at Northern Ontario's only live action harness racing venue. A buffet dinner in the Mardi Gras Restaurant along with coupons for harness racing and the slots are included. Transportation to the OLG Slots and return to the Radisson Hotel will be provided.

Ballot Boxes

Best Technical Talk

A ballot for the Best Technical Talk can be found in your registration package. One ballot per person please. The ballot box will be located at the Registration Desk until Wednesday, September 14, 2011 at 12:30 p.m. The winner of the Best Technical Paper will receive a plaque and a cash prize of \$500.00, sponsored by Rocklabs.

Best Exhibit Booth

A ballot for the Best Exhibit Booth can be found in your registration package. One ballot per person please. The ballot box will be located at the Registration Desk until Wednesday, September 14, 2011 at 12:30 p.m. The winner of the Best Exhibit Booth will receive a plaque.

Guest Program

Although no formal guest program is available, several handouts for shopping, site-seeing, and tourist attractions in and around the Great City of Sudbury will be available at the registration desk. Guests accompanying delegates have the opportunity to participate in any of the social events by purchasing tickets at the registration desk.



Exhibitors

Exhibit Hall Hours

The exhibition hall will be located on the third floor of the Radisson Hotel in the Centre and South Palladium Rooms.
Exhibit hours:

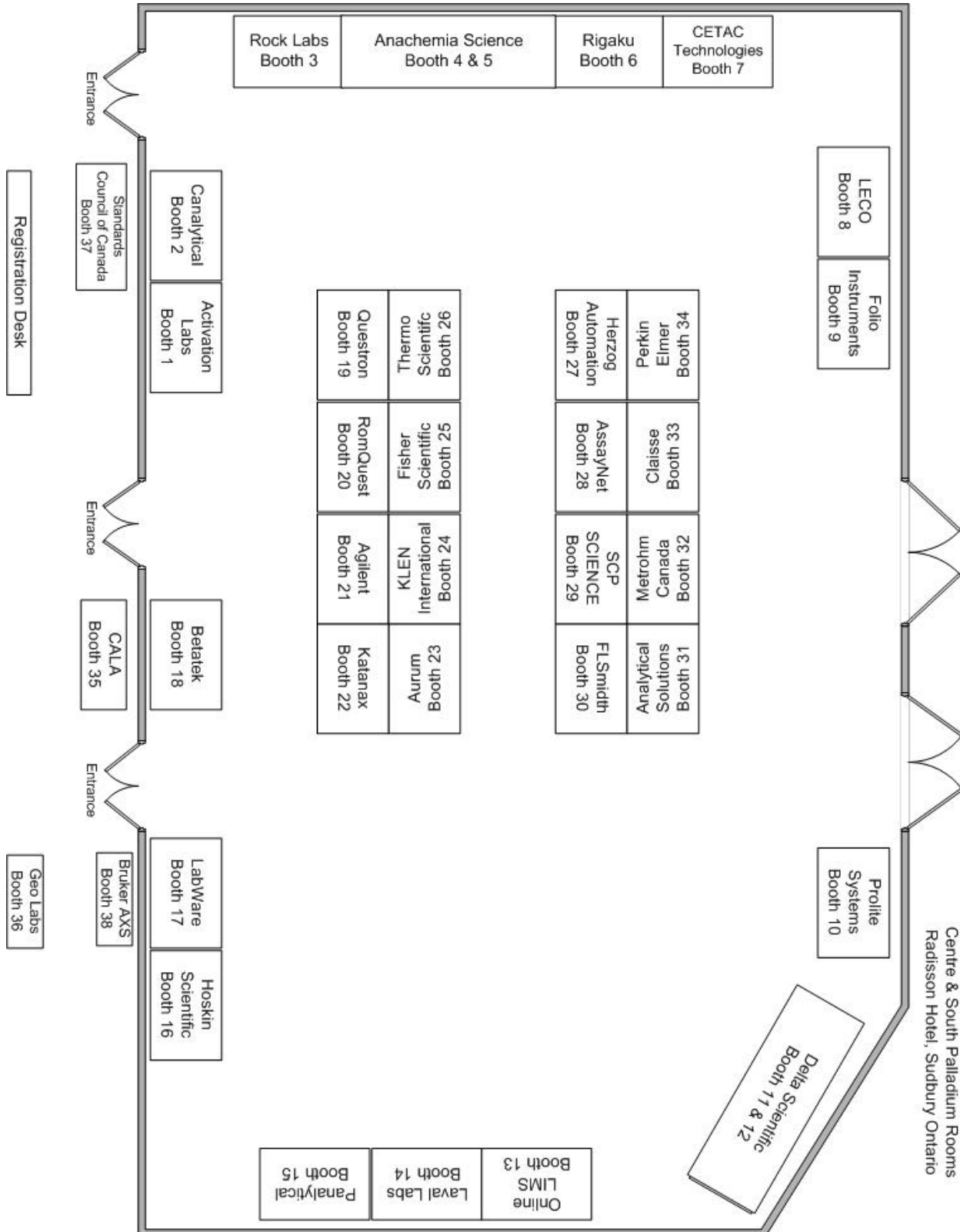
Exhibit Hall Times		
Exhibitor Set-up	Monday, September 12, 2011	8:00 a.m. to 4:00 p.m.
Exhibit Hall Times	Monday, September 12, 2011	6:00 p.m. to 8:00 p.m.
	Tuesday, September 13, 2011	8:00 a.m. to 5:00 p.m.
	Wednesday, September 14, 2011	8:00 a.m. to 11:30 a.m.
Exhibitor Tear-down	Wednesday, September 14, 2011	11:30 a.m. to 3:00 p.m.

Exhibitor List

Booth Number	Company	Booth Number	Company
1	Activation Laboratories	20	RomQuest
2	Canalytical	21	Agilent
3	Rocklabs	22	Katanax
4	Anachemia Science	23	Aurum
5	Anachemia Science	24	KLEN International
6	Rigaku	25	Fisher Scientific
7	CETAC Technologies	26	Thermo Scientific
8	LECO	27	Herzog Automation
9	Folio Instruments	28	AssayNet
10	Prolite Systems	29	SCP SCIENCE
11	Delta Scientific	30	FLSmith
12	Delta Scientific	31	Analytical Solutions
13	Online LIMS	32	Metrohm Canada
14	Laval Lab	33	Claisse
15	Panalytical	34	Perkin Elmer
16	Hoskin Scientific	35	CALA
17	LabWare	36	Geoscience Laboratories
18	Betatek	37	Standards Council of Canada
19	Questron	38	Bruker AXS



Exhibit Hall Floor Plan



2011 CMA Annual Conference & Exhibit
 September 12 - 15, 2011
 Centre & South Palladium Rooms
 Radisson Hotel, Sudbury Ontario



Technical Session Overview

Tuesday, September 13, 2011 - Morning Session Chairman - Ed Debicki, Lab Manager, Geoscience Laboratories			
Time	Presenter	Company	Title
9:00	Ron Gashinski	Ontario Ministry of Northern Development, Mines & Forestry	Canada: Continued Expansion in the Global Diamond Industry
9:40	Clayton Babcock	ATS Scientific Inc.	Digital Image Processing of Particle Size and Shape – Conventional Sieving Techniques are Passé
10:00	Coffee Break		
10:40	Wayne Blonski	Agilent Technologies	A Revolutionary Approach to the Analysis of Platinum Group Metals with the New Agilent 4100 MP-AES Microwave Plasma Spectrometer
11:00	Lynda Bloom	Analytical Solutions Ltd.	Setting Performance Limits for Assay Quality Control
11:20	Jeffrey Bown	Thermo Fisher Scientific	Maximising the Matrix Tolerance of ICP-OES by Harnessing the Latest Advances in Sample Introduction Technology
11:40	Carol Campbell	Standards Council of Canada	Laboratory Accreditation in Canada – The Canadian Mineral Analysis Testing Program
Tuesday, September 13, 2011 - Afternoon Session Chairman - Dr. Marcus Burnham, Chief Scientist, Geoscience Laboratories			
1:20	Ron Cardinall	AGAT Laboratories	Comparing Manual and Automatic Splits Following Crushing of Geological Material
1:40	Ian Devereux	Rocklabs Ltd.	Is There a Need for Much Better Dust Extraction in Geochem Labs?
2:00	Cory Gross	Elemental Scientific (ESI)	PrepFAST: A New Automated Variable On-line Dilution System for ICP/ICPMS
2:20	Coffee Break		
2:40	Lori Fields Hatherley	Rigaku Americas Corp.	Powder Versus Bulk X-ray Diffraction Comparisons for Phase Identification and Quantification of Three Rock and Mineral Specimens
3:00	Kurt Headrick	Vale	Representative Laboratory Sub-Sampling of Large Sulphide Concentrate Samples for Moisture and Elemental Determinations
3:20	Skage Hem	FLSmidth	Laboratory Equipment and Automated laboratory Systems from FLSmidth
3:40	Maureen Leaver	CCRMP-CANMET	Observations on the Data from the Preparation of Certified Reference Materials and Proficiency Testing Program – Mineral Analysis Laboratories (PTP-MAL) at CCRMP
4:00	Al Martin	Thermo Scientific	Thermo Perform'X, GeoAnalysis Focus – Mapping, Small Spot Analysis, and UniQuant
Wednesday, September 14, 2011 - Morning Session Chairman - James Schweyer, Supervisor of Operations, Geoscience Laboratories			
9:00	Laura Oelofse	Rigaku Americas Corp.	Combining X-ray Diffraction (XRD) and X-ray Fluorescence (XRF) Data to Elucidate the Elemental and Compositional Structure of Minerals for Phase Identification and Chemical Formulation with Special Reference to Oil Shales
9:20	Ed Paski	Analytical Innovations	Instrument Standardization Techniques for Routine Chemical Testing in Mineral Laboratories
9:40	Marcin Pawlak	Natural Resources Canada	Sequential Determination of Total Selenium, Seleno-L-methionine, Selenite and Selenate by High Performance Ion Chromatography Inductively Coupled Plasma Mass Spectrometry
10:00	Janice Pitre	Claisse	Dissolution Made Easy Using Peroxide Fusions for ICP-OES Analyses for Chromite Ores, Ferrochromes and Chromium Slags
10:20	Coffee Break		
11:00	Daniel Raymond	PANalytical	Streamlining Process Control in the Precious Metal Mining by XRF
11:20	Chady Stephan	Perkin Elmer	Analysis of FeCr Alloy Prepared by Sodium Peroxide Fusion
11:40	Bruce Weakland	Herzog Automation Corp.	New Products to Help with Your Sample Preparation Needs
12:00	Elaine Woo	BCIT	BC Assay Certification Program - An Educational Prospective



Technical Session - Tuesday, September 13, 2011

9:00 a.m.

Keynote Presentation: Canada: Continued Expansion in the Global Diamond Industry

Ron Gashinski

Director / Chief Gemmologist, Diamond Sector Unit - MNDMF, Sudbury, ON, Canada
ron.gashinski@ontario.ca

In the very short period of 13 years, Canada has gone from zero diamond production to four producing mines in 2011. By 2016, Canada may have a total of nine mines. This growth and expansion in diamond mining has presented many new and exciting value added opportunities. How and what aspects of the diamond pipeline do provincial governments and the private take advantage to create economic growth and increased employment from this increased diamond production. The opportunities and challenges range from providing services such as diamond sorting and valuation to cutting and polishing facilities. A gem of an opportunity for Canadians!

9:40 a.m.

Digital Image Processing of Particle Size and Shape – Conventional Sieving Techniques are Passé

Clayton Babcock

Technical Sales Representative, ATS-Scientific Inc., Burlington, ON, Canada
cbabcock@ats-scientific.com

Many of us remember working in the sample preparation room and having to perform sieve analysis. The assembly of the sieve stack, the noise, the dirt and all else that makes sieve analysis not much fun.

The Retsch CAMSIZER Digital Image Processing Particle Size and Shape Analysis System provides rapid and precise particle size and particle shape distributions for dry powders and bulk material in size ranging from 30µm to 30mm. This technique provides a wide variety of information about the sample, from a general size measurement, to shape parameters that can be closely correlated to specific performance characteristics. This also allows correlation to existing data from techniques as diverse as sieving and sedimentation.

10:40 a.m.

A Revolutionary Approach to the Analysis of Platinum Group Metals with the New Agilent 4100 MP-AES Microwave Plasma Spectrometer

Wayne Blonski

Optical Spectroscopy Product Specialist, Agilent Technologies, Winnipeg, MB, Canada
wayne.blonski@agilent.com

A rapid, simple and accurate method has been developed for analysis of platinum group metals in geochemical samples. This is based on a revolutionary elemental analysis technique – Microwave Plasma Atomic Emission Spectrometry (MP-AES). Compared to flame AA, this technique provides improved linear dynamic range, superior detection limits, fast sequential measurement and the capability to run unattended. It also eliminates the need for flammable gases or indeed, any bottled gas. The MP-AES runs from compressed air, providing a significant reduction in operating costs and eliminating gas cylinder handling. Performance will be demonstrated by presenting results for a range of sample types.



Technical Session - Tuesday, September 13, 2011

11:00 a.m.

Setting Performance Limits for Assay Quality Control

Lynda Bloom and Craig Hamlyn (OREAS)

Presenter: Lynda Bloom

President, Analytical Solutions Ltd., Toronto, ON, Canada

lynda@explorationgeochem.com

Geologists and chemists use reference materials to evaluate the acceptance or failure of batches of analytical data. Anecdotal evidence indicates that routine laboratory performance often does not conform to the predicated range of acceptable values based on round robin tests. Statistics for round robin tests are impacted by a variety of factors including the number of laboratories, selection of laboratories, temporal variation, consistent analytical procedures and sample size. Performance data from different laboratories and sampling constants from very small samples sizes (0.5 grams) will be used to demonstrate that sampling and measurement error need to be understood to find pragmatic solutions to setting acceptance limits.

11:20 a.m.

Maximising the Matrix Tolerance of ICP-OES by Harnessing the Latest Advances in Sample Introduction Technology

Martin Nash, Matthew Cassap and Jeffrey Bown

Presenter: Jeffrey Bown

Applications Specialist, Thermo Fisher Scientific, Illinois, USA

jeffrey.bown@thermofisher.com

Modern ICP-OES systems have pushed the limits of elemental analysis with enhanced speed, low detection limits, simultaneous multi-element measurement & fingerprinting as well as extreme linear dynamic range. The current generation of ICP-OES instruments are robust, compact, easy to use and can be installed in virtually any laboratory environment. The only limitation of the technique is in how heavy a matrix it will consistently tolerate. This presentation will illustrate how the practical limits of matrix tolerance can be extended to allow high-throughput analysis of the most challenging matrices by choosing appropriate sample introduction technologies from autosampler to torch and adopting best practice instrument optimisation. Practical examples will be presented using tough samples like Lithium Metaborate & Sodium Peroxide fusions to demonstrate accuracy & stability with an appropriate QC regimen.

11:40 a.m.

Laboratory Accreditation in Canada – The Canadian Mineral Analysis Testing Program

Carol Campbell

Senior Program Officer, Standards Council of Canada, Ottawa, ON, Canada

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The Standards Council of Canada (SCC) is a crown corporation established by an Act of Parliament in 1970, to foster and promote efficient and effective voluntary standardization in Canada. The Program Specialty Area - Mineral Analysis (PSA-MA) program is operated and managed by the SCC through its Laboratory Accreditation Program. The assurance that a mineral analysis laboratory adheres to recognized practices and standards can be achieved through accreditation in this program. Accreditation under the PSA-MA program is the formal recognition by the SCC of the competence of a mineral analysis laboratory to perform these activities.



Technical Session - Tuesday, September 13, 2011

1:20 p.m.

Comparing Manual and Automatic Splits Following Crushing of Geological Material

Ron Cardinall

Director - Technical Services, AGAT Laboratories, Mississauga, ON, Canada
cardinall@agatlabs.com

There will always be considerable discussion in the mining industry over sample preparation techniques. Everything from the size of split to mesh size are hotly debated topics between geologists, between assayers, and of course between geologists and assayers. One of the more contentious questions is whether manual splitting provides a more statistically accurate assay with less bias than automated splitting. With the increased demand on assay laboratories to provide more accurate work in a shorter amount of time this presentation looks at data collected over several years to determine if there is any bias between manual and automatic splitting of crushed material.

1:40 p.m.

Is There a Need for Much Better Dust Extraction in Geochem Labs?

Dr. Ian Devereux

Director - Rocklabs Ltd., Auckland, New Zealand
i.devereux@rocklabs.com

Dust extraction has been rated lowly in the functioning of geochem labs. Before the 1960s there was so much dust in some labs they were a serious health hazard. Then dust extraction became a recognized action, to remove floating dust generated during sample processing. As most Systems are underpowered, either in the original design or from adding more inlets as workloads increased, dust protection is still required for health reasons. Floors and equipment get coated in dust which needs removing.

We have now entered the era of mechanization and automation where there is a need for much better dust extraction to ensure equipment is clean without any human interaction, e.g. by using air blast or sucking through equipment at faster rates. This needs much faster air velocities so there is a need for two extraction Systems: one to remove floating dust, one for cleaning. Examples of this will be described.

2:00 p.m.

PrepFAST: A New Automated Variable On-line Dilution System for ICP/ICPMS

Cory Gross

Applications Specialist, Elemental Scientific (ESI), Omaha, NE, USA
cory.gross@icpms.com

PrepFAST in combination with the X-Series 2 operational software, PlasmaLab, allows for automated sample preparation in several distinct ways. Samples can be delivered to the autosampler neat and the system can perform a user defined dilution up to a factor of 200 times. This user defined dilution can also be applied to a calibration standard to allow a calibration curve to be created from a single stock solution. In addition, on the fly dilutions can be applied to over-range or internal standard out-of-range samples.



Technical Session - Tuesday, September 13, 2011

2:40 p.m.

Powder Versus Bulk X-ray Diffraction Comparisons for Phase Identification and Quantification of Three Rock and Mineral Specimens.

Lori Fields Hatherley

Application Scientist, Rigaku Americas Corporation, The Woodlands, TX, USA

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The popular practice in X-ray powder diffraction is to grind or powder the specimen before measuring. The intent is to randomize the individual crystals in a polycrystalline material, and minimize the particle size. This usually results in higher diffraction peak intensity in counts, higher peak to background ratios, minimizes particle absorption errors from different linear absorption coefficients and helps minimize preferred orientation. However, could any valuable information be obtained from the bulk form XRD measurements without all the grinding?

A series of XRD experiments with three mineral/rock types are compared for both the bulk and powdered forms to determine what types of information can be observed or "lost" in each physical preparation method. Quantification results (Rietveld analysis) from each preparation method are compared from automatic phase identification, and quantification programs. The Rietveld refinement parameters are evaluated for each method. Studies conducted on these samples determined specific advantages exist for both techniques.

3:00 p.m.

Representative Laboratory Sub-Sampling of Large Sulphide Concentrate Samples for Moisture and Elemental Determinations

Kurt Headrick

Chief Chemist, Vale, Newfoundland and Labrador Operations, Happy Valley - Goose Bay, NL, Canada

kurt.headrick@vale.com

Options for sub-sampling moist materials are limited, and not applicable to laboratory sub-sampling. The development of a method for laboratory sub-sampling of large samples of moist filter cake is described. XRF and moisture assays of duplicate splits of ship-loading samples of moist copper and nickel concentrates agreed within 1% relative, indicating that the method is capable of generating representative laboratory sub-samples. The method is simple, rapid, and uses readily available equipment.



Technical Session - Tuesday, September 13, 2011

3:20 p.m.

Laboratory Equipment and Automated Laboratory Systems from FLSmidth

Skage Hem
CEO, Managing Director, FLSmidth Brno, Brno, Czech Republic
srhe@flsmidth.com

FLSmidth delivers systems and machines performing and supporting sample preparation, sample logistics, metallurgical testing and analysis. There are delivered as individual units or integrated systems. The integrated systems range from handling the complete process from sample reception to analysis, or smaller independent units performing one or more operations. The following products are highlighted: ESSA JC2501 (crusher), ESSA LM2 (laboratory mill), Centaurus (combined mill and press for XRF/XRD), DCF 820 (automatic preparation of fused beads for XRF), PAL-MPA (containerized sample preparation for XRF/XRD) and general laboratory automation.

3:40 p.m.

Observations on the Data from the Preparation of Certified Reference Materials and Proficiency Testing Program – Mineral Analysis Laboratories (PTP-MAL) at CCRMP

Maureen E. Leaver
Coordinator, Canadian Certified Reference Materials Project, CANMET – Mining and Mineral Sciences Laboratories, Natural Resources Canada, Ottawa, ON, Canada
mleaver@nrcan.gc.ca

CCRMP receives data from laboratories world wide for the preparation of certified reference materials and Proficiency Testing Program – Mineral Analysis Laboratories. The amount of data is statistically large enough that trends in methods, accuracy and precision become evident. Various examples from recently released materials and cycles of PTP-MAL will be discussed.

4:00 p.m.

Thermo Perform'X, GeoAnalysis Focus – Mapping, Small Spot Analysis, and UniQuant

Al Martin
XRF Applications Specialist, Thermo Scientific, West Palm Beach, FL, USA
al.martin@thermofisher.com

Geochemical analysis can present some of the most difficult challenges for any scientist. With the wide potential of matrices which can be encountered combined at times with very limited sample sizes, obtaining useful data can be imposing.

Thermo Scientific's new WDXRF system, Perform'X, offers any analyst the tools to overcome many of these issues. With the inclusion of an imaging system and small spot analysis down to 0.5mm, mapping can be performed in-situ for any region of interest or individual spot analysis for studies of wider areas.

This feature combined with the powerful UniQuant Standardless Analysis program makes Perform'X the premier X-ray analytical system for geochemical analysis available today. Examples of these features are offered in this presentation.



Technical Session - Wednesday, September 14, 2011

9:00 a.m.

Combining X-ray Diffraction (XRD) and X-ray Fluorescence (XRF) Data to Elucidate the Elemental and Compositional Structure of Minerals for Phase Identification and Chemical Formulation With Special Reference to Oil Shales

Laura Oelofse

Product Marketing Manager, Rigaku Americas Corporation, The Woodlands, TX, USA

laura.oelofse@rigaku.com

Wave length dispersive x-ray fluorescence (WDXRF) and X-ray diffraction (XRD) are powerful analytical tools used in geochemistry to identify and quantify rock and mineral types.

With the current interest in Oil Shales, we have analyzed shale samples by WDXRF and XRD using Whole Rock Analysis Methods and Rietveld processing methodologies. The data from both sources is then combined to show the best match characterization techniques for phase identification and phase quantification.

The whole rock analysis is carried out using the vendor supplied application package, Mineral-Pak and the phase quantification is carried out using Rietveld XRD software.

The results show the power of applying the whole rock analysis data to the XRD phase quantification data for validation.

The economic importance of identifying productive oil shale deposits using advanced analytical interpretation of the data produced by these combined methods is explored.

9:20 a.m.

Instrument Standardization Techniques for Routine Chemical Testing in Minerals Laboratories

Edgar F. Paski

Consultant, Analytical Innovations, North Vancouver, BC, Canada

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Calibration of instruments in most minerals is commonly done using a series of standard solutions at various concentrations and applying a linear equation to relate instrument response to analyte concentration. Often the calibration is done with minimal consideration to the presence of outliers let alone how well the calibration function represents the relationship between instrument response and concentration. Operating software for many analytical instruments lacks the tools and assessment criteria for evaluating the calibration algorithms used, presence of outliers, or appropriateness of the fitted calibration curve.

In this presentation practical tools are presented for: selecting and evaluating calibration functions; testing for goodness of fit and linearity; identifying outliers in calibration plot data. An important distinction between techniques appropriate during method validation and routine daily use is discussed. Reasons for the inappropriateness of the correlation coefficient (r^2) for evaluating linearity and goodness of fit are presented. The use of simple, visual tools such as residuals plots for evaluating appropriateness of the calibration algorithm is demonstrated.

Topics covered include: establishing traceability of the calibration; estimating measurement uncertainty contribution from the calibration plot; assigning acceptability limits for certified reference materials and intra-run calibration drift checks.



Technical Session - Wednesday, September 14, 2011

9:40 a.m.

Sequential Determination of Total Selenium, Seleno-L-methionine, Selenite and Selenate by High Performance Ion Chromatography Inductively Coupled Plasma Mass Spectrometry

Marcin Pawlak
Chemist, Method Development, Mining and Mineral Sciences Laboratories, Natural Resources Canada, Ottawa, ON, Canada
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An analytical method to quantify total selenium, seleno-L-methionine, selenite and selenate in synthetic aqueous environmental media was developed. The method was in support of studies assessing the effects of selenium on the life-cycle of two aquatic invertebrates.

10:00 a.m.

Dissolution Made Easy Using Peroxide Fusions for ICP-OES Analyses for Chromite Ores, Ferrochromes and Chromium Slags

Janice Pitre and Mélanie Bédard
Presenter: Janice Pitre
AA/ICP Applications Product Manager, Corporation Scientifique Claisse, Québec, QC, Canada
jpitre@claisse.com

The main product generated by chromite is ferrochrome which is a major player in the steel industry. The stainless steel industry uses more than 90% of the world's chromite output.

The mining and steel industries must assess the quality of the chromite ore to optimize the grade of their stainless steel production, therefore the chemical analyses of the chromite ore as well as its final and waste products are mandatory. Metal analysis traditionally uses AA or ICP-OES to measure the metal contents in the ores and industrial products. However, the traditional dissolution method for chromite and ferrochrome is a multi-step, multi-acid digestion which requires the use of HNO_3 , HF and HClO_4 and can take anywhere between 1 to 3 hours.

As will be demonstrated in this presentation, sodium peroxide fusions are a quick, safe and efficient alternative for the dissolution of these specific samples.

The method was established by coupling Ion Chromatography (IC) to Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The IC system, initially comprising two separate systems, was altered through hardware and software modifications to allow for sequential determination of total selenium and species for each sample in a single run. Through this approach, separate analysis of samples for each analyte was avoided.



Technical Session - Wednesday, September 14, 2011

11:00 a.m.

Streamlining Process Control in the Precious Metal Mining by XRF

Daniel Raymond
General Manager, PANalytical, Montreal, QC, Canada
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For some time XRF has been well established in base metal mining laboratories for both research and process control. Recent advancements in spectral quality, excitation and automation make XRF suitable for process control use in precious metal ore refining. Shortened optical paths, high energy excitation and advanced optical components such as polarization has resulted in better XRF spectra quality. Advancements in data treatment have also resulted in lower detection. When coupled with extremely high up-time and automation for which XRF is well known for these items bring about the realization of quicker process control and metal accounting. Examples include the analysis of Au and Ag recovery on carbons and PGMs in recycled matrices and rapid analysis of furnace slags for mass balance purposes.

11:20 a.m.

Analysis of FeCr Alloy Prepared by Sodium Peroxide Fusion

Dr. Chady Stephan
Product Specialist: AA, ICP & ICP-MS, PerkinElmer, Woodbridge, ON, Canada
chady.stephan@perkinelmer.com

In this work we describe the performance of the Optima 8300DV in analyzing Ferrochrome samples prepared by sodium peroxide fusion.

The Optima 8300DV features a revolutionary Flat Induction Plates that replaces the Helical Radio Frequency (RF) Load Coil delivering a low flow operating system that does not require coil cooling and is capable of operating at a plasma argon flow as low as 8 L/min.

Several key parameters were evaluated; the **Accuracy** and **Precision**, by measuring the recovery and the relative standard deviation of three Certified Reference Materials (CRM). The **Stability**, by plotting the recovery of CCVs versus time for more than 12-hour period and the Method **Detection Limits** (MDLs), calculated as three times the standard deviation of the measured concentrations of 10 matrix blank replicate.



Technical Session - Wednesday, September 14, 2011

11:40 a.m.

New Products to Help with Your Sample Preparation Needs

Bruce Weakland

North American Sales Manager, Herzog Automation Corp., Cleveland, OH, USA

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Herzog Automation Corp. is the leading supplier of sample preparation systems for spectrographic and x-ray analysis from manual to fully automated equipment. Herzog has continued to meet the needs of customers by improving existing products and developing new equipment for preparing samples with safety and efficiency in mind. In particular, Herzog has recently developed an automatic milling machine for large samples, a semi-automatic milling machine for smaller samples, a mill and press combination system, a low pressure press for XRD samples, a dosing machine for weighing flux and new fusion machines. The most recent system has been designed for crushing, splitting and milling.

12:00 p.m.

BC Assayer Certification Program – An Educational Prospective

Elaine Woo

Faculty, British Columbia Institute of Technology (BCIT), Burnaby, BC, Canada

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“BC Certified Assayers have an international reputation for analytical competency and accuracy”. The Government of BC has run a successful Assayer Certification Program since 1895. Through the standards established over the past 100 years, the program has attained an enviable domestic and international reputation within the mining, mineral exploration, analytical chemistry and securities industries.

In partnership with the BC Government and assaying industries, British Columbia Institute of Technology (BCIT) offers a comprehensive training program in assaying, which follows closely the syllabus set by the Board of Examiners of the BC Assayer Certification Program.

BCIT Assayer Certification Training Program involves “tutored” correspondence courses and laboratory practicum that students could complete in two years by following assigned timelines. Its objective is to train students on attainment of efficiency, precision and accuracy in analytical work. One may opt to take only parts of the training program for the purpose of learning new or upgrading analytical skills, or as “refresher”.

Attend the presentation to learn what the BCIT Assayer Certification Training Program has to offer for you or your staff in gaining competency in assaying.



Laboratory Tours

Laboratory Tour #1: Geoscience Laboratories (Geo Labs)

Date: Thursday, September 15, 2011
Time: 9:00 a.m. to 11:00 a.m.
Departure: Bus leaves Radisson Hotel at 8:30 a.m.

Tour Description:

Participants will see all aspects of the Geo Labs analytical facility that will include sample log-in, sample preparation, solution preparation, fire-assay and nickel sulphide fire-assay, XRF, ICP-MS, ICP-AES, AA, Hg, ion chromatography (IC), automated titration (CI/FI), carbon/sulphur (C/S), moisture content analysis, FeO, loss on ignition, particle size analysis, and the Chittick method. The tour will also visit the mineralogy section to view techniques using x-ray diffraction (XRD), scanning electron microprobe (SEM), and electron probe micro analyzer (EMPA).

Laboratory Tour #3: Vale Central Laboratory

Date: Thursday, September 15, 2011
Time: 1:00 p.m. to 3:00 p.m.
Departure: Bus leaves Radisson Hotel at 12:30 p.m.

Tour Description:

Vale's Sudbury Central Laboratory provides reliable, dependable and accurate measurement and analytical expertise around sample preparation, analysis and technical support to the Ontario Division Smelting and Refining operations, on a 24-hour, 7-day basis. The Central Laboratory is accredited under ISO 17025, and is a certified member of the A2LA and CALA.

The Central Laboratory's core services include:

- Prompt response to various operations for process control
- Workplace and biological monitoring
- Legislated analyses for waters and effluents
- Analysis of liquid O₂ and SO₂, as well as H₂SO₄ and oleum
- Analysis of ores, concentrates, and other intermediate mill streams
- Analysis of purchased / secondary feeds
- Issuance of final product Assay Certificates to our Marketing Group
- Physical testing of Ni powders and pellets

The Central Lab receives approximately 5,000 samples per month, and carries out some 9,000 tests on these samples.

Laboratory Tour #4: Xstrata Process Support (XPS)

Date: Thursday, September 15, 2011
Time: 1:00 p.m. to 3:00 p.m.
Departure: Bus leaves Radisson Hotel at 12:30 p.m.

Tour Description:

Xstrata Process Support (XPS) is a licenced metallurgical engineering, technology and test services operation offering industry leading expertise in orebody characterisation, flowsheet development, operational support, growth initiatives and asset integrity management for most commodities including gold, nickel, copper, zinc, PGEs, rare earth and industrial minerals.

A tour through the facility will include the Mineral Science laboratory which contains 2 QEMSCANs, an SX 100 Cameca Microprobe, a Bruker D8 Advance XRD, a Tescan SEM, as well as a fully equipped sizing and polishing lab. Participants will also be shown the Xstrata Nickel chemical assay laboratories responsible for Xstrata Nickel's smelter and concentrator production samples.



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Workshops

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Left to right: Jessica Laporte, Brent Handford, Merilla Clement,
Troy Richardson, Fareeda Joly, Victoria Hingst, James Schweyer, Ed Debicki



43rd Annual CMA Conference and Exhibition
Sudbury, Ontario
September 12-15, 2011

Notes



43rd Annual CMA Conference and Exhibition
Sudbury, Ontario
September 12-15, 2011

2012 CMA

We look forward to seeing you at the
44th Annual Canadian Mineral Analysts (CMA) Conference and Exhibition

Loews Hotel Le Concorde
Quebec City, Quebec
September 9 - 13, 2012

For information contact:
Janice Pitre
Corporation Scientifique Claisse
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E-mail: jpitre@claisse.com

Schedule at a Glance

Monday, September 12, 2011		
Registration Desk	Outside North Palladium Room	8:00 a.m. to 5:30 p.m.
Exhibitor Set-up	Centre & South Palladium Rooms	8:00 a.m. to 4:00 p.m.
Workshop #1 – Sampling Theory	North Palladium Room	8:30 a.m. to 4:30 p.m.
Workshop #2 – Overview of Internal Auditing	Notre Dame Room	8:30 a.m. to 4:30 p.m.
Exhibit Hall	Centre & South Palladium Rooms	6:00 p.m. to 8:00 p.m.
Welcoming Reception	Centre & South Palladium Rooms	6:00 p.m. to 8:00 p.m.
Tuesday, September 13, 2011		
Registration Desk	Outside North Palladium Room	8:00 a.m. to 12:00 p.m.
Continental Breakfast	Centre & South Palladium Rooms	8:00 a.m.
Exhibit Hall	Centre & South Palladium Rooms	8:00 a.m. to 5:00 p.m.
Morning Technical Session	North Palladium Room	9:00 a.m. to 12:00 p.m.
Coffee Break	Centre & South Palladium Rooms	10:00 a.m. to 10:40 a.m.
Lunch	Centre & South Palladium Rooms	12:00 p.m. to 1:20 p.m.
Afternoon Technical Session	North Palladium Room	1:20 p.m. to 4:20 p.m.
Coffee Break	Centre & South Palladium Rooms	2:20 a.m. to 2:40 a.m.
Happy Hour	Centre & South Palladium Rooms	4:00 p.m. to 5:00 p.m.
Banquet Dinner and Dance	Grand Paris Ballroom	6:00 p.m. to 11:00 p.m.
Wednesday, September 14, 2011		
Registration Desk	Outside North Palladium Room	8:00 a.m. to 12:00 p.m.
Continental Breakfast	Centre & South Palladium Rooms	8:00 a.m.
Exhibit Hall	Centre & South Palladium Rooms	8:00 a.m. to 11:30 a.m.
Morning Technical Session	North Palladium Room	9:00 a.m. to 12:20 p.m.
Coffee Break	Centre & South Palladium Rooms	10:20 a.m. to 11:00 a.m.
Lunch	Grand Paris Ballroom	12:30 p.m. to 2:00 p.m.
CMA Business Meeting	North Palladium Room	2:00 p.m.
Exhibit Tear Down	Centre & South Palladium Rooms	11:30 a.m. to 3:00 p.m.
Sudbury Downs & OLG Slots	Bus Leaves Radisson Hotel – Front Doors Bus Returns to Radisson Hotel	5:00 p.m. & 5:45 p.m. 10:30 p.m.
Thursday, September 15, 2011		
Tour #1 – Geoscience Laboratories	Bus Leaves Radisson Hotel – Front Doors	8:30 a.m. to 11:30 a.m.
Tour #3 – Vale Central Laboratory	Bus Leaves Radisson Hotel – Front Doors	12:30 p.m. to 3:30 p.m.
Tour #4 – Xstrata Process Support	Bus Leaves Radisson Hotel – Front Doors	12:30 p.m. to 3:30 p.m.