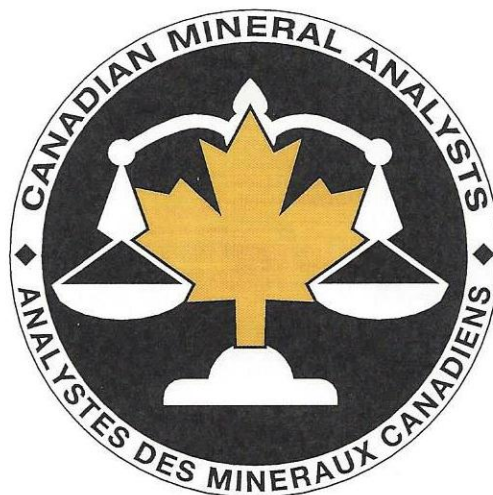


48th Annual Canadian Mineral Analysts (CMA) Conference and Exhibition



PROGRAM AND ABSTRACTS

September 12-15, 2016
Sudbury, Ontario

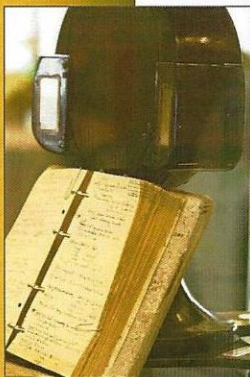
HOSTED BY:



Ontario

Ministry of Northern Development and Mines
Ontario Geological Survey

GEO LABS
GEOSCIENCE LABORATORIES





48th Annual CMA Conference and Exhibition
Sudbury, Ontario
September 12-15, 2016

Sponsors

Our thanks to the following organizations and people who kindly and generously made contributions to support the 2016 CMA Conference. Their generous support made this year's conference possible.

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48th Annual CMA Conference and Exhibition
Sudbury, Ontario
September 12-15, 2016

Welcoming Messages

Minister Michael Gravelle

Ministry of Northern Development and Mines



On behalf of the Government of Ontario, I would like to extend a warm welcome to the delegates attending the 48th Annual Canadian Mineral Analysts Conference and Exhibition in Sudbury.

Ontario takes great pride in being the leading jurisdiction for the exploration and production of minerals in Canada, and a major player across the world. The numbers say it all. In 2015, exploration spending in Ontario was \$393 million, and mineral production was valued at \$10.8 billion. This accounted for approximately one-quarter of Canada's total mineral output, and last year was the third year in a row that the province's mineral production exceeded \$10 billion.

Currently, Ontario's 42 mines and 6,900 aggregates sites directly employ just over 26,000 people. Another 50,000 jobs are associated with mineral manufacturing and processing. I am pleased to say

that we expect these job numbers to increase as four new mines are projected to open in Ontario over the next five years alone.

The OGS Geoscience Laboratories (Geo Labs) is a key part of Ontario's success. This facility provides analysis in geochemistry, mineralogy and reference materials. With the Ontario Geological Survey as its primary client, Geo Labs also offers its services to other government, academic, exploration, mining, environmental, industrial and research organizations. The primary focus is on research-grade analyses for academic institutions and government geological surveys.

The leading-edge analytical capability of the mineral analysis industry is crucial to the future of Ontario's mining sector if we are to continue the remarkable legacy that includes the Sudbury Basin — the richest hard-rock mining district in North America — discovered in 1883; the Porcupine gold rush in 1909 that established the Timmins camp; the Red Lake gold discovery of 1925; or the Hemlo find of 1981.

Ontario is committed to investing in the future of mining, which is such an important contributor to the provincial economy. We appreciate that the minerals sector relies on the interconnected strength of all areas of mining, including the excellence of the mineral analysis industry.

I congratulate the Geo Labs for hosting this important technical and networking event, and I wish everyone a successful conference.

Michael Gravelle

The Honorable Paul Lefebvre

Member of Parliament for Sudbury



As Member of Parliament for Sudbury, it is an honour to welcome delegates to the 48th annual Canadian Mineral Analysts Conference and Exhibition in Sudbury.

À titre de député fédéral de Sudbury, c'est un honneur pour moi de souhaiter la bienvenue aux membres d'Analystes des Minéraux Canadiens à Sudbury.

This Conference and Exhibition will afford you the opportunity to meet and confer with the very best professionals in Mining Analytics, and there's no better place for this than Sudbury

While in Sudbury, I encourage you to take the time to take in as much of our city and our world-class facilities as possible, and see for yourself why Sudbury has earned the reputation as a global leader in metal endowment research and world-class mining innovation.

I want to extend thanks and appreciation to all of the sponsors, staff and volunteers of the Canadian Mineral Analysts Conference and Exhibition in Sudbury, without whom this event would not be possible.

I hope you enjoy a safe and productive Conference and Exhibition.

Paul Lefebvre



Welcoming Messages

His Worship Brian Bigger

Mayor, City of Greater Sudbury



On behalf of City Council and the citizens of Greater Sudbury, I welcome you to the 48th annual Canadian Mineral Analysts Conference and Exhibit from September 12th-15th, 2016.

Together with our partners at the Government of Ontario, Ministry of Northern Development and Mines and Geoscience Laboratories, I am honoured that the City of Greater Sudbury is hosting such an important gathering.

The Canadian Mineral Analysts Conference and Exhibit consistently brings together leading experts including technicians, analysts, scientists and managers from across North America and beyond with experience in inorganic laboratories for mining companies, government bodies, commercial operations and university laboratory sectors.

The Sudbury Basin, the second largest impact crater on Earth, is home to one of the most fascinating geological structures in the world. The mineral rich grounds of the Sudbury Basin have put the City of Greater Sudbury at the forefront of mining, mining service and supply, geology and environmental science. It's thanks to the contributions of individuals like you that we have been able to achieve such great success.

We have a number of attractions for all ages and a variety of excellent dining options as well. Please visit www.sudburytourism.ca for all the information you need during your visit.

Again, I would like to thank all of the volunteers, organizers and sponsors who have given their time and efforts to ensure this conference is a success in our city. I wish all of the delegates the very best of luck and an enjoyable stay.

Yours truly,

Mayor Brian Bigger
City of Greater Sudbury

Ed Debicki, Conference Chairperson

48th Annual Canadian Mineral Analysts Conference and Exhibition



The Geoscience Laboratories (Geo Labs) is pleased to be your host for the 48th Annual Canadian Mineral Analysts (CMA) Conference and Exhibition. This is the fifth 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 from a technical, networking 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 2016 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 2016 CMA Conference a great success.

The CMA promotes close liaisons between analytical laboratories, the mining industry, academia, government, suppliers and manufacturers of analytical equipment, and suppliers of products and services. The Annual CMA Conference and Exhibition is CMA's showcase event which is hosted in a different Canadian city each year. Proceeds from the annual conference and CMA memberships are used to fund equipment grants and 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.

Ed Debicki



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. This will be a great opportunity for delegates to socialize and network with vendors.

Happy Hour

Following the close of the technical sessions on Tuesday, light refreshments and snacks will be offered in the exhibit hall area. This will be another great opportunity for delegates to mingle and network with vendors.

Continental Breakfasts

Registered delegates and guests can enjoy a continental breakfast on Tuesday and Wednesday in the exhibit hall starting at 7:30 a.m.

Buffet Lunch

A stand-up buffet lunch will be served in the exhibit hall at 12:00 noon. This will provide delegates and guests with the opportunity to visit booths, talk to vendors, and mingle with colleagues.

Gala Banquet Dinner

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. Following dinner, an amazing interactive, high impact, magic and illusions show will be performed by Stefano Presenza.

CMA Business Lunch and Business Meeting

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

Wednesday Entertainment Night

The Caruso Club (Società Caruso) located at 385 Haig Street, is a Sudbury tradition that dates back to 1948. The dining hall will serve up a buffet of homemade Italian food and desserts. After dinner there will be a Bocce Ball tournament for all to enjoy.

Transportation to the Caruso Club will leave the Radisson Hotel lobby entrance at 5:45 p.m. Return transportation to the Radisson Hotel will be provided at the end of the evening.

Ballot Boxes

Best Technical Talk

A ballot for the Best Technical Talk can be found in your registration package. There is one ballot per person. The ballot box will be located at the Registration Desk until Wednesday, September 14, 2016 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. There is one ballot per person. The ballot box will be located at the Registration Desk until Wednesday, September 14, 2016 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 Greater 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.



Conference Schedule

Monday, September 12, 2016		
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	Notre Dame Room	8:30 a.m. 12:00 p.m.
Workshop #2	Notre Dame Room	1:00 p.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, 2016		
Registration Desk	Outside North Palladium Room	8:00 a.m. to 12:00 p.m.
Continental Breakfast	Centre & South Palladium Rooms	7:30 a.m.
Exhibit Hall	Centre & South Palladium Rooms	8:00 a.m. to 5:00 p.m.
Morning Technical Session	North Palladium Room	8:40 a.m. to 12:00 p.m.
Coffee Break	Centre & South Palladium Rooms	10:20 a.m. to 10:40 a.m.
Buffet Lunch	Centre & South Palladium Rooms	12:00 p.m. to 1:00 p.m.
Afternoon Technical Session	North Palladium Room	1:00 p.m. to 4:00 p.m.
Coffee Break	Centre & South Palladium Rooms	2:20 p.m. 2:40 p.m.
Happy Hour	Centre & South Palladium Rooms	4:00 p.m. to 5:00 p.m.
Gala Banquet Dinner	Grand Paris Ball Room	6:00 p.m.
Wednesday, September 14, 2016		
Continental Breakfast	Centre & South Palladium Rooms	7:30 a.m.
Exhibit Hall	Centre & South Palladium Rooms	8:00 a.m. to 11:30 a.m.
Morning Technical Session	North Palladium Room	8:40 a.m. to 12:00 p.m.
Coffee Break	Centre & South Palladium Rooms	10:00 a.m. to 10:20 a.m.
CMA Business Lunch	Grand Paris Ball Room	12:00 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.
Entertainment Night	Caruso Club - Bus Leaves Radisson Hotel (Front Doors) at 5:45 p.m.	5:45 p.m.
Thursday, September 15, 2016		
Lab Tour #1 - XPS Consulting & Testwork Services	Bus Leaves Radisson Hotel (Front Doors) at 8:15 a.m.	9:00 a.m. to 11:00 a.m.
Lab Tour #2 - Geoscience Laboratories	Bus Leaves Radisson Hotel (Front Doors) at 8:30 a.m.	9:00 a.m. to 11:00 a.m.
Lab Tour #3 - Vale Sudbury Central Laboratory	Bus Leaves Radisson Hotel (Front Doors) at 1:00 p.m.	1:30 p.m. to 3:30 p.m.
Lab Tour #4 - Geoscience Laboratories	Bus Leaves Radisson Hotel (Front Doors) at 1:00 p.m.	1:30 p.m. to 3:30 p.m.



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		
Exhibitor Set-up	Monday, September 12, 2016	8:00 a.m. to 4:00 p.m.
Exhibit Hall Hours	Monday, September 12, 2016	6:00 p.m. to 8:00 p.m.
	Tuesday, September 13, 2016	8:00 a.m. to 5:00 p.m.
	Wednesday September 14, 2016	8:00 a.m. to 11:30 a.m.
Exhibit Tear-down	Wednesday, September 14, 2016	11: 30 a.m. to 3:00 p.m.

Exhibitor List

Booth Number	Company Name	Booth Number	Company Name
1	Thermo Fisher Scientific	18	Elemental Scientific Inc
2	Fisher Scientific	19	ISOSPARK Canada Inc
3	Isomass Scientific	20	Betatek Inc
4	ColdBlock Technologies	21	Katanax Inc
5	Rocklabs Automation Canada	22	Delta Scientific Lab Products
6	Canalytical	23	AssayNet Inc
7	Leco	24	Metrohm Canada Inc
8	Anachemica, VWR	25	Geoscience Laboratories
9	Anachemica, VWR	26	XRF Scientific Americas
10	Prolite Systems	27	Questron Technologies Corp
11	PerkinElmer Canada	28	FLSmidth
12	IMP Automation Canada Ltd	29	ATS Scientific
13	Laval Lab Inc.	30	Karsh Scientific
14	Agilent Technologies Inc.	31	Romquest Technologies
15	Heraeus Inc	32	PANalytical
16	Rigaku Americas	33	Skalar Inc
17	CALA	34	SCP Science

Exhibitor Passport Contest

Visit each exhibit booth and get the exhibitor to mark your "Exhibitor Passport" card found in your delegate package.

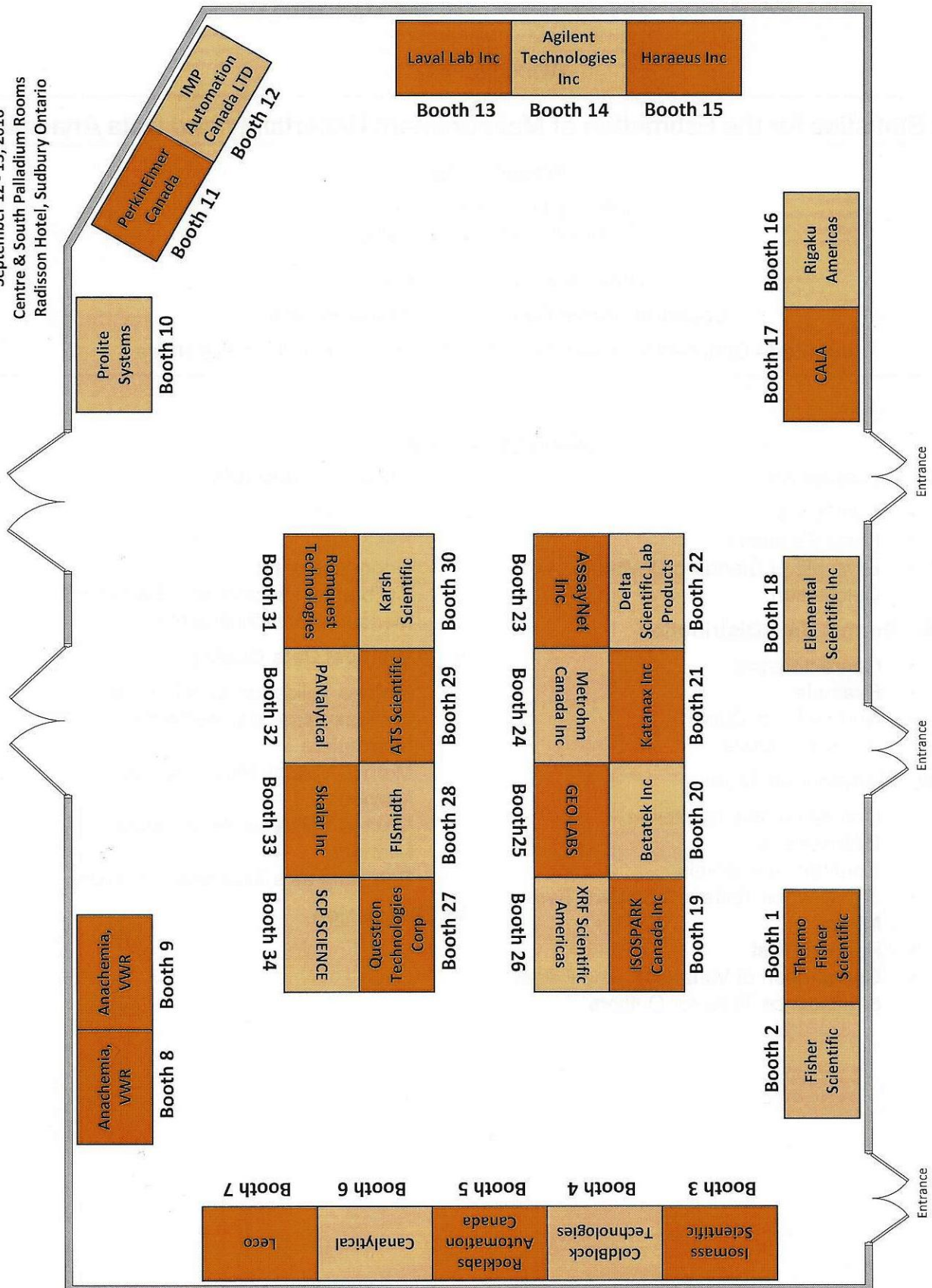
Everyone who visits each booth and obtains all of the exhibitors' marks will be eligible for a prize to be drawn at the CMA Business Luncheon. **Winner must be present to accept the prize.**

Completed cards must be dropped off in the box at the Registration Desk prior to **12:00 noon on Wednesday, September 14, 2016.**



Exhibit Hall Floor Plan

2016 CMA Annual Conference & Exhibit
September 12 - 15, 2016
Centre & South Palladium Rooms
Radisson Hotel, Sudbury Ontario



Registration Desk – Geoscience Laboratories



Workshops

Monday, September 12, 2016 - Morning

Workshop #1

Basic Statistics for the Estimation of Measurement Uncertainty and Data Analysis

Presented by

Wesley M. Johnson, Ph.D.
Quality Analysis Consultants

Time - 8:30 a.m. to 12:00 p.m.

Location - Notre Dame Room, Radisson hotel

Included - Continental Breakfast, Coffee Break, Lunch and Course Notes

Workshop Outline

I. Introduction

- Definitions
- Basic Equations
- Example of Standard Deviation Calculation

II. Normal Data Distribution

- Characteristics
- Example
- Normal Error Curve
- Z and P Factors

III. Significance Testing

- One-tailed and Two-tailed Distributions
- Confidence Intervals
- Significance Tests to Compare Two Means
- Paired T-Test
- Comparison of Variances - the F-Test
- Significance Tests for Outliers

IV. Regression Methods

- Regression
- Residuals
- Goodness of Fit
- Calibration Process as a Source of Measurement Uncertainty

V. Analytical Data Quality

- Method Validation as a Source of Measurement Uncertainty Information
- Method Validation for Standard Methods
- Method Validation for In-house Methods
- Sampling as a Source of Variation

VI. Discussion



Workshops

Monday, September 12, 2016 - Afternoon

Workshop #2

Sampling of Environmental and Mineral Materials

Presented by

Wesley M. Johnson, Ph.D.
Quality Analysis Consultants

Time - 1:00 p.m. to 4:30 p.m.

Location - Notre Dame Room, Radisson hotel

Included - Lunch, Coffee Break, and Course Notes

Workshop Outline

I. Introduction

- Sampling Stages
- Sample Preparation
- Test Portion

II. Particulate Material Concerns

- Sample Size
- Particle Size
- Nugget Effect
- Most Likely Result

III. Sampling Constants

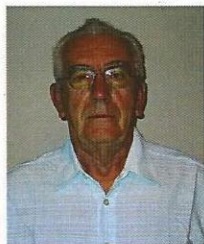
- Ingamells/Switzer Sampling Constant
- Gy's Sampling Constant
- Visman's Sampling constants

IV. Integrated Constants Approach

- Calculation of Variances
- Isolating Sources of Variances
- Estimating Sampling Uncertainties

V. Discussion

About the Presenter



Dr. Johnson has had many years of experience in commercial, industrial and government laboratories as an analyst, manager and Quality Control/Quality Assurance officer. He is retired from teaching Analytical and Environmental Chemistry at Okanagan University College. He co-authored the book *Rock and Mineral Analysis* published by John Wiley Publishers. He has developed and presented, in co-operation with Ms. Weitzel, numerous workshops on Quality Control/Quality Assurance, Method Validation, the Estimation of Measurement Uncertainty, Basic Statistics, Traceability and Fire Assaying as well as aspects of classical and instrumental analysis for industrial clients in Canada and abroad.

He was involved in the development of CAN-P-1579 as convener of the Mineral Analysis Working Group set up by the Standards Council of Canada (SCC) to establish a Standard 17025 accreditation program for laboratories in that industry. Dr. Johnson drafted the Canadian Association for Laboratory Accreditation (CALA) Policy for the Estimation of Measurement Uncertainty. He has served as an auditor for private industry and as a lead auditor for SCC and CALA accreditation visits to numerous laboratories and is a BC Certified Assayer.

E-mail: wesleymjohnson@shaw.ca

Phone/fax: (205)-474-0697



Technical Session Overview

Tuesday, September 13, 2016

Time	Presenter	Organization	Title
Morning Session Chair - Ed Debicki, Senior Manager, Geoscience Laboratories			
8:30	OPENING REMARKS		
8:40	Becca Lane and Carole Anne MacDonald	Materials Engineering and Research Office, MTO	Investigating and Addressing Materials-related Issues in Ontario Provincial Highway Infrastructure
9:20	Kyle James	Verder Scientific Inc.	Sampling and Sample Preparation Techniques for Large Sample Quantities and High Throughput Demands
9:40	Jeffrey Kemmerer	PANalytical	On-line Analysis – Increasing Efficiency
10:00	Kristin Leftwich	PROTO Manufacturing	A Case For The Benchtop X-Ray Powder Diffractometer
10:20	COFFEE BREAK - EXHIBIT HALL		
10:40	Ian Campbell and Roger Meier	FLSmidth	Ongoing History of Recent Advancements in Sample Preparation for XRF and XRD
11:00	Sébastien Rivard	PANalytical	XRF Analysis of Minerals - Solving the Standards Issue
11:20	Daniel Defoy	Claisse	The Claisse® New Automatic Weigher
11:40	Bruno Vrebos, Aleksandr Komelkov, Mark Ingham, and Marco van der Haar	PANalytical B.V.	Combining Energy and Wavelength Dispersive XRF to the Analysis of Geological Materials
12:00	LUNCH - EXHIBIT HALL		
Afternoon Session Chair - Dr. Marcus Burnham, Chief Scientist, Geoscience Laboratories			
1:00	Robert V.Gerard	The Centre of Forensic Sciences, MCSCS	The Centre of Forensic Sciences, the Chemistry Section
1:40	Jayme Curet	ThermoFisher Scientific	The Analysis of Alloys Using LA-ICP-OES
2:00	Christian Bohling	SECOPTA analytics GmbH	Inline Analysis of Mineral Resources by LIBS Element Analyzers. A Fast, Precise and Robust Technique is Adapted to Mineral Applications.
2:20	COFFEE BREAK - EXHIBIT HALL		
2:40	Brad McBain	IMP Automation Canada Ltd.	Arrested Cupellation - a Development in Automated Fire Assay (Now Called FIFA II) to Improve Measurable Limits for Precious Metals by an Order of Magnitude
3:00	Pamela Wee	Agilent Technologies Canada Inc	Improvements in the Resolution of Spectral Interferences on Iridium, Palladium, Platinum, and Rhodium Using a Second Generation ICP-QQQ
3:20	Lynda Bloom and Paul Hamlyn	Analytical Solutions Ltd.	Gold Homogeneity in CRMs
3:40	Maureen Leaver and Diane Desroches	CCRMP, NRCan	Observations on CCRMP and PTP-MAL Data
4:00	HAPPY HOUR - EXHIBIT HALL		



Technical Session Overview

Wednesday, September 14, 2016

Time	Presenter	Organization	Title
Morning Session Chair - James Schweyer, Lab Manager, Geoscience Laboratories			
8:40	Qianli Xie	Laboratory Services Branch, MOECC	Chromium Speciation Analysis of Soil/Sediment Using Species Specific Isotope Dilution: Extraction Methodology and Species Recovery
9:20	Jayme Curet and John Schmelzel	ThermoFisher Scientific	Handling High Matrix Samples on ICP-MS
9:40	Andrew Toms, Paul Field and J. Brian Mahoney	Elemental Scientific and University of Wisconsin - Eau Claire	Recent Developments in Rapid On-line Matrix Removal and Analyte Preconcentration for Trace Elemental Determination by ICP-MS of Geochemical Samples Prepared with Lithium-Borate Fusion
10:00	<i>COFFEE BREAK - EXHIBIT HALL</i>		
10:20	Cathy Wylie	Canadian Association for Laboratory Accreditation Inc.	Dealing with Risk as Part of your Management System
10:40	Kirill Pereverzev	ColdBlock Technologies	A New, Safe, Rapid Digestion Method for Uranium Exploration Using Coldblock Technology
11:00	Erick Helmeczi	Brock University	Application of Coldblock Technology to the Determination of Rare Earth Elements, Uranium, and Thorium in Geological Materials
11:20	Wayne Blonski	Agilent Technologies	Introducing the Agilent 5110 – the Fastest, Most Precise ICP-OES... Ever.
11:40	Ed Paski	Analytical Innovations	Control Charts - What the Analyst May Not Know That Can Bite Hard
12:00	<i>LUNCH - GRAND PARIS BALLROOM</i>		

Thank You!

Our thanks to all of the presenters, authors and all those who were part of the 2016 CMA Technical talks.

Don't forget to cast your ballot for the Best Technical Paper no later than **Wednesday, September 14, at 12:30 p.m.** Ballot box is located at the Registration Desk.

The winner of the Best Technical Paper will receive a plaque and a cash prize of \$500.00, sponsored by Rocklabs.



Technical Session Abstracts

Tuesday, September 13, 2016

Investigating and Addressing Materials-related Issues in Ontario Provincial Highway Infrastructure

Becca Lane and Carole Anne MacDonald

8:40 a.m. to 9:20 a.m.

Materials Engineering and Research Office, MTO - ON, Canada

The Materials Engineering and Research Office (MERO) of the Ministry of Transportation Ontario (MTO) develops the standards, policies and guidelines for the materials used in the construction of Ontario's provincial highways and bridges (concrete, asphalt, aggregates, chemicals, metals, etc.). In support of the \$2.5B annual Capital Construction Program, MERO works to ensure that quality materials and products are used, ensuring public safety and protecting infrastructure investments; supports innovation (e.g. introduction of new products and processes); works in partnership with the private sector and universities to develop testing standards for emerging materials, products and technologies; provides oversight and sets standards for laboratories working on provincial highway infrastructure contracts; and conducts specialized field and laboratory investigations to evaluate construction practices and material performance on provincial highways and bridges.

This presentation outlines the roles and functions of MTO's materials laboratories, citing examples of investigations into materials-related issues encountered on Ontario provincial highway infrastructure.

Sampling and Sample Preparation Techniques for Large Sample Quantities and High Throughput Demands

Kyle James

9:20 a.m. to 9:40 a.m.

Verder Scientific Inc. - PA, USA

The necessity to obtain reliable and accurate results in the laboratory for geological samples is crucial in determining to honest values for mineral content. Many issues arise when analyzing geological samples and the initial steps of sampling and preparing the samples for the laboratory can often be overlooked; thus, yielding inaccurate results that may lead to costly decisions. One key issue considered is the sample size and homogeneity. The more homogeneous sample that can be obtained will yield the most reliable result as well as determining an adequate sample size to initiate analysis. In order to best address these concerns within the industry, the Retsch XL solutions will be presented and discussed.

Specific Topics Covered:

- Homogeneous sample creation
- Sampling Techniques and best practices
- Determining sample size and throughput needs
- Understanding analytical fineness



Technical Session Abstracts

Tuesday, September 13, 2016

On-line Analysis – Increasing Efficiency

Jeffrey Kemmerer
PANalytical - USA

9:40 a.m. to 10:00 a.m.

Nearly all segments of the mining industry are facing increasing pressures to improve efficiency. Stagnant markets, low prices, reduced ore grades, increased labor costs and environmental regulations all challenge the profitability of the enterprises. Online, real time analysis is one technique that can guide significant improvements in efficiency.

Bulk material analysis is a technique to measure nearly all of a production stream, usually as it passes by on a conveyor belt. The paper focuses on the CNA (controlled neutron analyzer), an analyzer that uses an electric tube to generate the neutrons for the analysis. The CNA is suitable for measuring run of mine, typically after primary crushing, as well as other belt based process streams. The analyzer provides important information on the composition and homogeneity of these streams and can drive sorting and blending operations that avoid processing low grade ore and reduce natural ore variability respectively. Even without these steps, the CNA can provide valuable feedback to the mine to help improve their operations. The CNA can also provide feed forward information to help optimize flotation and heap leach operations. Despite the utility of elemental analyses, some challenges are based on the mineral structure of the ore components. Other sensors including NIR and XRD can provide this information and can provide important insight. These are summarized in the paper.

A Case for the Benchtop X-ray Powder Diffractometer

Kristin Leftwich
PROTO Manufacturing - MI, USA

10:00 a.m. to 10:20 a.m.

This talk will focus on the basic differences between the types of x-ray powder diffractometers, with an emphasis on recent advances in the technology used in benchtop configurations. These advances have increased the accuracy and resolution of benchtop systems such that they are now a viable option for geological laboratories.

This talk will address available options for benchtop units, the advantages of different x-ray tubes, sample stages, detectors and optics. Each section will include several types of geological samples to illustrate the versatility of benchtop systems for various applications. This information can help laboratory managers make more informed decisions about their XRD purchases and avoid over- or under-purchasing options, which can cause loss in productivity and/or financial resources.



Technical Session Abstracts

Tuesday, September 13, 2016

Ongoing History of Recent Advancements in Sample Preparation for XRF and XRD

Ian Campbell and Roger Meier
FLSmith - Czech Republic

10:40 a.m. to 11:00 a.m.

X-ray Fluorescence (XRF) and X-ray diffraction (XRD) are common analytical techniques used for the quantitative chemical and phase analysis of geological materials. Sample preparation is one of the most significant sources of error in quantitative XRF and XRD analysis and therefore careful sample preparation is critical to obtaining high quality analytical results. Some of the major sources of sample preparation error include sample heterogeneities due to improper grinding of the, infinite thickness issues due to improper compaction of the sample and sample to sample cross contamination. These errors can be magnified by the number of different laboratory staff involved in the sample preparation process.

Automation of the sample preparation process can help reduce these errors and improve sample to sample reproducibility. One of the challenges, however, for automated sample preparation has always been limiting sample to sample cross contamination, especially with the large compositional variety of samples many minerals laboratories must process on a day to day basis. We review the recent development of automated sample preparation for XRF and XRD analysis and discuss the latest technical innovations.

XRF Analysis of Minerals - Solving the Standards Issue

Sébastien Rivard
PANalytical - QC, Canada

11:00 a.m. to 11:20 a.m.

XRF is a powerful technique for the analysis of minerals due to its great precision, large elemental range and ease of sample preparation. Being a relative technique, XRF requires standards for calibration. This often poses challenges when specific material compositions are required, and the cost of the required standard materials, if even available, are high. Moreover, commercially available Certified Reference Materials are often unfit for purpose due to their different mineralogical phase compared to the samples what will be analyzed. Powerful solutions are now available to overcome these challenges and facilitate the integration of the XRF technique in routine operations.



Technical Session Abstracts

Tuesday, September 13, 2016

The Claisse® New Automatic Weigher

Daniel Defoy
Claisse - QC, Canada

11:20 a.m. to 11:40 a.m.

Drawing from more than 40 years of experience in sample preparation by fusion, Claisse has designed the newest generation of borate flux dispenser.

A slight error in the flux weighing has an important influence on the concentration measurements. Our new weigher ensures automated and constant weighing while eliminating calculation errors and fatigue for an increased accuracy and reproducibility of the analytical results. It also increases the global laboratory productivity and performance. The operators who used to be dedicated to flux weighing can now perform more valuable tasks in the laboratory.

This presentation will demonstrate the benefits of our new automatic weigher which can be used to weight the flux in absolute mode, ratio mode or catch weight. The industrial scale used in this system ensures sturdiness and reliability. The user- friendly interface allows managing different weighing programs in accordance to the increasing needs of our customers.

Combining Energy and Wavelength Dispersive XRF to the Analysis of Geological Materials

**Bruno Vrebos, Aleksandr Komelkov,
Mark Ingham, and Marco van der Haar**
PANalytical B.V. - the Netherlands

11:40 a.m. to 12:00 p.m.

Elemental analysis of geological materials (and trace element analysis in particular) can typically be very challenging due to the wide elemental and analytical range possible. X-ray fluorescence (XRF) techniques have traditionally been a popular technique to do so with good detection limits and analytical ranges from fluor (F) to americium (Am). Depending on the analytical requirement, geological analysis is often conducted with either wavelength dispersive (WD) or energy dispersive (ED) spectrometers which both have their unique advantages.

In this paper, elemental analysis will be discussed using a combination of both WDXRF and EDXRF simultaneously in a single instrument. It will be shown that such an arrangement allows to dramatically decrease measurement times or improve precision without compromising the analytical requirement achieved if only one technology had been used. In short, the combination of both technologies allows one to maximize the benefits of both techniques in one instrument.

The application of this technology will be discussed in the analysis of geological materials with specific attention to time savings while achieving specified analytical requirements such as accuracy, repeatability and detection limits.



Technical Session Abstracts

Tuesday, September 13, 2016

The Centre of Forensic Sciences, the Chemistry Section

Robert V. Gerard

1:00 p.m. to 1:40 p.m.

The Centre of Forensic Sciences, MCSCS - ON, Canada

The Centre of Forensic Sciences (CFS) consists of the Toronto lab in the Forensic Science and Coroners Complex (FSCC) and the Northern Regional Lab (NRL) situated in Sault Ste. Marie. They are government of Ontario Laboratories charged with providing scientific support to the Justice system of Ontario and investigative agencies. The CFS scientific services are divided into the Physical Sciences (Firearms & Toolmarks, & Documents), Biology, Toxicology and Chemistry Sections. An overview of the Chemistry Section will be presented outlining the types of cases and services provided by the Section. The collection of analytical instruments in the Chemistry section will be presented indicating special features and/or configurations which have proven useful in the analysis of forensic samples. Examples of forensic cases which have a mineral or metallurgical connection will be discussed. The range of cases will include homicides, robberies, fraud, poisonings and unknown material identification. A short in-house study on examining possible fraudulent meteorites purchased on-line with comparison to authentic meteoritic samples will also be presented. The following analytical instruments were used in the case examples: Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS), X-Ray Diffraction (XRD) featuring Bragg-Brentano and parallel beam geometry, Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopes with Energy Dispersive Spectrometry (SEM/EDX).

The Analysis of Alloys Using LA-ICP-OES

Jayne Curet

1:40 p.m. to 2:00 p.m.

ThermoFisher Scientific - MD, USA

The analysis of alloys is typically carried out to determine the ratio of base metal(s) to secondary constituents and/or any impurities that may be present. The results of the analysis can be used to predict both the properties and the purity of the alloys. This is used in the precious metals industry, where the high monetary value of the samples is prohibitive for using acid digestion, and in the nimonics and steel industries, where digestion can be complicated, and where site specific information is necessary.

Laser ablation with iCAP 7600 is ideal to achieve the sensitivity to determine impurities at sub mg/kg concentrations and have sufficient linear range to determine concentrations near 100%. The stability of the system means reproducible results across time, as highlighted in three industry sample types.



Technical Session Abstracts

Tuesday, September 13, 2016

Inline Analysis of Mineral Resources by LIBS Element Analyzers. A Fast, Precise and Robust Technique is Adapted to Mineral Applications

Christian Bohling
SECOPTA analytics GmbH - Germany

2:00 p.m. to 2:20 p.m.

Optical spectroscopy is commonly used in the field of secondary raw materials (sensor based sorting). Laser Induced Breakdown Spectroscopy (LIBS) is a technique which allows fast and precise simultaneous measurements of all elements without sample preparation and sample contact. Recycling applications (steel, metal, refractories) already have been realized, but the technology also fits perfectly for primary raw material applications. Different field reports of LIBS in the area of minerals are presented.

E.g. for the coal mining industry the usage of inline element analyzers is extremely beneficial. Based on the LIBS measurements the concentrations of carbon and ash are determined. Other specific elements (Fe, Si, Mg, S, Al, P) can be determined quantitatively if required. Calibrations for different coal qualities are currently available. The sustainability of those already have been verified and may be used on a global basis covering various regional conditions.

Used refractories are grinded and recycled to new refractories. However, as a prerequisite a homogeneous presorting of the refractories is necessary to aim for a closed material flow and to achieve the highest possible recycling of materials. An automated plant for the analysis and sorting of refractories has been set into operation in 2015.

Beside inline applications LIBS can also be applied for the analysis of drilling core samples. By scanning over an area high resolution 2D-elemental mapping is possible.



Technical Session Abstracts

Tuesday, September 13, 2016

Arrested Cupellation - A Development in Automated Fire Assay (Now Called FIFA II) to Improve Measurable Limits for Precious Metals by an Order of Magnitude

Blanche de Jong¹, Boyne Hohenstein² and Pierre Hofmeyr¹

2:40 p.m. to 3:00 p.m.

¹IMP South Africa, ²IMP Australia

*Presented by Brad McBain

The automated fire assay system (Fast In-line Fire Assay or FIFA I, for short) has not found acceptance in the Au mining industry as the lower measurable limit of 0.20 ppm did not allow Au tailings to be measured with confidence. It was uneconomic for a Au assay laboratory to operate conventional fire assay and FIFA I.

The development of arrested cupellation has overcome this hurdle which was a limiting factor in the FIFA I process. In the new automated fire assay process, automated sample preparation, fluxing, fusion and separation of a Pb button are similar to the FIFA I process, albeit with some improvements. However, the game-changer is the development and incorporation of arrested cupellation into the automated system, now called FIFA II. The purpose of arrested cupellation is to reduce the 50 g Pb button to 5 g in mass by partial cupellation by a specially developed arrested cupellation method thereby concentrating the Au and PGEs in the Pb by a factor of 10 and in so doing moving them into concentration ranges in the mini-button where they can be read on the spark spectrometer.

Results show that concentrations down to 0.02 ppm Au in geological materials can now be determined using arrested cupellation in the FIFA II process, an order of magnitude improvement over FIFA I. A full description of the arrested cupellation method and analytical data for Certified Reference Materials obtained by the FIFA II process

Improvements in the Resolution of Spectral Interferences on Iridium, Palladium, Platinum, and Rhodium Using a Second Generation ICP-QQQ

Pamela Wee

3:00 p.m. to 3:20 p.m.

Agilent Technologies Canada Inc. - ON, Canada

The Agilent ICP-QQQ with MS/MS capabilities was utilized to resolve spectral interferences on the noble metals Ir, Pd, Pt, and Rh. Several interferences are impossible to resolve by a single quadrupole ICP-MS or High Resolution Sector Field ICP-MS. The Agilent 8900 ICP-QQQ has a quadrupole mass filter, Q1, located between the ion optics and a collision/reaction cell (CRC). The cell is pressurized with a gas that discriminates interfering ions from analyte ions by collision and/or reaction mechanism. A second quadrupole, Q2, is located between the cell and an electron multiplier detector, functioning as the mass filter, selecting ions by their mass-to-charge ratios, m/z .

In reaction mode, a suitable gas that reacts at different rates with either the interfering or analyte ions is used to resolve polyatomic, doubly-charged interferences, and several isobaric atomic ion interferences. Q1, which precedes the CRC, rejects all non-selected masses while only allowing the analyte and its respective interferences to enter the cell. This assures and enables targeted chemical reactions to occur, which resolves the analyte from its interfering ion. Q1 and Q2 are under high vacuum which eliminates the risk of chemical reactions when ions are transmitted through to the detector. A mixture of ammonia and helium was used as the reaction gas. A comparison of the analytical performance between the first and second generation ICP-QQQ will be presented.



Technical Session Abstracts

Tuesday, September 13, 2016

Gold Homogeneity in CRMs

Lynda Bloom¹ and Paul Hamlyn²

3:20 p.m. to 3:40 p.m.

¹Analytical Solutions Ltd. - ON, Canada, ²OREAS - Australia

The application of Certified Reference Materials (CRMs) in the mining and exploration industry is to monitor laboratory quality and to comply with mandatory reporting requirements (e.g., TSX, ASX). The CRM certified values are consensus values derived by inter-laboratory round robin programs. The methods used by some manufacturers to filter outliers can mask potential issues with the homogeneity of the materials. Only outliers confidently reasoned to be analytical should be removed and this confidence only exists where homogeneity has been independently validated. A study to compare the homogeneity of different CRMs with respect to gold is discussed. The long-held assumption that sampling errors in gold CRMs contribute little to the variance of results is shown to be questionable in many instances.

Observations on CCRMP and PTP-MAL Data

Maureen Leaver and Diane Desroches

3:40 p.m. to 4:00 p.m.

CCRMP, NRCan - ON, Canada

For over 41 years, the Canadian Certified Reference Materials Project (CCRMP) has received data from laboratories worldwide for the preparation of certified reference materials and the last 18 years, Proficiency Testing Program – Mineral Analysis Laboratories (PTP-MAL). 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.



Technical Session Abstracts

Wednesday, September 14, 2016

Chromium Speciation Analysis of Soil/Sediment Using Species Specific Isotope Dilution: Extraction Methodology and Species Recovery

Qianli Xie

Laboratory Services Branch, MOECC - ON, Canada

8:40 a.m. to 9:20 a.m.

Experiments were conducted to analyze Cr species in soil and sediment, using a species specific isotope dilution technique. Isotope spikes used were $^{50}\text{Cr(III)}$ in 0.5% HNO_3 and $^{53}\text{Cr(VI)}$ in 0.5% NH_4OH . Initial experiments were carried out with different extraction media, e.g. $\text{NaOH}/\text{Na}_2\text{CO}_3$ solution, EDTA at pH 4, and EDTA with pH adjusted to 10 using NH_4OH . When using $\text{NaOH}/\text{Na}_2\text{CO}_3$, all $^{53}\text{Cr(VI)}$ spikes remained as $^{53}\text{Cr(VI)}$. However, $^{50}\text{Cr(III)}$ spike was converted into $^{50}\text{Cr(VI)}$, albeit not 100%. In contrast, when using EDTA at pH 4, $^{50}\text{Cr(III)}$ spike remained as $^{50}\text{Cr(III)-EDTA}$, whereas nearly 100% $^{53}\text{Cr(VI)}$ was converted into $^{53}\text{Cr(III)-EDTA}$. The experiments indicate that using EDTA with pH adjusted to 10 using NH_4OH allowed $^{50}\text{Cr(III)}$ and $^{53}\text{Cr(VI)}$ spikes to remain in their respective chemical forms during and after the digestion. Several certified reference materials, e.g. Sigma Aldrich SQC012, a diluted NIST2701 and Ottawa sand (typically used as a blank) were digested. To work out the mass balance and extraction recovery of each species, the samples were analyzed for total Cr by X-ray fluorescence (XRF) spectrometry and Parr bomb acid digestion prior to extraction. The extracts were then analyzed by inductively coupled plasma-mass spectrometry (ICP-MS) and ion chromatography (IC) coupled with ICP-MS for total Cr and Cr(III)/Cr(VI), respectively. The extract residues were also analyzed by XRF and Parr bomb acid digestion ICP-MS. All results will be presented and implications discussed.

Handling High Matrix Samples on ICP-MS

Jayme Curet and John Schmelzel

ThermoFisher Scientific - MD, USA

9:20 a.m. to 9:40 a.m.

This is a comparison of Argon gas dilution, on-line liquid dilution, and sampling depth adjustment on the iCAPQ ICPMS as methods for handling high sample matrix in the mass spectrometer. Argon gas dilution is a reduction in sample volume with Argon introduced to the aerosolized sample path to create a dilution of the sample by the added gas. On-line dilution refers to an increased volume of internal standard with respect to the sample volume to dilute the sample. Finally, moving the sampling depth of the cones in the plasma can be used to sample matrix. These modes were measure by analyzing the oxide levels, internal standard recoveries, spike recoveries, and detection limits in high matrix samples (ICSA, ICSAB, Sea Water).



Technical Session Abstracts

Wednesday, September 14, 2016

Recent Developments in Rapid On-line Matrix Removal and Analyte Preconcentration for Trace Elemental Determination by ICP-MS of Geochemical Samples Prepared with Lithium-Borate Fusion

Andrew Toms¹, Paul Field² and J. Brian Mahoney²

9:40 a.m. to 10:00 a.m.

¹Elemental Scientific - NE, USA, ²University of Wisconsin - Eau Claire, WI, USA

Analysis of lithium borate fusions by ICP-MS has always been a challenging application due to the matrix effects of the dissolved flux in the final solution. Instrument drift, undesired chemical interferences and accelerated wear on sample introduction components can all compromise the analytical results.

We present a method and initial results for on-line matrix removal of lithium borate fusions coupled with simultaneous preconcentration of the analytes of interest. Rapid ion-exchange and regeneration allow the determination of trace elements in geological samples while minimizing drift and interferences.

Reproducibility, accuracy and estimated detection limits based on commonly used fusion techniques and reagents will be shown.

Dealing With Risk as Part of Your Management System

Cathy Wylie

10:20 a.m. to 10:40 a.m.

Canadian Association for Laboratory Accreditation Inc. - ON, Canada

Risk management involves understanding, analysing and addressing risk to make sure organisations achieve their objectives. The risk management activity must be proportional to the complexity and type of organization involved.

The concept of assessing risk as part of the management system is not new. For example, when dealing with non-conformances, one of the steps is assessing the risk of the non-conformance and then responding to the non-conformance accordingly. Risk assessment is inherent in some of the activities, but risk management is not a requirement.

The upcoming revision to ISO/IEC 17205 is expected to include specific requirements related to risk management. This paper will give an overview of risk management principles and will look at the requirements related to risk in the current draft of the revised standard.



Technical Session Abstracts

Wednesday, September 14, 2016

A New, Safe, Rapid Digestion Method for Uranium Exploration Using Coldblock Technology

Kirill Pereverzev

ColdBlock Technologies - ON, Canada

10:40 a.m. to 11:00 a.m.

Uranium production allows for the ongoing growth in the nuclear industry and Canada is currently one of the world leaders in the production and processing of this strategic and critical resource. Current digestion techniques use dangerous acids including HF, HClO₄, H₂SO₄, and fusion techniques create problems from high total dissolved solids for analysis with existing spectroscopy systems. As such, technological advances eliminating these issues will help Canada remain a major player in the uranium industry. ColdBlock Digestion, a Canadian made and invented technology, offers an alternative to the problematic existing methods by dissolving uranium in a phosphoric acid matrix through the use of shortwave IR light in only 10 minutes. The resultant solution is easily processed through spectroscopic analysis.

We compared ColdBlock digestions of several uranium bearing CRMs obtained from CANMET, Geostats, and a uranium producer to existing values that were obtained using XRF fusion techniques. Samples were digested and analyzed by a technician blind to certified values.

We show that comparable results are obtained using the ColdBlock technique to the certified values from CANMET and Geostats with 97-98% recovery, as well as samples from the uranium producer. ColdBlock-based digestions for uranium are shown to be comparable to results by existing techniques while using a safer acid matrix and significantly faster digestion time.

Application of Coldblock Technology to the Determination of Rare Earth Elements, Uranium, and Thorium in Geological Materials

Erick Helmeczi

Brock University - ON, Canada

11:00 a.m. to 11:20 a.m.

Digestions of ores containing rare earth elements (REEs) have been attempted with countless acid digestion techniques. These methods use combinations of HF, HClO₄, HNO₃, H₂SO₄, HCl, and/or H₂O₂. Hotplates or pressurized microwave systems are used to accelerate the acid digestions of these materials. However, consistent results are typically only achieved with high-temperature ashing or fusion techniques. In this work, we shall present the results of our investigations of ColdBlock technology to liberate REEs from silica- and iron-based ores. The results achieved are in agreement with those of fusion techniques. Digestions were conducted with phosphoric acid in a ColdBlock system with an 8-minute digestion time, followed by a 5-minute cool-down period. The digestion results of OREAS-465 and REE-1 agree well with certified values for the REEs, thorium, and uranium. Finally, results will be presented on the CANMET certified reference material, OKA-2. This material has certified thorium and uranium concentrations, but the REE concentrations presented in the certificate are provisional.



Technical Session Abstracts

Wednesday, September 14, 2016

Introducing the Agilent 5110 – the Fastest, Most Precise ICP-OES... Ever.

Wayne Blonski

Agilent Technologies - ON, Canada

11:20 a.m. to 11:40 a.m.

The operational details of the new Agilent 5110 ICP-OES will be discussed. This instrument is designed to run samples faster, using less argon gas, without compromising performance. In addition to the existing industry leading features of the 5100 model, such as synchronous vertical dual view, many new productivity driving features have been added to the 5110. Two leading components are the AVS 6/7, a fully integrated (hardware and software) flow injection valve system and IntelliQuant, a rapid semiquantitative scan of all ICP elements within each sample.

The AVS6/7 greatly increases the speed of analysis without significant loss of precision. The fully integrated hardware means no external modules to install and wire, while fully integrated software allows for seamless operation with only several parameters to set within the main instrument software.

The IntelliQuant feature allows for a full spectral scan for rapid qualitative identification of all element available to ICP-OES including select halides. Results can be examined in several formats including the unique Heat Map which displays results on a colour coded periodic table for fast visual analysis.

Application results related to geochemical analysis will be presented to demonstrate the powerful capabilities of this instrument.

Control Charts - What the Analyst May Not Know That Can Bite Hard

Ed Paski

Analytical Innovations - BC, Canada

11:40 a.m. to 12:00 p.m.

We all know that labs accredited to the ISO/IEC 17035:2005 Standard pretty well have to use control charts to meet the requirements in Section 5.9. For most assayers, the traditional Shewhart chart is the principal – and often the only type of control charting used. Limits are often based on a standard deviation estimated sometime long ago, perhaps during method validation with maybe 10 or 15 values used.

The standard does have an uncertainty and its uncertainty is a function of the population size used to estimate it. The size and practical consequences of the uncertainty of the standard deviation for the assayer will be discussed.

While Shewhart charts for central tendency is a good start as well as easy to implement, their actual application may not be that straightforward in day-to-day use. The use of control charts for detecting trends is not as well understood by many and a plethora of “trending rules” is often confusing. The WECO rules and their underlying principles based on probability of occurrence are discussed. Charts for precision are discussed along with their critical importance in providing data requisite for estimating measurement uncertainty. Control charts useful for drift and trending (Cu-sum and J Chart) along with their practical implementation are presented.



48th Annual CMA Conference and Exhibition
Sudbury, Ontario
September 12-15, 2016

Laboratory Tours

Thursday, September 15, 2016 - Morning

Lab Tour #1

XPS Consulting & Testwork Services (XPS)

Time - 9:00 a.m. to 11:00 a.m.

Departure - Bus Leaves Radisson Hotel at 8:15 a.m.

XPS Consulting
& Testwork
Services

XPS Consulting & Testwork Services (XPS) is a licenced metallurgical engineering, technology and test services business offering industry leading expertise in orebody/geomet characterisation, flowsheet development, operational support, growth initiatives and asset integrity management for most commodities including gold, nickel, copper, zinc, PGEs, rare earth elements and industrial minerals.

A tour through the facility will include the Mineral Science laboratory which contains two 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 Sudbury Integrated Ni Operations chemical assay laboratories responsible for Sudbury INO Nickel's smelter and concentrator production samples.

XPS is located within the Glencore – Sudbury Integrated Ni Operations complex in Falconbridge, Ontario close to the Sudbury Airport.

Lab Tour #2

Geoscience Laboratories (Geo Labs)

Time - 9:00 a.m. to 11:00 a.m.

Departure - Bus Leaves Radisson Hotel at 8:30 a.m.

GEO LABS
GEOSCIENCE LABORATORIES

Participants will see all aspects of the Ontario Geological Survey's Geo Labs inorganic analytical facility which will include sample log-in, sample preparation, solution preparation, fire-assay and nickel-sulphide fire-assay, XRF and loss on ignition, ICP-MS, ICP-AES, AA, Hg, ion chromatography (IC), automated titration (Cl/FI), carbon/sulphur (C/S), moisture content analysis, FeO analysis, 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 microscope (SEM), and electron probe micro analyzer (EMPA).

The Geo Labs is registered to ISO 9001 and accredited to ISO 17025.



Laboratory Tours

Thursday, September 15, 2016 - Afternoon

Lab Tour #3

Vale Sudbury Central Laboratory

Time - 1:30 p.m. to 3:30 p.m.

Departure - Bus Leaves Radisson Hotel at 1:00 p.m.



Vale's Sudbury Central Laboratory provides reliable, dependable and accurate measurement and analytical expertise around sample preparation, analysis and technical support to the Vale Ontario Division Milling, 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 O_2 and H_2SO_4
- Analysis of ores, concentrates, and other intermediate mill streams
- Analysis of purchased/ secondary feeds
- Issuance of final product Assay Certificates to the Marketing Group
- Physical testing of Ni powders and pellets

The Central Lab receives approximately 5,500 samples per month, and carries out some 13,000 tests on these samples.

Lab Tour #4

Geoscience Laboratories (Geo Labs)

Time - 1:30 p.m. to 3:30 p.m.

Departure - Bus Leaves Radisson Hotel at 1:00 p.m.



Participants will see all aspects of the Ontario Geological Survey's Geo Labs inorganic analytical facility which will include sample log-in, sample preparation, solution preparation, fire-assay and nickel-sulphide fire-assay, XRF and loss on ignition, ICP-MS, ICP-AES, AA, Hg, ion chromatography (IC), automated titration (CI/FI), carbon/sulphur (C/S), moisture content analysis, FeO analysis, 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 microscope (SEM), and electron probe micro analyzer (EMPA).

The Geo Labs is registered to ISO 9001 and accredited to ISO 17025.



48th Annual CMA Conference and Exhibition
Sudbury, Ontario
September 12-15, 2016

◇◇ 2016 CMA Organizing Committee ◇◇



From left to right: Ed Debicki, Marcus Burnham, Merilla Clement, Fareeda Amirault, Brent Handford, Kayla Kalmo, Victoria Hingst, James Schweyer

Ed Debicki
Chairman/Finances

James Schweyer
Co-Chairman/Workshops

Marcus Burnham
Technical Program

Fareeda Amirault
Social Programs/Breaks/Lunches/Banquets

Brent Handford
Webmaster/Audio Visual

Merilla Clement
Registration/Booths/Laboratory Tours/
Accommodations

Kayla Kalmo
Program and Abstracts Volume

Victoria Hingst
Social Programs/Breaks/Lunches/Banquets



2017 CMA Announcement



We look forward to seeing you at the
**49th Annual Canadian Mineral Analysts (CMA)
Conference and Exhibition**

Coast Kamloops Hotel

1250 Rogers Way
Kamloops, BC V1S 1N5

September 11 - 14, 2017

For information, please contact:

John Andrew

New Gold Inc. – New Afton Mine

Tel. (250) 377-2885

E-mail: John.Andrew@newgold.com

Schedule at a Glance

Monday, September 12, 2016		
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	Notre Dame Room	8:30 a.m. 12:00 p.m.
Workshop #2	Notre Dame Room	1:00 p.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, 2016		
Registration Desk	Outside North Palladium Room	8:00 a.m. to 12:00 p.m.
Continental Breakfast	Centre & South Palladium Rooms	7:30 a.m.
Exhibit Hall	Centre & South Palladium Rooms	8:00 a.m. to 5:00 p.m.
Morning Technical Session	North Palladium Room	8:40 a.m. to 12:00 p.m.
Coffee Break	Centre & South Palladium Rooms	10:20 a.m. to 10:40 a.m.
Buffet Lunch	Centre & South Palladium Rooms	12:00 p.m. to 1:00 p.m.
Afternoon Technical Session	North Palladium Room	1:00 p.m. to 4:00 p.m.
Coffee Break	Centre & South Palladium Rooms	2:20 p.m. 2:40 p.m.
Happy Hour	Centre & South Palladium Rooms	4:00 p.m. to 5:00 p.m.
Gala Banquet Dinner	Grand Paris Ball Room	6:00 p.m.
Wednesday, September 14, 2016		
Continental Breakfast	Centre & South Palladium Rooms	7:30 a.m.
Exhibit Hall	Centre & South Palladium Rooms	8:00 a.m. to 11:30 a.m.
Morning Technical Session	North Palladium Room	8:40 a.m. to 12:00 p.m.
Coffee Break	Centre & South Palladium Rooms	10:00 a.m. to 10:20 a.m.
CMA Business Lunch	Grand Paris Ball Room	12:00 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.
Entertainment Night	Caruso Club - Bus Leaves Radisson Hotel (Front Doors) at 5:45 p.m.	5:45 p.m.
Thursday, September 15, 2016		
Lab Tour #1 - XPS Consulting & Testwork Services	Bus Leaves Radisson Hotel (Front Doors) at 8:15 a.m.	9:00 a.m. to 11:00 a.m.
Lab Tour #2 - Geoscience Laboratories	Bus Leaves Radisson Hotel (Front Doors) at 8:30 a.m.	9:00 a.m. to 11:00 a.m.
Lab Tour #3 - Vale Sudbury Central Laboratory	Bus Leaves Radisson Hotel (Front Doors) at 1:00 p.m.	1:30 p.m. to 3:30 p.m.
Lab Tour #4 - Geoscience Laboratories	Bus Leaves Radisson Hotel (Front Doors) at 1:00 p.m.	1:30 p.m. to 3:30 p.m.

