

The CIM Distinguished Lecturer Program

Volume 4 – (2015-Present)

Introduction

THE CIM DISTINGUISHED LECTURERS PROGRAM

Overview

The CIM Distinguished Lecturers program started in 1968 and included great minds of the industry. You can review a complete list of past lecturers on the CIM website (www.cim.org). The lecturers are elected by their peers through the CIM Awards process and will hold the title for a complete season, from September to June.

The number of lectures greatly varies from one season to another; there is no way to predict how many lectures one is to deliver. Based on previous year's statistics, it usually ranges from 5 to 10 per season per lecturer, but it can go up to 20 lectures in a season.

Lecture Requests

CIM National receives lecture requests from CIM Branches, CIM Societies, CIM Student Chapters and Universities and if the requested lecturer is available, coordinates the event.

CIM contact

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(information from the CIM Distinguished Lecturer Handbook)

Table of Contents

Introduction	2
2020/21	6
C.D. ('Lyn') Anglin	7
• The Mount Polley Tailings Spill: Response and Recovery – 6 Years Later.....	7
Nathan Ashcroft	8
• Bitumen Beyond Combustion.....	8
• Hydrogen For Industrial Uses.....	8
• Natural Gas Decarbonization (Ngd)	8
• Opportunity Within the Energy Transition	8
James Budac	9
• An Examination of the Roles of Rationalism and Empiricism in Refinery Troubleshooting	9
Jamile Cruz.....	10
• The Link between Inclusion & Diversity and High-Performance Operations	10
Monica Ospina	11
• Social and Human Capital: Strategic Investment to Guarantee Non-Conflict Sustainable Future for Mining, and its Supply Chain	11
• Mining contribution to society lies on fundamental pillars to lift humanity; social development and industrial supply chains.	11
Ebe Scherkus	12
• Social Licence to Operate in Virtual World	12
2019/20	13
Brian Lee Crowley.....	14
• When Demands for Social Licence Become an Attack on Democracy	14
Betty-Ann Heggie.....	15
• The Gender Physics Leadership Advantage	15
Mayana Kissiova	16
• Tailings, waste rock and water are by-products of the mining industry	16
Dr. Nathan Stubina	17
• At the Intersection of Technology, Innovation and Diversity in Mining	17
Teophile Yameogo.....	18
• Industry 4.0 and Digital Transformation.....	18
2018/19	19
Peter Bradshaw	20
• Awaruite, A New World Class Nickel Resource with Low Environmental Impact.....	21
Dominic Fragomeni.....	22

• Innovation in Mineral Processing: Celebrate the Past...Look to the Future	22
• Where do I start? A Troubleshooting Guide for the Mill Engineer	22
Siri Genik	23
• Why sustainability and stakeholder management makes good business sense for the mining business ... and your shareholders too	23
Chad LePoudre	24
• Tailings failure case studies, statistics and failure modes.....	24
Glenn Lyle.....	25
• Global Trends in Safety Risk Management and Use of Critical Controls	25
Arnfinn Prugger.....	26
• Scissors Creek: The First Potash Shaft Successfully Completed in Saskatchewan since 1979	26
Marilyn Spink	27
• Is Engineering a Commodity?	27
Mary Wells	28
• Magnesium-Alloy Forgings for Automotive Applications	28
2017/18	29
Guy Desharnais	30
• Metallurgical Sample Selection: A Simple Step that has the Potential to Sink your Project	30
• Mining BIG Data: the Future of Exploration Targeting	30
• Resource Over-Estimation: Post-Mortem and a Path Forward	30
Cameron Harris.....	31
• “The Mining Industry: So we’ve survived ... What now?”	31
Michael Samis.....	32
• Managing capital risk exposure by design.....	32
John Starkey	33
• Comminution circuits.....	33
Marty Wacker.....	34
• Development of the Cigar lake jet boring mining method	34
2016/17	35
Lawrence Devon Smith	36
• Discount Rates and Risk in Long Life Projects	36
Dr. Hani Henein	37
• Advanced micro alloyed steels for sustainable pipelines	37
• The evolution of the philosophy of engineering education	37
• Quantifying solidification path in rapid solidification using 3D measurements.....	37
Dr. Daniel Marshall	38

• Melt inclusions of native-silver and native-bismuth at Cobalt, Ontario. Model for native-metal enrichments comparing natural samples with experimental and in-situ studies	38
Patrick Stephenson	39
• Mineral resources, minerals reserves or pie in the sky?	39
Dirk Van Zyl	40
• Tailings Risk Management.....	40
2015/16	41
Mauro Chiesa	42
• Full-costing in the selection of good mine projects	42
Roussos Dimitrakopoulos	43
• Smart mining complexes and value chains: A technological perspective on risk management and sustainability	43
Dean L. Millar	44
• The journey to the 40% mine	44
Wilson Pascheto	45
• Materials technology in the mining industry, opportunities and challenges	45
Bill Steer	46
• Making informed choices – modern mining: “Standing still is going backwards!”	46
Ian Thomson.....	47
• The social license to operate: The reality, the myths and the dark side	47
Index.....	48
Appendices.....	53

2020/21

The webinars for these lectures will be available in September 2021
once the mandate of these Distinguished Lecturers is completed

C.D. ('Lyn') Anglin

Nathan Ashcroft

James Budac

Jamile Cruz

Monica Ospina

Ebe Scherkus

C.D. ('Lyn') Anglin

Summary Biography



C.D. ('Lyn') Anglin, Ph.D. Geology, and P.Geo., registered with Engineers and Geoscientists of British Columbia, is Principal Consultant with Anglin & Associates. 'Lyn has more than 35 years of geoscience research and senior management experience in the minerals and mining sector. Her career has ranged from government to non-profit and the private sector, and she is now consulting. 'Lyn was recruited by Imperial Metals in Sep 2014 to take on the role of Chief Scientific Officer to help lead their recovery and remediation response to the Mount Polley tailings spill. Before joining Imperial, she was President and CEO of Geoscience BC, an innovative, industry-led geoscience research organization based in Vancouver. She has extensive public communication and engagement experience, and prior to her senior

management roles in industry and at GBC, she spent 20 years with the Federal government in research management and science policy.

Lecture Abstract

The Mount Polley Tailings Spill: Response and Recovery – 6 Years Later



Six years after a glaciolacustrine layer under the tailings dam at the Mount Polley Mine failed, and 25 million cubic metres of water, tailings and embankment materials spilled into the surrounding environment, significant progress has been made in remediating the spill impacts. The company has invested on the order of \$70 million on clean-up and repair. Human health and environmental impact and risk assessments, monitoring studies, and extensive remediation of impacted areas have been completed. Risk assessments indicate human health risks from the spill are low, while environmental impacts are low to moderate, with impacts primarily related to the homogeneous grain-size and low-organic content of the spilled tailings. The remediation response has therefore been focused on physical aspects of the spill. Ongoing monitoring indicates that impacted ecosystems continue showing positive signs of recovery. Communications with stakeholders and First Nations were maintained through regular community meetings, community newsletters, and site tours with regulators, First Nations, community representatives, and members of the local public.

Nathan Ashcroft

Summary Biography



Nathan Ashcroft is a professional engineer and has over 22 years of experience in a wide range of leadership roles. His career has spanned the development of a range of energy projects across different parts of the globe in engineering and project management roles, including work in a startup company. Nathan has strategically formed initiatives and is a leader within energy transition and clean technology as it applies to our ever-changing energy world. Nathan has expertise in forming specialist teams to tackle major multi-faceted challenges. He has worked as advisor to government on energy related policy and initiatives. He led the high-profile Bitumen Beyond Combustion study and follow up, has led the Stantec Hydrogen team to take on global projects, along with now leading efforts for Geo-thermal adoption. Nathan is currently a director with the Alberta Clean Technology Industry Alliance

Lecture Abstract

Bitumen Beyond Combustion



The BBC program determines the potential of Alberta oil sands components for producing non-combustion products (i.e., products that are not fuels, such as gasoline, diesel, and heating oil). Examples of BBC products could include carbon fibers, graphene, polyurethanes, polycarbonates, controlled-release fertilizers, and high-quality asphalts. Work proceeded to 5 webinars presented to an audience all over the globe.

Hydrogen For Industrial Uses



Breaking down the different methods, technologies, economics of producing Hydrogen (grey-blue-green) and how the Hydrogen produced can have a major impact on GHG generation at Industrial facilities. Presentation will include handling, safety considerations, metallurgy, uses and true potential for Hydrogen. Stantec is involved with government, major companies in Canada and across the globe on the exciting but challenging potential of Hydrogen.

Natural Gas Decarbonization (Ngd)



Natural Gas is rightly growing as a cleaner lower emitting GHG source of energy, However, with any energy transition to ever more cleaner sources of fuel. Natural gas decarbonization constitutes the splitting of natural gas into its components: solid carbon and hydrogen. Nathan and Stantec team have been working on mapping out the various NGD routes for producing hydrogen, lean fuels and carbon products. NGD technologies are currently in the early stages, essentially pre-commercial. Work has recently been completed to understand the carbon products specifically, shining light on the potential to produce a synthetic graphite that can have many future applications, include within lithium-Ion batteries and the electrification of vehicles into the future. Carbon capture and storage overviews and possibilities can be discussed also.

Opportunity Within the Energy Transition



Our world is enabled by a complex mixture of different forms of energy. Today, this is predominantly powered by fossil fuels, namely coal, oil, and gas. However, a fundamental shift is underway in how we produce and consume energy. The 'Energy Transition' – a shift from a fossil-based system to lower greenhouse gas emitting forms of energy - is perhaps the single most challenging mission of our time. This lecture is about sharing experiences on how companies can improve sustainability and GHG reduction targets by integrating alternative energy sources and embracing energy efficiency.

James Budac

Summary Biography



James Budac received his BSc at UBC in 1978. After working for a time with Agriculture Canada he obtained his PhD in Chemistry at UVic in 1988. After briefly returning to Agriculture Canada, Budac and his family moved to Thompson, Manitoba where he joined the Technical Services group at Inco's Electrowinning refinery. Ten years later he took up a position with Sherritt's Process Technology group in their Fort Saskatchewan Operation.

Over the years Budac has volunteered his time with MetSoc: he took on the roles of secretary and chair of the Hydrometallurgy Section and helped coordinate the Ni/Co conference in Sudbury in 2008. Furthermore, he eventually became a member of the BOD of MetSoc, chaired the successful Conference of Metallurgists in 2017 and presided as the president of

MetSoc from 2017 to 2018. In addition to the chairmanship of the COM, He also organized a symposium on "Enabling Innovation."

Lecture Abstract

An Examination of the Roles of Rationalism and Empiricism in Refinery Troubleshooting



Often in metallurgy we are called upon to resolve production issues. These issues can range from a requirement to change product specifications to meet changing market forces to troubleshooting a process which has gone awry. The entire troubleshooting process can be multifaceted requiring a blend of empirical and rational steps. Among other things, I will discuss the positive and negative consequences that empiricism and rationalism bring to the resolution of production issues. As part of the discussion I will cite examples from the worlds of economics and medicine where competition between rationalist and empiricist approaches has heated up over the past few decades.

Jamile Cruz

Summary Biography



Jamile Cruz is a Business Transformation Executive and the Founder of I&D 101, a consulting firm specialized in Inclusion & Diversity strategies. Having moved to Canada as an engineering graduate, she worked directly for leading organizations such as Hatch, Vale, and Accenture, and consulted for many mining clients over her 20-year career, learning what it takes to deliver successful capital projects and develop high performing teams.

Her current focus is on creating more inclusive organizations and improving the experience of under-represented groups in multiple industries, especially in mining. Always involved in transformation projects, not only in Canada, but also in her home country, Brazil, she has recently led the development of an

Action Plan to advance the participation of women in the mining industry, together with IBRAM (Brazilian Mining Institute), the newly formed Women in Mining Brasil and many other partners, including the Canadian government.

Lecture Abstract

The Link between Inclusion & Diversity and High-Performance Operations



Increasing workforce diversity is a priority in Canadian mining. According to research conducted by Mining Industry Human Resources (MiHR) and CIM's Diversity and Inclusion Advisory Committee, the industry is expected to need more than 95,000 new hires in the coming decade drawn from a highly competitive labour market predicting just over 61,000 new entrants to the sector. To bridge this gap, the industry will need to compete with other sectors to attract, retain, and promote employees from non-traditional talent pools including women, Indigenous people, skilled new comers, and other under-represented groups.

A review of the literature shows that although there is a strong business case for increasing workforce and leadership diversity³, many employers struggle with how to effectively tap into this talent pool and few have viable action plans for how to fully leverage the experiences of diverse recruits once hired.

We propose that diversity and inclusion are not problems to be solved, but rather are manifestations of current organizational systems and cultures. Business can only unlock the performance potential of a more diverse workforce by intentionally addressing diversity and inclusion as critical pieces of their business and cultural strategies. Similarly, SH&E and operational excellence have both historically been recognized as issues to be most effectively addressed as subsets of organizational systems and cultures.

Monica Ospina

Summary Biography



Monica Ospina is a Corporate Social Responsibility and Sustainability expert with recognized experience in the design and implementation of CSR strategies that support operational productivity while building trusting relationships with communities impacted by mineral exploration and mining operations. Her expertise in transforming conflict into development and human and social capital into value for investors has contributed to ensuring operational readiness, improving the perception of mining and the well being of communities across regions.

As an author, Monica created the Local Community Procurement Program (LCPP), a sustainable supply chain model, awarded by the IFC-World Bank in 2012. She has also contributed to the IFC-World Bank's Guide for the Early Stakeholder Engagement (published in 2015) and participated in

discussion groups for the Sustainable Development Goals (SDGs) at the RIO + 20 World Convention on Sustainable Development in 2012.

Lecture Abstract

Social and Human Capital: Strategic Investment to Guarantee Non-Conflict Sustainable Future for Mining, and its Supply Chain



The world is shifting the attention to address fundamental issues around social justice and environmental protection. Investors among stakeholders shared concerns around conflict and economic progress. Mining is at the core of public scrutiny due to its activity in the developing world. Its close connection with communities under stress makes the Mining industry a catalyst for development or a source of conflict.

Mining contribution to society lies on fundamental pillars to lift humanity; social development and industrial supply chains.



Today's attention to ESGs challenges companies to demonstrate a strategic approach to the environment, society, and governance. But what is a strategic investment in social and human capital? The return on investment ranges from sustainable global supply chains that ensure employment opportunities for millions of people, to non-conflict, that provide operational stability.

This presentation provides an analysis of how to avoid social conflict and transform social risk into opportunities for the local and global economies.

Ebe Scherkus

Summary Biography



Ebe Scherkus is the mastermind behind the transformation of Agnico Eagle Mines (AEM) into a global gold producer. Using his signature combination of people skills, hard work and perseverance, he expanded the company's operations from the familiarity of Quebec into Nunavut, Finland and Mexico.

Born in Germany, Scherkus arrived in Canada as an infant. After growing up in Val d'Or, he graduated from McGill University in 1975 with a BSc in geology, and P Eng, geological engineering in 1991. He worked in camps in northwestern Quebec and Red Lake, Ont. before being hired by AEM's Don LaRonde in 1985 to evaluate a struggling gold project later named after LaRonde. The resulting drilling led to a deep discovery and a production decision in 1987. By the end of 2018, the LaRonde mine had produced almost six million ounces. Scherkus later developed the nearby Goldex and Lapa mines. As the company's president from 2005-2012, he led AEM's global expansion into Nunavut (Meadowbank, future Meliadine), Mexico (Pinos Altos, future La India), Finland (Kittila). Ebe Scherkus was inducted into the Canadian Mining Hall of Fame in January 2020.

Lecture Abstract

Social Licence to Operate in Virtual World



Finding an economic deposit does not necessarily mean it will be developed. Exploration and mine development by its very nature is expensive, high risk, often located in remote areas, potentially challenging political jurisdictions, shareholder activism, increasing regulatory requirements, overlapping regulatory agencies, cross cultural issues, anti-mining – climate change activism, technical challenges, availability of qualified and experienced labour and uncertain development lead times. As a result, a critical element in the successful of a deposit is to obtain a "Social Licence to Operate". To help accomplish this, mining exploration and development companies have increasingly resorted to using public relation firms, communication departments and social media to communicate with employees, communities, stakeholders, media, governments and regulatory bodies. With the recent Covid-19 pandemic, the use of video conferencing, virtual conferences popularized by such applications as Zoom have seen remote work and communication grow exponentially. Hardly a day goes by without extolling the benefits (mostly financial) of this new normal. "Offices will be downsized, commuting reduced, flexible work hours. This was already a trend prior to the pandemic. Covid-19 accelerated the process in the author's view. In an increasingly virtual, AI, devoid of human contact world, "Is there still room for a "hands on", "boots on the ground" to obtain this licence? Is it possible to gain the trust, transparency, understanding and respect required through a tablet or computer screen?

2019/20

Brian Lee Crowley

Betty-Ann Heggie

Mayana Kissiova

Dr. Nathan Stubina

Dr. Theophile Yameogo

Brian Lee Crowley

Summary Biography



Brian Lee Crowley is managing director of the Macdonald-Laurier Institute (MLI), a public policy think tank focusing on how to use federal power intelligently in the interests of all Canadians. MLI is consistently ranked the top think tank in Ottawa. Dr. Crowley was also the founder of the Atlantic Institute for Market Studies (AIMS) in Halifax, one of the country's leading regional think tanks.

One of Dr. Crowley's interests is the economic importance and vitality of the natural resource. His work in this regard includes a plethora of studies, commentaries, op-eds, and more. He has recently focused in particular on the extent to which reconciliation with Indigenous people is already well-advanced along the natural resource frontier and how much Canadians

have to learn from these experiences.

Over his long career, Dr. Crowley has distinguished himself as an author, a former Clifford Clark Visiting Economist with the federal Department of Finance, and as a frequent media commentator with expertise related to natural resources, Canada-US relations, foreign affairs, regional development policy, healthcare and more.

Lecture Abstract

When Demands for Social Licence Become an Attack on Democracy



Activists who propagate social licence claims are undermining the rule of law and our democratic institutions. They are free to exercise their democratic right to publicly disagree with their decisions, and even to threaten politicians with a loss of support if particular projects go ahead. It is wholly undemocratic, however, to say that you simply disregard the decisions of duly constituted constitutional and democratic authority as without merit or foundation. Furthermore, the failing to critically analyze the concept of social licence is creating problems in Aboriginal communities. A good example is the Chevron Pacific Trail Pipeline in British Columbia. While the builder has managed to win support from several First Nations groups, a small minority are still opposed and have threatened to block the development of the project. Relying too much on social licence allows First Nations groups that oppose development to hijack the desires of those who do. It also undermines important concepts, such as governments' and businesses' constitutional "duty to consult" with Aboriginals.

Betty-Ann Heggie

Summary Biography



Betty-Ann Heggie, a Senior Vice-President with PotashCorp (now Nutrien) retired in 2007 and currently serves as a corporate director, philanthropist, mentor and author. Devoted to getting more working women to the decision-making table she founded the Womentorship program at the University of Saskatchewan (U of S). To date, more than 2500 women have attended its professional development programs and networking events. She has written for many publications including Harvard Business Review and recently published a book, *Gender Physics: Unlock the Energy You Never Knew You Had to Get the Results You Want*. A member of Canada's Top 100 Most Powerful Women Hall of Fame and the Saskatchewan Business Hall of Fame, she has also received the Trailblazer Award from Women in Mining Canada and was named one of the 100 Global Inspirational Women in Mining. Heggie has received the Queen's Golden Jubilee Medal, the YWCA Lifetime Achievement Award and the U of S Alumni Mentorship Award.

Lecture Abstract

The Gender Physics Leadership Advantage



Gender Physics is a revolutionary practice designed to help business leaders capture the advantages of both gender attributes for maximum impact and success. In some venues, situations or with some audiences, it is best to respond with a more confident, assertive Masculine Energy while in others a caring, collaborative Feminine Energy works most effectively. Betty-Ann uses university research, and her own personal stories as a senior VP with the world's largest fertilizer company to demonstrate how using a particular type of energy creates a particular result. To aid in the learnings she has created a 'Go-To' Energy evaluation, Complementary Energy experiments and a step by step balancing process called the A+ Energy Model to activate behavioural change.

The results are for those who adopt Gender Physics to let go of established stereotypes and unlock the energy they never knew they had to get the results they want. Those in attendance will leave with a new way of looking at gender and be inspired to not only express their individuality, they will see the value in using the attributes of both genders.

Mayana Kissiova

Summary Biography



Mayana Kissiova holds a bachelor's and master's degree in civil engineering from the University of Architecture, Civil Engineering and Geodesy in Sofia, Bulgaria and a master's degree in tailings management engineering from the École Polytechnique de Montréal. She has over 23 years of experience in engineering, design, construction and operation of tailings and water management facilities. Prior to joining Osisko Gold Royalties in 2018, she was principal in tailings management with Golder Associates Ltd. She was an active engineer of record for a number of mining properties in Northern Quebec and lead tailings management design engineer for various projects in Canada, including Canadian Malartic, Laronde Mine, Louvicourt Mine among others, as well as internationally for Iamgold and Dundee precious metals properties. She is committed to

promoting a better understanding and control of the risk factors related to tailings and waste management through adopting best design, and management practices capitalizing on the lessons learned.

Lecture Abstract

Tailings, waste rock and water are by-products of the mining industry



Tailings, waste rock and water are by-products of the mining industry. They have little or no economic interest. However, the extraction of mineral resources generates large quantities of these materials, and variable techniques of storing them need to be developed. Important risks are associated with the management of these substances in the long term. If wrongly assessed, the risk factors could lead to incidents with catastrophic consequences. Recent examples of design and management give an insight to this engineering domain in fast development.

Dr. Nathan Stubina

Summary Biography



Dr. Nathan Stubina joined Sherritt International as vice president of technologies in November 2018. Prior to that, he was managing director of innovation for McEwen Mining. With 30 years of international industrial experience, he also worked at various major mining companies including Barrick Gold Corp., Noranda Inc. and Falconbridge Limited.

Dr. Stubina holds a Ph.D., in metallurgy and materials from the University of Toronto and a B. Eng. in mining and metallurgical engineering from McGill University.

Dr. Stubina is currently a member of the Association of Professional Engineers of Ontario (PEO), and was the vice president of the International District of CIM. He is a Past-President of the Metallurgy

& Materials Society of CIM and a member of the Lassonde Institute of Mining's Advisory Committee at the University of Toronto.

Lecture Abstract

At the Intersection of Technology, Innovation and Diversity in Mining



Come prepared to argue both sides of the following: Is Mining Innovation an Oxymoron?

It is well known that the mining sector is facing many difficult challenges: lower grade ores, smaller deposits, increasing costs, tighter margins, faltering capital markets, political risks, increased social/environmental demands, etc. If you ask senior mining executives, they generally agree that innovation is essential to the current and future survival of their companies, however, the decisions and actions of upper management do not often reflect this imperative. This presentation examines some of the barriers to innovation and what we all can do to move our industry forward. Together, we will examine recent trends in technology and innovation, both from within and outside the mining industry.

Teophile Yameogo

Summary



Biography

Theophile Yameogo is currently focused on enabling technology innovation across the industry to support core business excellence, and enterprise growth. Prior to joining Dundee Precious Metals as vice president of digital innovation, he was the national leader for mining advisory at Ernst & Young. He is also ex-director of mining operations for Accenture.

Since 2012, Yameogo has been involved with many mining companies for various transformation initiatives in Canada and abroad, beyond digital innovation. In prior years, he started in mining as a geophysicist graduate in Morocco, before completing his B. Eng. in mining in Montreal. He worked for Noranda & Falconbridge (now Glencore), and Cameco Corporation. He also ventured in engineering consulting and mining contracting.

Yameogo is a professional engineer in Ontario; he holds an MBA with Distinction from the University of Oxford, and a Ph.D. in rock mechanics from École Polytechnique de Montréal.

Lecture Abstract

Industry 4.0 and Digital Transformation



Many of us in the mining industry are still not aware of what Industry 4.0 entails, yet other sectors have embarked on the wave of digital transformations that drive this newly-coined industrial revolution. Digital transformation is quite simple, given that most people on the planet are embracing and living it on a daily basis. However, it seems that our sector, especially in Canada, is either oblivious or caught in the headlights, not knowing where to start, what to do, how to measure its value, or how to sustain it.

The objective of this lecture is to discuss and showcase frameworks and examples that will help mining companies assess, pilot, validate and implement digital transformation sustainably across the mining enterprise. Based on the author's experience working with the previous generation of mining powerhouses that were immersed in digital technologies, and using lessons learned working with multinational mining and metals on their digital innovation programs, attendees of this lecture should expect pragmatic recommendations anchored on the visionary objective of revolutionizing the mining and metals sector.

2018/19

Peter Bradshaw

Dominic Fragomeni

Siri Genik

Chad LePoudre

Glenn Lyle

Arnfinn Prugger

Marilyn Spink

Mary Wells

Peter Bradshaw

Summary Biography



Peter Bradshaw has served the mining industry with distinction for more than forty years as a mine-finder, company builder, an advocate of collaborative research and science and by working effectively with local and indigenous people. His early career with renowned Barringer Research gave him a global perspective on mineral exploration and the opportunity to develop and publish details of ground-breaking geochemical processes and exploration methods. In 1979, he joined Placer Development, a predecessor of Placer Dome, and helped advance several successful projects, most notably the discovery of the very high-grade zone VII at Porgera in Papua New Guinea (PNG). Bradshaw was also the driving force behind the formation of the very successful Minerals Deposit Research Unit (MDRU) at the University of British Columbia (UBC).

Among his other achievements Bradshaw brought expertise, integrity and energy to the junior sector, first with Orvana Minerals, which developed the Don Mario gold-silver-copper deposit in Bolivia. Later, as co-founder and president of First Point Minerals, he helped discover and identify the commercial importance of a new type of nickel deposit in BC and Yukon, in which nickel occurs as the nickel-iron alloy, awaruite.

Bradshaw earned a BSc (Geology) from Carleton University in Ottawa in 1962 and a PhD from Durham University in England (Economic Geology) in 1965.

During his subsequent ten years with Barringer Research Bradshaw helped prove the value of advanced geochemical exploration, in particular the use of selective extractions and soil profile sampling to improve interpretation and enhance the signal from buried deposits. Bradshaw then joined Placer, where the greatest of many accomplishments involved the Porgera project which was about to be abandoned after a failed feasibility study. Convinced of the potential for a high-grade zone in the bulk-tonnage deposit, Bradshaw launched a low-cost exploration program that led to the discovery of Zone VII, a very rich and large “plum”. Porgera became a world-class mine that has produced more than 18 million ounces of gold with potential for significantly more.

The resilience and tenacity shown by Bradshaw at Porgera helped define his career. Still with Placer, at the Misima gold mine also in PNG he worked with the government to adopt a marine tailings disposal system rather than build a tailings dam on the small, rugged and seismically active island. He worked with local leaders to prevent a mass in-migration to the island and the resulting social disruptions, as part of his long-standing commitment to find ways to work effectively and collaboratively with local and indigenous people. In addition he oversaw aspects of the final feasibility study of the Kidston gold mine in Australia, and optioned both Granny Smith in Australia and Omai in Guyana, all of which became significant producers.

Bradshaw’s most enduring legacy is MDRU, the highly successful industry-UBC research collaboration which he co-founded in 1989. Today MDRU is recognized internationally as a centre of excellence in mineral deposits research and training, a fitting tribute to its far-sighted and tenacious first chairman, Peter Bradshaw.

Lecture Abstracts

Awaruite, A New World Class Nickel Resource with Low Environmental Impact

The Decar Nickel District in British Columbia, Canada, represents a new nickel deposit model. The nickel is present as widely disseminated fine grained awaruite (Ni_3Fe) formed during serpentinization of ultramafic rocks. During serpentinization the nickel in olivine is liberated, and under low sulphur and oxygen fugacity, awaruite forms. This is an isochemical process for nickel which is mobilized over very short distances. This results in widely disseminated awaruite and uniform grades over several hundreds of metres. The formation of awaruite in the Decar District is thought to be generated by meteoric waters and the metamorphic method of formation precluded elevated concentrations of noxious elements such as As, Sb, Se, Hg, Cd, and S.

Mineral exploration to date has focused on the Baptiste deposit which is now one of the three largest undeveloped nickel resources in the world. Baptiste contains an indicated and inferred resource of 2.03 billion tonnes of 0.124% Davis Tube Recoverable Ni (DTR Ni). This resource base is being expanded by additional drilling. A Preliminary Economic Analysis defined diluted indicated and inferred resources of 925 million tonnes at 0.119% DTR Ni, totalling 1.7 billion pounds in an open pit. There are three additional occurrences present in the Decar District.

Awaruite is both highly magnetic and quite dense (8.2 g/cm³) making it amenable to simple mechanical metallurgical processing, i.e. a coarse crush - magnetic separation - finer crush - gravity concentration to produce a nickel-iron concentrate.

The tailings from Decar will contain 0-10% modal brucite ($\text{Mg}(\text{OH})_2$). Current lab-scale research at the University of British Columbia has demonstrated that brucite will sequester CO_2 and in the process may also stabilize the tailings by producing external surficial, and lesser interstitial Mg- carbonates. Ongoing work is designed to scale up lab tests for a field trial.

Resource Development and Resolution of Conflict with Indigenous People

The attitude of indigenous and local people, and NGOs, to resource development has changed significantly over the last several decades. In response to this there have been a number of initiatives such as the UN Declaration on Indigenous People, the Global Reporting Initiative (GRI), E3+ from the Prospectors and Developers Association, to mention only a few. When faced with a particular situation in the field however it is often not obvious how to apply the various principles set out in these documents. This paper presents a number of case histories of conflict and how it was resolved. These mainly cover exploration but include decisions made during exploration on operations and mine closure. Mention is made of the need for the generally ignored compelling need "social chain of custody" as companies and personnel change, especially during exploration and development. Reasons are given to use the term Integrated Social responsibility (ISR) rather than Corporate Social responsibility.

This presentation is interactive. As histories are presented the audience will be asked at various stages, before the conclusion of the history, how they would have recommended acting. There will also be opportunity to discuss how any situation may have been handled better.

The struggle for the Discovery of the Giant Porgera Gold Deposit, Papua New Guinea

Gold was first identified in the Porgera River in 1939 by John Black, a government patrol officer who was making "first contact" with the indigenous people. His diary for March 26th that year records "Down across the Porgera in a rocky chasm, altitude 4,900', blue marl shale. Gold +ve big rough edged flat colours in every dish. Best prospect I have ever seen let alone found." Because of the WW II and remote location hard rock exploration didn't start at Porgera until 1964. Between 1964 and December 1982 six different companies (with Placer as the last) dug tens of thousands of meters of trenches, drilled over 200 holes, dug 3 adits and defined over four million ounces of gold. It was not economic at that time due to remote location, very challenging metallurgy and significant geotechnical and other problems. This paper presents the exploration history and related metallurgical, engineering and social challenges, including the reasons why five companies walked away. Also why Placer and their partners very seriously contemplated dropping the property three different times for different reasons and how these obstacles were overcome leading to the discovery of the elusive and high grade Zone VII.

Dominic Fragomeni

Summary Biography



Dominic Fragomeni is an executive professional engineer with over 30 years experience in mineral processing operations management, technology implementation and business leadership.

As vice-president of Glencore-XPS, Fragomeni leads a team of technical specialists that provide innovative and practical solutions to clients in over 25 countries. Prior to joining XPS, he held various operations management roles including mill superintendent at Hemlo Gold, Brunswick Mining, Falconbridge Kidd Creek, Strathcona Mill and Raglan.

Fragomeni is a former national chairman of CMP. He received a CIM Fellowship in 2012 and a Noranda Achievement Award in 1996. He is a board member of Bharti School of Engineering and of Mirarco and supports research initiatives at the University of Alberta and McGill. He is an active member within CMIC and is passionate about operations performance excellence and supporting innovation in the industry. He is a graduate of the Haileybury School of Mines and received his mining engineering degree from Queen's University at Kingston in 1988.

Lecture Abstracts

Innovation in Mineral Processing: Celebrate the Past...Look to the Future

The mineral processing industry has a long history of innovation that is recognized but not often celebrated. These include significant advances in mineral measurement, testing, comminution, mineral separation and process control technologies that have transformed many mineral assemblages into ore.

This presentation presents some of the major mineral processing innovations and the impact they have had on our industry. As we look to the future, it is critical that we innovate and change. The role of our past and present industry leaders, champions and mentors of technology are explored with some examples of the next developments and how they can be catalyzed in the face of risk management, lower metal price cycles, resource constraints, inertia and the challenge of short term value delivery.

Where do I start? A Troubleshooting Guide for the Mill Engineer

Mineral processing plants continue to play a major role in the business case for many mining projects. The combination of ore variability, process complexity, scale and resource limits combined with continued pressure on operating costs and quality targets make the mineral processing plant challenging, yet fascinating and ripe with opportunity.

The ability to distill this complex network to its most basic elements is essential in achieving entitlement from the ore and installed equipment. In this presentation, the author presents a simple and elegant view of these elements and to the Mill Engineer, Mill Manager or Superintendent. Ore, Water, People and Process are presented discretely and their interactions are described through case studies from our industry.

Siri Genik

Summary Biography



Siri Genik has spent over 25 years working on major capital projects around the world. She has worked in the natural resource and infrastructure spaces. During the course of her career, she has developed particular expertise in strategic planning, risk management, stakeholder engagement and governance, with a strong focus on corporate social responsibility, sustainability and agreement negotiation. She has worked with the board room, leadership as well as project delivery teams.

Genik currently runs BRIDGE©, providing non-quantitative strategy services, advising her clients on risk management interfacing with commercial and sustainability issues. She crafts solutions with a mediation approach when working with stakeholders, whether indigenous and local communities, industry, labour, civil society and governments. An

important part of her expertise covers the social and community impacts of projects, negotiating agreements and building balance between global strategy and local needs and capacity.

She is a member of the Bar of Québec as well as a qualified mediator. She is perfectly fluent in English, French and Spanish.

Genik was born in Bogotá, Colombia, and grew up in South America, Africa, France, Spain and the UK. In the course of her career she has worked in Egypt, Russia, Malaysia, New Caledonia, Chile, Peru, Mexico, Panama, Argentina, Australia, Mongolia as well as Canada, Alaska and the Arctic. She and her family reside in Winnipeg, Manitoba.

Lecture Abstract

Why sustainability and stakeholder management makes good business sense for the mining business ... and your shareholders too

Mining is changing at breakneck speed....And while the usual concerns around the technical and financial requirements are still very much alive, a large number of “other” concerns now occupy the industry’s collective mind, be they coined as “CSR”, “ESG” or more generically as “non-quantitative” issues. Locations are increasingly more remote, assets more complex, and everybody is pinning their hopes on innovation and technology. Yet somehow, regardless of the size of the operation, there always seems to be a minefield of challenges between the boardroom & the leadership team on the one hand and the delivery of the project and the teams on the ground on the other hand. Taking a few steps back and “zooming out” to understand the landscape in which the business is operating is a core element to understanding where the hurdles may lie and who controls them. Whether it is the environment, water management, community or indigenous concerns, each stakeholder wants to be at the table. “Zooming back in” to define the execution strategy and the operations model. From the top down to the bottom up, within the organisation and externally, this lecture will address different strategies that will help build methods to integrate a sustainable approach throughout the business, all of its functions and all of its disciplines. The focus will be on how the business can successfully deliver value to the shareholders and ensure sustainable results for the stakeholders, until well beyond the mine closure and remediation. The target: deliver an integrated business model, based on trust and transparency, internally and externally, with a best-in-class reputation.

Chad LePoudre

Summary Biography



Based in Calgary and Saskatoon, D. Chad LePoudre, P.Eng., is vice president of geoscience and materials testing at SNC-Lavalin. He has 15 years' experience overseeing many geotechnical and geoenvironmental projects, and ten years of non-technical roles in construction, sales, management and finance, which contributed to his experience in business and project management. His professional interests lie primarily within the disciplines of tailings management, including site investigation, design, dam safety management systems (including dam safety reviews), construction management, containment systems, slope stability assessment, instrumentation installation and monitoring, and advanced laboratory testing. LePoudre is a board member and Past President of the Canadian Dam Association, actively involved in several committees working to advance guidance for dams and tailings dams. He also teaches many workshops on dam inspection, dam and tailings safety management systems, slope stability analysis, and conducting dam safety reviews in compliance with CDA guidance.

Lecture Abstract

Tailings failure case studies, statistics and failure modes

Public concern over safety of tailings dam facilities is growing as recent tailings dam failures in British Columbia (Canada), in 2014, Buenavista del Cobre, Sonora (Mexico) in 2014 and Bento Rodrigues (Brazil) in 2015, have resulted a significant impact to people and the environment. Breaching of tailings dams often results in the sudden release of water and sediments (tailings). These recent events, while highly publicized, are not isolated or particularly unique occurrences. Global record of historical events shows that consequences following these failures have been significant and in some instances catastrophic. Consequences of historical events included loss of life, changes in fluvial geomorphology and slope stability, widespread contamination resulting in loss of terrestrial and aquatic habitat, as well as legal repercussions and lack of public confidence. This presentation will give an overview of several case studies, the empirical statistics of tailings dam failures as well as the root causes of failure.

Glenn Lyle

Summary Biography



Glenn Lyle is a professional engineer based in Sudbury, Ontario. Glenn earned a B.Sc and M.Sc in mining engineering from Queens University in Kingston. Throughout his career, he has dedicated 33 years to Vale (formerly INCO) in various capacities, most notably in engineering, operations and safety. In 2009 he joined the Centre for Excellence in Mining Innovation (CEMI) as a research and development director, managing and seeking collaborative research projects. For the past five years, he has worked as a director with MIRARCO Mining Innovation, a not-for-profit applied research organization located on the Laurentian University campus delivering innovative solutions to mining industry challenges. With MIRARCO, he works in the field of Health, Safety and Risk Management, focussing on the delivery

of the Global Mining Industry Risk Management Program (GMIRM) training, safety risk management facilitation, and the evaluation and recommendation of health and safety research projects. He is a member of the CIM Safety Committee and the MER Society.

Lecture Abstract

Global Trends in Safety Risk Management and Use of Critical Controls

The elimination of fatalities is the priority safety goal of most mining companies. To accomplish this, organizations are moving beyond Behavioural Based Safety. The new approach combines the requirement for correct behaviours with a strong systematic approach identifying and mitigating hazards. In a systematic process; a company needs to analyze the hazards, determine the risks, mitigate the risks and then manage the controls. Many companies are also now moving to employing a control management system, in particular for Critical Controls. The talk will focus on the various aspects of these steps: discussion on risk assessment types, systematic application of risk assessment, development of risk assessment procedures, determining risk tolerance, the use of a layered approach to Risk Management, use of a Safety Maturity Model, and the use of Critical controls.

Arnfinn Prugger

Summary Biography



Arnfinn Prugger was born in Kirkenes, Norway in 1957, emigrating to Canada with his parents in 1960. His father worked in the fledgling Saskatchewan potash industry. Prugger spent his formative years in Saskatoon. He graduated with a B. Sc. in geological engineering (geophysics) from Queen's University in 1982, then pursued graduate studies at the University of Saskatchewan, completing his M. Sc. in 1985 (thesis: "Microseismicity Related to Potash Mining") and his Ph. D. in 1994 (thesis: "Fracture Mechanism of Potash Microseismic Events"). Prugger worked at PotashCorp (now Nutrien) from 1990 through 2018, ending his career as Vice President, Technical Services. His applied research interests include development of real-time microseismic and rock mechanics monitoring systems in potash

mines, development of improved in-mine instrumentation systems, the application of geophysical techniques to many different potash mining problems, and mine safety research (everything from reducing groundfall hazards to the mitigation of inflow risk).

Lecture Abstract

Scissors Creek: The First Potash Shaft Successfully Completed in Saskatchewan since 1979

The Rocanville potash mine, which is located in southeast Saskatchewan, has been in continuous production since its inception in 1971. Potash is mined at approximately 1000 m depth below surface at Rocanville. In 2007 an expansion of the Rocanville mine was announced: to increase production from 3.0MMtpa to approximately 5.7MMtpa finished potash products. The Rocanville potash mine has historically been accessed through two shafts: a production and ventilation exhaust shaft, and a service and ventilation fresh air shaft. A very important part of the Rocanville expansion involved construction of a new service shaft 15km from the existing surface plant. Once this third shaft was completed in 2015, the historical service shaft was converted to a second production shaft. Three shafts are now available for mine access and ventilation at Rocanville. This presentation summarizes the construction of the new Scissors Creek shaft at the Rocanville mine, the first potash shaft successfully completed in Saskatchewan since 1979.

Marilyn Spink

Summary Biography



Marilyn Spink's engineering career began in mining and pulp & paper and moved into steel-making operations working as a metallurgical engineer in both the United States & Canada. Bitten by the "capital project bug," she moved into consulting as a process engineer. In succeeding roles, as an engineering manager, she led multi-discipline teams to deliver large capital, complex minerals projects globally. Her goal now is to share lessons learned with project stakeholders, so as to deliver minerals projects better moving forward. As a Professional Engineer, Spink is appointed vice president of Professional Engineers Ontario, a member of the Ontario Society of Professional Engineers and a member of CIM for over 20 years. She is also a member of the Institute of Corporate Directors.

Lecture Abstract

Is Engineering a Commodity?

Marilyn builds a passionate case for taking the time to do the engineering well before putting a shovel in the ground. She walks the audience through several large complex global minerals projects she has been involved with over her 30 year career in the minerals industry and openly shares her lessons learned - the war wounds and the successes. Mine development has the potential to build wealth, but can also destroy capital, if the engineering, particularly process engineering, is not given the due diligence it deserves. Several resources and simple approaches are presented which can help ensure better project outcomes such as slowing down, creating a positive project team culture, "getting the right people on the bus", rewarding desired behaviour – externally & internally, continuously educating our clients, transferring knowledge from grey hairs and investing in well thought out engineering workflows. What is the definition of insanity? Doing the same thing and expecting different results. Can you imagine the wealth we could build in our industry if all stakeholders shifted their thinking to ensure the engineering phase was set up for success this time around?

Mary Wells

Summary Biography



Professor Mary Wells earned her metallurgical and materials engineering degree from McGill University and her Ph.D from the University of British Columbia in 1996. She joined the University of Guelph in 2017 as Dean of the College of Engineering and Physical Sciences.

Prior to the University of Guelph, she was a professor in the Mechanical and Mechatronics Engineering Department at the University of Waterloo. Her research addresses the relationship between processing, structure and properties for advanced metallic alloys used in the transportation sector.

Wells has spent the past decade addressing the continued under-representation of women in the engineering profession. In 2013, she was appointed the chair of the Ontario Network for Women in Engineering. To improve the gender diversity of the engineering profession, she has led initiatives to both understand the root causes of the lack of participation of women in engineering as well as programs to address these barriers.

Lecture Abstract

Magnesium-Alloy Forgings for Automotive Applications

The automotive industry is in the midst of a significant shift with the use of lightweight materials at the forefront of automotive vehicle design considerations to improve fuel economy. Today, light weighting represents the one of the nearest short term solutions to help the automotive industry meet the Corporate Average Fuel Economy (CAFÉ) standards set out by government in the USA. Today's interest in magnesium alloys for automotive applications is based on its high strength/weight properties. For this reason, magnesium alloys are very attractive as structural materials in all applications where weight savings are of great concern such as automobiles. Historically, the most prevalent manufacturing process for magnesium automotive components has been die casting, with over 90% of all magnesium products produced by this method. While casting is a cost-effective way to produce magnesium components, casting defects and inadequate mechanical properties limit automotive applications. Wrought magnesium alloys produced via processes such as forging typically have better mechanical properties than castings; however there is relatively little scientific knowledge on the best way to forge different magnesium alloys and knowledge about the effects of forging on microstructure and final mechanical properties is lacking. The talk presents a collaborative research program in Canada with Ford, Multimatic and a national government lab CANMETMaterials to investigate the design and forging of a full size control arm forged from a variety of magnesium alloys including, AZ31, AZ80 and ZK60.

2017/18

Cameron Harris

Guy Desharnais

John Starkey

Marty Wacker

Michael Samis

Guy Desharnais

Summary Biography



Guy Desharnais obtained his PhD from the University of Manitoba, which focused on belt-scale geochemistry of mafic-ultramafic rocks and related sulphide mineralization. He worked for five years as an exploration geologist with Xstrata Nickel (Glencore). Since joining SGS in 2010, Desharnais has completed a wide range of projects internationally, from resource estimations, economic evaluations, metallurgical sample selection, geometallurgical studies and audits of resources and reserves.

Desharnais has prepared NI 43-101 technical reports on a wide range of commodities and is considered a Qualified Person for a number of deposits types. He has a passion for sharing his technical knowledge and has completed several training sessions for a variety of audiences in French, English and Spanish. He led the team which won the Integra Gold Rush Challenge in 2016 (\$500k) which applied a combination of geology, virtual reality, weight of evidence and machine learning techniques to identify the most prospective exploration targets.

Lecture Abstracts

Metallurgical Sample Selection: A Simple Step that has the Potential to Sink your Project

Many metallurgical programs commonly suffer from samples that are not representative of the “rock recipes” that will eventually see the inside of a processing facility. Unfortunately, this often introduces a bias that is transmitted through all the detailed technical studies all the way to the construction of a flawed processing plant. The most common blunders include selection that is limited to the richest ore type, to a single host rock, to rocks excluded from the mine plan, or the lack of consideration for diluting rock types.

Discussion will focus on the appropriate scale of characterization including the introduction of the concept of time, mine schedules and plant scale into the selection process. The lack of consideration given to appropriate sample selection directly impacts the forecasts for hardness/recovery, flowsheet design and ultimately profitability of mining projects.

Mining BIG Data: the Future of Exploration Targeting

The application Machine Learning enhances our capability to harness exploration data to establish vectors to ore. However, careful consideration of the inputs and outputs by human geologists is required to ensure that the model does not merely predict what is already known or produce spurious results.

Resource Over-Estimation: Post-Mortem and a Path Forward

Several high-profile mineral exploration projects have recently suffered major setbacks following significant reductions in Resource and Reserve estimates. This talk explores the root causes for these, as well as some possible solutions.

Cameron Harris

Summary Biography



Dr. Cameron Harris has 30 years of experience in metallurgical plant design, construction, commissioning and company management. He is experienced in all aspects of technical and financial project feasibility determinations from process conceptualization to fundamental research and development (R&D), and through detailed process design to detailed engineering, construction and start-up of small to major installations.

Dr. Harris' areas of particular expertise include base metal production; pyro-metallurgy; process development and design; smelter operations; design; construction and start-up; environmental compliance; fundamental research; company management; business development and technology marketing.

Dr. Harris is also knowledgeable about cutting edge information technology such as IT/OT integration and the Internet of Things (IoT).

Lecture Abstract

"The Mining Industry: So we've survived ... What now?"

The extended downturn in metals prices has presented great challenges to the Mining Industry, but has delivered positive outcomes, from the necessary trimming of cost to ensure survival, in the form of significantly increased productivity, and improved focus on core business. However, less apparent negative outcomes are beginning to surface that are likely to threaten recovery as the tough times depart us.

Opinions about the manner in which the industry comes out of the trough and the actions needed to be taken to best profit from the recovery will be offered. Topics such as the impact of advanced technology, efficiency vs redundancy, optimization vs complexity, loss of skills, and short-term market expectations vs growth will be addressed.

Michael Samis

Summary Biography



Dr. Michael Samis is a leading integrated valuation and risk modelling practitioner in the natural resource industries with more than 25 years of mining experience. He has extensive professional experience valuing mining and petroleum projects with complex forms of flexibility and risk. His assignments have ranged from exploration stage to late-stage capital investments and include project financing and contingent taxes.

Dr. Samis has presented more than 30 professional valuation courses at universities and mining companies around the world, and has published or presented numerous valuation papers. In 2013, CIM awarded Dr. Samis with the Robert Elver Award for his contributions to mineral economics. He holds a PhD from the University of British Columbia in mining engineering and

Finance and he is a registered professional engineer in Ontario.

Dr. Samis is currently an associate partner with Ernst and Young's Transaction Advisory Service in Toronto, where he and his team also value derivative securities.

Lecture Abstract

Managing capital risk exposure by design

The mining industry has been criticised for over-investing in projects by front-loading capital investment. This criticism reflects the irreversibility of capital investment which can lead to negative returns and value destruction when business conditions turn hostile. An Integrated Valuation and Risk Modelling ("IVRM") framework can help companies consider the possibility of both hostile and favourable commodity price environments in their investment decision-making. IVRM is illustrated with a case study involving design choice at a prefeasibility project. In this example, there is a choice between either a staged development or a frontloaded capital design when there is gold price uncertainty. The analysis shows how static cash flow models may lead to front-loading capital with unnecessarily high risk exposure while a dynamic IVRM analysis brings out the lower capital risk of staged development. When capital is expensive, there is a real benefit to using IVRM to better understand the value of actively managing capital risk exposure with flexible project design.

John Starkey

Summary Biography



John Starkey is a mining engineer from the University of Toronto with 15 years of experience in mines and process plants, 15 years in process design, and 27 years as a licensed consulting engineer. His career includes work at Kam Kotia, Kidd Creek, and INCO mines and mills. He also worked at Kilborn for 12 years designing the Gays River, East Kemptville and Quintette process plants. He invented and co-developed the SPI and SAGDesign tests which are both widely used in industry today for the measurement of ore hardness for AG and SAG mill designs.

Starkey has presented thirty papers describing his work and progress in ore testing, and is a frequent lecturer globally at universities, teaching the fundamentals of AG/SAG grinding mill operation and design.

His mission is to capture for clients, the rich benefits of SAG milling technology, to help them find the most economical way to grind their ore.

Lecture Abstract

Comminution circuits

Comminution circuits are historically one of the most difficult parts of a mineral processing plant to design with confidence. There is controversy in the industry as to how best to approach this subject, with many solutions requiring a level of training and expertise beyond the ability of a non-specialist engineer. This has led to a culture of experts who opine on the subject with little or no direct benefit to the design process and the plant operator. In order to change this, mineral industry owners and senior managers need to understand the fundamental challenges that a comminution circuit poses to the design process, to the operators who use the equipment, and to the owners who invest in a project. This presentation is intended to summarize these challenges in a manner which is clear and unbiased, in a format which is applicable to the mining and mineral engineering community.

Marty Wacker

Summary Biography



Marty Wacker is principal engineer with Cameco Corporation and has over 30 years of experience. He spent over two decades developing Cigar Lake's unique, underground jet boring mining method from concept to production, leading the engineering to freeze the ore body and remotely mine the ore using a high pressure water jet. At Cigar Lake, he managed the design, construction and testing of equipment and infrastructure and held positions of maintenance superintendent and technical superintendent.

Wacker currently specializes in ground freezing and mining studies in the corporate technical department, providing support for Cigar Lake, other operations and future projects. He received a bachelor of science in mechanical engineering from the University of Saskatchewan in 1984.

Lecture Abstract

Development of the Cigar lake jet boring mining method

The Cigar Lake uranium deposit is one of the world's most difficult to extract due to very poor ground conditions, high pressure water and radiation from extremely high grade ore. This presentation focusses on the 20 year development of ground freezing and water jet mining (jet boring) methodologies to overcome these challenges and the highlights of the production ramp up.

2016/17

Lawrence Devon-Smith

Hani Henein

Daniel Marshall

Pat Stephenson

Dirk Van Zyl

Lawrence Devon Smith

Summary Biography



Lawrence Devon Smith (Larry) is principal consultant at Lawrence, Devon, Smith and Associates. He is a mining engineer with over 40 years of experience in project engineering and economic evaluations for mining, metallurgical and industrial projects. He is considered an expert in mineral project evaluation, discount rates and risk assessment.

Lecture Abstract

Discount Rates and Risk in Long Life Projects

The presentation examines industry practice regarding the development and use of discount rates for Discounted Cash Flow (DCF) evaluations. It also examines the impact that discount rates have on project evaluations and raises questions about the use of risk adjusted discount rates (RADR) to assess risk in longlife projects. A simple approach is proposed for addressing both the time value of money and risk in DCF evaluations with respect to capital costs, operating costs, schedules, ramp-up, tonnes, grade and price.

Dr. Hani Henein

Summary Biography



Dr. Hani Henein has been a professor in the Department of Chemicals & Materials Engineering at the University of Alberta since 1989 teaching and doing research on pipeline steels, metal-matrix composites and rapid solidification. He now partners with industry in research and has extensive international collaborations.

Lecture Abstract

Advanced micro alloyed steels for sustainable pipelines

This presentation will describe nearly two decades of collaboration between industry and university to advance and improve micro alloyed steels which are used for the transmission of oil and gas.

The evolution of the philosophy of engineering education

In this presentation Dr. Henein will discuss the need to expand the curriculum of young engineers to include GC as an important component of their undergraduate education.

Quantifying solidification path in rapid solidification using 3D measurements

Dr. Henein will outline some of the methodologies developed to quantify phase fractions and their solidification path as a function of processing conditions using EML and IA.

Dr. Daniel Marshall

Summary Biography



Dan Marshall is a professor of geochemistry in the Earth Sciences Department at Simon Fraser University, specializing in economic geology and fluid-rock interaction. His ore deposit studies have focused primarily on gold and silver deposits worldwide. His current research projects include gold, silver and gem mineralization.

Lecture Abstract

Melt inclusions of native-silver and native-bismuth at Cobalt, Ontario. Model for native-metal enrichments comparing natural samples with experimental and in-situ studies

Cobalt, Ontario is renowned for the 12.6 billion grams (445 million ounces) of silver produced from the area since its discovery in 1903. Based on our studies of natural and synthetic systems we are able to formulate a new model for silver transport, deposition and enrichment based on immiscible systems of molten precious metals and hyper-saline brines. These observations are consistent with silver inside these solid-silver inclusions melting at approximately 300 to 350 °C.

Patrick Stephenson

Summary Biography



Patrick Stephenson is principal geologist and director at AMC Consultants pty. ltd. with 45 years' experience. He is recognized internationally as an expert in mineral resource, mineral reserve estimation, classification and reporting.

Lecture Abstract

Mineral resources, minerals reserves or pie in the sky?

Stephenson's lecture discusses important and relevant issues and includes numerous case studies drawn largely from his personal experience. Particular reference is made to NI 43-101 and the latest developments in international mineral resource/reserve reporting standards. Issues covered include: what are mineral resources and mineral reserves; the importance of good estimation, classification and reporting; Qualified/Competent Persons; and "reasonable prospects" judgment.

Dirk Van Zyl

Summary Biography



Dirk van Zyl is professor and chair of Mining and the Environment at the University of British Columbia. He has more than 40 years' experience in research, teaching and consulting in tailings and mine rock structures. In the past decade much of his attention has focused on mining and sustainable development.

Lecture Abstract

Tailings Risk Management

The Mount Polley and Samarco tailings failures have eroded the confidence in the mining industry's ability to protect people and the environment. This lecture will focus on risk management of tailings facilities, briefly reflecting on these two recent tailings failures. Dirk will discuss the range of risks that must be identified and managed, as well as their risk management approaches. He will demonstrate that much progress is being made in many of these areas but that there are other areas that are not fully embraced and integrated. The challenges that remain will be highlighted.

2015/16

Mauro Chiesa

Roussos Dimitrakopoulos

Dean L. Millar

Wilson Pascheto

Bill Steer

Ian Thomson

Mauro Chiesa

Summary Biography



Mauro Chiesa is a semi-retired advisor with 36 years of financing and advisory services in the fields of extractive and infrastructure projects. This has included four years in Ottawa with Export Development Canada; 13 years in New York City with two international banks specialized in industrial finance; ten years with the World Bank Group, primarily with IFC, and ten years as an independent advisor and consultant in Vancouver.

Chiesa has a MBA and a BA from the University of British Columbia.

Lecture Abstract

Full-costing in the selection of good mine projects

Mine projects are depleting assets that are very capital-intensive. As replacement assets are becoming increasingly difficult to find, finding the capital to finance these assets is also becoming difficult. Adding further complexity, the public sector is becoming increasingly hesitant to support such developments, insisting on all mining companies to form two queues: one for permits and one for co-financing; much like the institutional investor, the public sector also is faced with pension obligations, and deficits. The resulting issues, which can be seen with over \$1 billion of asset provisions in but 30 months for the majors alone, has sent the institutional investor packing. The majors are shedding producing assets to raise cash, instead of purchasing promising assets from the juniors; the juniors in turn find themselves “crowded out” from the capital by the producing assets, and are faced with a difficult market. Industry valuations have suffered as a result, paradoxically, in a buyer’s market.

The mining company must now better screen and select its existing and future projects and perform to pro forma expectations to regain the market’s confidence, and valuation. The mining company has the data and budget, but often not the timely information or patience to improve this risk matrix. The presentation focuses on the framework including a “full costing” approach to reduce the risk of a blunder, reduce the political risk and inflation risk of the project facing either public-sector “queue.” The presentation also focuses on the public sector and what it must undertake to remain current; it too faces scrutiny. For the mining company, a more timely performance in delivering projects and the lower resulting volatility in valuation will regain the market’s confidence. For the public sector, this will result in economic development and revenues.

Roussos Dimitrakopoulos

Summary Biography



Roussos Dimitrakopoulos is a professor and Canada Research Chair (Tier I) in Sustainable Mineral Resource Development and Optimization under Uncertainty, and director of the COSMO - Stochastic Mine Planning Laboratory. He holds a PhD from École Polytechnique de Montréal, and an MSc from the University of Alberta in Edmonton. He works on risk-based simulation and stochastic optimization in mine planning and production scheduling, as well as the simultaneous optimization of mining complexes and mineral value chains under uncertainty. He has published extensively, maintaining large competitive grants from the National Science and Engineering Research Council of Canada. He has taught and worked in Australia, North America, South America, Europe, the Middle East, South

Africa and Japan. Dimitrakopoulos received the Synergy Award of Innovation, awarded in 2012 to him and his industry partners by the Governor General of Canada for his research contributions to mining science and engineering. In 2013, he received AIME/SME's Mineral Economics Award. In 2015-2016 he was a Distinguished Lecturer for CIM, and is a Fellow of the SAIMM, AusIMM and CIM.

Lecture Abstract

Smart mining complexes and value chains: A technological perspective on risk management and sustainability

A mining complex may be seen as an integrated business starting from the extraction of materials from a group of mines, the processing and treatment of these materials through different processing facilities interconnected by various material handling and transportation methods, all leading to a set of sellable products delivered to various customers and/or the spot market. Underlying uncertainties (stochasticity) related to the materials produced from the mines and the metal's spot market price are critical facets of this integrated business. Existing technologies do not explicitly manage these uncertainties, leading to the sub-optimal performance.

A new framework for the simultaneous optimization of mining complexes under uncertainty aims to maximize shareholder value, manage risk intelligently and address pertinent aspects of sustainability. It is a difficult problem to address due to its large scale, uncertainty in key parameters, intricacies of related data analytics and data-driven optimization, and absence of methods for simultaneous optimization of all components of a mineral value chain. Based on stochastic optimization, new methods tested in case studies for different mining complexes and commodities demonstrate that, when compared to past approaches: (i) reliability is improved in the operation's meeting production forecasts; (ii) larger amounts of metal are produced from the same mineral resource due to improved ability to understand spatial connectivity of high-grade materials; and (iii) substantially higher economic value than with existing approaches due to the ability of new smart technologies to directly manage risk. These impact the company, along with indirect stakeholders, such as local communities that may benefit from increased investments in activities and job stability, and the environment, which can benefit from improved control of waste management and continuous rehabilitation.

Dean L. Millar

Summary Biography



Dean Millar is Director of the Energy, Renewables and Carbon Management (ERCM) group of MIRARCO and Professor of Energy in Mining within Laurentian University's Bharti School of Engineering. Millar is a Fellow of the IOM3, holds a bachelor's degree in Mining Engineering and a doctorate in Rock Mechanics, both from Imperial College. He is a Certified Energy Manager.

Millar sits on the Executive Committee of the CIM Maintenance, Engineering and Reliability Society (MER) and is the Energy Theme Leader for the Ultra Deep Mine Network.

Lecture Abstract

The journey to the 40% mine

In the Canadian underground mining industry, on average, energy consumption costs are now over 18% of total operating costs and this proportion has been steadily increasing over the last 50 years. Without processes of continuous improvement in energy consumption, and/or driving down the cost of energy consumed, Canadian mines may lose ground in the competition that is the global mining business. Clearly there are also societal, environmental and sustainability benefits to be realised through energy management practices, but the chief driver of an economic activity such as mineral production should be lowering cost without compromising productivity, to maximize profit.

The "40% mine" is shorthand for a concept that promotes the introduction of step-change, disruptive technologies that will completely overhaul energy operations cost structures for mineral production. The aim is to bring about a sector wide reduction of primary energy consumption associated with mining to 40% of base year 2000 levels by 2040.

With reference to case studies, the lecture will show that it really is possible to achieve a 40% mine today, with technologies and innovations that are already market-ready. It will touch upon the use of maximum compression efficiency hydraulic air compressors, renewable energy technologies such as floating photovoltaic systems and wind turbines, the adoption of electrical loading and haulage equipment, underground comminution plant and air lift shaft haulage systems, as well as technologies established in other disciplines that may have applications in mining, such as cryogenic cooling.

Wilson Pascheto

Summary Biography



Wilson Pascheto is currently the manager of the Materials Technology Group of XPS Testing and Consulting Services, a division of Glencore, located in Sudbury, Ontario. He holds a Bachelor of Metallurgical Engineering from Mackenzie University in Brazil and a Master's of Materials Engineering from McMaster University.

Pascheto has 30 years of plan and laboratory experience in the fields of corrosion, wear, welding, mechanical properties of materials, materials testing and selection, failure investigations, research and development in the areas of metals, polymers, ceramics and composites.

He has been directly involved in quality assurance activities for major capital projects and has performed over 1,000 failure investigations ranging from small components to heavy industry machinery from smelters, mines, concentrators, refineries and hydrometallurgical operations.

Pascheto trains company engineers in QA/QC for capital projects as part of Design for Six Sigma.

Lecture Abstract

Materials technology in the mining industry, opportunities and challenges

Materials technology encompasses activities such as materials testing and selection, equipment design and fabrication, failure analysis and asset integrity amongst others. These activities can have a significant impact on the success of capital projects, on-line time of existing operations as well as health and safety in the work environment. While materials technology is a mature and well recognized discipline in the oil and nuclear industries, for example, it is awareness still lags in the mining industry. During 20 years of experience working in various large capital projects and operating plants, the author has experienced equipment failures which have caused significant losses to owners, in many cases amounting to millions of dollars. Many of these failures could have been prevented by proper application of materials technology best practices. Therefore, significant opportunities exist in the mining industry to improve the execution of capital projects, increase on-line time, minimize the occurrence of unplanned maintenance due to equipment failures, and all with positive contribution to health and safety. However, in order to explore these opportunities, two main challenges need to be addressed: awareness of the discipline strengths and its potential contributions and the availability of trained materials engineers. This talk will discuss the author's experiences in failure prevention in the mining industry, examples of major project failures and successes as well as their causes and relationships with materials technology. The material technology model adopted by the author and its impact on awareness and engineering training will also be discussed.

Bill Steer

Summary Biography



Bill Steer is the founder of the Canadian Ecology Centre (CEC) and General Manager/Head Master of one of Canada's leading environmental education centres. The Teachers' Mining Tour evolved from the CEC's M.A.D.E. principle. The week-long, comprehensive tours highlight modern mining – the environment, safety, technology and the many diversified occupations within the sector.

At Nipissing University in North Bay, Ontario, Steer teaches geography and outdoor experiential education courses for the Schulich School of Education's B.Ed. candidates. At Canadore College, Steer teaches geomatics to environmental technicians and to post-graduate students. He holds degrees and diplomas from Laurentian University, McMaster University and Durham College. Last but not least, Steer is "Back Roads Bill" on CBC Radio.

Lecture Abstract

Making informed choices – modern mining: "Standing still is going backwards!"

Modern mining is in good hands when it comes to educating teachers and their students.

One of Canada's leading outdoor environmental education centres – the Canadian Ecology Centre (CEC) – is the home of the Teachers' Mining Tour. In its sixth year, sponsored, in part, by the CIM and other mining partners, it brings teachers together for a comprehensive PD opportunity. For an entire week teachers are exposed to and made aware of what modern mining is all about.

The founder and General Manager of the CEC is Bill Steer, an environmental educator who has spent most of his career making various audiences aware of making informed choices. Through the M.A.D.E. (Make A Difference Environmentally) principle, the Teachers' Mining Tour educates teachers who in turn, during the course of their careers, affect many students. Bill will describe what the tour is all about and why there should be more such tours, particularly in the Oil Sands. He will identify how the mining sector can help and why, as a sector, we need to embrace that "Standing still is going backwards!"

Ian Thomson

Summary Biography



Ian Thomson has more than 40 years of experience in the mining industry. He worked the last two decades to advance and refine the management of social issues in resource development projects. Thomson's area of expertise includes stakeholder management, capacity building, design and development of sustainable social relations and guiding multi-stakeholder processes.

Thomson has led the development of new standards and guidelines for best practice management of social issues during exploration, facilitated construction of the Principles and Guidance for Responsible Exploration for PDAC, and was a prime mover in developing both the concept and metrics of

the Social License to Operate.

He is principal of Shinglespit Consultants Inc. and is a founding member and principal of On Common Found Consultants Inc. Thomson has also held management positions with Orvana Minerals Corporation and Placer Development Ltd.

Lecture Abstract

The social license to operate: The reality, the myths and the dark side

The concept of a social license to operate emerged in the late 1990s and was quickly adopted by the mining industry and its stakeholders. For many years the phrase was a useful metaphor to describe situations where there was (or was not) local community acceptance or approval of a mining project. More recently, the normative components of this social phenomenon were identified and subsequently quantitative metrics developed such that comparative statements can be made as to the quality and controls behind the social license at any project.

The last few years have seen the concept of a social license to operate migrate out of the mining sector and be applied to oil and gas projects, wind farms, highway construction, big box stores, hotels, casinos and other situations where there is development that interacts with local populations. The term has even become part of the language of politicians.

The presentation will explain the fundamentals of the social license to operate and, using case histories, describe how it plays out in a variety of situations. Emphasis will be given to distinguishing the myths that have surfaced from the reality on the ground and a dark side that has to be recognized, understood and controlled.

Index by Lecturer

A

Anglin, Lyn, 7

Ashcroft, Nathan, 8

B

Budac, James, 9

Bradshaw, Peter, 20

C

Chiesa, Mauro, 42

Crowley, Brian Lee, 14

Cruz, Jamile, 10

D

Desharnais, Guy, 30

Dimitrakopoulos, Roussos, 43

F

Fragomeni, Dominic, 22

G

Genik, Siri, 23

H

Harris, Cameron, 30

Heggie, Berry-Ann, 15

Henein, Dr. Hani, 37

K

Kissiova, Mayana, 16

L

LePoudre, Chad, 24

Lyle, Glenn, 25

M

Marshall, Dr. Daniel, 38

Millar, Dean L., 44

O

Ospina, Monica, 11

P

Pascheto, Wilson, 45

Prugger, Arnfinn, 26

S

Samis, Michael, 32

Scherkus, Ebe, 12

Smith, Lawrence Devon, 36

Spink, Marilyn, 27

Starkey, John, 33

Steer, Bill, 46

Stephenson, Patrick, 39

Stubina, Dr. Nathan, 17

T

Thomson, Ian, 47

V

Van Zyl, Dirk, 40

W

Teophile, 18

Wacker, Marty, 34

Wells, Mary, 28

Y

Yameogo,

Index by Topic

A

Advanced micro alloyed steels for sustainable pipelines, 37

At the Intersection of Technology, Innovation and Diversity in Mining, 17

Awaruite, A New World Class Nickel Resource with Low Environmental Impact, 20

B

Bitumen Beyond Combustion, 8

C

Comminution circuits, 33

D

Development of the Cigar lake jet boring mining method, 34

Discount Rates and Risk in Long Life Projects, 36

E

The evolution of the philosophy of engineering education, 37

An Examination of the Roles of Rationalism and Empiricism in Refinery Troubleshooting, 9

F

Full-costing in the selection of good mine projects, 42

G

(The) Gender Physics Leadership Advantage, 15

Global Trends in Safety Risk Management and Use of Critical Controls, 25

H

Hydrogen For Industrial Uses, 8

I

- Industry 4.0 and Digital Transformation, 18
- Innovation in Mineral Processing: Celebrate the Past... Look to the Future, 22
- Is Engineering a Commodity?, 27

J

- The journey to the 40% mine, 44

L

- (The) Link between Inclusion & Diversity and High-Performance Operations, 10

M

- Magnesium-Alloy Forgings for Automotive Applications, 28
- Making informed choices – modern mining: “Standing still is going backwards!”, 46
- Managing capital risk exposure by design, 32
- Materials technology in the mining industry, opportunities and challenges, 45
- Melt inclusions of native-silver and native-bismuth at Cobalt, Ontario. Model for native-metal enrichments comparing natural samples with experimental and in-situ studies, 38
- Metallurgical Sample Selection: A Simple Step that has the Potential to Sink your Project, 30
- Mineral resources, minerals reserves or pie in the sky? 39
- Mining BIG Data: The Future of Exploration Targeting, 30
- Mining contribution to society lies on fundamental pillars to lift humanity; social development and industrial supply chains, 11
- “(The) Mining Industry: So we’ve survived... What now?”, 31
- (The) Mount Polley Tailings Spill: Response and Recovery- 6 Years Later, 7

N

- Natural Gas Decarbonization (Ngd), 8

O

- Opportunity Within the Energy Transition, 8

Q

Quantifying solidification path in rapid solidification using 3D measurements, 37

R

Resource Over-Estimation: Post-Mortem and a Path Forward, 30

S

Scissors Creek: The First Potash Shaft Successfully Completed in Saskatchewan since 1979, 26

Smart mining complexes and value chains: A technological perspective on risk management and sustainability, 43

Social and Human Capital: Strategic Investment to Guarantee Non-Conflict, xx

Sustainable Future for Mining, and its Supply Chain, 11

Social licence to Operate in Virtual World, 12

The social license to operate: The reality, the myths and the dark side, 47

T

Tailing failure case studies, statistics and failure modes Glenn Lyle, 25

Tailing Risk Management, 40

Tailing, waste rock and water are by-products of the mining industry, 16

W

When Demands for Social Licence Become an Attack on Democracy, 14

Where do I start? A Troubleshooting Guide for the Mill Engineer, 22

Why sustainability and stakeholder management makes good business sense for the mining business... and your shareholders too, 23

Appendices

(Articles by Lecturers may be forthcoming)