

IPMI Precious Metal Sampling, Assay and Representation Symposium: A Mining and Refining Perspective

October 13th-15th, Colorado School of Mines

PROCEEDINGS

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8:45 am

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Opening remarks

Larry Drummond, Executive Director, IPMI

9:00 am

The Handling of Outliers in Sampling

Dr. Francis Pitard, President, [EPSC](#)

Abstract: Whether you are sampling ore or secondary precious metal bearing materials the incorrect handling of supposed outliers can result in economic losses. This presentation details different scenarios and case studies with outliers.

Bio: For over 30 years Dr Pitard and his consulting group has provided professional sampling consultation services and educational programs to many of the world's leading companies engaged in such diverse activities as base metals, precious metals, coal mining, steel, aluminum, and base metals smelting, petroleum exploration and production, chemical manufacturing, environmental monitoring and power generation, etc. FPSC is a recognized international expert in all aspects of Total Quality Management, Sampling, Statistical Process Control, and the practical application of statistical methods for problem solving. Dr. Francis F. Pitard is a recipient of Pierre Gy's gold medal for excellence in teaching and application of the Theory of Sampling. He is also a member of the Scientific Committee of the World Conference on Sampling and Blending.

9:30 am

Carbon Circuit Modelling – Theory and Application

Tyler Crary, Senior Metallurgist, SGS Minerals

Abstract: SGS strives for simplicity and user-friendliness, rather than precision through complexity with our CIP/CIL modelling package. This semi-empirical model combined academic perfection and pragmatic simplicity. This is a result both of the validity of the model's many assumptions under most CIP/CIL operating conditions, as well as the inherent robustness of the CIP and CIL processes. The model can be used in greenfields applications to optimize engineering design to lower capital costs of new plants and used to maximize the performance of a full-scale CIP or CIL plant based on the results of small scale experiments. The model allows for the generation of multiple operating scenarios, where the number of leach and adsorption stages can be varied, the carbon concentration per tank can be adjusted, the carbon loading and final barren solutions can be manipulated, and carbon advance and elution rates adjusted. In this presentation, the theory behind the model will be explained along with testwork descriptions and results from real case studies will be presented.

Bio: Tyler Crary is a senior metallurgist with over 10 years experience in the minerals industry. He completed a Bachelor of Applied Science in Chemical Engineering from Queen's University in Kingston, Ontario. Tyler worked for Hatch Limited as a process engineer in the mining and minerals business unit for two years before joining SGS in the fall of 2010 as a metallurgist. His extensive project experience includes over fifty projects worldwide, including flowsheet and plant optimizations. The majority of the projects he has worked on have been precious metals projects involving all aspects of gold ore processing, including: ore characterization, comminution, gravity separation, flotation, pressure oxidation, cyanidation, gold recovery from solution and cyanide destruction. Tyler is a member of the Professional Engineers of Ontario and Canadian Institute of Mining, Metallurgy and Petroleum.

10:00 am

The Impact of Impurities on the Sampling of Dore and Karat Scrap

David Murray, Metal Management Director, Asahi Refining

Abstract: This presentation details, with case studies, some of the challenges faced when sampling gold and silver dore that contain problematic impurities such as iron, nickel, arsenic and lead. The difficulties and possible solutions are discussed.

Bio: David joined Asahi Refining Canada Ltd. (formerly Johnson Matthey) in 1985. He started in the laboratory and now holds the position of Director, Metal Management. David provides technical support to all of Asahi North America's operations. Over the past 33 years, he has held roles as Production Manager, Operations Manager, and Site Manager in both Canada and in the UK. David has many years of experience in sampling, assaying and refining.

10:45 am

Refining Industry By-products: Representation and Analysis

Cody Burke, Analytical Chemist, Axium Scientific

Abstract: Written as a guide from the viewpoint of the witness and assayer, intent on providing useful insight from challenges and obstacles seen in the field and back at the lab. Refinery by-products—especially slags, used crucible, and used cupels—are relatively low-grade materials, yet they often accumulate enough residual precious metals to be worthy of reclaim at a refinery. Therefore, it is best that companies consider multiple factors when preparing to sell their accumulated by-products, such as transport/containment, material prep, oversize values, difficulties experienced during the assay, etc.

Bio: After leaving a career in the US Army, Cody Burke has spent the last 5 years working in the precious metals industry. He has worked as a lab technician, fire assayer, and now as the Operations Coordinator at Axium Scientific.

11:15 am

Considerations in the Fire Assay of Copper Bullion

Matthew Cole, Analytical Chemist, Sabin Metal

Abstract: The analysis of precious metal bearing copper bullion can be analyzed by many analytical techniques for value determination. This presentation details some of those techniques with a particular focus on fire assay. A comparison of precision, accuracy and cost of analysis will be presented.

Bio: Matthew graduated in 2014 from Purdue University with a BS in biochemistry. Initially, Matt began his career in the food industry at GLK foods as a quality assurance technician. After a year of industry experience, Matt accepted a position as a chemist at Sabin metal corporation.

12:45 pm

Can I get a Witness! : How Third-Party Supervision supports Precious Metals Trade

Joshua Husvar, Precious Metals Manager, Bureau Veritas

Abstract: This presentation focuses on the role of third party supervisors and how the unique relationship between them and their customer is a multi-faceted role of representative, agent and educator. Ultimately, the supervisor works to build trust between customer/refiner and support precious metals transactions.

Bio: Josh joined Inspectorate in 2003 as a field inspector during University. His work with the company included a series of successful projects which led to a promotion to Sales and Marketing Manager in 2010. He left to work for a brief period for as General Manager for the independent laboratory startup IDO Lab and then Business Development Manager for Automotive Catalyst Recycling company Hensel Recycling before returning to Inspectorate (now Bureau Veritas) to guide strategic development for the Metals & Minerals Division and being promoted to Precious Metals Manager in 2018 responsible for Precious Metals Audits, Representation, and the Reno Precious Metals Laboratory. Josh is also involved with the IPMI and currently is honored to serve on the Board of Directors as a member of the Executive Committee.

1:15 pm

The Kroll Institute For Extractive Metallurgy: 45 Years of Research and Education Success

Dr. Corby G. Anderson, Harrison Western Professor at the Colorado School of Mines

Abstract: This presentation will outline the history of the Kroll Institute for Extractive Metallurgy and its crucial roll in training Mineral Processing and Extractive Metallurgical Engineers along with providing high quality research and professional service. Current capabilities and projects of the Institute will be summarized.

Bio: Dr. Corby G. Anderson is a registered engineer with over 40 years of global experience in industrial operations, corporate level management, engineering, design, consulting, teaching, research and professional service. His career includes positions with Morton Thiokol, Key Tronic Corporation, Sunshine Mining and Refining Company, H. A Simons Ltd. and at CAMP-Montana Tech. He holds a BSc in Chemical Engineering a Masters Sc in Metallurgical Engineering and PhD in Mining Engineering - Metallurgy. He shares 12 international patents and 7 new patent applications. He currently serves as the Harrison Western Professor in the Kroll Institute for Extractive Metallurgy as part of the Mining Engineering Department and the George S. Ansell Department of Metallurgical and Materials Engineering at the Colorado School of Mines. In 2009 he was honored by the Society for Mining Metallurgy and Exploration with the Milton E. Wadsworth Extractive Metallurgy Award for his contributions in hydrometallurgical research. In 2015 he was awarded the International Precious Metals Institute's Tanaka Distinguished Achievement Award. In 2016 he received the Distinguished Member Award from the Society for Mining, Metallurgy and Exploration, the Outstanding Faculty Award from the George S. Ansell Department of Metallurgical and Materials Engineering at Colorado School of Mines and also became a Distinguished Member of the U of Idaho Academy of Engineering. In 2017 he received the EPD Distinguished Lecturer Award from The Minerals, Metals and Materials Society.

2:15 pm

Tellurium Co-precipitation – Revisited

Dr. Stacey Santolli, Sr Chemist, BASF

Abstract: The tellurium co-precipitation method utilizes redox chemistry to quantitatively co-precipitate precious metals with tellurium in the presence of tin. The complex chemistry that takes place between Te, Sn and the PM is not well understood, however, this presentation will go into some of the fundamental research used to investigate the complex chemistry of the tellurium coprecipitation method.

Bio: Dr Santolli earned her PhD in Chemistry from Texas A&M University and has worked for BASF for eight years. At BASF, Stacey supervises multiple teams, who specialize in gravimetric analysis, Te-Coprecipitation and other classical precious metal analytical techniques.

2:45 - 3:30 pm

Demonstration of Particle Size Analyzer

Dr. Vidumin Dahanayake and Alvin Smith, Anton Paar

Abstract: While knowing the particle size distribution of a sample is important for determining a proper sampling scheme, this is not always easily determined. The particle size analyzer can be used as an important tool in quickly and accurately characterizing materials for sampling.

Bio: Dr Vidumin is a Product Specialist, Materials and Particle Characterization at Anton Parr. He earned his PhD in Chemistry from Georgetown University and has spent much of his academic and professional career focusing on all aspects of the characterization of advanced materials and particles.

3:30 pm

New Chapter Discussion and Closing remarks, Larry Drummond

