

# TECHNICAL PROGRAM



**2021 SME Minnesota  
Conference**

April 13-15, 2021 | ONLINE



## TUESDAY, APRIL 13

- 9:00am - 9:45am** **Keynote: Leveraging Artificial Intelligence to Unlock People Power**  
*Stacey Koon and Lia Walker, Freeport-McMoRan*
- 9:45am - 10:30am** **LIVE Q&A and Coffee Break**
- 10:45am - 11:15am** **Mining Session | Optimizing Your Chances of Deploying a Performance LTE Network in North America**  
*Ron White, 3D-P*
- 10:45am - 11:15am** **Projects Session | Moving Allete Forward**  
*Eric Clement, Minnesota Power*
- 11:15am - 11:45am** **Mining Session | Hyperspectral Imaging of Bedrock Core from the Minnesota DNR Drill Core Library**  
*Don Eisenheimer, MN DNR and Cari Deyell-Wurst and Lionel Forteneau, Corescan, Ltd.*
- 11:15am - 11:45am** **Projects Session | NRRI – Discovering the Economy of the Future**  
*Brett Spigarelli, Rod Johnson, George Hudak and Kevin Kangas, Natural Resources Research Institute*
- 11:45am - 12:15pm** **Projects Session | The Rebirth of the Bloom Lake Operations**  
*Marc Beaubien, Quebec Iron Ore*
- 12:15pm - 12:45pm** **LIVE Q&A**

## WEDNESDAY, APRIL 14

- 9:00am - 9:45am** **Keynote: 2020 & 2021, Challenging Years for the Iron Ore Industry**  
*Serge Perreault and Guy Saucier, ASDR*
- 9:45am - 10:30am** **LIVE Q&A and Coffee Break**
- 10:45am - 11:15am** **Tailings Session | Terraflowing - An Innovative and Flexible Method For Tailings Management**  
*Nils Stewart, Weir Minerals*
- 10:45am - 11:30am** **Professional Development, Radical Productivity**  
*Dr. Erika Garms, CEO, WorkingSmarts, Inc*
- 11:15am - 11:45am** **Tailings Session | The Rapidly Evolving World of Tailings Management - Where are We Headed?**  
*Kurt Schimpke, Barr Engineering*

- 11:30am - 12:15pm** **Professional Development, Radical Productivity for Managers and Leaders**  
*Dr. Ericka Garms, WorkingSmarts, Inc*
- 11:45am - 12:15pm** **Tailings Session | On the Technical Aspects for Integration of Tailings Management and Incremental Life of Asset Net Present Value**  
*Mike O’Kane and M. Sangster, Okane Consultants*
- 12:15pm - 12:45pm** **LIVE Q&A**

## THURSDAY, APRIL 15

- 9:00am - 9:45am** **Keynote- Company Updates**
- 9:45am - 10:30am** **LIVE Q&A and Coffee Break**
- 10:45am - 11:15am** **Processing Session | Two-Mass vs Brute Force Screening**  
*Derek Kerker, General Kinematics*
- 10:45am - 11:15am** **Environmental Session | MOA Implementation for the NorthMet Mining Project**  
*Jennifer Bring, 106 Group, Dan Ettinger, Warner Norcross & Judd LLP, and Kevin Pylka, Polymet Mining Co.*
- 11:15am - 11:45am** **Processing Session | Development of Electrical Resistance Tomography System for Multiphase Flows in Mineral Processing**  
*Weiguang Xie, University of Minnesota, Duluth*
- 11:15am - 11:45am** **Environmental Session | Biological Removal of Sulfate from Water: Current Status and Outlook for Mine Water Treatment**  
*Ali Ling, Barr Engineering, Scott Kyser, Minnesota Pollution Control Agency, Nathan Johnson and Chan Lan Chun, University of Minnesota, Duluth*
- 11:45am - 12:15pm** **Processing Session | Bond Work Index – How Does it Work?**  
*Kyle Bartholomew, Metcom Technologies, Inc.*
- 11:45am - 12:15pm** **Environmental Session | Why Treat Water When you can Control the Source**  
*Paul Eger, Global Minerals Engineering*
- 12:15pm - 12:45pm** **LIVE Q&A**

## ON DEMAND

- Evolving Professional Ethics And Sustainable Mining**  
*David M. Abbott, Jr., CPG, Consulting Mining Geologist & Geoscience Ethics Columnist*

**TUESDAY, APRIL 13**

**KEYNOTE**

Sponsored by Hexagon Mining

**9:00am-9:45am**

**Artificial Intelligence (AI), Leveraging Artificial Intelligence to Unlock People Power**

*Stacey Koon, General Manager and Lia Walker, Manager-Innovation, Operational Improvement, FMI, Hexagon*

We are incredibly proud to be part of Freeport-McMoRan, a company long known for great people, excellent operations, and positive impact on our industry and the communities where we operate. We have a strong foundation and a long history of successes to build upon. However, our industry is in flux: On one hand, demand for our products, especially copper, is increasing. On the other, declining grades means it costs more to produce a pound of copper. Building on our powerful legacy, Freeport-McMoRan's high-performing culture, and innovative, tech-enabled people will set the gold standard for operational excellence and safety in our industry.

Now is the time to create our future. We can secure a sustainable future in the face of change, bring stability to our business, and safely increase our performance when we find smart, efficient ways to do our work. People and collaboration are key: The way we work together is the engine behind our success and people are our most valuable resource. To reach our full potential, we need to better leverage all the abilities and creativity of our people. Technology turbo-charges people power: We make better decisions, improve safety and efficiency and increase production when we use technology and act on data. This dramatically increases our ability to do more with what we have. It also means our people are developing cutting-edge skills.

Our Americas' Concentrator project demonstrated what happens when people embrace new ideas, technologies and techniques. This project combined the use of advanced analytics and powerful new ways of working that supercharged our people to deliver an entire new concentrator's worth of additional capacity to the market – without spending billions of dollars in capital to build a new concentrator. Using these new tools and ways of working, we have navigated well through an unprecedented health environment and continue to work in these ways to unlock our full operating potential.

Freeport-McMoRan Inc. has successfully leveraged a data driven innovation philosophy that is built on a unified management strategy, a strong technology foundation, and a collaborative culture. This presentation will highlight our journey from developing a consistent operating system that allowed us to achieve world-class performance to an AI-powered organization with advanced analytics embedded into our business.



*About the Speakers: Stacey Koon is General Manager-Administration for Freeport-McMoRan Morenci Operations in southeast Arizona. Stacey joined the company in 1999 in the Human Resources Department. In 2007, she became Director-Administration in Phoenix where she managed office building construction and leases, including the company's corporate headquarters and offices in Arizona and South America. In 2013, she relocated to Santiago, Chile where she served as Director-Administration and Human Resources for Freeport-McMoRan South America.*



*Lia Walker is the Manager-Innovation, Operational Improvement for Freeport-McMoRan Inc. She is the business leader for integrating data-driven innovation and technology transformation throughout Freeport-McMoRan Inc. Under her leadership, highly engaged business teams leverage agile and change management techniques to deploy technology and data science solutions that amplify business growth and profitability. Lia has 27 years of experience in the mining industry.*

**MINING SESSION**

Sponsored by Road Machinery & Supplies Co.

**10:45am-11:15am**

**Optimizing your Chances of Deploying a Performance LTE Network in North America**

*Ron White, 3D-P*

As LTE in open pit mining has gained traction in North America and spectrum for private networks has become available, quality of the spectrum remains a limiting factor. Most available LTE bands are in higher frequencies, exacerbating challenges already being experienced in more mature markets. These challenges include limited uplink throughput, shadowing at the working face, and costly infrastructure required to address those issues. In this presentation, Ron White will discuss how the deployment of a hybrid LTE network alleviates those shortcomings to create a powerful network, by cost effectively increasing the available coverage and off-loading congestion. Challenges that need to be overcome in any hybrid network design, such as roaming and providing a Layer 2 topology, are discussed.

*About the Speaker: Ron has been with 3D-P since 2004, driving the company's focus on wireless network design for challenging environments, as well as the Intelligent Endpoint, mining application integration, and open access to data. As President, Ron is continuing to drive the company's vision toward enabling digitalization, and the IIOT. Ron has an extensive background in wireless, networking, field deployments and mining applications and is well known for his ability to teach, motivate, and drive consensus.*

**11:15am-11:45am**

**Hyperspectral Imaging of Bedrock Core from the Minnesota DNR Drill Core Library**

*Don Eisenheimer, Minnesota Department of Natural Resources, and Cari Deyell-Wurst and Lionel Forteneau, Corescan, Ltd.*

The Minnesota DNR and Corescan obtained 16,376 feet (4,991 meters) of hyperspectral core imaging (HCI) data from thirty-two (32) archived cores at the Hibbing Drill Core Library. Core came from five Northern Minnesota focus areas that highlighted distinct mineral resources. HCI is a non-destructive technique that preserves high-value limited core material and identifies mineral abundances and maps mineral textures at 500 micron spectral resolution. Project results support DNR land management decisions on state mineral rights and promote mineral exploration and development. This project for the first time provides public access to hyperspectral imaging data archived within the Coreshed® Virtual Core Library.

*About the Speakers: Don Eisenheimer is a senior geologist at the Minnesota DNR. He received a B.A. in Geophysical Sciences from the University of Chicago, and M.S. and Ph.D. degrees from the University of Wisconsin-Madison. Don was a Postdoctoral Fellow at the Geological Survey of Japan, and an Assistant Professor of Geology at Stockton University of New Jersey. Prior to joining the DNR in 2006, Don worked in the Twin Cities environmental consulting industry.*

## PROJECTS SESSION

Sponsored by Minnesota Power

### 10:45am-11:15am Moving Allete Forward

*Eric Clement, Minnesota Power*

This presentation will review how Allete weathered the storm of the Covid-19 pandemic and continues to provide the mining industry reliable, safe, and affordable power. Many of our lives were disrupted throughout 2020 and continue to be affected by the pandemic. Just like many of your businesses, Allete needed to adapt our policies and procedures to continue to deliver our product reliable power. The presentation will dive a little deeper into how Allete was impacted by the pandemic, kept the lights on, and is now well positioned to come out stronger including an in-depth look of our recent announcement to be Carbon Free by 2050 and how that will affect the mining industry.

*About the Speaker: Eric Clement is currently working for Minnesota Power as Manager – Distribution Engineering and Asset Management. He started out with Minnesota Power as the reliability engineer tracking all the power outages for the company. As his career progressed over the last 16 plus years, he moved into project engineering and supervision. He is currently leading the Distribution Engineering, Asset Management and Customer Service departments.*

### 11:15am-11:45am NRRI - Discovering the Economy of the Future

*Brett Spigarelli, Rod Johnson, George Hudak and Kevin Kangas, Natural Resources Research Institute*

As part of the University of Minnesota system research enterprise, NRRI is helping catalyze the economy of the future, one that will be defined by the natural resource nexus of water, energy and materials within the sustainable development nexus of the environment, economy and society. Through collaborative partnerships, we deliver the innovative tools and solutions needed to utilize and sustain Minnesota's precious natural resources. NRRI research informs decisions on natural resource utilization and drives economic opportunities for the State of Minnesota and beyond. To develop a portfolio of opportunities for Minnesota, NRRI employs over 140 scientists, engineers, technicians, staff and students in two industrial research facilities. Come and learn how NRRI is putting its new vision into action.

*About the speaker: Brett Spigarelli is Metallurgical Engineer at the NRRI Coleraine labs. He has been with NRRI since 2017. Prior to NRRI, he received his Ph.D. in Chemical Engineering from Michigan Technological University in 2013. After graduation, he went to work at Mesabi Nugget on the ITmk3 alternate ironmaking technology as a Process Development Engineer. After Mesabi Nugget, Brett went to work at the Steel Dynamics, Inc. Specialty Bar steel mill in Pittsboro, Indiana. In Pittsboro, he served as the Process Engineer for the electric arc furnace.*

### 11:45am-12:15pm The Rebirth of the Bloom Lake Operations

*Marc Beaubien, Quebec Iron Ore*

Five years ago, on March 31st 2016, two entrepreneurs had a dream to reopen the Bloom Lake operations. They created Quebec Iron Ore, a subsidiary of Champion Iron Ore. After a world class start-up and commissioning in February 2018, their vision for a long term operation is taking shape with a consolidation of the Phase 1 but also an expansion to double the output of the mine. Join us to learn about this vision, people driving it and their desire to succeed in producing a quality Iron ore product and become a major player in the Labrador.

*About the Speaker: Marc Beaubien is GM QIO. Marc graduated from Laval University in metallurgical engineering. He also has an MBA from Northeastern University in Boston. With over 30 years of experience Marc has a solid background in operations. In his career he was instrumental to several plant improvements and always became a force for change within the companies that he partnered with. Marc worked with Rio Tinto in the capacity of Manager Productivity Improvement (Technology & Innovation group) in the Montreal hub. Iron Ore Company of Canada in Labrador City, Business Improvement, Integrated Planning, Operations Center in his last two years he managed IOC's Pellet Plant where he significantly improved employee engagement and overall plant performance (safety, plant overall cleanliness, productivity and costs). Marc also worked in the Titanium slag business for Quebec Iron and Titanium in Sorel and Madagascar. He worked in the Calcium Carbonate (wet and dry grinding) business with OMYA Canada as manufacturing manager.*

## WEDNESDAY, APRIL 14

### KEYNOTE Sponsored by Rio Tinto

### 9:00am-9:45am 2020 & 2021, Challenging Years for the Iron Ore Industry

*Serge Perreault and Guy Saucier, ASDR*

Since June 2017, the price of iron ore at 62% CFR has experienced sustained growth marked by a peak in July 2019 at 120US\$/t, then a drop to 78 US\$/t in February 2020, to finally peak at 174US\$/t in early March 2021. Canadian iron ore miners (Rio Tinto - IOC, ArcelorMittal Mines Canada, Quebec Iron Ore & Baffinland Iron Mines Corporation) had to manage a sharp slowdown in production between mid-March and mid-April 2020 due to the COVID-19 pandemic. The increase in iron ore prices and premiums on iron ore pellets since April 2020 will have been favorable to the North American iron ore producers. In this presentation we will review the market of the iron ore worldwide, the wealth of the USA and Canada iron ore industry and the forecast for the next two years.

*About the Speaker: After graduating with a bachelor's degree (1982) and a master's degree in geology (1987) from the University of Montreal, Serge Perreault has been active in geological research and mineral exploration for nearly 30 years. Serge Perreault worked for 17 years at the Quebec Ministry of Natural Resources between 1991 and 2008. In October 2008, Serge joined SOQUEM as a senior geologist, held the position of principal geoscientist until his retirement at the end of March and was appointed Acting Director-General of SOQUEM between March 2020 and January 2021. Serge is a member of the Order of Geologists of Quebec and the CIM. He is one of the cofounder of the North American Iron Ore Symposium.*

**10:45am-11:30am**  
**Professional Development, Radical Productivity**

*Dr. Erika Garms, CEO, WorkingSmarts, Inc*

**Sponsored by Barr Engineering**

Wish you could get more done so you could free up time and lower your stress level? "Radical Productivity" will show you how productivity is connected to your emotional state, your physical state, and mental habits and routines. Discover the 'Top 10 Activators to Radical Productivity' including shifting mindset on demand, the formula for making habit changes, how to draw in and sustain focus, and how to help your body support your productivity. Leave this session with a map for how to find truly radical productivity with the 10 Activators in your tool kit, all grounded in neuroscience.

**11:30am-12:15pm**  
**Professional Development, Radical Productivity for Managers and Leaders**

*Dr. Erika Garms, CEO, WorkingSmarts, Inc*

**Sponsored by Barr Engineering**

Do you wish you could get more done to free up time and lower your stress level? "Radical Productivity" will show you how productivity is connected to your emotional state, your physical state, and mental habits and routines. Discover the 'Top 10 Activators to Radical Productivity' including shifting mindset on demand, the formula for making habit changes, how to draw in and sustain focus, and how to help your body support your productivity. Leave this session with a map for how to find truly radical productivity with the 10 Activators in your tool kit, all grounded in neuroscience. You'll be armed with techniques to use yourself and also in managing teammates and their performance.



*About the Speaker: Erika Garms helps bright leaders and teams work, manage, and innovate smarter. She uses her gift for translating powerful scientific theory to everyday workplace practice, to shape healthier and higher-performing organizations. Garms is the author of, "The Brain-Friendly Workplace: Five Big Ideas from Neuroscience That Address Organizational Challenges". She speaks regularly at conferences, company meetings, and management retreats and is a professional member of the National Speakers Association and past Dean of the NSA Speakers Academy.*

**TAILINGS SESSION**

**Sponsored by Naylor Pipe**

**10:45am-11:15am**  
**TerraFlowing – An Innovative and Flexible Method For Tailings Management**

*Nils Stewart, Weir Minerals, Madison, WI*

Weir Minerals have developed a dewatering process called "TerraFlowing™" to address both the value proposition of tailings and tailings storage. TerraFlowing™ is an opportunity to produce tailings of a suitable size fraction to construct tailings storage facility embankments or manufacture structural concrete products, as well as shotcrete for reinforcement and support. TerraFlowing™ is also capable of producing dewatered tailings of variable moisture content from a pumpable tailings up to 74wt% solids, or as a stackable product in excess of 76wt% solids. This presentation explores the TerraFlowing™ tailings handling process.

*About the Speaker: Nils Stewart is an internationally recognized expert in the field of backfilling and tailings handling solutions. Educated in South Africa, Nils attended the University of Cape Town where he graduated with a Master of Science (M.Sc.) in Materials Science focusing on backfilling. From there he went to work on mines sites for a number of companies, including Anglo American Gold and Uranium, specializing in underground support and backfill systems design and operation.*

**11:15am-11:45am**  
**The Rapidly Evolving World of Tailings Management – Where are We Headed?**

*Kurt Schimpke, Barr Engineering, Minneapolis, MN*

A series of recent high-profile impoundment dam failures abroad has led to a sea change within the mining industry and a renewed call for safe tailings storage from investors, insurers, regulators, and the public. Perhaps the most notable change has been release of the Global Industry Standard on Tailings Management in August 2020, which will undoubtedly form the basis for future regulation in various jurisdictions – including those within the United States. Additionally, various industry groups have mobilized to develop and release other guidance documents. Where there was previously a relative lack of guidance, the industry may soon be faced with the challenge of deciding what to follow. The presentation will provide a summary of key tailings management developments in recent years and offer insight as to where the industry may be headed.

*About the Speaker: Kurt is a senior geotechnical engineer with Barr Engineering Co. in Minneapolis, Minnesota. He has a bachelor's degree in civil engineering from Michigan Tech and a master's degree from Virginia Tech. At Barr, he primarily serves mining clients, focusing on tailings dam design, dam safety inspections, instrumentation monitoring, geotechnical investigations, and assessment of tailings strength. He is past-president of the Minnesota Geotechnical Society and serves on the Tailings and Mine Waste conference organizing committee.*

**11:45am-12:15pm**  
**On the Technical Aspects for Integration of Tailings Management and Incremental Life of Asset Net Present Value**

*Mike O'Kane and M. Sangster, Okane Consultants, Saskatoon, SK, Canada*

Core values of a person, family, community or industry, together with behaviors indicative of those values, result in culture. The Global Industry Standard on Tailings Management (GISTM) represents a change in culture for the mining industry, which one can interpret as sharing core values of 'safety for people' and 'protection of the environment'. Behaviors with which GISTM espouse to be indicative of these core values include a focus on people and the environment at the earliest phases of a project, implementation of best practices, conformance when there is no conflict with legislation, and integration of tailings management across the mine life cycle. Moving forward, GISTM is now the foundation for all activities within the mining industry in respect of tailings management. This technical presentation focuses on Topic II, Requirement 2.2; summarized here as, interdisciplinary knowledge across the tailings facility life-cycle. Discussion will focus on the vital importance of pore-water pressure in respect of geotechnical and geochemical stability during tailings management planning, operations, and into closure. Case studies will be used to demonstrate the importance of pore-water pressure in tailings characterization and how it must be used within tactical planning and optimization when implementing Topic II, Requirement 2.2. Terzaghi's Observational Method will be presented to illustrate how key mechanisms, and site-specific controls on these mechanisms, influence tailings management in respect of climate conditions across the mine-life-cycle, such that an asset can optimize its incremental net present value and reduce risk of unrecognized and unfunded liability.

*About the Speaker: Mike O'Kane founded Okane Consultants in 1996, a company providing integrated mine planning and closure outcomes to the mining industry internationally. Mike continues to work with Okane as senior technical advisor, using his wide-ranging technical expertise and knowledge on risk management best practices as tools for development and communication of closure planning and project specific objectives and designs. He is an expert on the application of unsaturated zone hydrology and geochemistry for mine waste management.*

**THURSDAY, APRIL 15**

## KEYNOTE

Sponsored by Lakehead Constructors Inc.

**9:00am-10:00am**

### Company Updates

The following companies will provide brief updates and address questions:

- Cameuse
- Eagle Mine
- PolyMet
- Talon Metals Corp
- Teck
- Twin Metals Minnesota
- USS
- Vermillion Gold Inc

## PROCESSING SESSION

Sponsored by Carmeuse Lime & Stone

**10:00am-10:30am**

### Two-Mass vs Brute Force Screening

Derek Kerker, General Kinematics, Crystal Lake, IL

The main focus will be on the differences between the brute force screens and the two-mass natural frequency screens. There can be huge advantages to capacities and the ability to handle large upset conditions in typical SAG mill and HPGR comminution circuits. It will be explained in both technical forms and laymen terms for better understanding to all. There can also be very large differences in how long the equipment will last. Much lower horsepower with higher tonnages.

*About the Speaker: Derek's career spans nearly 45 years with General Kinematics, with the vast majority of that time in Engineering. He spent over 6 years as Engineering manager for the process and mining departments before moving to sales as the Western Regional sales manager. Most recently, he became the Mining Director due to the technical knowledge of the mining equipment.*

**10:30am-11:00am**

### Development of Electrical Resistance Tomography System for Multiphase Flows in Mineral Processing

Weiguo Xie, University of Minnesota, Duluth, MN

The research aimed at solving the problem of measuring instantaneous local physical quantities for multiphase flows in mineral processing, which are common in minerals industry and with significant challenges. A compact Electrical Resistance Tomography (ERT) probe was built and then used to measure within a few flotation machines for the change of liquid content (high conductivity fluid distribution) and turbulence energy distribution. ERT is a powerful technique that has the potential to be used for a wider range of applications, such as leaching process, high temperature flows in further downstream production chain (steel making process and alloy manufacturing process).

*About the Speaker: Professor Xie is an Associate Professor in Chemical Engineering at the University of Minnesota – Duluth. He was awarded his PhD in 2002 at the UMIST, Manchester, United Kingdom. His expertise is in mathematical modelling, simulation, optimization, measurement and control in chemical engineering and minerals processing.*

**11:00am-11:30am**

### Bond Work Index – How does it Work?

Kyle Bartholomew, Metcom Technologies Inc., Grand Rapids, MN

Since its publication in British Chemical Engineering, 1960, Bond's Third Law of Comminution has been used as a design, benchmarking, and optimization tool by metallurgists worldwide. This presentation is a refresher on the Bond Equation, and how it remains a powerful, standard method for evaluating grinding circuit performance, even as grinding equipment has evolved over the decades. The equation is broken down and explained to improve insight, and to help avoid common mistakes, misapplications, and misconceptions about the Bond method.

*About the Speaker: Kyle Bartholomew is senior metallurgist and partner of Metcom Technologies. Founded by Dr. Robert E. McIvor, Metcom provides world-leading training and knowledge transfer for mineral grinding circuits. Kyle has a bachelor's degree in chemical engineering from Michigan Technological University and a master's degree in management of technology from the University of Minnesota. He has worked for NRRRI, Seagate Technology, and Cleveland Cliffs, and is co-inventor on five US patents.*

## ENVIRONMENTAL SESSION

Sponsored by Foth Infrastructure & Environment LLC

**10:00am-10:30am**

### MOA Implementation for the NorthMet Mining Project

Jennifer Bring, 106 Group, St. Paul, MN; Dan Ettinger, Warner Norcross & Judd LLP, Grand Rapids, MN; Kevin Pylka, PolyMet Mining Co., Hoyt Lakes, MN

Poly Met Mining, Inc. is proposing to develop the NorthMet Project, a copper-nickel-platinum group elements mine near Hoyt Lakes, Minnesota. The Project involves the reactivation and rehabilitation of a former taconite processing facility and development of a new mine site. A Memorandum of Agreement (MOA) has been established outlining mitigation for adverse effects to a diverse set of historic properties. Our presenters will share multiple perspectives, including: legal background; coordinating the many requirements of the MOA with the Project schedule; engaging with co-lead federal agencies, consulting agencies, and American Indian tribes; and documenting a mining landscape historic district that spans over 23,000 acres.

*About the Speakers: Jennifer Bring is Cultural Resources Manager at the 106 Group, a cultural resource consulting company that works nationwide. For almost 20 years, her work has focused on cultural resources management, coordinating National Historic Preservation Act and National Environmental Policy Act processes, and strategic and collaborative planning.*

*Dan Ettinger is a partner at Warner Norcross + Judd, a full-service law firm with over 200 attorneys in Michigan. Dan concentrates his practice in the areas of mining and natural resource development, environmental litigation, NEPA and NHPA compliance, and administrative law, with a special focus on issues related to Native American tribes and cultural resources. Dan advises mining and natural resource development clients regarding tribal engagement and consultation, compliance with laws aimed at protecting tribal interests and resources, such as the National Historic Preservation Act, and other cultural resource issues that can arise in the course of permitting a development project.*

*Kevin Pylka is a Manager of Environmental Permitting and Compliance at Poly Met Mining, Inc., a mine development company preparing to mine copper, nickel, and precious metals. His work with PolyMet has focused on multiple aspects of environmental review and permitting including NEPA/NHPA review and the cultural and historic resource issues that stem from that review.*

**10:30am-11:00am**

### **Biological Removal of Sulfate from Water: Current Status and Outlook for Mine Water Treatment**

*Ali Ling, Barr Engineering, Minneapolis, MN; Scott Kyser, Minnesota Pollution Control Agency, St. Paul, MN; Nathan Johnson and Chan Lan Chun, University of Minnesota Duluth, Duluth, MN*

This presentation describes regulatory pressures, factors affecting performance, and future outlook for biological sulfate removal technologies for mine water treatment. Active or passive biological treatment can be a low cost option, either as a standalone technology or as pretreatment. Regulatory context of Minnesota's sulfate standards increase the urgency of developing a portfolio of viable biological sulfate removal technologies. Effectiveness depends on reactor configuration, temperature, carbon and nutrient supply, sulfate reducing community makeup and biochemistry, and stability of immobilized sulfide. Bench-scale research is underway at the University of Minnesota for pilot- and demonstration-scale studies as a basis for full-scale implementation.

*About the speaker: Ali Ling is a professional environmental engineer at Barr Engineering in Minneapolis, focusing on front-end design, testing, and modeling. Prior to starting at Barr, she completed a PhD in environmental engineering and microbial ecology.*

**11:00am-11:30am**

### **Why Treat Water When you Can Control the Source**

*Paul Eger, Global Minerals Engineering, Woodbury, MN*

Effective antimicrobial source control techniques were first shown to be effective over 30 years ago, but the lack of consistent, well documented case studies and application challenges have limited its use. New control and application methods and a better understanding of mechanism merit reassessment of this approach. Proof of principle source control tests were conducted on a waste rock sample from the Barite Hill superfund site; three waste saturation conditions were simulated, treatment was successful in eliminating the acidophilic bacteria, but a different approach was required for each condition.

*About the Speaker: Paul Eger is an environmental engineer with Global Minerals Engineering. He has 40 years of experience dealing with environmental issues related to mining and water resources both in the public and private sector. His technical expertise focuses on water treatment, waste management, reclamation and regulatory issues.*

## **SCHOLARSHIP RECIPIENTS:**

### **SME MN Student Scholarships**

Christian Swenson\*  
Camryn Jordan\*  
Ben Rudnicki

*\*Leadership Award recipients*

### **SME Twin Cities Scholarships**

Madison Wieczorek  
Jonathan Full  
Lydia Wilimitis

**\$24,000 with 21 scholarships awarded this year**

### **Scholarship with DSACF**

#### **(Duluth Superior Area Community Foundation):**

Claire Barlass  
Sylvia Berka  
Sam Berlin  
Chace Durovec  
Arnold Majjala  
Tatem Rios  
Adeline Barto  
Jason Blood  
Cade Johnson  
Elisabeth Payne  
Alexander Robertsen  
Angela Martini  
Charles Dammann  
Alan Nelson  
Kyle Peterson

### **25 Year Members:**

Sarah Blust  
Kurt Gitzlaff

### **50 Year Members**

Wayne Nordstrom  
Doug Learmont

### **2021 Mining Professional of the Year**

Mike Indihar of United Taconite

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**KEYNOTE SESSION SPONSORS**

**Barr Engineering Co.**  
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For over 50 years, Barr has been assisting national and international mining clients with complex, large-scale projects. We offer a single source for the technical and regulatory services needed to take projects from conceptual studies and environmental assessments through facility construction, operations, and closure. Barr's services include environmental review, permitting, and compliance; reserve estimation and resource reporting; mine planning; mineral processing; facility and site design; electrical and process controls; tailings and water management; and mine-site remediation and reclamation. Headquartered in Minneapolis, Barr also has offices in Colorado, Minnesota, Michigan, Missouri, North Dakota, Utah, and Alberta, Canada.

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Road Machinery & Supplies Co. is a distributor of construction and mining equipment with sales and support operations throughout the Upper Midwest. RMS represents the best brands in the industry – including Komatsu, the second largest manufacturer of construction equipment in the world – and backs them up with responsive, knowledgeable product support and technology solutions, enabling customers to complete their jobs safely and on time. Based in Savage, Minnesota, RMS operates nine locations across Minnesota, Iowa, Illinois, and the Upper Peninsula of Michigan and seven affiliated companies in Minnesota and Texas.

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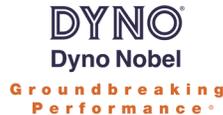
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## Duluth Seaway Port Authority

802 Garfield Avenue  
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The Duluth Seaway Port Authority is an independent public agency created by the Minnesota State Legislature to foster regional maritime commerce, promote trade development, facilitate industrial development and serve as an advocate for port interests here and around the world.

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