BHP Billiton is proud to support SEG 2014: Building Exploration Capability for the 21st Century hosted by the Society of Economic Geologists

BHP Billiton is a leading global resources company. With a world-class portfolio of large, long-life, low-cost, expandable, upstream assets, excellence in geoscience is critical to our exploration and resource development activities.

People are the foundation of our business and underpin our success. With a global team of over 100,000 employees and contractors located at more than 100 locations around the world, we offer unparalleled opportunities to work across disciplines, geographies and cultures. We strive for excellence and are committed to working in ways that are true to Our BHP Billiton Charter values of Sustainability, Integrity, Respect, Simplicity, Accountability and Performance. This ensures our people start each day with a sense of purpose and end the day with a sense of accomplishment.
Saturday

**Presidential Address & Student Mentoring Forum**
2:00pm – 4:30pm
Red Cloud Peak

**Welcome Reception**
5:00pm – 7:00 pm
Columbine Ballroom

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**REGISTRATION**
Lobby, Keystone Conference Center

- **Friday:** 2:00pm – 5:00pm
- **Saturday:** 7:00am – 7:00pm
- **Sunday:** 7:30am – 6:30pm
- **Monday:** 7:30am – 5:00pm
- **Tuesday:** 7:30am – Noon

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**EXHIBITS**
Columbine Ballroom

- **Saturday:** 5:00pm – 7:00pm
- **Sunday:** 10:00am – 7:00pm
- **Monday:** 10:00am – 6:30pm
- **Tuesday:** 10:00am – 1:30pm

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**POSTER VIEWING**
Columbine Ballroom

- **Saturday:** 5:00pm – 7:00pm
- **Sunday:** 10:00am – 7:00pm
- **Monday:** 10:00am – 6:30pm
- **Tuesday:** 10:00am – 1:30pm

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**SPEAKER READY ROOM**
Crestone Office

- **Saturday:** 8:00am – 5:00pm
- **Sunday:** 8:00am – 5:00pm
- **Monday:** 8:00am – 5:00pm
- **Tuesday:** 8:00am – 1:30pm

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**WIFI**
Network: Keystone Conference Center
Password: SEG2014

All sessions and social events are held at the Keystone Conference Center.
Welcome!

We welcome you to SEG 2014 at Keystone, SEG’s flagship international conference!

The SEG 2014 Conference theme, “Building Exploration Capability for the 21st Century,” will showcase exciting new research and technologies aimed at proactively addressing the global industry trends of increasing raw material demand and depletion of near-surface ore deposits. To develop an exploration capability that will meet these 21st century challenges, we will need access to the best new science, the best new tools, and the best new ways to pragmatically apply them.

This Conference features an outstanding lineup of widely recognized international speakers, complemented by high-quality poster presentations and an exceptional group of topical pre- and post-meeting field trips and workshops. The meeting brings together a broad spectrum of economic geology stakeholders and practitioners, covering advanced academic studies to practical case histories.

Student participation is a major focus of SEG 2014. In addition to the pre-conference student mentoring forum, there will be significant student participation in the technical program and a number of SEG student chapter displays throughout the venue.

We are most grateful to our Conference sponsors who, during a difficult period for the industry, have stepped up to help make SEG 2014 a success. Their generosity directly facilitates student participation and programs.

On behalf of the Organizing Committee and all other volunteers, we welcome you to SEG 2014 in the heart of the spectacular Rocky Mountains. Enjoy the Conference!

Bart Suchomel, Chairman, SEG 2014 Organizing Committee

Brian Hoal, Executive Director, Society of Economic Geologists
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Back cover Conference Center floor plan

Conference Information*

Conference Organizing Committee
• Chairman: Bart Suchomel, Western Mining Services, LLC
• Technical Sessions: Jon Hronsky, Western Mining Services, LLC
• Publications: Karen Kelley, U.S. Geological Survey
• Posters/Students: Thomas Monecke, Colorado School of Mines
• Workshops: John Black, Double Black Diamond Resources LLC, and Brad Margeson, Western Mining Services, LLC
• Field Trips: Bill Chávez, New Mexico Institute of Mining and Technology
• Fundraising/Marketing: Brian Hoal and Nikki Jamison, Society of Economic Geologists
• Exhibits/Administration: Darline Daley, Quality Business Services
• Secretary/Students: Christine Horrigan, Society of Economic Geologists

SEG Contact Information
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E-mail: seg@segweb.org
Website: www.segweb.org

Conference Facilitator/Exhibits
Quality Business Services (QBS)
P.O. Box 622009, Littleton, CO 80162 USA
E-mail: darline@qbsoffice.com
Tel. 303.914.0694

Conference Registration
Sea to Sky Meeting Management Inc.
Suite 206, 201 Bewicke Avenue
North Vancouver, BC, Canada V7M 3M7
Website: seatoskymeetings.com

Internet Services
Network: Keystone Conference Center
Password: SEG2014

*For registration, exhibit, and speaker ready room hours, as well as an overview of schedules, please see the inside front cover of this program. A Conference Center floor plan is located inside the back cover. All events, except where attendees have been informed otherwise, will be held in the Center.
Please join us for the SEG Awards Ceremony on Monday from 3:00 to 4:00pm in the Red Cloud Peak and Shavano Peak rooms, Keystone Conference Center.

SEG R.A.F. Penrose Gold Medal for 2013

NOEL C. WHITE
Consultant, Australia

SEG Silver Medal for 2013

DAVID R. COOKE
University of Tasmania, Australia

SEG Ralph W. Marsden Award for 2013

JEFFREY W. HEDENQUIST
Consultant, Canada

SEG Waldemar Lindgren Award for 2013

SHAUN L.L. BARKER
University of Waikato, New Zealand

SEG Brian J. Skinner Award for 2013

LINDA LERCHBAUMER
OMV, Austria

SEG Distinguished Lecturer for 2014

KAIHUI YANG
Zijin Mining Group, China

SEG International Exchange Lecturer for 2014

PAUL S. HEITHERSAY
DMITRE, Australia

SEG Thayer Lindsley Visiting Lecturer for 2014

NEIL WILLIAMS
Hon. Professorial Fellow, University of Wollongong, Australia

SEG Regional VP Lecturer for 2014

ZENGQIAN HOU
Chinese Academy of Geological Sciences, China
Pre-Conference Program

Saturday, September 27, 2014

Presidential Address & Student Mentoring Forum
2:00 pm – 4:30 pm
Red Cloud Peak

Presidential Address: Judith Kinnaird, Geology: Lifelong Learning

Student Mentoring Forum
Hosted by bhpbilliton

Forum Panel:
Mary Doherty, Chief Geochemist, Newmont Mining
Tracey Kerr, Group Head of Exploration, Anglo American
Larry Meinert, Head – Natural Resources Program, US Geological Survey
John Muntean, Director, Ralph Roberts Center for Research in Economic Geology at University of Nevada
David Rainey, Chief Geoscientist, BHP Billiton
Brock Riedell, Consulting Geologist, Minerals Exploration
Moira Smith, Chief Geologist, Pilot Gold

Welcome Reception
5:00 pm – 7:00 pm
Columbine Ballroom

Pre-Conference Field Trips: Dates as Noted

Porphyry and Skarn Systems of the Southwest United States
Field Trip Leaders: William X. Chávez, Jr., Erich U. Petersen

Non-Ferrous Mineralization Associated with the Wawa-Abitibi Terrane and Duluth Complex Cu-Ni-PGM Deposits, Northeastern Minnesota
Field Trip Leaders: George Hudak, Dean Peterson

Colorado Porphyry-Molybdenum Deposits and Leadville District
Field Trip Leaders: Ralph J. Stegen, Tommy B. Thompson

Cripple Creek and Victor Gold Mine
Field Trip Leaders: Timothy R. Brown, Sergei A. Diakov

Pre-Conference Workshops:
Saturday, September 27, 2014

Advanced GIS Techniques — Maximizing Your Data
Presenters: Willy Lynch, Mike Price

Application of Multi-Element Geochemical Data: Exploring Datasets for Better Targeting and Domaining
Presenters: Lynda Bloom, Pim van Geffen, Gervais Perron, Peter Winterburn, Chris Benn, Juan Carlos Ordóñez, Réjean Girard

Future of Mineral Exploration Drilling and Sampling
Presenters: James S. Cleverley, Richard Hillis
**Technical Program**

Talks for which the presenting author is a student can be identified by an asterisk (*) after the title.

Names of invited speakers are highlighted.

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**Day 1: Sunday, September 28, 2014**

**Session 1 (plenary): Fundamentals Advances in Economic Geology**

**Welcome and Introduction**  8:15 am  

*Bart Suchomel*, Conference Chairman, Western Mining Services (WMS)  
Session Chair: Jon Hronsky, WMS

**Mineral evolution: Episodic metallogenesis, the supercontinent cycle, and the coevolving geosphere and biosphere**  8:30 am  
Robert Hazen, Carnegie Institution for Science; George Mason University

**The physical hydrology of ore-forming magmatic-hydrothermal systems**  9:00 am  
Philipp Weis, ETH Zurich

**Timescales of mineral systems—advances in understanding over the past decade**  9:30 am  
Massimo Chiaradia, University of Geneva

**Break**  10:00 am

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**Session 2: Fundamental Advances in Economic Geology**

Session Chair: Judith Kinnaird, EGRU, University of the Witwatersrand

**Ore formation drives ore extraction:** 10:30 am  
*Economic geology is the foundation for geome*  
Karin Olson-Hoal, Colorado School of Mines

**Textural and isotopic evidence for metallic nanoparticles in bonanza epithermal ores** 10:50 am  
James Saunders, Auburn University

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**Widespread euxinic conditions are not a prerequisite for sedimentary exhalative mineralization in the Selwyn Basin, Canada** 11:10 am  
Joseph Magnall, University of Alberta

**Contemporaneous alkaline lamproites and carbonatites in the Kalmakyr and Muruntau ore districts, Tienshan, Uzbekistan: Mantle contribution for the formation of giant ore deposits** 11:30 am  
Reimar Seltmann, Natural History Museum, CERCAMS

**Investigation of the quartz-gold interface utilizing electron microscopy** 11:50 am  
Michelle Burke, Miami University

**Duration and dynamics of orogenic-type gold deposits** 12:10 pm  
Steven Micklethwaite, Centre for Exploration Targeting (CET), University of Western Australia

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**Barrick**

Barrick’s Goldrush discovery is the direct result of years of robust technical work. The geological foundation and understanding of ore controls developed in the Cortez district were used to target concealed mineralization, resulting in the one of the largest, highest grade gold discoveries worldwide since 2001. The discovery team was awarded PDAC’s prestigious 2014 Thayer Lindsley Discovery Award. Quality technical work, perseverance, discipline and teamwork are core to Barrick’s exploration efforts and will be critical to the next generation of discoveries.
Session 3: Mineral System Science
Session Chair: François Robert, Barrick

Syntectonic formation of giant porphyry copper and intrusion-related ore deposits in linear belts by decompression fluid saturation of regularly spaced diapiric plutons ascending fault ramps within the anticlinal hinge of the frontal Cordilleran fold and thrust belt
George Brimhall, University of California, Berkeley

The physical and tectonic setting of Andean high-sulfidation epithermal gold-silver deposits and what it means for mineralizing processes and exploration targeting
Thomas Bissig, MDRU, University of British Columbia

Volcanic processes in the formation porphyry copper deposits
Stephen Sparks, University of Bristol

Structural controls on the emplacement of porphyry systems: The case of the Rio Blanco-Los Bronces cluster, Andes of central Chile
Jose Piquer, CODES, University of Tasmania

Porphyry copper deposits in China: Spatial-temporal distribution and their tectonic settings
Jingwen Mao, Institute of Mineral Resources, Chinese Academy of Geological Sciences

Jurassic gold metallogeny in the Colombian Andes
Hildebrand Leal-Meja, MDRU, University of British Columbia

Session 4 (plenary): Innovations in Exploration Technology
Session Chair: Jean Des Rivieres, BHP Billiton

Coiled tubing drilling and real-time sensing—enabling prospecting drilling in the 21st century?
Richard Hillis, Deep Exploration Technologies, CRC

Muon tomography: Bringing new physics to ore-body imaging
Doug Bryman, University of British Columbia

Next generation three-dimensional geologic modeling and inversion
Mark Jessell, University of Western Australia

Break

Session 5: Deposit Footprints
Session Chair: David Kelley, MMG

Using multi-element geochemistry to map multiple components of a mineral system. Case study from a sediment hosted Cu-Ni camp, NW Province, Zambia
David Wood, First Quantum Minerals, Ltd.

Chlorite chemistry as an exploration tool in the propylitic halo of porphyry-epithermal systems: A case study of the Batu Hijau porphyry Cu-Au system, Indonesia
Jamie Wilkinson, CODES, University of Tasmania; Imperial College (London); Natural History Museum (London)

Copper isotopic vectors to supergene enrichment: Leached cap isotopic footprint of the Quellaveco porphyry copper deposit, southern Peru
David Braxton, Anglo American; presentation by Ryan Mathur, Juniata College

Contrasting footprints and characteristics of IOCG-type and porphyry-type hydrothermal systems related to episodic Mesozoic arc magmatism in coastal northern Chile
Mark Barton, University of Arizona

Structural, mineralogical, geochemical and petrophysical characterization of mafic dykes: A key to defining the Canadian Malartic gold deposit footprint
Stéphane Perrouty, University of Western Ontario
Day 2: Monday, September 29, 2014

Session 7 (plenary): Mineral System Science
Session Chair: Perry Eaton, Newmont

The mineral system concept: The key to successful undercover targeting
Cam McCuaig, University of Western Australia

The Carlin gold system: Applications to exploration in Nevada and elsewhere
John Muntean, Nevada Bureau of Mines, University of Nevada-Reno

A giant Mesoarchean crustal gold-enrichment episode: Possible causes and consequences for exploration
Hartwig Frimmel, University of Würzburg

Break

Session 8: Mineral System Science
Session Chair: Rich Goldfarb, USGS

Tectonic architecture of ca. 1.60-1.57 Ga IOCG mineralisation in Australia
Caroline Forbes, DET CRC, University of Adelaide

Orogenic gold systems in the Andes of South America
Steffen Hagemann, CET, University of Western Australia

Gold metallogeny of northwestern Iberia: Superimposed orogenic and intrusion-related mineralization in an evolving Variscan orogeny
James Mortensen, University of British Columbia

The Abitibi breaks: Syn-orogenic extensional faults inverted as thick-skinned thrusts
Wouter Bleecker, Geological Survey of Canada
### Session 9: Innovations in Exploration Technology

Session Chair: Amanda Butt, Rio Tinto

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker</th>
<th>Institution</th>
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<tbody>
<tr>
<td>10:30 am</td>
<td>Micro-analytical innovation for diamonds exploration and beyond</td>
<td>Paul Agnew</td>
<td>Rio Tinto</td>
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<tr>
<td>11:00 am</td>
<td>Examples of seismic signatures of large mineral systems</td>
<td>Greg Turner</td>
<td>HiSeis</td>
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<tr>
<td></td>
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<td>presentation by Don Pridmore, HiSeis</td>
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<tr>
<td>11:20 am</td>
<td>Finding the blind: Targeting carbonate-hosted deposits using stable isotopes</td>
<td>Shaun Barker</td>
<td>University of Waikato</td>
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<tr>
<td>11:40 am</td>
<td>Core orientation—data QC as a key to discovery</td>
<td>Russell Myers</td>
<td>Corvus Gold, Inc.</td>
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<tr>
<td>12:00 pm</td>
<td>Improved interface designs for automated analysis of potential field data</td>
<td>Eun-Jung Holden</td>
<td>CET, University of Western Australia</td>
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**Lunch**

### Session 10 (plenary): Deposit Footprints

Session Chair: Murray Hitzman, Colorado School of Mines

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<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td>New advances in detecting the distal geochemical footprints of porphyry systems—epidote mineral chemistry as a tool for vectoring and fertility assessments</td>
<td>David Cooke</td>
<td>CODES, University of Tasmania</td>
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**SEG Awards Ceremony (plenary):**

For a list of awardees, see p. 5

Location: Conference Center, Red Cloud Peak and Shavano Peak

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**Gold Resource Corporation**

**NYSE MKT: GORO**

Monthly Dividends: Gold, Silver or Cash

[www.goldresourcecorp.com](http://www.goldresourcecorp.com)
Day 3: Tuesday, September 30, 2014

Session 12 (plenary): Exploration Management and Targeting
Session Chair: Tracey Kerr, Anglo American

What does the global exploration industry need to deliver in the 21st Century?
A shareholder’s perspective
Randall Oliphant, New Gold

The global shift to undercover exploration—How fast? How effective?
Richard Schodde, MinExCo

Finding the copper mine of the 21st century: conceptual exploration targeting for hypothetical reserves*
John Sykes, Curtin University

Break

Session 13: Exploration Management and Targeting
Session Chair: Rob Krcmarov, Barrick

The business of exploration in China
(SEG Distinguished Lecture)
Kaihui Yang, Zijin Mining Group

The role of organizational culture and its link to strategy in mineral exploration management
Eric Seedorff, Lowell Institute for Mineral Resources, University of Arizona

Data mining—a powerful tool for exploring under cover in mature districts
Colin Barnett, BW Mining

Curvature attribute from surface-restoration as predictor variable in Kupferschiefer copper potentials: An example from the Fore-Sudetic Region (Poland)*
Pablo Mejia-Herrera, Université de Lorraine

KGHM International operates mines in Canada, the USA and Chile and is currently constructing the Sierra Gorda copper-molybdenum Project in Chile. We are progressing the Ajax Project in Kamloops, British Columbia as well as the Victoria Project, our newest discovery in Sudbury, Ontario. We are a wholly owned subsidiary of KGHM Polska Miedź S.A., focused on growth in copper and other metals.

www.kghminternational.com
An innovative structural hypothesis established during target generation for gold and copper mineralisation in the Cobar district, NSW Australia

Lize Stander, New Gold

Session 14: Mineral Systems Science
Session Chair: John Everest, KGHM

Mineral systems and area selection: Application to IOCG, Ni, and other mineral systems in Australia
Roger Skirrow, Geoscience Australia; presentation by David Huston, Geoscience Australia

The chonolith Ni-Cu model: Expanding the footprint of Ni-Cu deposits and chasing weaknesses in the nickel mineral system model
Steve Beresford, First Quantum Minerals; presentation by Jon Hronsky, WMS

Mesoproterozoic carbonatitic magmatism in the Bayan Obo deposit, Inner Mongolia, North China: Constraints for the mechanism of super accumulation of rare earth elements
Kuifeng Yang, Chinese Academy of Sciences

Mesoproterozoic iron oxide-apatite and iron oxide-copper-gold-rare earth element deposits of southeast Missouri, USA: Geology, geophysics, and exploration potential
John Slack, USGS

Controls on the formation of a large Zn-Pb Irish-type deposit: Evidence from the Navan halo
Freya Marks, University College Dublin

Proterozoic basement structures and thermogenic sulfate reduction-derived H₂S as key controls on economic Laisvall-type Pb-Zn deposits, eastern erosional front of the Scandinavian Caledonides, Sweden
Nicolas Saintilan, University of Geneva

Lunch

Session 15: Case Studies of 21st Century Exploration Success
Session Chair: Mike Christie, First Quantum Minerals

Discovery history of the Sakatti Cu-Ni-PGE deposit, Finland
Jim Coppard, Consultant

Geology and discovery of Escondida Este porphyry Cu-Mo deposit, Escondida cluster district, northern Chile
Marco Ipinza, Minera Escondida Ltda.; presentation by Alejandro Pizarro, Minera Escondida Ltda.

Geology and discovery history of the Chukaru Peki Cu-Au deposit, Timok magmatic complex, Serbia
Vertrees (Mac) Canby, Freeport McMoRan Exploration

Boliden’s Garpenberg Zn-Pb-Ag mine, Sweden—critical factors behind the discoveries that turned mine closure into a large expansion project
Rodney Allen, presentation by Rolf Jonsson, Boliden Group

Discoveries of Fresnillo plc: The silver giant in Mexico
David Giles, Fresnillo plc

Discovery of the Nuevo Chaquiro porphyry Cu-Au-(Mo) deposit, Antioquia Department, Colombia
Paul Bartos, AngloGold Ashanti
Session 16: The Fundamental Advances in Economic Geology

Session Chair: Mary L. Little, Mirasol Resources Ltd.

The geobiology of sediment-hosted mineral deposits
Clinton Scott, USGS

Sources of reduced sulfur, early diagenesis, and fine laminae in the currently forming metalliferous sediment of the brine-covered Atlantis II Deep, Red Sea*
Tea Laurila, University of Ottawa, Geomar

Iron and oxygen isotope and element systematics of magnetite from the Los Colorados IOA deposit, Chile: A paradigm shift for IOA deposits?
Adam Simon, University of Michigan

Newmont

Newmont is actively seeking earn-in exploration opportunities of emerging gold and copper-gold discoveries in North and South America, East and West Africa and Australia

Please contact our Regional Exploration Business Development managers:
Christian Clode
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Craig Miller
Australia
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Steven Woods
Africa
steven.woods@newmont.com

Volcanostratigraphic controls on the occurrence of massive sulfide (VMS) deposits in the Semail ophiolite, Oman
Larryn Diamond, University of Bern

Metal mobility and hydrothermal alteration within the Kevitsa Ni-Cu-PGE deposit, Lapland, Finland
Frank Santaguida, First Quantum Minerals

Break

Session 17 (plenary): Case Studies of 21st Century Exploration Success

Session Chair: Bruce Gemmell, CODES, University of Tasmania

Anglo American exploration: Key ingredients to a decade of success
Graham Brown, Consultant

The Ivanhoe Group—two decades of global discoveries
David Broughton, Ivanhoe Mines

Motive, means and opportunity: Key factors in the discovery of the Nova-Bollinger magmatic nickel-copper sulfide deposits in Western Australia
Mark Bennett, Sirius Resources NL
**Post-Conference Program**

**Post-Conference Field Trips**

**The Viburnum Trend: A World-Class October 1–3 Pb-Zn-Cu MVT District in SE Missouri, USA**
Field Trip Leaders: Thomas G. Schott, Anna A. Kutkiewicz, Harrison J. Ingham, Kyle Williams

**Uncovering the Bingham and October 1–2 Stockton Cu-Mo-Au Porphyries**
Field Trip Leaders: Kim E. Schroeder, Kenneth A. Krahulec, Rudy Ganske

**Gold and Silver Mines of the Sierra Madre October 1–5 Occidental, Mexico**
Field Trip Leader: Guillermo Gastelum-Morales

**Post-Conference Workshops: October 1–2, 2014**

**Exploration in 2025: The Tools and Techniques to Explore Under Cover**
Venue: Colorado School of Mines, Golden Colorado
Presenters: Ken Witherly, Neil Williams, John R. Holliday, Thomas Bissig, Jon A. Woodhead, Peter L. Kowalczyk, Dianne E. Mitchinson, James S. Cleverley
Student Coordinator: Douglas T. (Ty) Conner

**Getting More from Drill Core — Automated, Spectral-Based Mineral and Texture Mapping**
Presenters: Brigette A. Martini, Ronell Carey, Representatives from Leapfrog, aQuire, and exploration companies

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**Discover**

Using the latest in technology and innovation, Rio Tinto Exploration has delivered extraordinary results across a broad range of commodities and environments globally since 1947 and we continue to push new frontiers.

To find out more please visit us at booth 39.

riotinto.com

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**RioTinto**
Posters

Posters will be on display throughout the Conference in the Columbine Ballroom. In addition to the regular hours, a dedicated exhibits and poster session chaired by Thomas Monecke will be held on Monday, September 29, at 4:00 p.m.

Regular hours are as follows:
Saturday: 5:00 pm – 7:00 pm
Sunday: 10:00 am – 7:00 pm
Monday: 10:00 am – 6:30 pm
Tuesday: 10:00 am – 1:30 pm

Titles and authors of posters are listed below, grouped by theme.
Posters for which the senior author is a student can be identified by an asterisk (*) that follows the poster number.
Italics indicate the presenting author.
Abstracts and pdfs of posters are published on the Conference USB flash drive, distributed in the complimentary bag given all attendees.

**Fundamental Advances in Economic Geology**

P 001* Strontium and stable C and O isotopic composition of carbonates in the Ernest Henry deposit, Queensland, Australia: Implications for genesis and exploration
Michael Fuss, Zhaoshan Chang, Christa Placzek, and Richard Lilly

P 002* Tracking the link between epidotized and volcanogenic massive sulfide (VMS) deposits in the Semail ophiolite, Oman
Samuel A. Gilgen, Larryn W. Diamond, and Ivan Mercolli

P 003* Bulk compositional controls on mineral assemblages in metamorphosed ore deposits: An example from the LaRonde-Penna Au-rich VHMS deposit, Quebec, Canada
Helen Thomas, Nigel M. Kelly, Thomas Monecke, Patrick Mercier-Langevin, David Pitre, Benoît Dubé, and Yvette Kuiper

P 004* Two kinds of initial fluids associated with aplite porphyry and granite porphyry driving the formation of the giant Chalukou porphyry Mo deposit, NE China
Zhenzhen Li, Kezhang Qin, Guangming Li, Luying Jin, and Guoxu Song

P 005* The major-trace element chemistry of garnet in metamorphosed hydrothermal alteration zones in the Proterozoic Stollberg Zn-Pb-Ag-(Cu-Au) ore field, Bergslagen district, Sweden: Implications for exploration

P 006* Textures and cathodoluminescence properties of molybdenite-bearing quartz veins at the Bingham Canyon Cu-Au-Mo porphyry deposit
Simon Kocher, Jamie J. Wilkinson, Robin Armstrong, and Kim Schroeder

P 007* Transition and comparisons between calc-alkaline and alkaline porphyry mineralizations, Woodjam district, central British Columbia
Irene del Real, Farhad Bouzari, Craig Hart, Jacqueline Blackwell, Amelia Rainbow, and Ross Sherlock
P 008* Defining time-space relationships between hydrothermal and volcanic activity in a complex epithermal system, Bruner Au-Ag property, NV
Dylan Baldwin and Greg B. Arehart

P 009 Iron and oxygen isotope and element systematics of magnetite from the Los Colorados IOA deposit, Chile: A paradigm shift for IOA deposits?
Adam Simon, Martin Reich, Laura Bilenker, Jaayke Knipping, Craig Lundstrom, Artur Deditius, Ilya Bindeman, and Fernando Barra

P 010* High-temperature fluid inclusions from quartz veinlets at the Malmyzh porphyry copper-gold deposit, Far East of Russia
Daria S. Bukhanova and Pavel Yu. Plechov

P 011* Time-space relationships between sediment-hosted gold mineralization and intrusion-related polymetallic mineralization at Kinsley Mountain, Nevada
Tyler J. Hill, John L. Muntean, Randy Hannink, and Pete Shabestari

P 012* Post-mineralization displacement of Carlin-type deposits: Effects of the Northern Nevada Rift
Wiley B. Skewes and Elizabeth Holly

P 013 The characteristics of fluid inclusions and stable isotopes of the Awen gold deposit, Truongson fold belt, Laos
Yongqing Chen and Jin Xie

P 014* Textural and chemical evolution of unidirectional solidification textures in intrusion-related Au-W occurrence at Kharaatyagaan, central Mongolia
Jamsran Erdenebayar and Takeyuki Ogata

P 015* Sulfur isotopic studies of polymetallic sulfides hosted within hydrothermal mudstones associated with the Cambrian Lemarchant volcanogenic massive sulfide deposit, Newfoundland, Canada
Stefanie Lode, Stephen J. Piercey, Graham D. Layne, Christine A. Devine, and Glenn Piercey

P 016 Consistent copper isotope footprints in surface and groundwater from multiple deposit types
Ryan Mathur, LeeAnn Munk, Brian Townley, Jennifer Roskowski, S. Song, Kunyi Guo, Fernando Tornos, Spencer R. Titley, and Martin Reich

P 017* Multiple sulfur isotope implications for the genesis of Algoma-type BIF, marine metal cycling, and exploration
David Diekrup, Stephen Ginley, Mark D. Hannington, and Harald Strauss

P 018 The 2.69 Ga Paringa basalts: Crustal recycling into the asthenosphere source
Nuru M. Said and Campbell T. McCuaig

P 019* Scanning electron microscopy investigation of gold in laterites from Venezuela: Textures suggest low temperature mobilization of gold
Joshua A. Silverstein, Mark Krekeler, and John Rakovan

P 020* Quartz-sulfosalt relationships in high-sulfidation deposits—Goldfield, Nevada, USA: Genetic implications
Johanna M. Cervera Acosta, Elizabeth Holley, Tsolmon Gonchig, Edy Vasquez, Pamela Lagrava, and Justin Lowe

P 021* Evidence for early horizontal shortening in the southern Abitibi subprovince, Canada: Implications for Neoarchean geodynamic processes
Ben M. Frieman, Yvette D. Kuiper, Thomas Monecke, and Nigel Kelly

P 022 An integrated approach to understanding granulite-hosted gold: Tropicana deposit, Western Australia
Mark G. Doyle, Tom L. Blenkinsop, Tony Crawford, Ian R. Fletcher, Jeffrey Foster, Ross R. Large, Ryan Mathur, Neal J. McNaughton, Sebastien Meffre, Janet R. Muhling, and Birger Rasmussen
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