



We apologize for the delay in the publication of Explore 128

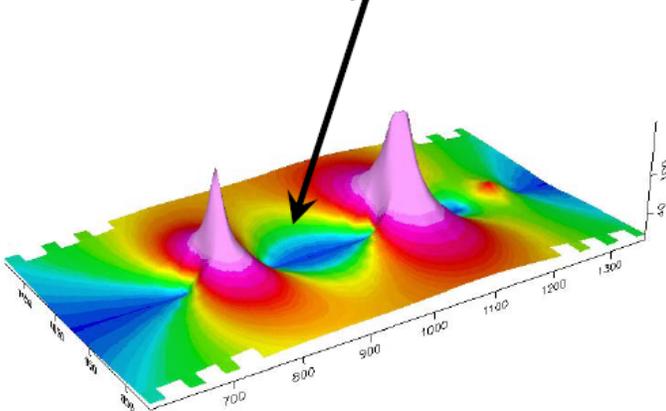


ACTLABS Group of Companies-Laboratories

Activation Laboratories Limited in Ancaster, Ontario has continued to expand. New state-of-the art fire assay facilities are now operational utilizing three new fire assay furnaces obtained from Australia. We have, however, purchased the smaller size furnaces and have limited the load of the furnaces to 42 crucibles to ensure that the furnace load can be poured adequately prior to cooling too much as is common with the larger 84 crucible loads. This allows us to maintain our commitment to the highest quality fire assays. To supplement the analytical finish we have added a new Varian AA and two Cahn gravimetric balances.

We have expanded our ICP/OES department to include a new state of the art Varian Vista Pro ICP, to supplement our other three optical ICP's. New packages introduced include a sodium peroxide fusion for assay and trace element analysis. In addition we have added a new Perkin Elmer Sciex Elan 9000 ICP/MS to add to our four existing ICP/MS's and our High Resolution Finnegan Mat Element 2 ICP/MS. New analytical packages introduced include direct analysis of vegetation without ashing and

Halo Kimberlite Pipe Anomaly at Pxxx1



analysis of water for Au down to 0.1 ppt. A new laser ablation unit will be added in the coming in the near future to the high resolution ICP/MS. CO2 analyses are now performed directly by coulometry using a new UIC coulometer instead of the old indirect way using combustion IR on the original sample and a leached residue and obtaining the CO2 by difference. This has allowed us to lower the cost of CO2 analysis, improve the detection limit and the quality. A second Eltra C,S

continued on page 2



David Kelley

AAG Presidential Address

This is an exciting time for the AAG as the final preparations for the 22nd International Geochemical Exploration Symposium in Perth, September 17-23, are being put into place. The Local Organizing Committee, chaired by Nigel Radford and Paul Morris, has done an excellent job organizing this symposium. This IGES will be somewhat unique from past ones in that it will also incorporate the 1st International Applied Geochemistry Symposium, reflecting our new Association's name. In perusing the registration brochure, it's clear that this will be an excellent meeting, packed with Keynote talks, papers and posters covering a broad range of applied geochemistry topics. If you need more information on this meeting go to our website and click on the widget.

I'm sad to report that we have lost one of our distinguished members and leaders, Paul Theobald. Paul passed away peacefully at home with his family on July 16th. Paul was a founding member of the AEG and a past President. I was fortunate to work with Paul at the USGS - Branch of Exploration Geochemistry - from 1982-1986. Paul was a legend at the Survey, and all of the young geologists knew it. Each spring we would venture back to his office, a portable trailer behind Building 2 on McIntyre Street in Golden, hoping to sign up as one of his field assistants. The first time I did this I noticed a big piece of Fe-oxide on his file cabinet upon entering the trailer. Trying to impress Paul with my knowledge, I asked him if this was "gossan", but I thought it was a French word and pronounced it more like "Garçon." The next spring I ventured into Paul's trailer again and this time he asked if I had any experience riding horses. "Sure", I said, thinking that the pony ride on my 5th birthday counted. I think he could sense my city roots so that summer I worked in Caliente, Nevada out of a helicopter instead of riding horses into Williams Fork, Colorado with Paul and his crew. Paul was a great geochemist, mentor and teacher to many at the Survey. Each summer he would fill up large tubs of water in the parking lot and teach everyone how to properly pan a sample. Paul pioneered the use of heavy mineral concentrates for regional mineral potential assessments, which led to international assignments in Mexico, China, Saudi Arabia and Europe. His daughter, Mary Doherty, was already an expert in panning because he used to pay her 10 cents a sample to carry and pan his samples. You can still get Mary to pan samples but it will cost you a lot more than 10 cents. Paul will be missed by many friends, colleagues, and especially his family.

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Newsletter for the Association of Applied Geochemists

EXPLORE NEWSLETTER wishes to thank our Corporate Sponsors



# Geochemical Laboratory

Updates... *continued from page 1*



analyzer was added to our Leco unit to allow us to measure C,S from low ppm to major quantities. Additional fume hood and dissolution capabilities have also been added including a second microwave digestion unit. A Malvern Mastersizer S laser particle size analyzer was added in the last year. Additional TM Engineering Terminator crushers have been added in sample preparation after our favourable evaluation of the first unit. The specification for this crusher now allows 85% - 10 mesh on the primary crush versus 70% -10 mesh with the last generation of crusher. A second vegetation asher now has been commissioned to improve turnaround time for ashed vegetation samples.

The culmination of several years of development work in conjunction with Assaynet have come to fruition with the full implementation of our new laboratory information management system (LIMS). We now have the tools to ensure complete audit trails through all areas of the lab. This allows us to locate the exact status of samples within the lab allowing us to improve significantly on turnaround time. The LIMS also has full QC functions. A web interface will allow the client to log samples in externally and print bar code labels to be affixed to your samples. Automatic notification of sample receipt is now routinely done.

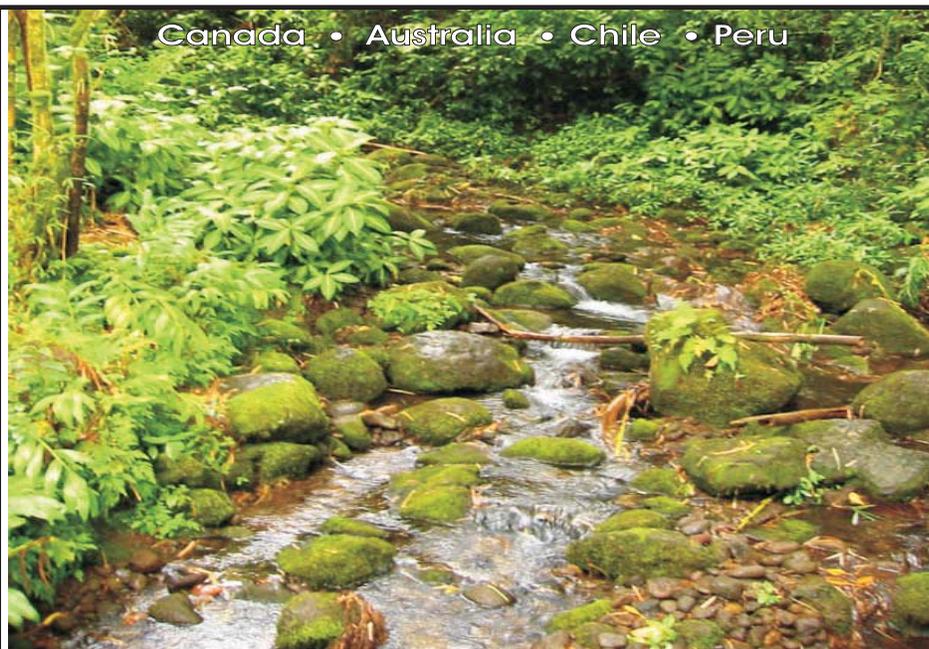
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## President's Message... *continued from page 1*

I'm happy to announce that the Association has a new Honorary Member and a new Gold Medalist. The recipients of these distinguished awards, along with the latest Student Paper Prize winner will be announced at the Gala Dinner in conjunction with the IGES, September 20<sup>th</sup> at the Government House.

We picked up several new members and renewed several past members at the Geological Society of Nevada's symposium "Window to the World", held May 15 - 18, 2005 in Reno, Nevada. A summary of this meeting and the Goldschmidt Conference is included in this issue.

Preparation continues in the AAG-sponsored workshop, *Geochemistry in Mineral Resource Development*, for the Society of Economic Geologists meeting, *Wealth Creation in the Minerals Industry*, May 14-16, 2006, in Keystone, Colorado. I'd like to thank Graham Closs for

his efforts in driving this initiative.

Finally, I'm happy to announce that Bob Eppinger will be the new Chair of the Website Committee. I would like to thank Richard Carver for serving in this role for the past two years. Bob will be working closely with our Web Master, Andrew Ransom, to maintain and improve the website. If you have ideas or suggestions for the website, please contact Bob (eppinger@usgs.gov).

I hope to see you at the IGES in Perth.

Sincerely,

**David Kelley**

*Newmont Mining Corporation*

*Malozemoff Technical Facility*

*10101 East Dry Creek Rd*

*Englewood, Colorado*

*USA 80112*

*dave.kelley@newmont.com*



## Annual General Meeting – Sunday September 18<sup>th</sup> 2005

The Annual General Meeting of the AAG will be held this year in conjunction with the IGES in Perth, Australia.

The meeting will take place at 3:30 p.m. in the Golden Ballroom at the Sheraton Hotel, prior to the AAG Distinguished Lecturer talk at 5:00 p.m.



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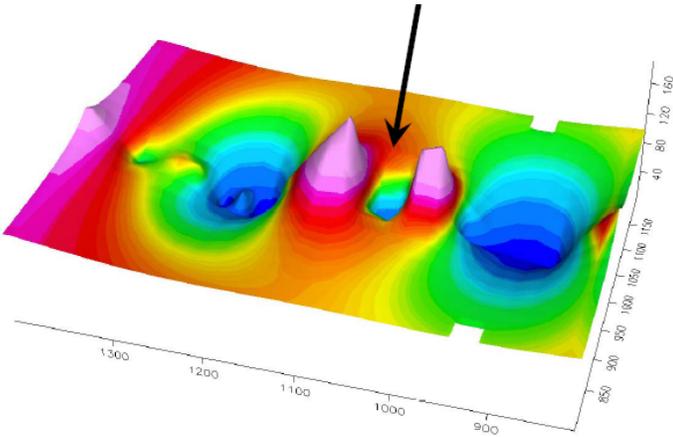
For more information contact Geosoft at [software@geosoft.com](mailto:software@geosoft.com). Visit us at [www.geosoft.com](http://www.geosoft.com).

# Geochemical Laboratory

Updates... continued from page 2

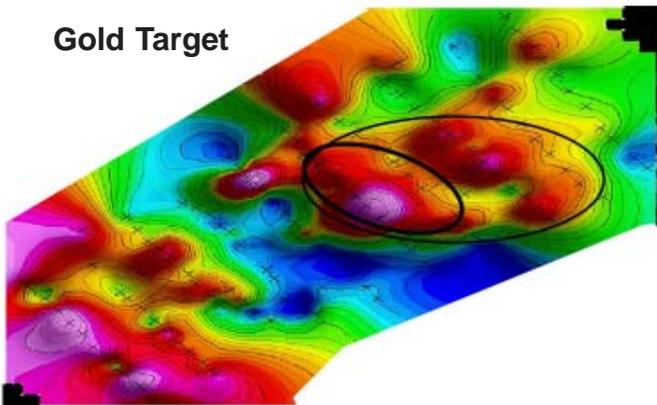


## Halo Kimberlite Pipe Anomaly at Pxxx2



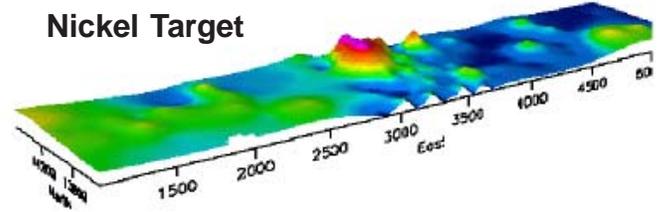
Our CAMIRO research project came to a very successful conclusion in 2004 with the countdown of confidentiality period commenced. Our Soil Gas Hydrocarbon (SGH) test for mineral exploration is very popular. This predictive geochemistry is experiencing significant success in depicting buried gold, petroleum and kimberlite targets. Many clients are using this technique to differentiate magnetic anomalies of interest that might be potential drill targets from barren anomalies thus improving drilling programs. With the SGH method we provide data on 162 organic compounds. Using a forensic

## Gold Target

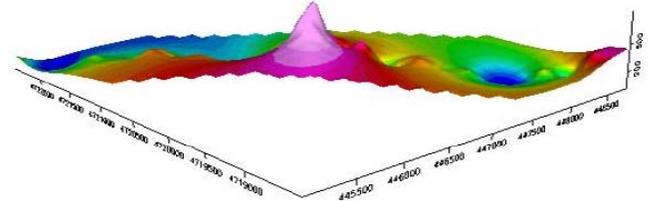


approach, specific geochromatographic target signatures have been developed from known case studies for gold and kimberlite surveys as well as uranium, nickel and VMS. With our interpretive service, we are now able to use a

## Nickel Target



## Wet Natural Gas Target



rapid data processing technology to vector towards the buried target and present the most probable location of a vertical projection of the target. The examples illustrate outstanding targets for two kimberlite pipes at two different transects, a gold and nickel target from a grid sampling programs and a target for a wet natural gas play.

**Actlabs-Skyline Peru S.A.C.** in Lima Peru have continued their expansion with the acquisition of another Varian AA and additional sample preparation equipment. The lab achieved ISO 9001 accreditation in 2004.

**Actlabs Chile S.A.** in La Serena and Antofagasta has continued on its quality improvement initiative and has achieved ISO 9001 accreditation this year. Much additional equipment and personnel have been obtained to handle the workload.

**Actlabs Greenland-** A new sample preparation facility with state of the art TM Engineering Terminator and pulverizer has been installed in Nuuk, Greenland.

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### Coming soon in the AAG EXPLORE newsletter:

Technical articles and letters to the editor are encouraged as submissions for discussion within the newsletter. Each issue of **EXPLORE** contains a series of short discussion papers which provide either an update on a particular geochemical topic, or present current debates about issues of interest. Suggestions for future "Focus" topics may be forwarded to the editor,

Chris Benn (Email: [Chris.Benn@BHPBilliton.com](mailto:Chris.Benn@BHPBilliton.com))

**Issue: Focus topic and Contact:**

129	Geochemistry as a Professional Career
<b>Contributor Deadline</b>	October 30, 2005
<b>Publication Date:</b>	December 2005

## Geochemical Laboratory Updates...



Genalysis was founded in 1975 in Perth, Western Australia by directors Terry and Tena Wheeler and this year are celebrating their 30<sup>th</sup> year of operation. Terry passionately heads a team of dedicated staff (more than 200) with most of the key personnel having 10-20 years service with the company and/or industry experience.

New developments include:

- **Automated Sample Preparation**

Genalysis has much pleasure in announcing that they have recently placed an order for a fully automated robotics sample preparation system from IMP. This significant investment will form phase one of a multi-phased project to automate many of the sample preparation and analytical procedures currently being carried out manually. This Australian first system will be installed and commissioned later this year at the new Genalysis Perth property. IMP is a leading designer and supplier of automated laboratory equipment. We believe that this system will alleviate some of the labour intensive areas within Genalysis and help our systems become more streamlined.

- **On-line Tracking of Work**

Genalysis is happy to announce that the online LabTrak system is up and running and available for our clients. LabTrak has been developed to provide clients with a simple and quick way to check the status of their analytical jobs via the internet. It will provide users with information on pending jobs (where samples have not yet been received by Genalysis), active jobs and completed jobs (for approximately six months after completion). Visit our website via [www.genalysis.com.au/client\\_area](http://www.genalysis.com.au/client_area) to gain access to this new feature.

- **New Instrumentation**

In co-operation with Perkin Elmer Australia we will be introducing two new Elan 9000 units to the existing fleet of PE instrumentation. The new Elan 9000 ICP-MS system simplifies the ICP-MS by providing an easy-to-use, easy-to-maintain tool for routine ultratrace level analysis. These instruments have excellent detection limits, high sample throughput, and the stability required to meet the heavy loads required by the mining and exploration industry. This will give Genalysis a total of five ICP-MS instruments and four ICP-OES instruments. This increase in instrumentation is intended to give a significant increase in throughput.

For those attending the Perth IGES 2005 conference, Genalysis extends a warm welcome for interested delegates to visit the laboratory. A tour has been arranged in conjunction with the event organizers to be held during the conference time-table – register via your expression of interest in the registration brochure or online at <http://www.promaco.com.au/conference/2005/iges/>.



## SGS Minerals Services

SGS Minerals Services is a world leader in the supply of analytical, metallurgical, mineralogical and diamond services. With satellite labs in locations throughout the globe and flagship laboratories on every continent, SGS Minerals provides a comprehensive network of expertise to exploration clients.

### CAPACITY

The SGS Minerals analytical laboratory network continues to expand its global capacity. Expansions include the newly opened commercial sample preparation facilities in Kunming-China, Elko-Nevada and Durango-Mexico and a successful start-up of two new commercial laboratories, including fire assay and base metal analysis in Tianjin, China and Ouagadougou, Burkina Faso. SGS also continues to expand its portfolio of mine-site laboratories in as Australia, Brazil, Guatemala, Peru, Philippines, Serbia and West Africa. Significant expansion to sample preparation and fire assay facilities in Belo Horizonte and Toronto, as well as expansion to Toronto's ICP and ICP-MS lab demonstrate our determination to meet market demand with world class service.

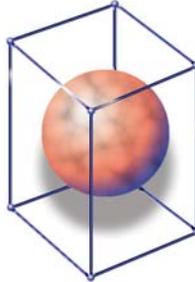
### COMMITMENT

Recent advancements of personnel within the SGS group ensure a reliable and committed work force dedicated to meeting our client's needs while providing superior client service. Russ Calow, formerly the Director of Mineral Analytical Services was recently appointed as Vice President of Global Geochemistry for the Minerals Services group. Russ takes over for John Thompson who has decided to retire after many years of intense work and dedication to the industry. Ken Litjens will now serve as the Manager of Geochemical Business Development globally.

### CAPABILITY

Specialists from the central SGS laboratories ensure that best practices are followed in all of our laboratories with ongoing monitoring through participation in regular

*continued on Page 6*



**Robert G. Jackson**  
Consulting Geochemist

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## Geochemical Laboratory

Updates... continued from page 5



internal and external round robin programs, and real time analytical trend surveillance available from LIMS.

Underpinning the standardization effort is adherence to the ISO 17025 quality standard. All SGS geochemical laboratories operate to procedures compliant to this standard with key commercial locations formally accredited to this standard.

The standardization process also provides support for ongoing innovation in our laboratories. One of the innovative processes that SGS offers is the Mobile Metal Ion (MMI) process which continues to develop and increase the visibility of subsurface mineralization.

### MMI

The Mobile Metal Ion (MMI) soil geochemistry process, under license from Wamtech in Australia, continues to be highly successful for many exploration companies. A recent success is in the State of Montana where the low level MMI anomalies have been instrumental in locating a buried Cu / Mo porphyry deposit. Other MMI successes include clear delineation of kimberlite targets under thick glacial cover. A new MMI multi-element leach for up to 40 elements, using a pH neutral extraction, help in the identification of polymetallic targets or multi-element associations for specific styles of mineralization. Within this group of

elements are the rare earth metals which are rapidly becoming an integral part of the geochemistry of nickel sulphide exploration.

### LIMS

A global upgrade of the SGS Minerals Services Laboratory Information Management System (LIMS) is currently in motion. Not only does this upgrade continue our efforts for global standardization but it also permits the group to share and integrate data on a worldwide basis within the laboratory network. Clients also have access to a high security web based data reporting system which allows the client to monitor analytical progress as well as charting and statistical manipulation of all of the quality control data.

### LEAN SIX SIGMA

SGS adopted the six sigma business initiative three years ago. This client focused and business management philosophy has manifested itself in SGS Minerals by adding significant improvement to quality assessment processes and assisted in the standardization of processes throughout our geochemical analysis network. This capability to provide a common product offering is an important consideration for many of our clients who have operations in numerous countries and would like to have access to standard methods at regional laboratories.

### DIAMOND EXPLORATION SERVICES

Diamond exploration services are also available within the group for exploration globally. Capacity and services within the diamond group continue to expand. They include:

- Exploration sample processing for heavy mineral content
- Indicator mineral selection & grain morphological studies
- Microprobe analysis and indicator mineral chemistry interpretation
- Macro and micro-diamond extraction by caustic dissolution
- Bulk sample processing in 1 and 10 tonne/hr DMS plants

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**Contact us on:**

<p>Telephone +61 8 9459 9011 Email genalysis@genalysis.com.au 15 Davison Street Maddington 6109 Western Australia</p>	<p>Facsimile +61 8 9459 5343 Website www.genalysis.com.au PO Box 144 Gosnells 6990 Western Australia</p>
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## Geochemical Laboratory

Updates... continued from page 6



- Diamond recovery by grease table and SORTEX™

The SGS Minerals Services group will continue to develop and implement new processes and methods to meet the demands of our global client group. Please don't hesitate to contact us to explore how SGS Minerals Services can become your exploration partner.

Our fee schedule is located at [www.sgslakefield.com/geochemfee.html](http://www.sgslakefield.com/geochemfee.html)

### SGS Minerals Services

*ca.min@sgs.com*

Pierrette Prince

*pierrette.prince@sgs.com*



## AAG Annual Report

### AAG President's Report

Visibility of the association has improved significantly over the past year though the participation of our members at various meetings and by the co-sponsoring of other meetings. Presentations on data analysis, secondary dispersion through transported overburden, and the integration of landscape evolution with surficial geochemistry at the SEG 2004 meeting in Perth helped spread the word that geochemistry is alive and well in the minerals exploration industry. The AAG also co-sponsored and helped promote the Geological Society of Nevada meeting and the Goldschmidt meeting, both held in May, 2005. We plan to do the same for the Goldschmidt 2006 meeting in Melbourne, Australia, and will be conducting AAG-sponsored workshops at the SEG 2006 meeting in Breckenridge, Colorado and at Exploration 2007 in Toronto.

The Awards committee was resurrected by Bill Coker (Chair), Barry Smee, Bob Garrett and Guenter Matheis to evaluate candidates for Honorary Membership, the AAG Gold Medal and the Past President's Medal. I am happy that 2 awards will be presented soon at the IGES.

The AAG Website continues to improve with secure on-line dues renewal and new membership application processing. On-line voting is now being investigated. Bob Eppinger has taken on the Chair of our Website Committee.

*David Kelley*  
AAG President  
August 2005

### AAG Treasurer's Report

The AAG is extremely fortunate in that Eion Cameron has once again become our investment manager, a responsibility that had rested with HSBC for about five years prior to October 2004. Changes in strategies at HSBC, their fee schedule and a disappointing return led to Eion reprising his former role as of last November and opening an AAG brokerage account at TD Waterhouse. As a result, the AAG's current investments have a total value of ~\$442000 (Cdn), some \$37000 higher than nine months ago! Eion sends the AAG Executive a monthly report detailing the investment status, any changes he advises and the reasons for so doing: it makes good reading! We will still need to draw on our investment income until profits from the journal and our conferences materialize.

*Gwendy Hall*  
AAG Treasurer  
August 2005

### AAG Secretary's Report

Significant happenings in AAG Council since the September 2004 AGM include:

1. Iftikhar Malik of Pakistan accepted the role as Regional Councilor for southern Asia.
2. Benedetto De Vivo accepted the new position of Regional Councilor for southern Europe.

continued on page 8

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## AAG Annual Report... *continued from page 7*

3. Fees for student membership to AAG were reduced to US\$10.
4. AAG accepted Oviedo, Spain's proposal to host the 2007 IGES.
5. Elections to AAG Council for the 2005-2006 term were held for the first time entirely by email as allowed by the Association's revised By Laws. The process went smoothly with the response rate being about the same as with paper ballots in the past. We had comments from two Fellows who had some concerns about email voting. One expressed concern that some Fellows might not have access to email while the other had concern about a possible lack of anonymity in the voting process. Hopefully our next elections will be conducted through our secure web site.
6. Stew Hamilton was named AAG's Distinguished Lecturer for 2005.

*David B. Smith  
AAG Secretary  
August 2005*

### **Report for Geochemistry: Exploration, Environment, Analysis (GEEA)**

GEEA has been published efficiently and in a timely manner, with excellent communication between Ottawa and the UK. Several special issues have been published in

2005, namely: Proceedings from the 6<sup>th</sup> International Symposium on Environmental Geochemistry (Edinburgh); Proceedings from the 21<sup>st</sup> International Geochemical Exploration Symposium (Dublin); and finally Geochemical Mapping organised and edited by Clemens Reimann. Next year we shall publish an issue from the Geological Survey of Canada focussing on smelter 'footprints'.

Two advances in particular have been made this year. First, GEEA is on track to have an Impact Factor, with coverage beginning for the 2004 publication year. GEEA will appear in the 2006 Journal Citation Reports, Science Edition. Our journal is also one of ~30 provided by GeoscienceWorld (<http://www.geoscienceworld.org/>), a non-profit organisation formed by a group of leading geoscientific organizations (e.g. GSA, GSL) for the purpose of making geoscience research and related information easily and economically available via the Internet. The search functionality of GSW is extremely flexible: do examine their website.

We still need a higher flow of regular papers to our young journal so that the balance with special issues is maintained. AAG members: please direct research papers to GEEA!

*Gwendy Hall, Editor-in-Chief  
GEEA, Ottawa  
August 2005*

*continued on page 9*

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For more information visit [www.alschemex.com](http://www.alschemex.com)

## AAG Annual Report... *continued from page 8*

### Report from the Business Office

I continue to work closely with Andrew Ransom to update the AAG webpage. Andrew is working on putting the AAG database on the web where I will keep it updated on a daily basis. This will allow active members in the AAG access to the member's area at all times. Andrew is hoping to have this ready by December 2005.

We are now set up for members to pay their dues on line via the secure website on the webpage. Andrew is also working on handling book orders from the AAG online. Once this is completed, we can discontinue the manual method of processing credit card payments.

For the first time, we used the internet to send membership renewal forms. I will continue to send out reminder letters to all members who have yet to pay their dues. Our membership is very low at this time so it is important for each Councilor to be promoting the AAG at every possible event. At this time, we have 525 paid AAG members for 2005 (22 Students, 296 Members, 204 Fellow Members and 3 Honorary Memberships; 31 of these are new memberships in the AAG for 2005). In 2004, we closed out the year with 560 active AAG members (21 of these are new memberships).

*Betty Arseneault*  
AAG Business Manager  
August, 2005

### New Membership Committee Report

Attempts were made to follow up on 2004 recommendations made by this Committee on how to attract new members to the AAG. A Powerpoint presentation was developed to help market the organization. It contains illustrations that high-light the various activities of the organization and advantages of membership. The intent is that members take every opportunity available to give an overview of the AAG, using selected Powerpoint slides, at meetings attended by geoscientists who might be interested in joining our organization. Overviews were presented at the GSN 2005 conference in Nevada by Dave Kelley and the Goldschmidt Conference by Dick Glanzman.

Both experiences demonstrated the need for more advanced planning to identify an attending individual willing to represent the AAG at the meeting, obtain booth space for the display of promotional materials, arrange for getting a 'booth kit' to site, provide bulk promotional material to the organizing committee for inclusion in the registration kit, lobby the organizing committee for an opportunity to make a presentation sometime during the meeting, and obtain budget approval from the AAG Council for related expenses.

The Powerpoint presentation was distributed to specific members in the various regions of active membership with the intent that they were to develop a network of active members in their area – these members would be requested to identify opportunities to get in front of groups of geoscientists and make a promotional presentation about the AAG (presentation available in

Powerpoint or Adobe format). This initiative has not been successful due to the lack of volunteers to get involved. No progress has been made toward forming a Marketing Committee to advance this effort and to develop an advertising strategy.

*Robert Jackson*  
New Membership Committee Chairman  
August 2005

### EXPLORE Newsletter

Since the last AGM four EXPLORE newsletters have been published. The format of having Focus Issues has continued and these have been on Environmental Geochemistry, Petroleum Geochemistry, Regional Geochemistry and Updates on Laboratories. Issues have been 28-32 pages in length and have been well supported by Corporate advertisers.

Many thanks to the Business Manager, Associate Editors and contributors.

Technical contributions from previous newsletters are currently being compiled into a format so they can be downloaded from the AAG website.

*Chris Benn*  
Editor, Explore  
August 2005

### Perth IGES Report

Steady progress has been made in the last 12 months in organising the 22nd IGES in Perth. We have received a significant number of contributions for presentations, and have had to limit oral submissions to about 60 papers, with the remaining 70-80 papers as posters. This response has been complemented by strong sponsorship support (currently standing at about \$A90 000), and take-up of 19 of the 24 trade booths. However, this has been offset by a relatively poor response for social events although the structure of the events means that they can be scaled back with no loss of quality. Due to low registrations, only the field excursion to the Southwest of WA is viable, and 2 of the 6 workshops have been cancelled for the same reason. At present, registrations stand at 170, with 40 presenters still to register. As many exploration company personnel will probably not register until immediately before the meeting, we anticipate a total of between 250 and 300 registrants at the time of the conference.



*Shea Clark Smith*

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## Regional Councilor Report - Chile

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Greetings once again from Chile. The mining industry, at all scales, is again on the roll, something always good for all of us. From my previous letter many things have occurred, good and tragic. The bad news always first, a moment of silence for lost colleagues, Cristian Miranda, Pedro Pablo Villanueva and Justiniano Valenzuela (geologists from Cia. Minera Cerro Bayo Ltda., subsidiary of CDE), whom, together with the pilot and other six passengers perished in a fatal plane crash between Balmaceda and Chile Chico, XI Region of Aysén, on May 16th. Our small community is always touched by such tragic loss, our condolences to family and friends.

On better news we are proud to announce the winner of the IGES20 Student Bursary for IGES22, Mrs. Verónica Herrera, Ph.D. student of the Department of Geology, Catholic University of the North. The IGES20 Student Bursary was created after IGES20, Santiago, consisting of free registration to future IGES meetings and to one associated short course, sponsored by the AAG. This was signed between the IGES20 LOC and AAG (AEG). In an effort to make this bursary work, we have managed to raise funds for the IGES20 Student Travel Bursary, which in this occasion resulted in help from Anglo American Noranda and BHP Billiton, for a total of US\$1,800. This help has made it possible for Verónica to effectively participate at IGES22, Perth. This travel bursary was channeled through SEMA (Santiago Exploration and Mining Association), our thanks for help and fund administration. As a former IGES20 LOC member, I will continue efforts in keeping this travel bursary alive, which combined with the student bursary provided by AAG, will assure participation of a student from a Chilean University, working in topics of applied geochemistry, at future IGES meetings. Our thanks to sponsoring companies. Christopher Oates (Anglo American), Waldo Cuadra (Noranda) and John Larson (BHP Billiton) are acknowledged.

Another interesting note, which is a reflection of company policies in their effort to cooperate with education of good and qualified professionals, is acknowledged to Anglo American and CVRD. Anglo American, after a throughout selection process (April – May 2005), which involved visits and interviews of students at all three Universities in which Geology and Geochemistry are taught in Chile, selected two students from the University of Chile for a fully sponsored Ph.D. program at Queen's University at Kingston, Ontario, Canada (Joseline Tapia and Juan Carlos Zamudio). In addition, since 2004, Paula Ramirez (former IGES20 bursary to IGES21, Dublin) is currently at Imperial College, London, undergoing a Ph.D. program, also fully sponsored by Anglo American. On a local base good news are also present. Anglo American is currently sponsoring one student for the M.Sc. program at the Department of Geology, University of Chile (Carmina Jorquera), and has stated interest in keeping this M.Sc. student bursary on a permanent basis. Our thanks out to Christopher Oates,

Javier Urrutia and Anglo American for such kind support, and our applause at such well intended policies aimed at boosting potentials of the best local students. We are confident they will make good professionals. A similar policy has been taken by Compañía Minera Latino Americana (CMLA), local subsidiary of CVRD (Brazil), whom have selected one student (Gabriel Hernandez) as trainee and whom will be sent to further continue his studies in Brazil. CMLA has stated interest to continue such support. Our thanks to Gilberto Schubert for such effort.

The above events have boosted interest and motivation among students with one new AAG student member, four new AAG student membership applications and more to come. There is enough critical mass may allow creation of a student chapter. These are probably the best moments to seek new members, as exploration has regained momentum, geochemistry always among vital exploration tools. We are on the roll again. See you all at IGES22.

Cheers,

**Brian Townley**  
Regional Councilor  
Chile




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## Geological Society of Nevada's Symposium - "Window to the World"

May 15 - 18, 2005 in Reno, Nevada

Attendance at this meeting, held every 5 years, was outstanding with about 1,000 delegates from 25 countries. There was an excellent array of technical sessions, ranging from detailed discussions of Great Basin geology and mineral deposits, to important discoveries from around the world. A host of different field trips covering different aspects of Nevada metallogeny complemented the meeting. Unfortunately, though, geochemistry was not strongly represented at the meeting. The AAG needs to become more involved with the GSN and to ensure that applied geochemistry is a part of the 2010 meeting. There should be plenty to report as geochemistry is being used with great enthusiasm in Nevada right now, including the use of hydrogeochemistry, biogeochemistry and soil gas.

The Association is grateful to the GSN for free booth space in exchange for promoting the meeting. The booth provided a great opportunity to renew acquaintances with past members, and to meet several new members, including several new student members. Don Schissel, Clark Smith, Graham Closs and I pitched in to pay for several student's membership dues. A poster targeting Nevada explorationists was prominently displayed in the booth and attracted a lot of attention.

**Dave Kelley**  
President, AAG



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22<sup>nd</sup>  
**IGES**  
2005

from Tropics to Tundra

**Sheraton Perth Hotel**  
**Perth, Western Australia**  
**19 - 23 September 2005**

### Symposium Themes:

- Regolith - the continuum; from tropics to tundra.
- Discovery case histories and geochemical exploration in tropical, temperate and glacial terrains.
- Geochemical explorations brave new world. Seeing through transported overburden, mechanisms of metal mobility.
- Environmental geochemistry, its interaction with exploration.
- Geochemistry of mineral deposits: isotope and hydrothermal geochemistry.
- Data, our raw materials: analysis, QAQC, data management, data processing.

### Pre/Post Field Excursions:

- Geochemistry of the South West
- Lachlan Fold Belt - Regolith, Gold and Shiraz, NSW
- Geochemical Exploration in the Eastern Goldfields of WA

### Pre/Post Workshops

- Groundwater geochemistry
- Interpreting data
- Regolith mapping
- Mine closure geochemistry
- Partial leaches
- Managing data



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### Sponsorship Options:

IGES is the world's premier forum for discussion of issues related to geochemistry in the mineral resources and industry.

Recent IGES meetings have also included sessions dealing with environmental chemistry.

The IGES Symposium will attract scientists from all around the world - DON'T miss this unique opportunity to showcase your products and services with either sponsorship or a trade stand.

Sponsorship Options available:

- NOTE-PADS (AUD\$550)
- PENS (AUD\$550)
- LIST OF PARTICIPANTS (AUD\$550)
- PROCEEDINGS (AUD\$3,300)
- SESSION (AUD\$2,200)
- SIGNAGE (AUD\$2,200)
- TEA BREAK (AUD\$1,100 EACH)
- DINNER (AUD\$11,000)
- RECEPTION (AUD\$5,500)
- LUNCHESES (AUD\$5,500 EACH)
- NAME BADGES (AUD\$1,650)
- KEYNOTE SPEAKER (tba)
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- ADVERTISEMENT (AUD\$TBC)

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[www.promaco.com.au/conference/2005/iges](http://www.promaco.com.au/conference/2005/iges)

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## Program Overview

	Sunday 18 September	Day One Monday 19 September		Day Two Tuesday 20 September		Wed 21 September	Day Three Thursday 22 September		Day Four Friday 23 September		
Pre-Symposium Field Trip and Workshops		0900 – 0925	Opening	0830 – 0915	Keynote	Free Day	0830 – 0915	Keynote	0830 – 1010	Papers	Post-Symposium Field Trips and Workshops
		0925 – 1010	Keynote	0915 – 1005	Papers		0915 – 1005	Papers	1010 – 1040	Tea Break	
		1010 – 1040	Tea Break	1005 – 1040	Tea Break		1005 – 1040	Tea Break	1040 – 1220	Papers	
		1040 – 1220	Papers	1040 – 1220	Papers	Optional Tours	1040 – 1220	Papers	1220 – 1330	Lunch	
		1220 – 1330	Lunch	1220 – 1330	Lunch		1220 – 1330	Lunch	1330 – 1510	Papers	
	Registration from 1500	1330 – 1510	Papers	1330 – 1510	Papers	Genalysis Laboratory Visit	1330 – 1510	Papers	1510 – 1540	Tea Break	
		1510 – 1540	Tea Break	1510 – 1540	Tea Break		1510 – 1540	Tea Break	1540 – 1720	Papers	
	Distinguished Lecture 1715	1540 – 1720	Papers	1540 – 1720	Papers		1540 – 1720	Papers	1720 – 1830	Happy Hour	
	Welcome Reception	Evening Social Function	Swan River Cruise and Old Fremantle Prison	Evening Social Function	Symposium Gala Dinner at Government House		Evening Social Function	Australian Bushwalk at the Perth Zoo			

## REGISTRATION BROCHURE AVAILABLE AND ONLINE - Earlybird deadline 8 August

### Registration Fees:

*(All fees are in Australian dollars and include GST)*

#### AAG Member

Earlybird by 08/08/05

AUD \$693 (\$63 GST)

General after 08/08/05

AUD \$748 (\$68 GST)

One Day

AUD \$242 (\$22 GST)

Student (fulltime)

AUD \$264 (\$24 GST)

#### Non-Member

Earlybird by 08/08/05

AUD \$792 (\$72 GST)

General after 08/08/05

AUD \$847 (\$77 GST)

One Day

AUD \$319 (\$29 GST)

Student\* (fulltime)

AUD \$352 (\$32 GST)

Partner (non-delegate)

AUD \$473 (\$43 GST)

*\*(Student fees include a one year AAG Membership)*

### The Venue:

The symposium venue is the Sheraton Perth Hotel located at 207 Adelaide Terrace, Perth, tel (08) 9224 7777, fax (08) 9224 7788. (International area code 61).

[www.sheraton.com/perth](http://www.sheraton.com/perth)

The Sheraton Hotel offers world class accommodation and service and is only a short stroll from Perth's business, commercial and retail district.

A range of accommodation to suit all budgets is available.

All conference and accommodation enquiries should be directed to Promaco Conventions.

### Social Program:

A super social program is planned which includes a cruise on the beautiful Swan River to Fremantle and a visit to the Old Fremantle Prison, a Gala Dinner at Government House in the magnificent Ballroom and a special evening experience at the Perth Zoo.

Accompanying persons will also be looked after with a special program, including visits to the wineries and the local wildflower regions, fun shopping excursions and more.

In addition to the pre and post field excursions, a number of pre and post conference tours are available to see more of our beautiful state.

For more information go to [www.promaco.com.au/conference/2005/iges](http://www.promaco.com.au/conference/2005/iges).

For more information:

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## Vapor Phase Transport, Biomineralization and Much Much More at the 15<sup>th</sup> Annual V.M. Goldschmidt Conference, Moscow, Idaho, May 2005

Attending this conference involving 1,150 geochemists and 408 geochemistry students in presenting 1,713 papers in 84 sessions in four days of meetings was a rare pleasure. Every conceivable aspect of geochemistry was represented in at least one and commonly multiple sessions. All abstracts are compiled in a 915-page Supplemental issue of *Geochimica et Cosmochimica Acta* (Volume 69, No. 10S, May, 2005).

Reconsideration of the vapor phase transport and geochemistry particularly as it relates to the formation of ore deposits and geochemical haloes was a fascinating session chaired by A.E. Williams-Jones and C.A. Heinrich. Considerable research has demonstrated that vapor-rich fluid inclusions can contain a broad suite of metals that are often distinctly different from those of the brine-rich inclusions associated with ore deposits. However, laboratory and field sampling of the vapor phase in active supercritical and subcritical geothermal systems have demonstrated vapor phase transport of a number of elements of considerable importance in geochemical exploration for mineral deposits.

Vapor phase papers included a mass balance quantification of these metals suites. A new equation of state for the vapor state has been developed (N.N. Akiniev). Rhenium, molybdenum, zinc, cadmium indium and lead appear to be important vapor phase elements in copper-molybdenum porphyry and molybdenum-tungsten skarn deposits. Hydrocarbon-rich vapors are selective and important in vapor phase transport of metals. Arsenic, antimony, germanium and vanadium are important vapor phase elements transported in gold deposits. Silver is readily transported in hydrogen sulfide vapors (A.Y. Bychkov). Vapor phase transport of platinum at magma conditions and perhaps hydrothermal conditions may well be important considerations in PGM deposits (F.A. Blaine, et al.).

A laboratory study suggests that vapor-phase dominant mineralization may be enriched in nickel, copper, platinum and palladium but depleted in ruthenium, rhodium and iridium (S-J. Barnes, A. Peregoedova and D. Baker). Positive correlations of platinum, palladium and nickel with the sulfur fugacity suggests that they are transported as a sulfur vapor while copper and gold are not correlated with the sulfur fugacity suggesting that they may be transported as metals at 1,000 to 1,100°C. Hydration of vapor phase boron species suggests that hydrolysis and hydration processes are important in vapor phase transport between 100 and 171°C (I.Y. Nikolaeva and A.Y. Bychkov). The overall conclusion from the session is that vapor phase transport is an "important consideration in any model" of ore deposition/formation. A separate session dealt with

aspects of PGE deposit hydrothermal fluids, magmatic volatiles and their surficial metal mobility. Biogeochemistry and microbial processes were major subjects of multiple sessions. Geochemical controls on microbial processes, biomineralization models and mechanisms, interfacial biogeochemical processes, microbially-induced mineral phases, microbial influences on mineral speciation and stability as well as ancient biomolecules are but a few of these subjects.

Recognition, definition and documentation of the role of microbes in geochemical signatures and metals transport/deposition are expanding at an exponential rate that is long overdue.

Among the many additional sessions included those that dealt with carbon-gold association, mercury geochemistry, advances in in-situ microanalysis of trace elements, historical mantle heterogeneity, geochronology of both mantle samples and tectonic processes, geochemical evolution of silicic magma systems, A-type granites and related rocks through time, accessory mineral geochemistry in both igneous and metamorphic petrogenesis and subduction zone processes and fluids involving both magmatic and metamorphic phases were most informative.

**Richard K. Glanzman**

Glanzman Geochemical LLC, Lakewood, CO  
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## Readers' Forum



Sir,

No doubt progress has been made in geochemical sampling. However I personally find improper a debate about theory and practice on the “nugget effect” (EXPLORE #127 of April 2005, Readers Forum, pages 18-23).

“How to lie with statistics” is a subject I observed beyond my 35 years of membership with the AEG/AAG. Just to select gold in any matrix as an example of “nugget effect” on sampling is strongly impractical and a biased selection.

To treat the so called “nugget effect” the following information must be known:

- the density distribution of the materials
- the size distribution of the materials
- the composition: purely inorganic or mixed organic/inorganic materials?
- is the effect studied on treated samples in the dry or wet state? If treated in the wet state, was it lixiviated or elutriated? if treated in the dry state, was it ground in a ball mill for hours on end?
- has the material been subjected to segregation?
- how was it sampled/sub-sampled?
- how was it split? Before or after grinding/sieving?
- how hard is the material and the matrix on the Mohs scale? It certainly makes a difference when grinding lead pellets (hardness=1) in coarse sand (hardness = 7) or sapphires (hardness = 9) in talcum (hardness = 1).

When a common matrix of gold (hardness = 3) in a mixture of quartz (hardness = 7), feldspar (hardness = 6) and clay (hardness = 2) is ground up and passed through a 100 mesh sieve, the following may occur:

- (a) Gold and clay (similar to microscopically deposited gold of a Carlin-type matrix) all may pass through the smallest size sieve with minimal grinding.
- (b) Gold grains gall onto harder surfaces and become smaller. The abraded material is of microscopic size. After a sufficient long grinding, all larger grains disappear and become microscopic. On shorter grinding a few larger grains do not pass through the sieve and may produce the traditional “nugget effect”.
- (c) Gold embedded inside organically compromised minerals escape detection with the usual analytical methods, giving only a percentage of the available metal. Different treatments or grinding may increase that percentage. There is no “nugget effect”.

With such variability, no statistics can help in its entirety and each case must be treated separately.

**E.L Kothny Ph.D**

*Walnut Creek*



CA



## CALENDAR OF EVENTS

International, national, and regional meetings of interest to colleagues working in exploration, environmental and other areas of applied geochemistry.

■ August 29-2 September **STOMP 2005** – International Conference on Structure, Tectonics and Ore Mineralization Processes. Townsville, Australia. Email [Stewart.Parker@jcu.edu.au](mailto:Stewart.Parker@jcu.edu.au). Website [www.es.jcu.edu.au](http://www.es.jcu.edu.au).

■ August 30-September 13, 2005. **Modular Course in Structure, Tectonics, and Mineral Exploration**, Sudbury, Ontario, Canada. Email: [blafrance@laurentian.ca](mailto:blafrance@laurentian.ca), Website <http://earthsciences.laurentian.ca>.

■ September 5-19 2005 **GEOCHIM 2005**, Prague, Email [pasava@cgu.cz](mailto:pasava@cgu.cz) or [masek@cgu.cz](mailto:masek@cgu.cz)

■ September 5-7, 2005 **9th IMWA (International Mine Water Association)** Oviedo, Spain. Email [imwa@innova.uniovi.es](mailto:imwa@innova.uniovi.es). Website [www.uniovi.es](http://www.uniovi.es)

■ September 19-23 **22<sup>nd</sup> IGES** Perth Western Australia – see this **EXPLORE**. [www.aeg.org](http://www.aeg.org)

■ September 20-23 **Mineral Deposits of South America: New Visions**, XVI Congreso Geológico Argentino, La Plata, Argentina. Website: [www.congresogeologico.ar](http://www.congresogeologico.ar)

■ October 25-November 5 **10th Brazilian Geochemical Congress and 2nd Geochemical Symposium of the Mercosul Countries**, Porto de Galinhas, Recife, Brazil Email: [valderez@ufpe.br](mailto:valderez@ufpe.br) Website: [www.ufpe.br/xcbgq](http://www.ufpe.br/xcbgq).

■ November 13-16 **New Zealand Minerals Conference 2005** Auckland, New Zealand. Website [www.ausimm.co.nz](http://www.ausimm.co.nz)

■ November 21-24 **Quebec Exploration 2005**, Chateau Frontenac, Quebec, Canada. Website [www.QuebecExploration.qc.ca](http://www.QuebecExploration.qc.ca). Email [info@quebecexploration.qc.ca](mailto:info@quebecexploration.qc.ca)

■ December 1<sup>st</sup>, 2005 **4<sup>th</sup> Sprigg Symposium** Uranium Exploration, Deposits, Mines and Mine Waste Disposal Geology, Gelnside, Australia. Email [jim.jago@unisa.edu.au](mailto:jim.jago@unisa.edu.au)

■ December 8-17. **Modular Course in Exploration Geophysics**, Sudbury, Ontario, Canada. Email: [mlesher@laurentian.ca](mailto:mlesher@laurentian.ca), Website: <http://earthsciences.laurentian.ca>.



## CALENDAR OF EVENTS

continued from page 14

■ April 5-16, 2006. **Modular Course in Exploration for Magmatic Ore Deposits**, Sudbury, Ontario, Canada..

Email: [mlesher@laurentian.ca](mailto:mlesher@laurentian.ca), Website: <http://earthsciences.laurentian.ca>.

■ May 14-16, 2006 **Wealth Creation in the Minerals Industry**, in Keystone, Colorado. Website

[www.seg2006.org](http://www.seg2006.org)

Please check this calendar before scheduling a meeting to avoid overlap problems. Let this column know of your events.

**Chris Benn**

*BHP Billiton*

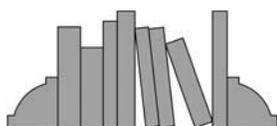
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## RECENT PAPERS

This list comprises titles that have appeared in major publications since the compilation in **EXPLORE** Number 126. Journals routinely covered and abbreviations used are as follows: Economic Geology (EG); Geochimica et Cosmochimica Acta (GCA); the USGS Circular (USGS Cir); and Open File Report (USGS OFR); Geological Survey of Canada papers (GSC paper) and Open File Report (GSC OFR); Bulletin of the Canadian Institute of Mining and Metallurgy (CIM Bull.); Transactions of Institute of Mining and Metallurgy, Section B: Applied Earth Sciences (Trans. IMM). Publications less frequently cited are identified in full. Compiled by L. Graham Closs, Department of Geology and Geological Engineering, Colorado School of Mines, Golden, CO 80401-1887, Chairman AEG Bibliography Committee. Please send new references to Dr. Closs, not to **EXPLORE**.

Accornero, M. et al., 2005. The fate of major constituents and chromium and other trace elements when acid waters from the derelict Libiola mine (Italy) are mixed with stream waters. *Applied Geochem.* **20**(7): 1368-1390.

Aiuppa, A. et al., 2004. Plume chemistry provides insights into mechanisms of sulfur and halogen degassing in basaltic volcanoes. *Earth and Planet. Sci. Letters.* **222**(2): 469 -

Andrews, A.S. and Golding, S.D. (eds.), 2005, Selected Papers from the 5<sup>th</sup> symposium on Applied Isotope Geochemistry. *Applied Geochem.* **20**(4): 671-813.

Angelone, M. et al., 2005. Fluid geochemistry of the Sardinian Rift – Campidano Graben (Sardinia, Italy): fault segmentation, seismic quiescence for geochemically “active” faults, and new constraints for selection of CO<sub>2</sub> storage sites. *Applied Geochem.* **20**(2): 317-340.

Avila, P.F. et al., 2005, Geochemical signatures and mechanisms of trace elements dispersion in the area of the Vale dos Gatas mine (Northern Portugal). *J. Geochem. Explor.* **85**(1): 17.

Aykol, A. and Budakoglu, M., 2005, Metal dispersion in sediments of the Kacacay River draining the historic Balya Pb-Zn mine-debris sites, NW Anatolia, Turkey. *Neus Jahrbuch Fur Mineralogie-Abhandlung.* **81**(1): 39.

Banerjee, S. and Mitra, S., 2004. Remote surface mapping using orthophotos and geologic maps draped over digital elevation models: Application to the Sheep Mountain anticline, Wyoming. *Am. Assoc. Petrol. Geol. Bull.* **88**(9): 1227 -

Banks, D. et al., 2004. Distribution, salinity and pH dependence of elements in surface waters of the catchment areas of the Salars of Coipasa and Uyuni, Bolivian Altiplano. *J. Geochem. Explor.* **84**(3): 141 -

Barnes, S.J. et al., 2004. Lithochemical exploration for komatiite –associated Ni-sulfide deposits: Strategies and limitations. *Min. and Petrol.* **82**(3-4): 259 -

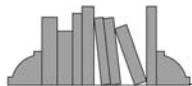
Bednar, A.J. et al., 2005, Effects of iron on arsenic speciation and redox chemistry in acid mine water. *J. Geochem. Explor.* **85**(2): 55-62.

Berzina, A.N. et al., 2005, distribution of rhenium in molybenite from porphyry Cu-Mo and Mo-Cu deposits of Russia (Siberia) and Mongolia. *Ore Geol. Rev.* **26**(1/2): 91.

Bierlein, F.P. and McKnight, S., 2005. Possible Intrusion-Related Gold systems in the Western Lachlan Orogen, Southeast Australia. *EG* **100**(2): 385-398.

Bockrath, C., Ballhaus, C. and Holzheid, A., 2004. Fractionation of the platinum-group elements during mantle-melting. *Science* **305**: 1951 -

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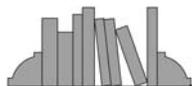


## RECENT PAPERS

*continued from Page 15*

- Calvert, S.E., 2004. Beware intercepts: interpreting compositional ratios in multi-component sediments and sedimentary rocks. *Organic Geochem.* **35**(8): 981
- Cappuyens, V. and Swennen, R., 2005, Kinetics of element release during combined oxidation and pH leaching of anoxic river sediments. *Applied Geochem.* **20**(6): 1169-1179.
- Castendyk, D.N., Maule, J.L., and Webster, J.G., 2005. A mineral quantification method for wall rocks at open pit mines, and application to the Martha Au-Ag mine, Waihi, New Zealand. *Applied Geochem.* **20**(1): 135-156.
- Cawthron, R.G., 2005, Contrasting sulphide contents of the Bushveld and Sudbury igneous complexes. *Min. Deposita* **40**(1): 1-12.
- Cohen, D.R., Dunlop, A.C., and Rose, T., 2005, Contrasting dispersion patterns for gold in stream sediments at Timbarra, NSW, Australia. *J. Geochem. Explor.* **85**(1): 1-16.
- Chapman, J.G. and Boxer, G.L., 2004. Size distribution analyses for estimating diamond grade and value. *Lithos.* **76**(1-4): 369-376.
- Chung, E.H. et al., 2005. Environmental contamination and bioaccessibility of arsenic and metals around the Dongjeong Au-Ag-Cu mine, Korea. *Geochemistry-Exploration, Environmental, Analysis* **5** (1): 69-74.
- Cicchella, D., DeVivo, B., and Lima, A., 2005. Background and baseline concentration of values of elements harmful to human health in the volcanic soils of the metropolitan and provincial areas of Napoli (Italy). *Geochemistry-Exploration, Environmental, Analysis* **5**(1): 29-40.
- Courtin-Nomade, A. et al., 2005. Spatial variability of arsenic in some iron-rich deposits generated by acid mine drainage. *Applied Geochem.* **20**(2): 383-396.
- Dalstra, H. and Guedes, S., 2004. Giant Hydrothermal Hematite Deposit with Mg-Fe Metasomatism: A Comparison of the Carajas, Hammersley, and other Iron Ores. *EG* **99**(8): 1793-1800.
- DeCaritat, P., Kirste, D., Carr, G., and McCulloch, M., 2005, Groundwater in the Broken Hill region, Australia; recognizing interaction with bedrock and mineralization using S, Sr, and Pb isotopes. *Applied Geochem.* **20**(4): 767-787.
- Deyell, CL. Et al., 2005, Alunite in the Pascur-Lamay High-Sulfidation Deposit: Constraints on Alteration and Ore Deposition Using Stable Isotope Geochemistry. *EG* **100**(1): 131-148.
- Donisa, C., Steinnes, E., and Sjobakk, T.E., 2005, Nitric acid soluble fractions of 21 elements in Norwegian podzols: Factor affecting regional differences in vertical distribution. *Applied Geochem.* **20**(7): 1258-1267.
- Dove, P.M., de Yoreo, J.J., and Weiner, S. (eds.), 2003. Biomineralization. *Rev. Min. and Geochem.* V. 54. 381p.
- Dyck, D.R. et al., 2004. Effective resource estimates for primary diamond deposits from the EKATI diamond mine, Canada. *Lithos* **76**(1-4): 317-336.
- Edraki, M., Golding, S.D., Baublys, K.A. and Laurence, M.G., 2005, Hydrogeochemistry, mineralogy, and sulfur isotope geochemistry of acid mine drainage at the Mt. Morgan mine environment, Queensland, Australia. *Applied Geochem.* **20**(4): 789-805.
- Entwistle, J.A. et al., 2005. Determination of selected actinides (U, Pu, and Am) in Belarus soils using high resolution inductively coupled plasma mass and spectrometry. *Geochemistry-Exploration, Environmental, Analysis* **5**(1): 11-19.
- Ernst, R.E. and Buchan, K.L., 2004. Igneous Rock Association in Canada 3. Large Igneous provinces (LIPS) in Canada and adjacent regions. 3 Ga to present. *Geoscience Canada* **69**(5): 1143 -
- Espana, J.S. et al., 2005, Acid mine drainage in the Iberian Pyrite Belt (Odiel river watershed, Huelva, SW Spain): Geochemistry, mineralogy, and environmental implications. *Applied Geochem.* **20**(7): 1320-1356.
- Fedortchouk, Y. and Canil, D., 2004. Intensive variables in kimberlite magmas, Lac de Gras, Canada, and implications for diamond survival. *J. Petrology* **45**(9): 1725 -
- Fortin, D., Takahashi, Y., and Ferris, G.F., 2004, Special Issue on Bacteria and Geochemical Speciation of Metals. *Chem. Geol.* **212**(3/4):
- Gemmell, J.B., Sharpe, R., Jonasson, I.R., and Herzig, P.M., 2004. Sulfur Isotope Evidence for Magmatic Contributions to Submarine and Subaerial Gold Mineralization: Conical Seamont and the Ladolain Gold Deposit, Papua, New Guinea. *EG* **99**(8): 1711-1725.
- Goh, K.H. and Lim, T.T., 2005. Arsenic fractionation in a fine soil fraction and influence of various anions on its mobility in the subsurface environment. *Applied Geochem.* **20**(2): 229-239.

*continued on page 17*



## RECENT PAPERS

*continued from Page 16*

- Graham, S. et al., 2004. Tracing Cu and Fe from source to porphyry: in situ determination of Cu and Fe isotope ratios in sulfides from the Grasberg Cu-Au deposit. *Chem. Geol.* 207(3/4): 147 -
- Grande, J.A. et al., 2005, Acid mine drainage and acid rock drainage processes in the environment of Herrerias mine (Iberian Pyrite Belt, Huelva-Spain) and impact on the Andevalo Dam. *Environ. Geol.* 47(2): 185-196.
- Gray, J.E. et al., 2005. Historical deposition and fluxes of mercury in Narraquinnep Reservoir, southwestern Colorado, USA. *Applied Geochem.* 20(1): 207-220.
- Groves, D.I. et al., 2005. Secular changes in global tectonic process and their influence on the temporal distributions of gold-bearing mineral deposits. *EG* 100(2): 203-224.
- Grunfeld, K., 2005. Dealing with outliers and censored values in multi-element geochemical data – a visualization approach using XmdvTool. *Applied Geochem.* 20(2): 341-352.
- Hall, B., 2005. Mineral Education 2025 – What Do We Want Minerals Education To Look Like In 2025. *AusIMM Bull.* Jan/Feb: 13-16.
- Hall, B., 2005. The Australian Qualifications Framework (AQF). *AusIMM Bull.* Jan/Feb: 24-25.
- Hanley, J.J., Mungall, J.E., Bray, C.J., and Gorton, M.P., 2004. The origin of bulk and water-soluble Cl and Br enrichments in ore-hosting Sudbury Breccia in the Fraser Copper Zone, Strathcona Embayment, Sudbury, Ontario, Canada. *Can. Min.* 42(6): 1777-1798.
- Harmon, R.S. et al., 2005. Laser-induced breakdown spectroscopy (LIBS) – an emerging field-portable sensor technology for real-time, in-situ geochemical and environmental analysis. *Geochemistry – Exploration, Environmental, Analysis* 5(1): 21-28.
- Hinchev, J.G. and Hattori, K.H., 2005, Magmatic mineralization and hydrothermal enrichment of the High Grade Zone at the Lac des Iles palladium mine, northern Ontario, Canada. *Min. Deposita.* 40(1): 13-23.
- Hinchev, J.G., Hattori, K.H., and Lavigne, M.J., 2005, Geology, Petrology, and Controls on PGE Mineralization of the Southern Roby and Twilight Zones, Lac des Iles Mine, Canada. *EG* 100(1): 43-61.
- Hoatson, D.M. et al., 2005, Late Archean Lake Harris Komaliite, Central Gawler Craton, South Australia: Geologic Setting and Geochemistry. *EG* 100(2): 349-374.
- Hulbert, L.J. et al., 2005, U-Pb Zircon and Re-Os isotope Geochronology of Mineralized Ultramafic Intrusions and Associated Nickel Ore from the Thompson Nickel Belt, Manitoba, Canada. *EG* 100(1): 29-41.
- Hylander, L.D. and Meili, M., 2005, The rise and fall of mercury: Converting a resource to refuse after 500 years of mining and pollution. *Critical Rev. in Environmental Sci. and Tech.* 35(1): 1-80.
- Ireland, T., Large, R.R., McGoldrick, P., and Blake, M., 2004. Spatial Distribution Patterns of Sulfur Isotopes, Nodular Carbonate, and Ore Textures in the McArthur River INVC) Zn-Pb-Ag deposit, Northern Territory, Australia. *EG* 99(8): 1687-1709.
- Jakubec, J., 2004. Role of geology in diamond project development. *Lithos* 76(1-4): 337-346.
- Johansen, G.F., 2005. A Solution To Grade Estimation In A High Nugget Environment – The Bendigo Experience. *AusIMM Bull.* Jan/Feb: 67-73.
- Johnson C.M., Beard, B.L., and Albarede, F. (eds.), 2004, *Geochemistry of Non-Traditional Stable Isotopes.* *Rev. Min. and Geochem.* V. 55. 454 p.
- Johansson, L. et al., 2005. Growth and Cu accumulation by plants grown on Cu containing mine tailings in Cyprus. *Applied Geochem.* 20(1): 101-107.
- Jones, S., Herrmann, W., and Gemell, J.B., 2005, Short Wavelength Infrared Spectral Characteristics of the HW Horizon: Implications for Exploration in the Myra Falls Volcanic-hosted Massive Sulfide Camp, Vancouver Island, British Columbia, Canada. *EG* 100(2): 273-294.
- Kebede, F., 2004. Use of termite mounds in geochemical exploration in north Ethiopia. *J. African Earth Sci.* 40(1-2): 101-103.
- Kelley, K.D. and Jennings, S., 2004. A Special Issue Devoted to Barite and Zn-Pb-Ag Deposits in the Red Dog District, Western Brooks Range, Northern Alaska – Preface. *EG* 99(7): 1267-1280.
- Kerr, A. and Leitch, A.M., 2005, Self-Destructive Sulfide Segregation Systems and the Formation of High-Grade Magmatic Ore Deposits. *EG* 100(2): 311-332.
- Kokelj, S.V. and Burn, C.R., 2005. Geochemistry of the active layer and near-surface permafrost, Mackenzie delta region, Northwest Territories, Canada. *Can. J. Earth Sci.* 42(1): 37-48.

*continued on page 18*



## RECENT PAPERS

*continued from Page 17*

- Kontorovich, A.E. and Kashirtsev, V.A., 2004. Special Issue on the Theory of Oil Formation and Organic Geochemistry. *Russian Geology and Geophysics* 45(7): 737-912.
- Kovalev, K.R. et al., 2004, Gold and silver in ores of volcanogenic hydrothermal and hydrothermal-sedimentary pyrite-poly-metallic deposits of Siberia. *Russian Geol. and Geophysics*. 45(10): 1121.
- Kubota, H. et al., 2004, Exploration indices and mineral potential map of Kuroko deposits in northeast Japan. *Resource Geology* 54(4): 387-398.
- Kuscu, I. et al., 2004, An approach to geochemical characterization of productive versus barren granitoids in terms of iron in Central Turkey. *J. Asian Earth Sci.* 24(3): 311.
- Kuster, D. et al., 2005, Petrogenetic reconnaissance investigation of mafic sills associated with flood basalts, Mekelle basin, northern Ethiopia: Implications for Ni-Cu exploration. *J. Geochem. Explor.* 85(2): 63-80.
- Lake, L.W., Bryant, S.L., and Araque-Martinez, A.N. (Eds.), 2002. *Geochemistry and Fluid Flow. Developments in Geochemistry No. 7.* Elsevier. 226 p.
- Lavoud, T. et al., 2004. Paleo-gossans within the lateritic iron crust: Example of the nickeliferous prospect of Bonga, Burkina Faso. *J. African Earth Sci.* 39(3/5): 465 -
- Lee, C.H. and Lee, H.K., 2004. Environmental impact and geochemistry of old tailing piles from the Sanggok Mine Creek, Republic of Korea. *Environ. Geol.* 46(6/7): 727 -
- Lei, L. and Watkins, R., 2005. Acid drainage reassessment of mine tailings, Black Swan Nickel Mine, Kalgoorlie, Western Australia. *Applied Geochem.* 20(3): 661-667.
- Lima, A., Albanese, S., and Cicchella, D., 2005. Geochemical baselines for the radio-elements K, U, and Th in the Campania region, Italy: a comparison of stream sediment geochemistry and gamma-ray surveys. *Applied Geochem.* 20(3): 611-625.
- Linklater, C.M., Sinclair, D.J., and Brown, P.L., 2005. Coupled chemistry and transport modeling of sulphidic waste rock dumps at the Aitik mine site, Sweden. *Applied Geochem.* 20(2): 275-293.
- Lowery, G.V. et al., 2004. Macroscopic and microscopic observations of particle-facilitated mercury transport from New Idia and Sulphur Bank mercury mine tailings. *Environ. Sci. and Tech.* 38(19): 5101.
- Maiser, W.d. and Ashwal, L.D., 2004. Reference materials for geochemical PGE analysis: new analytical data for Ru, Rh, Pd, Os, Ir, Pt, and Re by isotope dilution ICP-MS in geological reference materials. *Chem. Geol.* 208(1-4): 319 -
- Mark, G. et al., 2005, Modeling outflow from the Ernest Henry Fe oxide Cu-Au deposits: implications for ore genesis and exploration. *J. Geochem. Explor.* 85(1): 31.
- Matasova, G.G. et al., 2005. The use of magnetic methods in an environmental study of areas polluted with non-magnetic wastes of the mining industry (Solair region, Western Siberia, Russia). *Geochemistry – Exploration, Environmental, Analysis* 5(1): 75-89.
- Mitchell, R.H. et al. (Eds.). 2004. Selected Papers from the Eighth International Kimberlite Conference. V. 1. *Lithos* 76(1-4): 1-585.
- Mitchell, R.H. et al. (Eds.). 2004. Selected Papers from the Eighth International Kimberlite Conference. V.2. *Lithos* 77(1-4): 1-940.
- Modabberi, S. and Moore, F., 2004. Environmental geochemistry of Zarshuran Au-As deposit, NW Iran. *Environ. Geol.* 46(6/7): 796 -
- Mojzsis, S.J., 2004, The first billion years: New insights from geochemistry. *Precambrian Res.* 135(4): 245-250.
- Moncur, M.C., Ptacek, C.J., Blowes, D.W., and Jambor, J.L., 2005. Release, transport, and attenuation of metals from an old tailings impoundment. *Applied Geochem.* 20(3): 639-659.
- Monecke, T. et al., 2005, truncated fractal frequency distribution of element abundance data: A dynamic model for the metasomatic enrichment of base and precious metals. *Earth and Planet. Sci. Letters* 232: 363-378.
- Mumm, A.S. and Wolfgramm, M., 2004. Fluid Systems and Mineralization in the north German and Polish basin. *Geofluids* 4(4): 315 -
- Nash, G.D., Johnson, G.W., and Johnson, S., 2004. Hyperspectral detection of geothermal system-related soil mineralogy anomalies in Dixie Valley, Nevada: A tool for exploration. *Geothermics* 33(6): 695 -
- Naumov, V.B., Kovalenko, V.I., Dorofeeva, V.A., and Yarmolyuk, V.V., 2004. Average concentrations of major, volatile, and trace elements in magmas of various geodynamic settings. *Geochem. Intern.* 42(10): 977 -
- Nickson, R.T. et al., 2005. Arsenic and other drinking water quality issues. Muzalfargarh District, Pakistan. *Applied Geochem.* 20(1): 55-68.

*continued on page 19*



## RECENT PAPERS

*continued from Page 18*

- Pardo-Iguzquiza, E. and Chica-Olmo, M., 2005. Interpolation and mapping of probabilities for geochemical variables exhibiting spatial intermittency. *Applied Geochem.* 20(1): 157-168.
- Parks, J.L. and Edwards, M., 2005, Boron in the environment. *Critical Rev. in Environmental Sci. and Tech.* 35(2): 81.
- Patinha, C., da Silva, E.F., and Fonseca, E.C., 2004. Mobilization of arsenic at the Tallhadas old mining area – Central Portugal. *J. Geochem. Explor.* 84(3): 167 -
- Peng, X. et al., 2005. The vertical variations of hydrocarbon pollutants and organochlorine pesticide residues in a sediment core in Lake Taihu, East China. *Geochemistry – Exploration, Environmental, Analysis* 5(1): 99-104.
- Percival, J., 2003. Superior Province: A Billion Year Record of Archean Craton Evolution and the Birth of Plate Tectonic Processes (GAC Howard Street Robinson Distinguished Lecture 2003). *Geol. Assoc. Canada Misc. Pub. No. 4. CD-ROM.*
- Petrie, B.S., Craw, D., and Ryan, C.G., 2005, Geological controls on refractory ore in an orogenic gold deposit, Macraes mine, New Zealand. *Min. Deposita.* 40(1): 45-58.
- Porter, S.K. et al., 2004, Toxic metals in the environment: Thermodynamic Considerations for possible immobilization strategies for Pb, Cd, As, and Hg. *Critical Rev. in Environ. Sci. and Tech.* 34(6): 495.
- Quang, C.X., Clark, A.H., and Lee, J.K.W., 2005, Response of Supergene Processes to Episodic Cenozoic Uplift, Pediment Erosion, and Ignimbrite Eruption in the Porphyry Copper Province of Southern Peru. *EG* 100(1): 87-114.
- Quejido, A.J. et al., 2005. Distribution of trace elements in fracture fillings from the "Mina Fe" uranium deposit (Spain) by sequential leaching: implications for the retention processes. *Applied Geochem.* 20(3): 487-506.
- Qiu, G. et al., 2005. Mercury and methylmercury in riparian soil, sediments, mine-waste calcines, and moss from abandoned Hg mines in east Guizhou province, southwestern China. *Applied Geochem.* 20(3): 627-638.
- Rajesh, H.M., 2004, Application of remote sensing and GIS in mineral resource mapping – an overview. *J. Min. and Petrol. Sciences* 99(3): 83.
- Randall, J., 2004, Ecosystem Function Analysis – a tool for monitoring mine-site rehabilitation success. *MESA J.* 35(Oct.): 24-27.
- Reimann, C. and de Caritat, P., 2005, Distinguishing between natural and anthropogenic sources for elements in the environment: Regional geochemical surveys versus enrichment factors. *Sci. Total Environment* 337(1-3): 91.
- Reith, F., McPhail, D.C., and Christy, A.G., 2005, *Bacillus cerus*, gold and associated elements in soil and other regolith samples from Tomakin Park gold mine in southeastern New South Wales, Australia. *J. Geochem. Explor.* 85(2): 81-98.
- Rondeau, B. et al., 2005, Hydrological and biogeochemical dynamics of the minor and trace elements in the St. Lawrence River. *Applied Geochem.* 20(7): 1391-1408.
- Rowland, J.V. and Sibson, R.H., 2004, Structural controls on hydrothermal flow in a segmented rift system, Taupo Volcanic Zone, New Zealand. *Geofluids* 4(4): 259 -
- Sa, J.H.S., Barnes, S.J., Pritchard, H.M., and Fisher, P.C., 2005, The Distribution of Base metals and Platinum-Group Elements in Magnetite and Its Host Rocks in the Rio Jacare Intrusion, Northeastern Brazil. *EG* 100(2): 333-348.
- Sajn. R., 2005. Using attic dust and soil for the separation of anthropogenic and geogenic elemental distributions in an old metallurgic area (Celje, Slovenia). *Geochemistry – Exploration, Environmental, Analysis* 5(1): 59-67.
- Sako, A. et al., 2005. Variations in otolith elemented compositions of two dupeid species, *Stolothrissa tanganicae* and *Linnothrissa miodon* in Lake Tanganyika. *Geochemistry – Exploration, Environmental, Analysis* 5(1): 91-97.
- Sasmaz, A. et al., 2005, Geochemical patterns of the Akagmadeni (Yozgat, Central Turkey) fluorite deposits and implications. *J. Asian Earth Sci.* 24(4): 469.
- Schmincke, H.U., 2004. *Volcanism*. Springer. 401 p.
- Schreck, P. et al., 2005, Multi-metal contaminated stream sediment in the Mansfold mining district: metal provenance and source detection. *Geochemistry – Exploration, Environmental, Analysis* 5(1): 51-57.
- Schultz, R.B. and Rimmer, S.M. (Eds.), 2004. Special Issue on the Geochemistry of Organic-Rich Shales: New Perspectives. *Chem. Geol.* 206(3/4): 163-166.
- Scotese, C.R., 2004. A continental drift flipbook. *J. Geol.* 112(6): 729 -
- Scully, K.R., Canil, D., and Schultze, D.J., 2004. The lithospheric mantle of the Archean Superior province as imaged by garnet xenocryst geochemistry. *Chem. Geol.* 207(3/4): 189 -
- Seiler, R.L., Stollenwerk, K.G., and Garbarino, J.R., 2005. Factors controlling tungsten concentrations in ground

*continued on page 20*



## RECENT PAPERS

*continued from Page 19*

- water, Carson Desert, Nevada. *Applied Geochem.* **20**(2): 423-441.
- Selinus, O. et al. (eds.), *Essentials of Medical Geology: Impacts of the Natural Environment of Public Health.* Elsevier. 812 p.
- Shepard, T.J. et al., 2005, Permo-Triassic unconformity-related Au-Pd mineralization, South Devon, UK: new insights and the European perspective. *Min. Deposita.* **40**(1): 24-44.
- Shieh, S.S., Chu, J.Z., and Jang, S.S., 2005. An Interactive Sampling Strategy Based on Information Analysis and Ordinary Kriging for Locating Hot Spot Regions. *Math Geol.* **37**(1): 29-48.
- Sidenko, N.V. and Sherriff, B.L., 2005, The attenuation of Ni, Zn, and Cu, by secondary Fe phases of different crystallinity from surface and ground water at two sulfide mine-tailings in Manitoba, Canada. *Applied Geochem.* **20**(6): 1180-1194.
- Slack, J.F. et al., 2004. Paleozoic Sedimentary Rocks of the Red Dog Zn-Pb-Au District and Vicinity, Western Brooks Range, Alaska: Provenance, Deposition, and Metallogenic Significance. *EG* **99**(7): 1385-1414.
- Slack, J.F. et al., 2004. Multi-stage Hydrothermal Silicification and Fe-Tl-As-Sb-Ge-REE Enrichment in the Red Dog Zn-Pb-Ag District, Northern Alaska: Geochemistry, Origin, and Exploration Applications. *EG* **99**(7): 1481-1508.
- Sloan, E.D., 2004. Introductory overview: Hydrate knowledge development. *Am. Min.* **89**(8/9):1155 -
- Spandler, C., Hermann, J., Arculus, R., and Mavrogenes, J., 2004. Geochemical heterogeneity and element mobility in deeply subducted oceanic crust: insight from high-pressure mafic rocks from New Caledonia. *Chem. Geol.* **206**(1/2): 21 -
- Stamatakis, M.G., 2004. Phosphate deposits of Neogene age in Greece: Mineralogy, geochemistry and genetic implications. *Chemie Der Erde – Geochemistry* **64**(4): 329 -
- Stoker, P.T., 2005. The 2004 JORC Code – Comparison with the 1999 JORC Code. *AusIMM Bull.* Jan/Feb: 57-61.
- Takeke, M., 2005. Carriers of Rare Earth Elements in Pacific Deep-Sea Sediments. *J. Geol.* **113**(2): 201-215.
- Tarvainen, T., Hellmuth, K.H., and Backmen, B., 2005. National geochemical concentrations and fluxes of Cu, Th, and U in Finland. *Geochemistry – Exploration, Environmental, Analysis* **5**(1): 41-50.
- Thompson, L.C., Jones, K., and MacCulloch, I.R.F., 2005. Cyanide Biodetoxification In Spent Ore, Tailings And Process Solutions. *Aus. IMM. Bull.* Jan/Feb: 76-83.
- Todoruva, S.G., Siegel, D.I., and Costello, A.M., 2005, Microbial Fe (III) reduction in a mineratrophic wetland-geochemical controls and involvement in organic water decomposition. *Applied Geochem.* **20**(6): 1120-1130.
- Tyler, E.W.J., 2005, Globalization And The National Interest. *Aus. IMM Bull.* Jan/Feb: 52, 54, 56.
- Volk, H. et al., 2005, Geochemical comparison of fluid inclusion and present-day oil accumulations in the Papuan foreland – evidence for previously unrecognized petroleum source rock. *Organic Geochem.* **36**(1): 29.
- Von der Heyden, C.J. and New, M.G., 2005, Differentiating dilution and retention processes in mine effluent remediation within a natural wetland on the Zambian Copper belt. *Applied Geochem.* **20**(7): 1241-1257.
- Warren, L.A. (ed.), 2004. A Special Issue on Microbial Geochemistry. *GCA* **68**(15): 3139-3284.
- Wenbo, R. et al., 2004. Geology and geochemistry of the Shangmanggang red clay-type gold deposit in West Yunnan. *J. Geochem. Explor.* **84**(3): 105 -
- White, J.D.L., Smellie, J.L., and Clague, D.A. (Eds.), 2003. Explosive Subaqueous Volcanism. *Am. Geophys. Union Geophys. Mono.* 140. 379 p.
- Whitehead, P. and Neal, C., 2005, Special Issue of Bioremediation of Acid Mine Drainage: The Wheal Jane Mine Wetlands Project. *Sci. Total Environ.* **338**(1-2): 1.
- Whiteley, J.D. and Murray, F., 2005. Determination of platinum group elements (PGE) in environmental samples by ICP-MS: a critical assessment of matrix separation for the mitigation of interferences. *Geochemistry – Exploration, Environmental, Analysis* **5**(1): 3-10.
- Wilde, P., Lyons, T.W., and Quinby-Hunt, M.S., 2004. Organic carbon proxies in black shales: Molybdenum. *Chem. Geol.* **206**(3/4): 167-176.
- Wilson, N.J., Craw, D., and Hunter, K., 2004. Contributions of discharges from a historic antimony mine to metalloid content of river waters, Marlborough, New Zealand. *J. Geochem. Explor.* **84**(3): 172 -
- Xue, X., Kanzaki, M., Neuville, D.R., and Kawamoto, T. (Eds.), 2004. Structure and properties of silicate melts and fluids. *GCA (Special Edition)* **68**(24): 5011-5104.



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GEOLOGICAL SOCIETY OF AUSTRALIA  
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## 4<sup>TH</sup> SPRIGG SYMPOSIUM

### URANIUM : EXPLORATION, DEPOSITS, MINES AND MINE WASTE DISPOSAL GEOLOGY

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This symposium immediately precedes the South Australian Explorers Conference  
(AMF Centre, Friday 2<sup>nd</sup> December)

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