

EXPLORE

NUMBER 114

Newsletter for the Association of Exploration Geochemists

JANUARY 2002



Philippe Freyssinet

PRESIDENT'S MESSAGE

Happy New Year!

It's the beginning of a new year, a time of renewal for the AEG, and I am honoured and privileged to serve the AEG with its most capable Council members. First of all, I would like to express my thanks, and those of all AEG members, to Nigel Radford, who now stands down from his role as AEG President. Nigel will continue to serve on the Council as AEG's former President. His efficiency and diplomatic skills were solicited over and over during this past year, and his calm and clear vision of AEG's position and evolution have secured a bright future for our Association. Many thanks Nigel!

As the first vice president of the AEG, and in line to serve as President in 2003, Steve Amor has already done a tremendous job for the association, both as Chairman of the Symposium Committee and as webmaster for our web site. I am relying on his invaluable assistance to enliven the association this year.

One of the highlights of this past year was the 20th International Geochemical Exploration Symposium held in Santiago, Chile. I take this opportunity to express my gratitude on behalf of the AEG to Peter Rogers, Colin Brooks and their team for their remarkable effort in organising this successful symposium. The strong attendance and the very high standard of the technical papers are strong evidence that the AEG is supported by dynamic scientific research that will influence geochemical exploration practice in years to come.

In 2001, we were able to enjoy the first issues of GEOCHEMISTRY, Exploration, Environment, Analysis, mainly thanks to Gwendy Hall's work, GEEA's Editor in Chief. We all agree on the high quality of these publications, which will better position our journal in an increasingly competitive scientific publishing market. The content of the 2002 issues will strengthen the journal's position, with the publication of the proceedings from the congress that took place in Santiago (*Chile*). We all need to keep up this effort and ensure that the best papers from our discipline are published in GEEA so that our journal's future can be assured!

AEG has undergone profound changes during these past few years with the launch of its new scientific journal, and its web site (www.aeg.org), and the review of the association's statutes. All this has occurred in the context of the current mineral industry crisis that has so strongly affected exploration. Despite these adverse conditions, the AEG has managed to keep its head above water and has found a new impetus thanks to a lively debate amongst the association members.

The first issue of GEEA was dedicated to the geochemistry of acid drainage in abandoned mines, which says a great deal about the ongoing evolution of the AEG. Geochemistry has become a key discipline amongst Earth Sciences and its applications are very far reaching. Our association stands at a junction between a scientific discipline, geochemistry and a significant economic player: the Mineral Industry. Even though it goes without saying that geochemistry has been one of the pillars of mining exploration success over the past decades, it now also plays a key role in environmental management. It appears that AEG is particularly well placed to play a significant role in this field, especially in the evaluation of the mineral industry's environmental impact. This is an area of significant scientific research and service activities around the world, which involve a very large number of active AEG members. This subject, which has, most recently, been debated by Nigel Radford and others in **EXPLORE**, will undoubtedly be on our 2002 agenda.

The next International Geochemical Exploration Symposium will be held in 2003 in Dublin. Gerry Stanley and his team are already actively preparing this venue. Until then, our association will focus on other forms of communication. Thanks to the efforts of Beth McClenaghan and Steve Armor, our website is already highly praised. It is not only a valuable tool for our association members, but it is also, and most importantly, our portal to the outside world. We need to keep strengthening its content so it becomes a useful and attractive site for the whole geochemical community, especially for students who often have difficulties

continued on page 3



EXPLORE NEWSLETTER
wishes to thank our
Corporate Sponsors



TABLE OF CONTENTS

President's Message 1

Geosoft Inc. and Metech Pty Ltd 3

Past President's Message 3

Corporate Sponsorship of Explore 4

GEEA Memorial Issue 5

Recent Papers 6

Technical Note:
 Gold and Base Metal Exploration in
 Northern Pakistan 11

Technical Note:
 Diamond Exploration Studies in
 Glaciated Terrain 14

Note from the Editor 15

Calendar of Events 16

New Members 18

Integrated Data Management 18

AEG Committees 19

21st IEGS - Dublin 20

ALS Acquires Bondar Clegg 20

AEG Membership Application 21

List of Advertisers 22

Exploration Technology:
 Discovery thru Innovation 22-23

Geosoft Inc. (Toronto, Canada), Metech Pty Ltd (Perth, Western Australia) sign coop agreement.

Geosoft Inc. is pleased to announce a cooperative agreement with Metech, an Australian software and support services company originating out of Perth, Western Australia. Located in five of the major mining centers of the world, Geosoft is now positioned to provide mineral exploration companies with the technology and support to solve their complete exploration data needs from data acquisition through management and processing to final presentation and reporting.

The goal of this agreement is to develop a complete solution that helps our clients increase the value and ensure the integrity of their geological, geochemical and geophysical data through better management, quality control, analysis, integration and reporting/presentation. We can provide comprehensive and well supported software solutions eliminating the need for dealing with a multitude of suppliers. The combined software suite represents a significant break from previous generations of software - enabling everyone to exchange data and results easily, both within the exploration and regional office and also via the Internet.

The integration of Metech's aQuire solution with Geosoft's Oasis montaj, the industry standard environment for geoscientists working with spatial data,

Continued on Page 3

An end-to-end solution from one global provider – Geosoft

Geosoft combines Oasis montaj with acQuire to provide a complete data management, processing and presentation solution.

Let us help you increase the value of your data to improve your exploration opportunities.

Go to www.geosoft.com/16

Geology Geochemistry Geophysics

GEOSOFT

acquire

GEOSOFT
Oasis montaj

Selective Extractions

Deep cover **penetration.**

SGHSM

TerraSolSM

Enzyme LeachSM

Na Pyrophosphate

...and more...

actlabs.com

Actlabs

Geosoft acquisition...

----- continued from Page 2

addresses the major problem experienced by professionals in the exploration and mining industries - storing and accessing quality technical data.

Geosoft's **CHIMERA**, **WHOLEPLOT** and **GEOPHYSICS** applications provide the tools for processing and mapping of geochemical, drillhole and geophysical data. The end result is to increase our client's ability to make knowledgeable and intelligent decisions based on their data.

Geosoft, a software and services company, serves the earth science community through a worldwide network of offices, distributors and Geosoft Plus strategic partners. The company is a global leader in providing one-stop solutions, based on Oasis montaj, for effective decision-making based on large-volume spatial data.

For more information see the Geosoft website at www.geosoft.com or the Metech website at www.metech.com.au.



President's Message

----- continued from Page 1

accessing scientific information. We must build a network around Steve so as to maintain and update our web site; our Regional Councillors could assist in this role.

EXPLORE continues to an important link between AEG members. Thanks to the efforts of the Business Manager, Dave Kelley, **EXPLORE**'s budget is very likely to soon benefit from corporate sponsorship. Consequently, its format and layout will probably be modified some time this year. Furthermore, an electronic version of **EXPLORE** is under study and could be released mid-year.

Finally, we must also keep supporting another weapon to our communication arsenal, I am thinking of the short courses and workshops sponsored by AEG. This is a vital part of our communication strategy particularly with geochemists, as it gives us the opportunity to demonstrate our expertise and attract new members.

I am sure you can see, as I do, that the year 2002 brings interesting new possibilities for the AEG to more effectively serve membership as a think tank in exploration and environmental geochemistry coupled with good communication through GEEA, **EXPLORE** and our website. Your feedback, knowledge, contributions, and support are always very important to us.

Philippe Freyssinet

President AEG

BRGM

Environment & Process Division

BP6009, F-45060 Orléans, France

Tel : 33-238.64.3005

Fax : 33-238.64.3680

Email : p.freyssinet@brgm.fr



Past President's Message

----- January 2002



Nigel Radford

May I start by wishing all members of AEG a Happy, Healthy and Prosperous New Year? The year in which you have honoured me by letting me serve as your president has flown by, and I now hand over the AEG presidency into the capable hands of Philippe Freyssinet. Philippe is head of Environmental Geochemistry at the BRGM in France, and is, I believe, the first French President of AEG. *Bon Chance* Philippe, I hope the year brings as much pleasure to you as this last one has for me!

And it has been a busy year for AEG! I cannot begin any recap of the year without mentioning the sad passing of our dear friend and AEG Co-founder, Alan Coope. Alan, you will be sadly missed in the ranks of the profession you loved so dearly and served so well. AEG is undertaking two permanent memorials to Alan. Firstly we are coordinating a special volume of GEEA in Alan's memory to include papers on the geochemistry of the Great Basin. Let's make this volume really special! Please send papers to Peter Rogers (proger3@attglobla.net) and to Gwendy Hall (ghall@nrcan.gc.ca). Secondly we are starting a memorial fund to allow student scholarships to be allocated in Alan's memory. Alan was above all a great teacher of the science he loved, and this is a truly fitting memorial to him. There is space for donations to this fund on the membership renewal form recently mailed to you all, and I urge those of you who can to make a donation to this fund.

This past year has seen the very successful launching of our new Journal, **Geochemistry: Exploration: Environment: Analysis (GEEA)**. It looks superb and is already brimming with excellent articles. More of these are always needed and for it to be a success, you (and I), the AEG members for whom the Journal is assembled, must keep the papers rolling in.

EXPLORE, our newsletter, has continued to disseminate fascinating, and sometimes provocative articles to our members under the editorship of Lloyd James. Early in 2002, Lloyd is passing the job over to Mary Doherty. Thanks to you, Lloyd for your efforts, and to Mary for making such a commitment.

Under the care of Steve Amor, the **AEG Web Site** (www.aeg.org) has expanded continuously over the year and I think we are now getting excellent value from this very important means of communication.

For me a highlight of 2001 was the 20th IGES in Santiago, Chile. Those of us who were lucky enough to attend had a great time, both geochemically and socially. This was certainly the best IGES I have attended, and the AEG's thanks are due to the Local Organising Committee.

At the start of the year, I set myself a target of getting consensus on a series of changes to the AEG By Laws that would make the Association more relevant to geochemists

continued on page 4

Corporate Sponsorship of Explore

You will have noticed the bright colors in this issue of **EXPLORE**. This results from a new AEG policy, that allows for the corporate sponsorship of Explore. We are fortunate to have two sponsors for 2002 - Geosoft and Actlabs. With their generous support, all four issues of **EXPLORE** will be printed with 8 pages of colour, allowing authors of technical articles a venue for presenting geochemical data in color, and providing advertisers with the option of placing colour ads. If you have ever been envious of the rich color presentation of geophysical data, then take advantage of this opportunity and submit articles that present geochemistry the way it should be, in full colour. If you are an advertiser and are interested in being a corporate sponsor, please contact the **EXPLORE** Business Manager.

Conditions of Corporate Sponsorship

The conditions for the corporate sponsorship of **EXPLORE** are outlined below. Corporate sponsorship will provide the funds necessary to allow a minimum of 8 pages of colour in two issues per year (minimum of one sponsor), or 8 pages of colour in 4 issues per year (minimum of two sponsors). Pages printed in colour will be used for graphics related to technical articles and for advertisements. Non-corporate sponsors have the option of advertising in black and white or in colour when a

colour issue is planned. The conditions of corporate sponsorship of **EXPLORE**, including the fees and ad rates, are subject to annual review by the AEG Council.

1. Cost: US\$3,000 annually (Jan-Dec) with annual renewal in December.
2. If only one corporate sponsor exists, two issues with eight pages of colour will be printed annually.
3. If two corporate sponsors exist, four issues with eight pages of colour will be printed annually.
4. Additional sponsors will allow additional pages of colour to be printed and/or allow the AEG subsidy to be reduced.
5. The colour pages will include the front, inside front, inside back, back, and center 4 pages and will be used for colour advertising and colour graphics related to technical articles.
6. Premium advertising space will be offered to corporate sponsors for the inside front cover, inside back cover, and back. Sponsors may elect to have ad located in center 4 pages to accompany technical article for a given issue. In such a case, premium ad space to be used for other advertisers for that given issue if warranted.
7. Ad placement costs are in addition to the corporate sponsorship fees. Corporate sponsors will pay rate for black and white ads, even if ad is in colour.
8. Non-corporate sponsors that want colour ads have to pay colour ad rate (black and white rate plus 20%) to

continued on page 5

Past President's Message...

in all branches of mineral resources, not simply mineral exploration. These changes are to be circulated to the Fellows shortly for their consideration. Membership numbers for the Association are falling steadily, from over 1000 three years ago, to less than 800 now. Obviously the downturn in the exploration and mining industry is partly responsible, but I am sure that these changes to the Association's constitution will demonstrate that we are relevant to *all* aspects of geochemistry in the mineral resources area. By the way, voting on these proposed changes, as for the recent Council elections, will be readily available on our web site. At the Council elections, I used the web site to vote, and it was delightfully simple. I recommend that method to all of you in future.

For me the low point of the year is that the mineral exploration industry continues to depress. There are fewer and fewer jobs as large companies abandon exploration (by slashing budgets and staff) and by merging with or taking over each other, with inevitable smaller exploration budgets. For their part, the smaller companies now find it almost impossible to raise capital on the markets. We know the consequences: there will be too few new deposits in the development pipeline to satisfy on-going demand for metals. That appears logical enough, but it seems that corporate thinking is not looking that far ahead. What can

we as individuals do? Seemingly not much, the corporate "they" do not seem to listen to individuals. But as shareholders in resource companies we can do a little, by asking at company meetings (AGMs and the like) questions about the alarming decreases in exploration expenditure. If enough shareholder concern is expressed, it will filter through to the boardrooms. We might as well have a go, because no one else seems likely to do it for us. As with politicians and public opinion, so it is with Directors and shareholder opinions.

As I climb down from the soap box, I would like to take this last opportunity to exhort you all to take an active part in AEG. It's your association, have your say, ask that question that's been bugging you, put an article in **EXPLORE**, add a contact to the web site, and look for material for GEEA. Above all try and get your friends and colleagues to join AEG and make it more and more relevant to our truly exciting science. I believe we are on the threshold of major advances in exploration geochemistry, and these will lead to major new mineral discoveries, as well as to better understanding of the movement of metals in the near surface environment. These are exciting times, let's have fun with our science! Good Luck to all explorers, and thanks for having me as your president.



Memorial Issue GEEA Dedicated to J. Alan Coope

With the untimely passing of J. Alan Coope on August 5th 2001 the Association of Exploration Geochemists and the exploration community as a whole has lost one of the giants of the latter half of the 20th century. The life and times of Alan will be celebrated by family, friends and colleagues who will recall his many contributions to the profession of exploration geochemistry.



Corporate Sponsorships...

continued from Page 4

place an ad in colour. This will only be available if this issue is planned for colour.

9. A banner will be printed at the bottom of the front page acknowledging the corporate sponsors (normally by printing the sponsors logo).
10. The Table of Contents will be placed on the inside front of each issue.
11. All ads in **EXPLORE** will have "Paid Advertisement" in small print near the ad.

David Kelley

EXPLORE – Business Manager
Email: dave.kelley@wmc.com.au



On a personal note I was looking forward to renewing my long acquaintance with Alan at the 20th International Geochemical Exploration Symposium in Santiago de Chile this last May. Unfortunately illness intervened.

To celebrate the professional achievements of Alan the Association of Exploration Geochemists has decided to dedicate a Special Issue of Geochemistry, Exploration, Environment and Analysis to his memory. The Special Issue is entitled "Applied Geochemistry and Exploration in the Great Basin of Nevada."

Potential contributors are cordially invited to submit manuscripts to :

Marcia Scrimgeour,
Editorial Office Manager, Geochemistry : Exploration,
Environment, Analysis
P.O Box 26099, 72 Robertson Road,
Nepean, Ontario K2H 9R0, Canada
Tel : 613 828 1222
Fax: 613 828 2567
Email : geaa@compmore.net

Further information can be obtained from :

Peter J. Rogers

10902 Highway 215, South Maitland,
RR 4, Shubenacadie, Nova Scotia B0N 2H0, Canada
Tel : 902 261 2692 and in Chile 569 238 9057 (mobile)
Fax: 902 261 2099 and in Chile 562 748 6772
Email : proger3@attglobal.net or chavin@cnova.net



GLOBAL EXPLORATION 2002: Integrated Methods for Discovery

www.seg2002.org



**APRIL 14-16, 2002
DENVER, COLORADO USA**

Technical Sessions • Posters • Core Shack • Workshops • Field Trips • Exhibits

Co-sponsored by:

Society for Geology Applied to Mineral Deposits
Association of Exploration Geochemists
Society of Exploration Geophysicists

Major sponsors now include:

BHP Billiton, AngloGold North America, Barrick Gold,
Companhia Vale do Rio Doce, Gold Fields, Newmont
Mining, Rio Tinto, U.S. Geological Survey, Buenaventura

Learning from the Discovery of the World's Great Mineral Deposits



RECENT PAPERS

This list comprises titles that have appeared in major publications since the compilation in **EXPLORE** Number 113. 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**.

Adriano, D.C., 1986. Trace Elements in the Terrestrial Environment. Springer-Verlag. 517 p.

Anand, R.R., 2001. Evolution, classification and use of ferruginous materials in gold exploration, Yilgarn Craton, Western Australia. *Geochemistry: Exploration, Environment, Analysis*. 1(3): 221-236.

Anand, R.R., Wildman, J.E., Varga, Z.S., and Phang, C., Regolith evolution and geochemical dispersion in transported and residual – Bronzewing gold deposit. *Geochemistry: Exploration, Environment, Analysis*. 1(3): 265-276.

Asfahani, J. and Mohamad, R., 2000. Investigation of Electrical Properties of Radioactive Phosphatic Layers in the Al-Sharquieh Mine, Syria. *Explor. Mining Geol.* 7(2): 141-148.

Astrom, M., 2001. Effect of widespread severely acidic soils on spatial features and abundance of trace

elements in streams. *J. Geochem. Explor.* 73(3): 181-191.

Bachmann, T.M., Friese, K., and Zachmann, D.W., 2001. Redox and pH conditions in the water column and in the sediments of an acidic mining lake. *J. Geochem. Explor.* 73(2): 75-86.

Banwart, S.A. and Malmstrom, M.E., 2001. Hydrochemical modeling for preliminary assessment of minewater pollution. *J. Geochem. Explor.* 74: 73-97.

Barrett, T.J., MacLean, W.H., and Tennant, S.C., 2001. Volcanic Sequence and Alteration at the Parys Mountain Volcanic-Hosted Massive Sulfide Deposit, Wales, United Kingdom: Applications of Immobile Element Litho-geochemistry. *EG* 96(5): 1279-1305.

Bechtel, A., Gratzner, R., Puttman, W., and Oszczepalski, S., 2001. Variable alteration of organic matter in relation to metal zoning at the Rote Faule front (Lubin-Sieroszowiae mining district, SW Poland). *Organic Geochem.* 32(3): 377 -

Becker, A., Klock, W., Friese, K., Schreck, P., Treutler, H.-C., Spettel, B., and Duff, M.C., 2001. Lake Suber See as a natural sink for heavy metals from copper mining. *J. Geochem. Explor.* 74: 205-217.

Beqiraj, A., Masi, U., and Violo, M., 2000. Geochemical characterization of podiform chromite ores from the ultramafic massif of Bulqira (Eastern Ophiolitic Belt, Albania) and hints for exploration. *Explor. Mining Geol.* 9(2): 149-156.

Bortnikova, S.B., Smolyakov, B.S., Sidenko, N.V., Kolonin, G.R., Bessonova, E.P., and Androsova, N.V., 2001. Geochemical consequences of acid mine drainage into a natural reservoir: inorganic precipitation and effects on plankton activity. *J. Geochem. Explor.* 74: 127-139.

Brauhart, C.W., Huston, D.L., Groves, D.I., Mikucki, E.J., and Gardoll, S.J., 2001. Geochemical Mass Transfer Patterns as Indicators of the Architecture of a Complete Volcanic-Hosted Massive Sulfide Hydrothermal Alteration System, Panorama District, Pilbara, Western Australia. *EG* 96(5): 1263-1278.

Butt, C.R.M and Scott, K.M., 2001. Geochemical exploration for gold and nickel in the Yilgarn Craton, Western Australia – an introduction. *Geochemistry: Exploration, Environment, Analysis*. 1(3): 179-182.

Callaghan, T., 2001. Geology and Host-Rock Alteration of the Henty and Mount Julia Gold Deposits, Western Tasmania. *EG* 96(5): 1073-1088.

Shea Clark Smith
MEG

**MINERALS EXPLORATION &
ENVIRONMENTAL GEOCHEMISTRY**

Plant • Soil • Gas • Rock

P.O. Box 18325, Reno, Nevada 89511
2235 Lakeshore Drive, Carson City, Nevada 89704
Tel: (775) 849-2235 • Fax: (775) 849-2335
SheaClarkSmith@compuserve.com



RECENT PAPERS

continued from Page 6

- Corbett, K.D., 2001. New Mapping and Interpretations of the Mount Lyell Mining District, Tasmania: A Large Hybrid Cu-Au System with an Exhalative Pb-Zn Top. *EG* 96(5): 1089-1122.
- Cornelius, M., Smith, R.E. and Cox, A.J., 2001. Laterite geochemistry for regional exploration surveys – a review, and sampling strategies. *Geochemistry: Exploration, Environment, Analysis*. 1(3):211-220.
- Craw, D., 2001. Tectonic controls on gold deposits and their environmental impact, New Zealand. *J. Geochem. Explor* 73(1): 43-56.
- Davidson, G.J., Stolz, A.J., and Eggins, S.M., 2001. Geochemical Anatomy of Silica Iron Exhalites: Evidence for Hydrothermal Oxyanion Cycling in Response to Vent Fluid Redox and Thermal Evolution (Mt. Windsor Subprovince, Australia). *EG* 96(5): 1201-1226.
- Davies, B.E. (ed.), 1980. *Applied Soil Trace Elements*. Wiley. 467 p.
- Diko, L., Vervoort, A., and Vergauwen, I., 2001. Geostatistical modeling of lateritic bauxite orebodies in Surinam: effect of the vertical dimension. *J. Geochem. Explor*. 73(3): 131-153.
- Dinelli, E., Lucchini, F., Fabbri, M., and Cortecchi, G., 2001. Metal distribution and environmental problems related to sulfide oxidation in the Libiola copper mine area (Ligurian Apennines, Italy). *J. Geochem. Explor*. 74: 141-152
- Dold, B. and Fontbote, L., 2001. Element cycling and secondary mineralogy in porphyry copper tailings as a function of climate, primary mineralogy, and mineral processing. *J. Geochem. Explor*. 74: 3-55.
- Doming, S.C., 2001. Evaluation of gold grade potential in erratic gold veins using bulk-rock geochemical discrimination index. *Trans. IMM* 110: B 40-44.
- Doyle, M.G., 2001. Volcanic Influences on Hydrothermal and Diagenetic Alteration: Evidence from Highway-Reward, Mount Windsor Subprovince, Australia. *EG* 96(5): 1133-1148.
- Eilu, P. and Groves, D.I., 2001. Primary alteration and geochemical dispersion haloes of Archaean orogenic gold deposits in the Yilgarn Craton: the pre-weathering scenario. *Geochemistry: Exploration, Environment, Analysis*. 1(3): 183-200.
- Elburg, M.A., et al., 2001. Age and metasomatic alteration of the Mt. Neill Granite at Nooldoonooldoona Waterhole, Mt. Painter Inlier, South Australia. *Aust. J. Earth Sci.* 48(15): 721-730.
- Gast, M., Schaaf, W., Scherzer, J., Wilden, R., Schneider, B.U., and Huttli, R.F., 2001. Element budgets of pine stands on lignite and pyrite containing mine soils. *J. Geochem. Explor*. 73(2): 63-74.
- Gemmell, J.B. and Fulton, R., 2001. Geology, Genesis, and Exploration Implications of the Footwall and Hanging-Wall Alteration Associated with the Hellyer Volcanic-Hosted Massive Sulfide Deposit, Tasmania, Australia. *EG* 96(5): 1003-1035.
- Gibson, H.L., Kerr, D.J., and Cattalani, S., 2000. The Horne Mine: Geology, History, Influence on Genetic Models, and a Comparison to the Kidd Creek Mine. *Explor. Mining Geol.* 9(2): 91-111.
- Gifkins, C.C. and Allen, R.L., 2001. Textural and Chemical Characteristics of Diagenetic and Hydrothermal Alteration in Glassy Volcanic Rocks: Examples from the Mount Read Volcanics, Tasmania. *EG* 96(5): 973-1002.
- Goad, R.E., et al., 2000. The NICO and Sue-Dianne Proterozoic, Iron-Oxide-hosted, Polymetallic Deposits, Northwest Territories: Application of the Olympic Dam Model in Exploration. *Explor. Mining Geol.* 9(2): 123-140.
- Goldfarb, R.J., Groves, D.I., and Gardoll, S., 2001. Orogenic gold and geologic time: A global synthesis. *Ore Geology Reviews* 18(1-2): 1 –
- Gray, D.J., 2001. Hydrogeochemistry in the Yilgarn Craton, *Geochemistry: Exploration, Environment, Analysis*. 1(3): 253-264.
- Herrmann, W., Blake, M., Doyle, M., Huston, D., Kamprad, J., Merry, N., and Pontual, S., 2001. Short Wavelength Infrared (SWIR) Spectral Analysis of Hydrothermal Alteration Zones Associated with Base Metal Sulfide Deposits at Rosebery and Western Tharsis, Tasmania, and Highway-Reward, Queensland. *EG* 96(5): 939-955.

continued on page 8



Jeffrey A. Jaacks Ph.D.
Geochemistry

8493 East Foxhill Place
Englewood, CO 80112
USA

(303) 713 - 1601
j.jaacks@worldnet.att.net



RECENT PAPERS

continued from Page 7

Herrmann, W. and Hill, A.P., 2001. The Origin of Chlorite-Tremolite-Carbonate Rocks Associated with the Thalanga Volcanic-Hosted Massive Sulfide Deposit, North Queensland, Australia. *EG* 96(5): 1149-1173.

Holmstrom, H. and Ohlander, B., 2001. Layers rich in Fe- and Mn-oxyhydroxides formed at the tailings-pond water interface, a possible trap for trace metals in flooded mine tailings. *J. Geochem. Explor.* 74: 189-203.

Hoth, N., Wagner, S., and Hafner, F., 2001. Predictive modeling of dump water impact on the surroundings of the lignite dump site Janschwalde (Eastern Germany). *J. Geochem. Explor.* 73(2): 113-121.

Holtstam, D. and Mansfeld, J., 2001. Origin of a carbonate-hosted Fe-Mn-(Ba-As-Pb-Sb-W) deposit of Langban-type in central Sweden. *Min. Deposita.* 36(7): 641-657.

Hozhina, E.I., Khramov, A.A., Gerasimov, P.A., and Kumarkov, A.A., 2001. Uptake of heavy metals, arsenic, and antimony by aquatic plants in the vicinity of ore mining and processing industries. *J. Geochem. Explor.* 74: 153-162.

Huston, D.L., Brauhart, C.W., Drieberg, S.L., Davidson, G.J., and Groves, D.I., 2001. Metal leaching and inorganic sulfate reduction in volcanic-hosted massive sulfide mineral systems: Evidence from paleo-Archean Panorama district, Western Australia. *Geology* 29(8): 687 -

Huston, D.L. and Kamprad, J., 2001. Zonation of Alteration Facies at Western Tharsis: Implications for the Genesis of Cu-Au Deposits, Mt. Lyell Field, Western Tasmania. *EG* 96(5): 1123-1132.

Jung, M.C., 2001. Heavy metal contamination of soils and waters in and around the Imcheon Au-Ag mine, Korea. *Applied Geochem.* 16(11-12): 1369-1376.

Kimitrakipoulos, R. and Kaklis, K., 2001. Integration of assay and cross-hole tomographic data in orebody modeling: Joint geostatistical simulation and application at Mount Isa mine, Australia. *Trans. IMM* 110: B33-39.

Kumar, S., Chaki, A., and Bagchi, A.K., 2001. Geochemistry of the granites from Jharsuguda district, Orissa: Implications for rare metal mineralizations. *J. Geol. Soc. India* 57(6): 539

Large, R.R., Allen, R.L., Blake, M.D., and Herrmann, W., 2001. Hydrothermal Alteration and Volatile Element halos for the Rosebery K Lens Volcanic-Hosted Massive Sulfide Deposit, Western Tasmania. *EG* 96(5): 1055-1072.

Large, R.R., Gemmell, J.B., Paulick, H., and Huston, D.L., 2001. The Alteration Box Plot: A Simple Approach to Understanding the Relationship between Alteration Mineralogy and Litho-geochemistry Associated with Volcanic-Hosted Massive Sulfide Deposits. *EG* 96(5): 957-971.

Large, R.R., McPhie, J., Gemmell, J.B., Herrmann, W., and Davidson, G.J., 2001. The Spectrum of Ore Deposit Types, Volcanic Environments, Alteration Halos, and Related Exploration Vectors in Submarine Volcanic Successions: Some Examples from Australia. *EG* 96(5): 913-938.

Lee, C.G., Chon, H.T., and Jung, M.C., 2001. Heavy metal contamination in the vicinity of the Daduk Au-Ag-Pb-Zn mine in Korea. *Applied Geochem.* 16(11-12): 1377 -

BQ **BECQUEREL
LABORATORIES**

CANADA

6790 Kitimat Rd., Unit 4
Mississauga, Ontario, L5N 5L9
Tel: (905) 826-3080
Fax: (905) 826-4151
e-mail: ssimpson@becquerellabs.com
Contact: Steve Simpson

Neutron Activation Analysis Specialists

*Gold + multielement suite
Independent check analyses
Exploration and research*

AUSTRALIA

Lucas Heights Science and Technology Centre
New Illawarra Rd., Lucas Heights, NSW 2234
Tel: (02) 9543 2644
Fax: (02) 9543 2655
e-mail: naa@bq.com.au
Contact: David Garnett / Helen Waldron



RECENT PAPERS

continued from Page 8

- Lintern, M.J., 2001. Exploration for gold using calcrete – lessons from the Yilgarn Craton, Western Australia. *Geochemistry: Exploration, Environment, Analysis*. 1(3): 237-252.
- Ljungberg, J. and Ohlander, B., 2001. The geochemical dynamics of oxidizing mine tailings at Laver, northern Sweden. *J. Geochem. Explor.* 74: 57-72.
- Ludwig, B., Prenzel, J., and Obermann, P., 2001. Modelling ion composition in seepage water from a column experiment with an open cut coal mine sediment. *J. Geochem. Explor.* 73(2): 87-95.
- Lundgren, T., 2001. The dynamics of oxygen transport into soil covered mining waste deposits in Sweden. *J. Geochem. Explor.* 74: 163-173.
- Marshall, D. and Watkinson, D.H., 2000. The Cobalt Mining District: Silver Sources, Transport and Deposition. *Explor. Mining Geol.* 9(2): 81-90.
- Martin, A.J., McNee, J.J., and Pedersen, T.F., 2001. The reactivity of sediments impacted by metal-mining in Lago Junin, Peru. *J. Geochem. Explor.* 74: 175-187.
- Martin-Fernandez, J.A., Olea-Meneses, R.A., and Pawlowsky-Glahn, V., 2001. Criteria to Compare Estimation Methods of Regionalized Compositions. *Math. Geol.* 33(8): 889-909.
- McKenzie, E.J., Brown, K.L., Cady, S.L., and Campbell, K.A., 2001. Trace metal chemistry and silicification of micro-organisms in geothermal sinter, Taupo volcanic zone, New Zealand. *Geothermics* 30(4): 483 -
- Miller, C., Halley, S., Green, G., and Jones, M., 2001. Discovery of the West 45 Volcanic-Hosted Massive Sulfide Deposit Using Oxygen Isotopes and REE Geochemistry. *EG 96(5)*: 1227-1237.
- Miretzky, P., Conzonno, V., and Fernandez Cirelli, A., 2001. Geochemical processes controlling silica concentrations in groundwaters of the Salado River drainage basin, Argentina. *J. Geochem. Explor.* 73(3): 155-166.
- Miskelly, N., 2001. Accelerated Progress on International Mineral Reserves Reporting Standards. *Aus IMM Bull.* Aug/Sept.: 44-51.
- Morin, K.A. and Hutt, N.M., 2001. Prediction of minesite-drainage chemistry through closure using operational monitoring data. *J. Geochem. Explor.* 73(2): 123-130.
- Morris, P.A. and Sanders, A.J., 2001. The effect of sample medium on chemistry over greenstone belts in the northern Eastern Goldfields of Western Australia. *Geochemistry: Exploration, Environment, Analysis*. 1(3): 201-210.
- Muller, D., Franz, L., Herzig, P.M., and Hunt, S., 2001. Potassic igneous rocks from the vicinity of epithermal gold mineralization, Lihir Island, Papua New Guinea. *Lithos* 57(2/3): 163-186.
- Neal, H.E., 2000. Iron Deposits of the Labrador Trough. *Explor. Mining Geol.* 9(2): 113-121.
- Ohlander, B., Kriese, K., and Fritz, P. (eds.), 2001. *Geochemical Studies of Mining and the Environment – Special Issue.* *J. Geochem. Explor.* 74: 1-231.
- Pais, I. and Jones, J.B., Jr., 1997. *The Handbook of Trace Elements.* St. Lucie Press. 230 p.
- Parsons, M.B., Bird, D.K., Einaudi, M.T., and Alpers, C.N., 2001. Geochemical and mineralogical controls on trace element release from the Penn mine base-metal slag dump, California. *Applied Geochem.* 16(11/12): 1567-1594.
- Paulick, H., Herrmann, W., and Gemmel, J.B., 2001. Alteration of Felsic Volcanics Hosting the Thalanga Massive Sulfide Deposit (Northern Queensland, Australia) and Geochemical Proximity Indicators to Ores. *EG 96(5)*: 1175-1200.
- Pettersson, U.G. and Ingri, J., 2001. The geochemistry of Co and Cu in the Kafue River as it drains the Copperbelt mining area in Zambia. *Chem. Geol.* 177(3/4): 399 -
- Proenza, J.A., et al., 2001. Genesis of sulfide-rich chromite ores by the interaction between chromitite and pegmatitic olivine-norite dikes in the Potosi Mine (Moa-Baracoa ophiolitic massif, eastern Cuba). *Min. Deposita.* 36(7): 658-669.
- Puffer, J.H., 2001. Contrasting high field strength element contents of continental flood basalts from plume versus reactivated-arc sources. *Geology* 29(8): 675-686.
- Radford, N., 2001. Analyst's Couch – Acid Soluble Zirconium. *Explore* 113: 3-5.
- Rantitsch, G., 2001. The fractal properties of geochemical landscapes as an indicator of weathering and transport processes within the Eastern Alps. *J. Geochem. Explor.* 73: 27-42.

continued on Page 10



RECENT PAPERS

continued from Page 12

- Ravizza, G., Blusztajn, J., and Brichard, H.M., 2001. Re-Os systematics and platinum-group element distribution in metalliferous sediments from the Troodos ophiolite. *Earth Planet. Sci. Letters* 188(3/4):369-
- Reis, A.P., Sousa, A.J., and Cardoso Fonseca, E., 2001. Soil geochemical prospecting for gold at Marrancos (Northern Portugal). *J. Geochem. Explor.* 73(1): 1-10.
- Robertson, I.D.M., 2001. Geochemical exploration around the Harmony gold deposit, Peak Hill, Western Australia. *Geochemistry: Exploration, Environment, Analysis.* 1(3): 277-288.
- Rolland, W., Wagner, H., Chmielewski, R., and Grunewald, U., 2001. Evaluation of the long term groundwater pollution by the open cast lignite mine Janschwalde (Germany). *J. Geochem. Explor.* 73(2): 97-111.
- Ryabchikov, I.D., 2001. Deep geospheres and ore genesis. *Geol. Ore Deposit* 43(3): 173 -
- Schardt, C., Cooke, D.R., Gemmell, J.B., and Large, R.R., 2001. Geochemical Modeling of the Zoned Footwall Alteration Pipe, Hellyer Volcanic-Hosted Massive Sulfide Deposits, Western Tasmania, Australia. *EG* 96(5): 1037-1054.
- Schlieker, M., Schuring, J., Hencke, J., and Schulz, H.D., 2001. The influence of redox processes on trace element mobility in a sandy aquifer – an experimental approach. *J. Geochem. Explor.* 73(3): 167-179.
- Sharpe, R. and Gemmell, J.B., 2001. Alteration Characteristics of the Archean Golden Grove Formation at the Gossan Hill Deposit, Western Australia: Induration as a Focusing Mechanism for Mineralizing Hydrothermal Fluids. *EG* 96(5): 1239-1262.
- Shvartsev, S.L. and Dutova, E.M., 2001. Hydrochemistry and mobilization of gold in the hypergenesis zone (Kuznetsk, Alatau, Russia). *Geol. Ore Deposits* 43(3): 434-438.
- Sidenko, N.V., Giere, R., Bortnikova, S.B., Cottard, F., and Pal'chik, N.A., 2001. Mobility of heavy metals in self-burning waste heaps of the zinc smelting plant in Belovo (Kemerovo Region, Russia). *J. Geochem. Explor.* 74: 109-125.
- Sun, Y., Secombe, P.K., and Yang, K., 2001. Application of short-wave infrared spectroscopy to define alteration zones associated with the Elura zinc-lead-silver deposit, NSW, Australia. *J. Geochem. Explor.* 73(1): 11-26.
- Tangestani, M.H. and Moore, F., 2001. Porphyry copper potential mapping using the weights-of-evidence model in a GIS, northern Shahr-e Babok, Iran. *Aust. J. Earth Sci.* 48(5): 695-701.
- Thielemann, T., Krooss, B.M., Littke, R., and Welte, D.H., 2001. Does coal mining induce methane emissions through the lithosphere/atmosphere boundary in the Ruhr Basin, Germany? *J. Geochem. Explor.* 74: 219-231.
- Vreca, P., Pirc, S., and Sajn, R., 2001. Natural and anthropogenic influences on geochemistry of soils in terrains of barren and mineralized carbonate rocks in the Pb-Zn mining district of Mezica, Slovenia. *J. Geochem. Explor.* 74: 99-108.
- Wagner, T. and Boyce, A.J., 2001. Sulphur isotope characteristics of recrystallisation, remobilization and reaction processes: a case study from the Ramsbeck Pb-Zn deposit, Germany. *Min. Deposita* 36(7): 670-679.
- Walvoort, D.J.J. and de Cruijter, J.J., 2001. Compositional Kriging: A Spatial Interpolation Method for Compositional Data. *Math. Geol.* 33(8): 951-966.
- White, A.F. and Brantley, S.L. (eds.), 1995. *Chemical Weathering Rates of Silicate Minerals.* *Min. Soc. Am., Rev. in Min.* V. 31: 581 p.

continued on Page 14

XRAL

Analytical Services

Wherever in the world
your interests are...

XRAL Laboratories
1885 Leslie Street
Toronto, ON M3B 3J4
Tel: (416) 445-5755
in the USA:
1 (800) 387-0255
Fax: (416) 445-4152

Les Laboratoires XRAL
129, av. Réal Caouette
Rouyn-Noranda, PQ
J9X 5A9
Tel: (819) 764-9108
Fax: (819) 764-4673

SGS del Peru S.A.
Av. Elmer Faucett 3348
Callao 1 - Lima, Peru
Tel: (51-14) 840855
Fax: (51-15) 741600

SGS-XRAL Laboratories
Km 2.5 Carretera
Internacional
Salida a Nogales
Hermosillo, Mexico
Tel: (52-62) 106535
Fax: (52-62) 100350

Sample preparation: Flin
Flon (Manitoba), Saint John
(N.B.), Red Lake, (ONT),
Grand Falls, (NFLD),
Tumeramo (Venezuela), and
Ulaanbaatar (Mongolia).

Laboratories:
Ecuador, Bolivia, Brazil,
Chile, Ghana, Zimbabwe,
Kazakhstan, Europe and
elsewhere.



SGS maintains 1,100 offices
in 140 countries.

Member of the SGS Group (Société Générale de Surveillance)

for Geologists

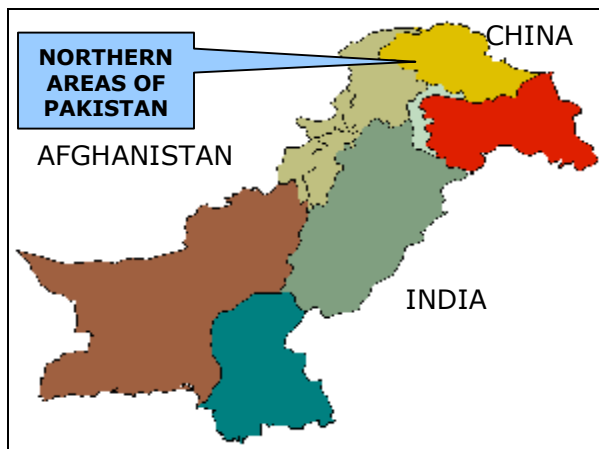

Technical Note

Gold and Base Metal Exploration in Northern Pakistan

Introduction

Fine and nugget gold has been extracted from the Northern Areas of Pakistan (Fig. 1) for well over 2000 years. This has naturally attracted exploration attention to the region in recent times. A drilling program on the Indus terraces initiated in 1974 by the Pakistan Mineral Development Corporation (PMDC), with the technical assistance of an Austrian based consulting group M/s Austromineral, was unsuccessful. More recently (1992 to 2001) PMDC carried out systematic regional geochemical exploration over an area of some 50,000 km² in the Northern Areas. The primary objective was to define areas with apparent gold and base metal potential on which more detailed investigations might be focussed.

Fig. 1. Location of Northern Areas, Pakistan.



Summary results of this regional survey are presented here.

Location

The survey area is situated between Latitude 34°33" to 37°04"N and Longitude 72°31' to 77°11"E (Fig. 1). It is located in the extreme northern part of Pakistan that is connected via the Karakoram Highway (KKH) with China in the north and other parts of Pakistan in the south. The survey area borders Afghanistan in the N-NE and the Indian controlled portion of Kashmir to the east. Gilgit, which is 610km north from Islamabad by road, is the administrative capital of the Northern Areas.

Topography

The area is occupied by three important mountain ranges that converge in the vicinity of Gilgit; the Hindukush from the west, and the Himalaya and Karakoram from the east. Relief is extremely high. The area includes K2, the second highest mountain in the

Continued on Page 12

Your Global Partner in Mining and Mineral Exploration

New Offices

Now offering sample preparation and sample export services to North America and Australia from four new locations:

- Mwanza, Tanzania
- Tehran, Iran
- Izmir, Turkey
- Ojebyn, Sweden

Services

Servicing all your sample preparation and assay requirements:

- Gold and PGE's
- Base Metals
- Nickel Laterites
- Industrial and Bulk Minerals

For full details contact your nearest ALS Chemex Laboratory or visit www.alschemex.com



Technical Note...

— — — — — continued from Page 11

world (8611m), and there are six other peaks >8000m elevation. The large Indus River enters the area from the east and turns southward in the central part. The Hunza River joins it from the north and the Gilgit River from the west. About 20% of the area is permanently covered by glaciers and ice sheets. Drainage patterns are dendritic. Temperatures are extreme with temperature as low as -60C° in the winter and as high as 45C° during the summer. The terrain is extremely rugged with slopes as steep as 60° and locally near vertical.

Regional Geology

The Northern Area contains east-west trending mountain ranges with three regional tectonic units. These are from north to south:

1. **Karakoram Block** which is a part of the Eurasian Plate. Rocks range from Proterozoic to Tertiary and comprise shelf sediments and low to high grade gneisses. The sequence has been intruded by 2-3 phases of the Tertiary calc-alkaline Karakoram batholith.
2. **Kohistan – Laddakh Island Arc** mainly comprises late Jurassic to Cretaceous tholeiitic to calc-alkaline volcanic rocks.
3. **The Indian Plate** trends north to south in the form of Haramosh- Nanga Parbat massif. This divides the island-arc into two parts: (1) Kohistan Arc; and (2)

Table 2

Minus 80 mesh samples (ppm)								
	AU	AG	CU	PB	ZN	CO	BI	NI
Detection Limit	0.05	0.5	5	5	5	5	10	5
Threshold	0.09	2	80	25	100	25	10	60
No. of anomalous samples	90	23	214	92	123	107	54	189
Panconcentrate samples (ppm)								
Threshold	2	2	90	100	90	60	30	50
No. of samples	253	105	182	223	78	152	102	202

Laddakh Arc. In this region the Indian Plate comprises mainly granitic and gneissic rocks.

The zone developed in between the obducted Karakoram Block and the subducted Island Arc is generally known as the Main Karakoram Thrust (MKT), whilst the one in between the Island Arc and the Indian Plate is known as the Main Mantle Thrust (MMT). Beside these collisional tectonic zones the Karakoram Block itself has undergone some regional under thrusting.

Sampling & Analysis

Twenty liters of stream sediment was collected at each sample site. After removal of around 70 grams of <80-mesh material by sieving, the remaining sample was subject to pan concentration. The resulting concentrates were pulverized and coned and quartered. Thirty grams of this material was taken for “total” acid digestion. Analysis was carried out by Atomic Absorption Spectrometry after running standard solutions in a local laboratory established with Australian assistance. Three readings were used to obtain average Au, Ag, Cu, Pb, Zn, Ni, Co and Bi value for each sample.

Analytical Results

The analytical results for 2359 <80 mesh stream sediment and 1782 pan concentrate samples are summarized in Table-1. Threshold for each element was determined with the aid of frequency diagrams. Threshold values and the number of anomalous samples so determined together with analytical detection limits are shown in Table-2. Spatial distribution maps for each element has been prepared. Those for <80 mesh copper and pan concentrate gold anomalies are shown in Figure 3 and Figure 2, respectively.

Table 1

Basic Statistical Data

Minus 80 mesh samples (ppm)								
	AU	AG	CU	PB	ZN	CO	BI	NI
Count	2359	2359	2359	2359	2359	2359	2359	1734
Average	0.07	0.97	46.46	9.88	63.88	14.28	10.25	44.38
Min	0.05	0.5	5	5	5	5	10	5
Max	2.62	102	895	370	3900	312	110	2500
Median	0.05	0.5	15	5	30	15	10	15
Mode	0.05	0.5	27	10	38	20	10	25
Stdev	46.28	42.14	331.74	375.38	142.19	55.85	475.24	232.33
Quartile-1	0.05	0.5	21	5	44	10	10	21
Quartile-2	0.05	0.5	35	6	55	13	10	29
Quartile-3	0.05	0.5	56	11	72	17	10	50
Quartile-4	2.62	102	895	370	3900	312	110	2500
Panconcentrate samples (ppm)								
	AU	AG	CU	PB	ZN	CO	BI	NI
Count	1782	1781	1782	1782	1782	1782	1782	1182
Average	2.95	1.31	55.36	73.73	47.50	29.91	39.36	57.69
Min	0.05	0.5	5	5	5	5	10	5
Max	330	78	7600	6900	3300	500	11010	3380
Median	0.05	0.49	27	10	38	20	10	25
Mode	0.05	0.49	15	5	30	15	10	15
Std	16.11	3.33	212.62	296.38	82.42	34.17	300.88	186.39
Quartile-1	0.05	0.5	16	5	30	13.5	10	15
Quartile-2	0.05	0.5	27	10	38	20	10	25
Quartile-3	0.5075	1.99	55	37	52	32	10	50
Quartile-4	330	78	7600	6900	3300	500	11010	3380

continued on Page 13

Technical Note... continued from Page

12

Fig.2 Distribution of gold anomalies in Northern Areas.

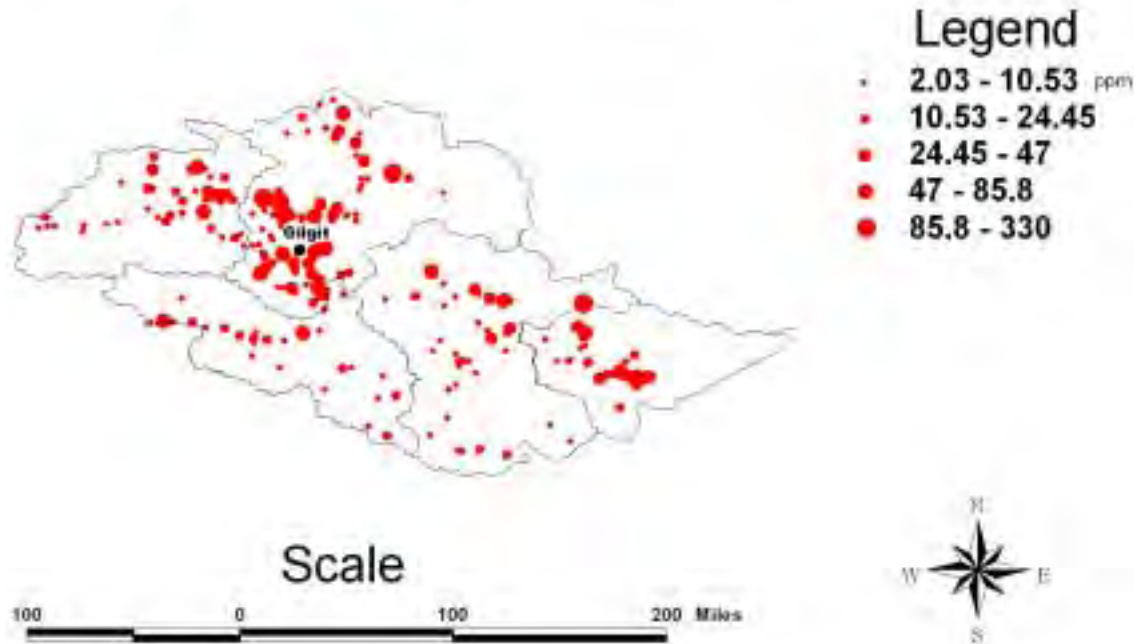
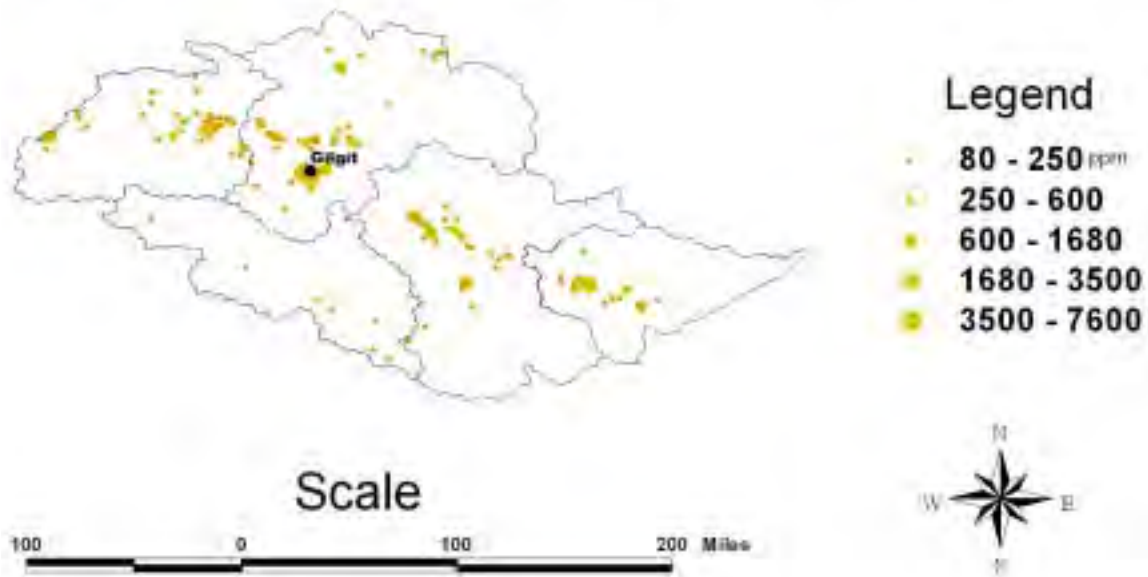


Fig.3 Distribution of copper anomalies in Northern Areas.



Gold Source Rocks

Follow-up studies in a number of valleys based on the regional geochemical and field study data have resulted in the location of a number of gold mineralized zones. These have yielded the following gold values:

- | | |
|----------------|-------------|
| 3. Golo Das | 0.2 to 12.0 |
| 4. Shigri Bala | 0.6 to 1.5 |
| 5. Machulu | 0.15 to 6.6 |
| 6. Bagrot | 0.2 to 3.01 |

Locality Name	Gold Values (ppm)
1. Ranthak	0.2 to 11.2
2. Satpara	<0.05 to 1.2

The significance of these localities is that they are either very close to the Main Karakoram Thrust zone

Technical Note...

—continued from Page 13

(MKT), where the presence of metallic mineralization might be expected, or they contain potentially favourable rocks such as meta-volcanics, greenstone complex, high grade and/or carbonaceous schist/gneisses.

Conclusions

1. Gold occurrences seem to be more concentrated in the Proterozoic rocks of the Karakoram Block and along the MKT.
2. Gold mineralization appears to be in several types of host rocks with different genetic environments.
3. Values of cobalt and nickel are only slightly elevated in the study area.
4. Copper displays remarkable enrichment along and in the vicinity of the MKT.
5. Bismuth anomalies are generally restricted to Laddakh Island Arc rocks.

Iftikhar A. Malik

Pakistan Mineral Development Corporation
Islamabad, Pakistan
Email: iamalik@isb.perd.net.pk



Technical Note

Diamond Exploration Studies in Glaciated Terrain

GSC research scientists Beth McClenaghan and Bruce Kjarsgaard continued their kimberlite/glacial dispersal studies in the Kirkland Lake-Lake Timiskaming kimberlite fields of northeastern Ontario, Canada this September. Fieldwork consisted of excavating trenches into two kimberlites on the Seed property, and pits down-ice for till sampling. The kimberlites are overlain by 5.5m and 2m, respectively, of till deposited by the Laurentide ice sheet before it retreated from the region approximately 9,000 years ago. The upper surface of the kimberlite is striated, indicating ice flow was towards the south-southwest. Kimberlite, plus till overlying and down-ice of the kimberlites was sampled to determine the mineralogical and geochemical signature of the kimberlite and to document glacial dispersal patterns. Kimberlite boulders from local ('down-ice') gravel pits were also collected to determine if the Seed kimberlites are the source of the boulders in these eskers.

Last summer (2000), Beth and Bruce completed a regional till geochemical and kimberlite indicator mineral survey encompassing the known Lake Timiskaming kimberlite field, and an area extending up to 80 km to the south. The basis of this regional study is to provide information on the distribution and extent of glacial dispersal of kimberlite indicator minerals from the known



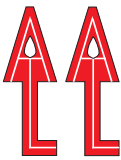
RECENT PAPERS

continued from Page 10


Zhang, G., Wasyliak, K., and Pan, Y., 2001. The characterization and quantitative analysis of clay minerals in the Athabasca Basin, Saskatchewan: Application of shortwave infrared reflectance spectroscopy. *Can. Mineralogist* 39: 1347-1363.



ASSAYS AND GEOCHEMICAL ANALYSES



ACME
ANALYTICAL
LABORATORIES
LTD.



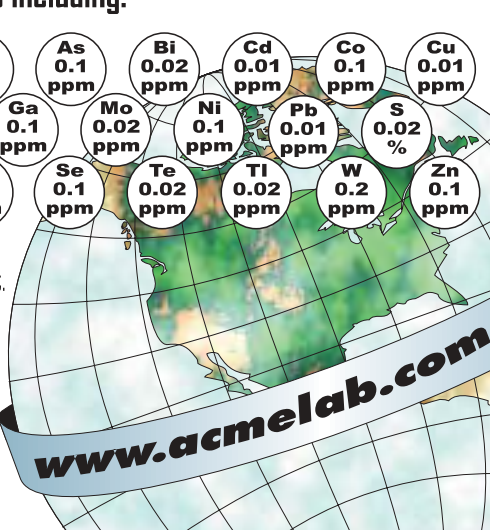
Vancouver
1996

ICP Mass Spec Analysis **CDN \$16.50 US \$12.35**
(Aqua regia digest on 1 gm sample)

37 Elements including:

Au 0.2 ppb	Ag 2 ppb	As 0.1 ppm	Bi 0.02 ppm	Cd 0.01 ppm	Co 0.1 ppm	Cu 0.01 ppm
Hg 5 ppb	Ga 0.1 ppm	Mo 0.02 ppm	Ni 0.1 ppm	Pb 0.01 ppm	S 0.02 %	Zn 0.1 ppm
Sb 0.02 ppm	Sc 0.1 ppm	Se 0.1 ppm	Te 0.02 ppm	Tl 0.02 ppm	W 0.2 ppm	

852 East Hastings St.
Vancouver • BC
Canada • V6A 1R6
Tel: 1-604-253-3158
Fax: 1-604-253-1716
Toll Free:
1-800-990-2263



www.acmelab.com

MEXICO
GM LACME Laboratories SA de CV
Leonardo@acmelab.com

SOUTH AMERICA
ACME Analytical Laboratories (Chile) Ltda.
service@acmelabs.cl

International



Geochemical
Consultants

Mary E. Doherty

Principal

- ❖ GEOCHEMICAL EXPLORATION
- ❖ SURVEY DESIGN, IMPLEMENTATION
- ❖ MULTI-DIMENSION DATA INTERPRETATION
- ❖ ARCVIEW PROJECT INTEGRATION
- ❖ SELECTIVE EXTRACTION APPLICATION
- ❖ INDICATOR MINERAL CHEMISTRY
- ❖ TRAINING SEMINARS

International Geochemical Consultants, L.L.C.
5763 Secrest Court Golden, Colorado 80403 U.S.A.
Phone: 1-303-278-6876 Fax: 1-303-215-0641
MaryEDoherty@earthlink.net

Technical Note...

-----continued from Page 14
kimberlites near New Liskeard, and to identify indicator mineral anomalies in till not related to the known kimberlites that warrant further exploration. These GSC till data complement kimberlite indicator mineral data for stream sediments collected in the same region by the Ontario Geological Survey (Allan, 2001). The GSC results were recently released as GSC Open File 4086. This report can be purchased from the Geological Survey of Canada Bookstore, telephone: (613) 995-4342, Email: gsc_bookstore@gsc.nrcan.gc.ca.

Beth McClenaghan
Terrain Sciences Division
Geological Survey of Canada
601 Booth Street
Ottawa, Ontario
CANADA K1A 0E8
Phone: 613-992-7805
Email:
bmcclena@nrcan.gc.ca

Bruce Kjarsgaard
Mineral Resources Division
Geological Survey of Canada
601 Booth Street
Ottawa, Ontario
CANADA K1A 0E8
Phone: 613-995-5705
Email:
bkjarsga@nrcan.gc.ca

Geochemistry: Exploration, Environment, Analysis.

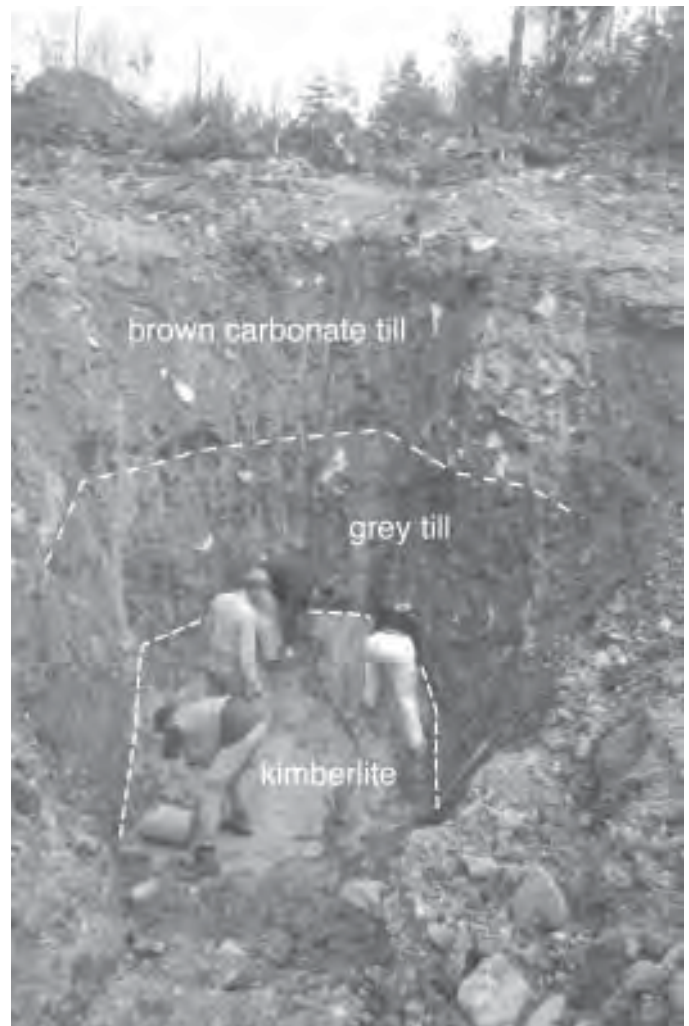
Please support your new Journal.

One thing GEEA cannot manage without is **TOP QUALITY SCIENTIFIC PAPERS**. This is your journal. You, the members of the Association, are showcasing our science. Let's make this a great journal by really making the effort to put pen to paper (or fingers to the keyboard) and get some real top-drawer new papers to the Editor. Instructions for authors are to be found on our web site (www.aeg.org).

So come on folks, get cracking, write up that study you did last year or even years ago. Someone out there would certainly benefit from your data and your conclusions! Especially us people out there in the Exploration Industry!

For too long we've been moaning about our industry being in the doldrums, let's get out and show we're scientists, not wimps!!

Put it on paper for GEEA today!



A large excavator was used to expose the striated surface of the Seed kimberlite which subcrops beneath 6 m of till.



Note from The Editor...

EXPLORE is designed to provide an informal forum for the members of our Association. Short to moderate length technical articles on case histories, field and analytical technique developments, reviews, new concepts, etc. are always welcome.

This is also true for news of recent and upcoming exploration and environmental geochemistry meetings and news of individual member movements and activities. If you have something for inclusion in **EXPLORE**, don't hesitate, send it to the Editor.

As indicated below, the deadlines for each issue are at least 30 days before publication date (e.g. the deadline for the October issue is August 31).

Lloyd James
Email: l-njames@ecentral.com





CALENDAR OF EVENTS

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

■ February 10-14, 2002, **15th Annual Symposium on the Application of Geophysics to Environmental and Engineering Problems (SAGEEP 2002)**, Tropicana Hotel, Las Vegas, NV, USA (EEGS, 720 S. Colorado Blvd, Suite 960-S, Denver, CO 80246, Phone: 303-756-3143 FAX: 303-691-9490 EMail: eegs@neha.org Web: <http://www.eegs.com>)

■ February 25 - 27, 2002, **Society for Mining, Metallurgy, and Exploration (SME) annual meeting**, Phoenix, AZ. William Wilkinson Jr., Phelps Dodge Mining Co., 2600 N. Central Ave., Phoenix, AZ 85004, (602) 234-6080, Fax: (602) 234-4847. E-mail: wwilkinson@phelpsd.com.

■ March 4-7, GeoProc2002—Geochemical Processes, Bremen, Germany. Information: Horst D. Schulz, +49(0)421-218-3393, fax +49(0)421-218-4321; Astrid Haderl, +49(0)421-218-3950, fax +49(0)421-218-4321.

■ March 10-13, 2002, **AAPG Annual Convention and Exhibition**, George R. Brown Convention Center, Houston, Texas, by the American Association of Petroleum Geologists. (AAPG Convention Department, 1444 S. Boulder Ave., Tulsa, OK 74119 USA, Phone: 800-364-2274 or 918-560-2679 EMail: convene@aapg.org Web: <http://www.aapg.org>)

■ April 7-11, 2002, **223rd ACS Natl. Mtg. Orange County Convention/Civil Center, Orlando, Fla.** INFORMATION: ACS Meetings, 1155 16th St., N.W., Washington, D.C. 20036-4899, (800) 227-5558, (202) 872-4396, fax (202) 872-6128, e-mail: natlmtgs@acs.org

■ April 3-5, 2002, **GSA Southeastern and North-Central Sections Joint Meeting**, Lexington, Kentucky. Information: Jim Cobb and John Kiefer, Kentucky Geological Survey, (859) 257-5500. Abstract deadline: December 19, 2001.

■ April 11-12, 2002, **GSA South-Central Section Meeting**, Alpine, Texas. Information: Kevin Urbanczyk, (915) 837-8110. Abstracts deadline: January 5, 2002.

■ April 14-16, 2002, **Society of Economic Geologists, Global Exploration 2002 —Integrated Methods for Discovery**, Denver, Colorado. Information: SEG2002@segweb.org.

■ May 7-8, 2002, **GSA Rocky Mountain Section Meeting**, Cedar City, Utah. Information: Robert L. Eves, (435) 586-1934. Abstracts deadline: February 4, 2002.

■ May 13-15, 2002, **GSA Cordilleran Section Meeting**, Corvallis, Oregon. Information: Bob Yeats (541) 737-1226. Abstracts deadline: February 7, 2002.

■ May 15-17, 2002, **4th International Conference on Advances in Fluid Mechanics**, Ghent, Belgium, by the Wessex Institute of Technology, UK and University of Ghent, Belgium. (Conference Secretariat, AFM 2002, EMail: shobbs@wessex.ac.uk Web: <http://www.wessex.ac.uk/conferences/2002/afm02>)

■ May 27-29, 2002, **47th Joint Annual Meeting of the GAC and MAC Of Canada**, University of Saskatchewan, Saskatoon, Saskatchewan, CANADA, by the Geological Association of Canada and the Mineralogical Association of Canada. Conference Secretary - Karen McMullan, Email: karen.mcmullan@usask.ca

■ June, 8-14, 2002, **American Society for Surface Mining and Reclamation (ASSMR) 18th National Meeting**, Lexington, KY. http://www.ca.uky.edu/assmr/Upcoming_Events.htm

■ July 14-August 2, 9th International Platinum Symposium and Field Conference, Bozeman, Montana. Organizers: IGCP (International Geological Correlation Programme) 427, Society for Geology Applied to Mineral Deposits. Information: Roger Cooper, (409) 880-8239, fax 409-880-8246.

■ July 21-25, 2002, **9th International Platinum Symposium**, Holiday Inn - Grand Montana, Billings, MT, USA, by the IGCP427/SEG/SGA. (Roger Cooper, Dept. of Geology, Lamar University, P.O. Box 10031, Beaumont, TX 77710, Phone: 409-880-8239 EMail: cooperrw@hal.lamar.edu Web: <http://www.platinumsymposium.org>)

■ July 22-27, 2002, **The Earth System and Metallogensis: A Focus on Africa**, Windhoek, Namibia, by The Geological Society of Namibia, The Geological Society of South Africa, and The Geological Society of Zambia. (The Secretary, IAGOD/GEOCONGRESS 2002, P.O. Box 44283, Linden 2104, South Africa, EMail: gssa@pop.onwe.co.za Web: <http://www.gssa.org.za>)

■ Aug 31-Sep 04, 2002, **Emerging Concepts in Organic Petrology and Geochemistry**, The Banff Centre, Banff, Alberta, Canada, by the Canadian Society for Coal Science and Organic Petrology (CSCOP) & The Society for Organic Petrology (TSOP). (Dr. Martin Fowler, Geological Survey of Canada, 3303-33rd St. NW, Calgary, Alberta T2L 2A7 Canada, Phone: 403-292-7038 FAX: 403-292-7159 EMail: Mfowler@nrcan.gc.ca Web: <http://www.cscop.tsop2002.com>)



Calendar of Events

continued from Page 8

- October 27–30, 2002, **Annual Meeting of the Geological Society of America**, Denver, Colorado. Information: TEL 1-800-472-1988, meetings@geosociety.org.
- February 24-26, 2003, **Society for Mining, Metallurgy, and Exploration (SME) annual meeting**, Cincinnati, OH. Contact: SME (sme@smenet.org). SME, Meetings Dept., P.O. Box 277002, Littleton, CO 80127, 800-763-3132. SME (sme@smenet.org)
- August 29 – September 3, 2003, **21st International Geochemical Exploration Symposium**, Dublin Ireland. Contact Eibhlin Doyle, Secretary LOC, Email: eibhlindoyle@gsi.ie
- November 2–5, 2003, **Annual Meeting of the Geological Society of America**, Seattle, Washington. Information: TEL 1-800-472-1988, meetings@geosociety.org.
- October 10-15, 2004, **SEG International Exposition & 74th Annual Meeting**, Denver, Colorado, US, by the SEG. (Debbi Hyer, 8801 S. Yale, Tulsa OK 74137, Phone: (918) 497-5500 EMail: dhier@seg.org Web: <http://meeting.seg.org>)

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

Virginia T. McLemore

*New Mexico Bureau of Mines and Mineral Resources
New Mexico Institute of Mining and Technology
801 Leroy Place
Socorro, NM 87801 USA
TEL: 505-835-5521
FAX: 505-835-6333
e-mail: ginger@gis.nmt.edu*



Support Your Organization

Advertise

in Your Magazine

Prospectors and Developers Convention 2002

Metro Convention Centre, Toronto, Canada

Short Course 2

Improving the odds: Effective exploration geochemistry
Saturday March 9, 9 am-5 pm

To register for this course use the PDAC website:

www.pdac.ca

Organizer:

L. Graham Closs, Colorado School of Mines, Golden, CO, USA

Presenters:

Lynda Bloom, Analytical Solutions, Ltd., Toronto, Canada, Mary E. Doherty, International Geochemical Consultants, LLC., Golden, CO, USA

This one-day short course will review advances in exploration geochemistry and provide guidelines for compliance with recent securities regulation changes. Effective and efficient application of geochemistry can be achieved through: appreciation of available alternatives; knowledgeable selection and application; and systematic and creative interpretation and presentation of results. An assessment of these fundamental principles will be presented in the context of best practices guidelines. Emphasis will also be placed on cost effective surveys.

Topics

- Design of geochemical programs
- Field sampling
- Sample preparation & chemical analysis
- Fire assay procedures, with emphasis on platinum and palladium
- Quality control & quality assurance
- Partial extraction analysis: Principles and available options
- Data management, processing and interpretation

Recent Advances

- Airborne hyperspectral surveys and regional geochemistry, Phoebe Hauff, Spectral International, Denver, USA
- Geochemical data management, quality control, analysis and presentation, Tracey Minton, GeoSoft Europe Ltd., London, UK
- GOCAD and 3D virtual reality visualization, Rob Gordon, Quantec Geosciences, Toronto, Canada
- Weighted sums: A New Brunswick case history, Lynda Bloom, Analytical Solutions Ltd., Toronto, Canada
- Mineral chemistry case history, Mary Doherty, International Geochemical Consultants, Golden, CO, USA



New Members...

To All Voting Members:

Pursuant to Article Two of the Association's By-Law No.1, names of the following candidates, who have been recommended for membership by the Admissions Committee, are submitted for your consideration. If you have any comments, favorable or unfavorable, on any candidate, you should send them in writing to the Secretary within 60 days of this notice. If no objections are received by that date, these candidates will be declared elected to membership. Please address comments to David B. Smith, Secretary AEG, USGS, Box 25046, MS 973, Denver, CO 80225, USA.

Editors note: Council has decided that all new applicants will receive the journal and newsletter upon application

for membership. The process of application to the Nepean office, recommendation by the Admissions Committee, review by the Council, and publication of applicant's names in the newsletter remains unchanged.

MEMBERS

Eupene, Geoffrey S.
Chief Advisor, Mining,
Pt Handal Srisajasa,
Jakarta, INDONESIA

Thomsen, Michael
Director Applied Exploration Systems
Newmont Corp,
Englewood, Colorado, USA



Integrated Data Management

“Integrated Data Management - Oasis montaj and acQuire” Sessions Available During the PDAC and SEG

Geosoft and Metech are pleased to announce two sessions, entitled “Integrated Data Management – Oasis montaj and acQuire”, that will take place in Toronto during the PDAC March 10 - 13, 2002 and in Denver during the SEG April 14 - 16, 2002.

Who should attend?

- Geologists, Geochemists, and Geophysicists looking for a complete solution for working with all types of exploration data from collecting to reporting.
- Geoscientists looking to improve their exploration opportunities through better data management, quality control, analysis, integration and presentation.
- Exploration managers looking for a cost saving end-to-end solution from one provider enabling an easy exchange of data and results.

The presentation will include the following topics:

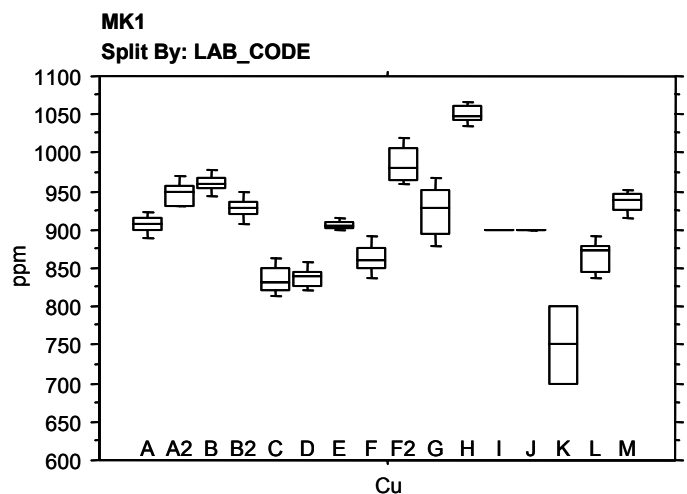
- Work Flow from ‘Start’ to ‘Finish’: acQuire and Oasis montaj objectives - vertical integration of business rules.
- Field Data Capture: Introduction of the new Pocket acQuire
- Data Management and Synchronization Concepts.
- Data Quality Control and Quality Assurance.
- Metech and Geosoft Partnership Benefits: Link and relationship to Oasis montaj.
- Data Visualization and Map Production.

Seating at these events is limited. For details or to reserve a seat, please go to www.geosoft.com/17.



Correction...

Figure 2 on Page 7 of the October issues of EXPLORE (No. 113) was truncated in the printing process. The correct figure is shown below.



Dr. Grigory Abramson, AEG, SEG

MINERAL EXPLORATION GEOCHEMISTRY

SOIL & ROCK

2/150 Hall Street, Bondi Beach, NSW, 2026
Australia

Tel: 61 2 9365 4005, Mobile: 0419 120 842
gr_abramson@yahoo.com

THE ASSOCIATION OF EXPLORATION GEOCHEMISTS

P.O. Box 26099, 72 Robertson Road, Nepean, Ontario K2H 9R0 CANADA
Telephone (613) 828-0199

OFFICERS

January - December 2002

Philippe Freyssinet, President
BRGM
BP6009
Orleans, France 45060
TEL: +33 238 64 3005
FAX: +33 238 64 3652
email: p.freyssinet@brgm.fr

Stephen D. Amor, Vice President
1235 Fairview Street, Suite 353
Burlington, Ontario
Canada L7S 2K9
TEL: +1 905 308 9514
FAX: +1 905 308 9414
email: SteveAmor@compuserve.com

David B. Smith, Secretary
U.S. Geological Survey
Box 25046, MS 973
Denver, CO 80225
USA
TEL: (303) 236-1849
FAX: (303) 236-3200
email: dsmith@helios.cr.usgs.gov

Gwendy E.M. Hall, Treasurer
Geological Survey of Canada
601 Booth Street, Room 702
Ottawa, ON K1A 0E8
CANADA
TEL: (613) 992-6425
FAX: (613) 996-3726
email: ghall@gsc.nrcan.gc.ca

COUNCILLORS

Councilor Emeritus
Sherman Marsh

2001-2003
Paul Taufen (*ex-officio*)
Robert J. Bowell
Mary E. Doherty
Dave Kelley
Christopher Oates
Cliff Stanley

2002-2004
Nigel Radford (*ex officio*)
Other councillor names
unavailable at time of
publication

Australia
Leigh Bettenay
Nigel Brand
Mark Elliott
Brazil
Germano Melo Jr.
Chile
Alvaro Puig
China
Xueqiu Wang

Europe
J. B. De Smeth
Northern Countries
Vacant
Southeast Asia
Tawsaporn Nuchangong
Southern Africa
Charles Okujeni
UK and Republic of Ireland
Deirdre M. A. Flight

COMMITTEES

**Australian Geoscience Council
Representative**
Graham Taylor

**Canadian Geoscience Council
Representative**
W. K. Fletcher

Awards and Medals Committee
Eric Weiland, *Chair*
John S. Cone
Robert G. Garrett
Günter Matheis
Barry W. Smee

Bibliography Committee
L. Graham Closs, *Chair*
Robert G. Garrett
Richard K. Glanzman
Eric C. Grunsky
Peter J. Rogers

Distinguished Lecturer Committee
David Garnett, *Chair*

Election Official
Sherman Marsh

EXPLORE
Lloyd James, Editor
Sherman P. Marsh, Assoc. Editor
David Kelley, *Business Manager*

**Geochemistry: Exploration,
Environment, Analysis**
Gwendy E.M. Hall, *Editor-in-Chief*

Admissions Committee
Nigel Radford, *Chair*

New Membership Committee
Shea Clark Smith, *Chair*
Mark S. Elliot
Germano Melo, Jr.

Publicity Committee
M. Beth McClenaghan, *Chair*
Sherman P. Marsh
J. Stevens Zuker
R. Steve Friberg

Regional Councillor Coordinator
Philippe Freyssinet

Short Course Committee
Colin E. Dunn, *Co-Chair*
Vlad Sopuck, *Co-Chair*

Student Paper Competition Committee
Ian Robertson, *Chair*
J.B. de Smeth
Richard Davy
Owen Lavin

Symposium Committee
Steve Amor, *Chair*
Eion Cameron
Mario Desilets
Philippe Freyssinet
Gwendy Hall
Virginia McLemore
Barry W. Smee
Graham F. Taylor

Web Site Committee
Steve Amor, *Chair*
Richard Carver

Betty Arseneault, Business Manager

P.O. Box 26099, 72 Robertson Road, Nepean, ON K2H 9R0 CANADA, TEL: (613) 828-0199 FAX: (613) 828-9288, e-mail: aeg@synapse.net

Steve Amor, Webmaster
e-mail: SteveAmor@compuserve.com

ALS Chemex Acquires Bondar Clegg

ALS Chemex is pleased to announce that it has acquired the Bondar Clegg laboratory group, effective December 1, 2001.

Bondar Clegg is a major provider of analytical services to the minerals industry, with laboratory facilities in Canada, USA, Mexico and South America. Where there is a direct overlap of Bondar Clegg and ALS Chemex facilities, the facilities will be merged to maximize capacity and breadth of services. As well, the majority of key management and client services staff from both Bondar Clegg and ALS Chemex will be continuing with the new team. We will thus be able to offer continued local access to services backed by strong centralized laboratories and personnel in order to provide high quality and cost effective laboratory services in a timely manner.

To ensure continuity of data, Bondar Clegg and ALS Chemex specific methods and procedures will continue to be offered after the merger of the two laboratory groups and service commitments to all clients will remain intact. We are fully committed to ensuring that it is "business as usual" and that we provide a seamless merger of the two companies.

We are excited by the long-term opportunities for expanding our service levels. Additional resources to respond more immediately with on-site service solutions for the most remote locations and an expanded technical

team to continue with research and development projects will allow us to offer more innovative services in the years to come.

Should you require any further information regarding this acquisition and merger, please do not hesitate to contact us (minerals@alschemex.com) or view our website (www.alschemex.com).

We welcome your comments and feedback.



Deadlines for the Next Four Issues of EXPLORE

Contributors's deadlines for the next four issues of
EXPLORE are as follows:

Issue	Publication date	Contributor's Deadline
115	April 2002	February 28, 2002
116	July 2002	May 31, 2002
117	October 2002	August 31, 2002
118	January 2003	November 30, 2002



21st IGES DUBLIN, 2003

29th August to 3rd September, 2003

Preliminary Announcement

- Technical Sessions
- Workshops
- Posters and Trade Exhibition
- Field Visits
- Accompanying Persons Programme
- Social Programme

For additional information please see the AEG Website: <http://www.aeg.org>

Contact: If you have any questions, suggestions for the Symposium or would like to offer assistance to the Local Organising Committee please contact:

The Secretary LOC - Eibhlin Doyle (e-mail eibhlindoyle@gsi.ie)

The LOC comprises representatives from: the Geological Survey of Ireland; the Geological Survey of Northern Ireland; the Exploration and Mining Division of the Department of the Marine and Natural Resources; the Environmental Protection Agency; the Irish Association for Economic Geology; and the Institution of Mining and Metallurgy.



THE ASSOCIATION OF EXPLORATION GEOCHEMISTS APPLICATION FOR NON-VOTING MEMBERSHIP*

Please complete the section relevant to the class of membership sought and supply your address on this form.
Mail the completed application, together with annual dues, to the address below.

***Details of requirements and application forms for voting membership (fellowship) can be obtained from the AEG website (<http://www.aeg.org>) or business office.**

MEMBER

I _____ wish to apply for election as a Member of the Association of Exploration Geochemists. I am presently employed by:

_____ as a _____.

(employer)

(employment title)

I am actively engaged in scientific or technological work related to geochemical exploration and have been so for the past two years. Upon receipt of the Code of Ethics of the Association I will read them and, in the event of being elected a Member, agree to honour and abide by them. Witness my hand this _____ day of _____ 20 _____.

(Signature of applicant)

STUDENT MEMBER

I _____ wish to apply for election as a Student Member of the Association of Exploration Geochemists. I am presently engaged as a full-time student at _____, where I am taking a course in pure or applied science. Upon receipt of the Code of Ethics of the Association and in the event of being elected a Student Member agree to honour and abide by them. Witness my hand this _____ day of _____ 20 _____.

(Signature of applicant)

Student status must be verified by a Professor of your institution or a Fellow of the Association of Exploration Geochemists. I certify that the applicant is a full-time student at this institution.

(Signature)

(Printed Name and Title)

NAME AND ADDRESS

(to be completed by all applicants)

Name: _____
Address: _____

Telephone: _____
bus: _____
fax: _____
home: _____
email: _____

Annual Dues

All applications must be accompanied by annual dues. Select one or two below:

1	2002 member dues	US\$	70	_____
2	2002 student member dues		40	_____
	If you require a receipt, include a self-addressed envelope and add		2	_____
	If your check is not drawn from a U.S.A. or Canadian bank, add		15	_____
		TOTAL		_____

All payments must be in US funds. Payment by check, International Money Order, UNESCO Coupons, International Postal Orders, VISA and Master Card are acceptable. For users of VISA or Master Card, minor variations in your billing may reflect currency exchange rate fluctuations at time of bank transaction.

If you pay by charge card, please provide the following information: type: Master Card _____ VISA _____

Credit card account number: _____ Expiration date: _____.

Name: _____ Signature: _____

Please note: Your completed form should be mailed to the Business Office of the Association and will be acknowledged upon receipt. The Admissions Committee reviews all applications and submits recommendations to Council, who will review these recommendations at the next Council Meeting or by correspondence. If no objection is raised the names, addresses and positions of candidates will be listed in the next issue of the Association Newsletter. If after a minimum of 60 days have elapsed following submission of candidate information to the membership no signed letters objecting to candidates admission are received by the Secretary of the Association from any Member, the Candidate shall be deemed elected, subject to the receipt by the Association of payment of required dues. Send completed application, together with annual dues to:

EXPLORE

Newsletter No. 114

JANUARY 2002

Editor: Lloyd James (303) 741-5199 (Phone and Fax)

(l-njames@ecentral.com)

Associate Editor:

Sherman P. Marsh (303) 986-0939

spmarsh@earthlink.net

Assistant Editors:

Elizabeth Bailey (eabailey@usgs.gov)

Robert Eppinger (eppinger@usgs.gov)

David Gray (d.gray@per.dem.csiro.au)

Patrick Highsmith (phighsmith@alschemex.com)

Geoff Murphy (gckmurphy@acenet.net.au)

David Turner (dturner@swri.edu)

Marian Skwarnecki (Marian.Skwarnecki@adl.clw.csiro.au)

Business Manager:

David Kelley (303) 268-8318 (dave.kelley@wmc.com)

EXPLORE is published quarterly by the Association of Exploration Geochemists, P.O. Box 150991, Lakewood, CO 80215-0991, USA.

EXPLORE is a trademark of the Association of Exploration Geochemists.

Type and layout of EXPLORE: Vivian Heggie, Heggie Enterprises, Thornton, CO (303) 288-6540; <vjmhggie@starband.net>

ADVERTISING RATES

Full page (Black & White)	241h x 190w mm	(9.5h x 7.5w in)	US \$ 970
Full page (Color)			US\$1165
Half page (Black & White)	241h x 89w mm	(9.5h x 3.5w in)	US \$ 530
or	124h x 190w mm	(4-7/8h x 7.5w in)	
Half page (Color)			US \$635
Third page (Black & White)	241h x 51w mm	(9.5h x 2w in)	US \$420
or	178h x 89w mm	(7h x 3.5w in)	
Third page (Color)			US \$505
Quarter page (B&W)	124h x 89w mm	(4-7/8h x 3.5w in)	US \$300
or	241h x 41w mm	(9.5h x 1-5/8w in)	
Quarter page (Color)			US \$360
Eighth page (Black & White)		60h x 89w mm(2-3/8h x 3.5w in)	US \$190
Eighth page (Color)			US \$230
Business Card (B&W)	51h x 89w mm	(2h x 3.5w in)	US \$ 50
Business Card (Color)			US \$ 60

Please direct advertising inquiries to:

DAVID KELLEY, WESTERN MINING CORP. (USA)

8008 EAST ARAPAHOE COURT • ENGLEWOOD, CO 80112 • USA

(303) 268-8318 Fax: (303) 268-8370 (dave.kelley@wmc.com)

LIST OF ADVERTISERS

Grigory Abramson	18
Acme Analytical Laboratories, Ltd.	14
Activation Laboratories Ltd.	2
ALS/Chemex	11
Becquerel Laboratories, Inc.	8
Geosoft	2
International Geochemical Consultants - Mary Doherty	14
Jeff Jaacks	7
MEG Shea Clark Smith	6
Rockware Geochemist's Workbench	24
XRAL - X-Ray Assay Labs	10

Exploration Technology: Discovery through Innovation

(see facing page)

Workshop Program

Friday April 12, Morning

8-8:30AM	Registration and Coffee
8-8:40	Introduction
8-8:40	Role of Integration in Mineral Exploration
9-9:30	Geophysics - Introduction
9:30-10:00	Airborne Geophysics
10-10:15	Break - Coffee
10:15-11	Ground Geophysics
11-11:30	Borehole Geophysics
11:45-12:45	Lunch
	Major Co. Perspective on Integration

Friday April 12, Afternoon

1-1:30	Geochemistry – Introduction
1:30-2	Sampling and Landscape Geochemistry
2-2:30	Analytical Services and QA/QC
2:30-3	Selective Extractions
3-3:15	Break – Coffee
3:15-3:45	Hydrogeochemistry
3:45-4:05	Biogeochemistry
4:05-4:25	Gas Geochemistry
4:25-4:45	Lithogeochemistry

Friday April 12, Evening

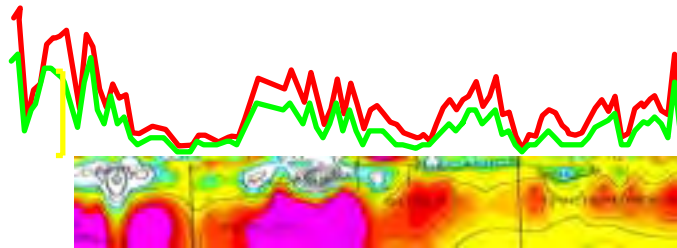
6-7PM	Dinner
	Petroleum Exploration Perspectives on Integration

Saturday April 13, Morning

8:00-8:10AM	Introduction/Logistics/Updates
8:10-8:30	Junior Company Perspective on Integration
8:30-9	Remote Sensing – Big Picture!
9-9:30	GIS
9:30-10:15	Visualization Technology
10:15-10:30	Break - Coffee
10:30-11	Smart Rooms
11- 11:30	Remote Sensing – Mineral Mapping
11:45-12:45	Lunch
	Consultant's Perspective on Integration

Saturday April 13, Afternoon

1-1:30PM	Process of Integration
1:30-1:50	Case Study 1: Diamonds
1:50-2:10	Case Study 2: Base Metals
2:10-2:30	Case Study 3: Uranium
2:30-2:50	Case Study 4: Porphyry Copper/Skarn
2:50-3:10	Case Study 5: Gold
3:10-3:30	Break – Coffee
3:30-4:30	Wrap-up
	Review and Synthesis
	Panel Discussion



**SEG2002 Pre-Conference Workshop:
“Exploration Technology: *Discovery Thru Innovation*”**



April 12-13, 2002, Denver Colorado, USA
Holiday Inn Conference Center– DIA

Outline:

This two-day workshop will evaluate current exploration technologies and their role in integrated exploration programs, with perspectives from the large, small and junior companies and from the consulting perspective. Exploration geophysics, geochemistry, remote sensing and information technology will be reviewed; successful discoveries based upon integrated exploration will be presented; and a panel will investigate strategies for effective implementation of integration of these technologies into the exploration environment.

This workshop will be of particular interest to exploration managers and senior exploration geologists charged with design and execution of exploration programs.

To Register: www.seg2002.org

For Information: www.aeg.org

Workshop Organizers:

Graham Closs (Colorado School of Mines, email: lcloss@mines.edu)

Mary E. Doherty (International Geochemical Consultants, LLC, email: MaryEDoherty@earthlink.net)

Ken Witherly (Condor Consulting, Inc., email: ken@condorconsult.com)



The Geochemist's Workbench®

H₂O • Ag⁺⁺⁺ • Am⁺⁺⁺ • As(OH)₄⁻ • Au⁺ • B(OH)₃ • Ba⁺⁺ • Br⁻ • Ca⁺⁺ • HCO₃⁻ • Cs⁺ • Cl⁻ • Co⁺⁺ • Cr⁺⁺⁺ • Cu⁺ • Eu⁺⁺⁺ • F⁻

We put **BUGS** in our software!

Growth and decay of microbial biomass in a laboratory experiment

New!
Version 3.2

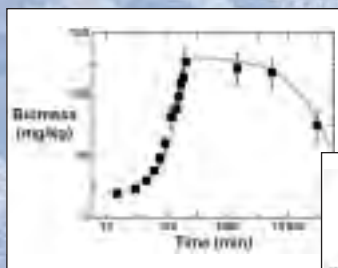
Windows 98/ME and
Windows NT/2000/XP

Growth on acetate in a chemostat experiment of two strains of microbes, one fast, the other efficient

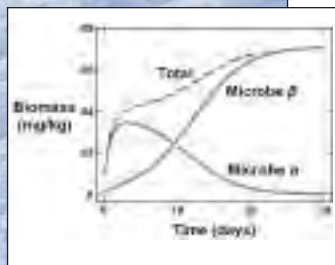
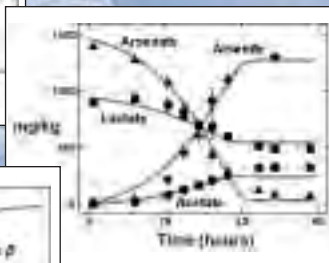
Photo: B. Fouke



RockWare®
Earth Science Software



Arsenate reduction by BACILLUS ARSENICOSELENATIS



GWB Short Course!

October 30–31, 2002
Denver, Colorado
(with annual GSA Meeting)

New in 3.2 —

- **MICROBIAL METABOLISM AND GROWTH** Model the geochemical and mineralogic effects of complex microbial communities
- **CUSTOM RATE LAWS** Specify kinetic rate laws of any form — No Programming needed!

GWB is your personal toolkit for —

- Reaction simulation
- Kinetics
- Surface chemistry
- Isotope fractionation
- "Pitzer equations"
- Speciation
- Bioavailability
- Redox disequilibrium
- Redox-pH diagrams
- Catalysis, enzymes, and more!

Price —

\$2,900.00 (\$1,600.00 academic)

Industry • Government • Consulting
Academic • Classroom

The Geochemist's Workbench® is a registered trademark of the University of Illinois.

Over 200 Software Solutions at <http://www.rockware.com>

2221 East Street, Suite 101, Golden, CO 80401 • 800.775.6745, 303.278.3534, fax: 303.278.4099

EXPLORE

Newsletter for The Association of Exploration Geochemists

P.O. Box 150991, Lakewood, CO, 80215-0991, USA

Please send changes of address to:
Association of Exploration Geochemists

P.O. Box 26099, 72 Robertson Road, Nepean, Ontario, K2H 9R0, Canada • TEL: (613) 828-0199 FAX: (613) 828-9288
e-mail: aeg@synapse.net • <http://www.aeg.org/aeg/home.htm>

PR SRT STD.
U.S. POSTAGE
PAID
DENVER, CO
PERMIT NO. 3550