SGA News

SOCIETY for GEOLOGY APPLIED to MINERAL DEPOSITS

December 2001 Number 12

Industrial Minerals Support Economic Geology in a Globalized World

Milos Kuzvart

Charles University, Prague, Czech Republic

There are more than 3500 known minerals, 60 of which are used in the industry as minerals or their combinations (rocks), forming approximately 100 industrial mineral (nonmetallic) commodities, which represent 60% of all extracted mineral raw materials and 40% of the value of all solid raw materials. Nonmetallics occur in more than 100 genetic types – from early magmatic diamond to chemogenic sediments. Their reserves are sufficient for the nearest future, but most nonmetallics in the 21st century will be extracted from yet–to-be discovered deposits.

Recent developments in the field of nonmetallics

New applications of nonmetallics as fillers – kaolin, talc, calcium carbonate, mica, wollastonite, silica, diatomite, gypsum – have been developed for instance in paper-, paint-, plastic-, rubber- and adhesives industry. These minerals act not only as a replacement for more expensive material, but contribute to electrical conductivity, flexural strength, heat resistance or other desired properties. This has expanded the use of products like plastics which have replaced anything from glass milk bottles to steel panels of automobiles. Thin panels of stone as nonload–bearing veneer are used on façades of large buildings, and sulfur is used in pavement and concrete blocks.

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IMPORTANT NOTICE

A New Web Resource: Mineral Abbreviations for Studies on Ore Deposits

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7th Biennial SGA Meeting jointly organized with SEG, Athens, Greece, 24-28 August 2003

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Mineralium Deposita Editors' Report

Boulder/Clausthal October 2001

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Excluding papers for thematic issues, a total of 90 papers were received in the two *Mineralium Deposita* offices in 2000. Through the first two-thirds of 2001, we have received 63 manuscripts, which is projected to about the same number as the previous year's record number for the journal. Whereas two-thirds of the papers in 2000 came to the Denver office, it appears as if an equal amount are going to Denver and Clausthal in 2001. Papers status can be broken down as follows:

	Accepted	Rejected	Pending	Total
Denver (2000)	17	28	11	56
Clausthal (2000)	10	13	11	34
Denver (2001)	1	6	23	30
Clausthal (2001)	2	10	21	33

- In summary, no more than 54% of the papers submitted in 2000 will eventually be found as acceptable. Most likely, the final number will be between 30-40% of submitted papers accepted when all the pending papers are decided upon. We expect the same for 2001—that is, we will be accepting about one out of every three papers.
- No more thematic issues of *Mineralium Deposita* will be considered through at least the first part of 2003, as we now have a backlog on these. During 2001, the Brazilian gold issue came out as 36 (3-4) and the Granitoid gold issue was just published as 36 (6). For 2002, we have now approved most acceptable papers for issues on Gold in China (Zhou and Goldfarb) and Alkalic Gold (Muller). Papers are still being evaluated for an issue on Metallogeny of the Alpine-Balkan-Carpathian-Dinaride region (Heinrich and Neubauer). Submitted papers for issues on Alteration and VMS Systems (Galley) and PGE deposits (Thalhammer and Diamond) are expected in the near future.
- For the 4th consecutive year, the ISI Journal Citation Report has shown the Science Impact Factor of *Mineralium Deposita* has gone up. Impact factors are as follows:

1997:	0.630	1999:	0.989
1998:	0.745	2000:	1.303

For comparison, over the same period, the figure for *Economic Geology* has been as follows:

1997:	0.806	1999:	1.000
1998:	1.022	2000:	1.354

The impact factor is a measure of the frequency with which the "average article" in a journal has been cited in a given year. The impact factor helps evaluate a journal's relative importance, especially when compared to others in the same field. The factor is calculated by dividing the number of citations to articles published in the two previous years in the journal by the total number of articles published in those two years. Generally, a value above 1.0 is the number that is recognized as reflecting a good journal of original scientific articles. Therefore, both the most recent calculated value for *Mineralium Deposita* and the steady increase in values during the last four years suggest the journal is doing well in the scientific community. ◆

Richard Goldfarb and Bernd Lehmann

SGA News

N.° 12 December 2001

Editor

Massimo Chiaradia

Département de Minéralogie, Université de Genève, Rue des Maraîchers 13, CH-1211 Genève 4 SWITZERLAND

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SGA News is a publication of SGA (Society of Geology Applied to Mineral Deposits) and appears twice a year. SGA News can be also read in the SGA homepage on Internet: http://www.min.tu-clausthal.de/www/sga/sga.html maintained by Bernd Lehmann and Jan Heinhorst, Institut fur Mineralogie, TU Clausthal, Adolph Roemer str. 2a, D-38678 Clausthal-Zellerfeld; Fax: +49 5323 72 2321; e-mail: heinhorst@immr.tu-clausthal.de

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Information for contributors

Items for publication may be sent to: SGA News (see address below). Manuscripts should be sent in computer diskette in Macintosh or DOS formats using Microsoft Word or WordPerfect. Please always send a paper copy and indicate the format you are using.

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NEWS OF THE SOCIETY

☞ News of the Council

Report of the President

H. Papunen summarized his three years presidential period and thanked all Council members for their active collaboration. On behalf of the SGA Council, the Executive Secretary thanked H. Papunen for his active work in favor of SGA.

Status of the SGA-SEG collaboration

Besides a successful collaboration at Cracow and a planned joint SEG-SGA Meeting in Denver (2002), future - possibly deeper - collaboration will be discussed in the near future. SGA will run a 2 days „diamonds" short course (April 17-18, 2002), followed by the SEG 1-day field trip. D. Rickard (SEG Vice-President for Europe) informed about future SEG plans focused on the education in the field of mineral deposits worldwide. The SGA Council highly welcomed this initiative and expressed its will to take an active role in this long-term strategy.

7th SGA Biennial Meeting in 2003

The 7th Biennial SGA Meeting "Mineral Exploration and Sustainable Development" will take place in Athens (Greece) from August 24-28, 2003 (see page 24).

Future Activities

- Joint SEG-SGA Global Exploration 2002 „Integrated Methods for Discovery" Conference (April 2002, Denver, Colorado, USA).
- 11th IAGOD Symposium (July 22-27, 2002, Windhoek, Namibia).
- Uranium Deposits: From Their Origin To Their Environmental Impacts (September 24-26, 2002, Prague, Czech Republic).
- The 7th SGA Biennial Meeting "Mineral Exploration and Sustainable Development" (August 24-28, 2003, Athens, Greece).

Various

- The Council nominated J. Pasava to negotiate terms and conditions of the SGA involvement in the upcoming IGC in Florence (2004).
- The Council discussed various conditions of possible future sponsorship of geoscientists from developing countries.
- The Council approved a proposal by D. Leach to begin with „SGA student chapters" at selected leading universities with mineral deposit programme (see page 16).
- The Council wishes to attract more corporate members in the future and would welcome any suggestions from membership and ongoing corporate members.

SGA General Assembly, Cracow, Poland, August 28th, 2001

H. Papunen (SGA President) delivered the SGA activity report which covered the period from the last SGA General Assembly (August 2000, Rio de Janeiro, Brazil) to date.

The report of the Treasurer (P. Herzig) was approved by the General Assembly with recommendation that more money should be spent on SGA promotion and sponsoring activities towards young scientists.

Presentation of the SGA Award on the Best Paper in MD for the period 1999-2000

The award was presented by H. Papunen (SGA President), J. Pasava (SGA Executive Secretary) and B. Lehmann (Editor, MD) to F. Melcher (Mining University of Leoben, Austria) for the article:

☛

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We expect your letters with comments, news, criticisms, ...

✂ ....

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If you have changed (or will change in the near future) your address please fill in this form and send it to:

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!!! IMPORTANT NOTICE !!!

Applications to SGA for meeting sponsorship have to be submitted to Jan Pasava, SGA Executive Secretary, on appropriate forms developed and approved by the SGA Council which are available at the SGA home page on Internet:

http://www.min.tu-clausthal.de/www/sga/sga.html

Other requests will be not considered.

F. Melcher, W. Grum, T.V. Thalhammer and O. Thalhammer : The giant chromite deposits at Kempirsai, Urals: constraints from trace element (PGE, REE) and isotope data (Mineralium Deposita 34: 250-272).

The award consists of DM 3000 plus travel expenses to the Biennial Meeting to receive the Prize. On behalf of all authors Dr. F. Melcher highly appreciated the award.

Your suggestions and ideas for any topic of interest to SGA are welcome! They can be addressed to any Council member or to

Dr. Jan Pasava
SGA Executive Secretary

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SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS (SGA)

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SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS

Report of the Executive Secretary about membership

21 Regular Members, 18 Student Members and 2 Senior Members applied for membership from April 5, 2001 to August 15, 2001

LIST OF NEW SGA MEMBERS
(April 5, 2001-August 15, 2001)

Regular Members

Milburn DARCY, Taringa, Queensland, AUSTRALIA
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Martin HAMISH, c/o Rio Tinto Mining and Exploration Limited, Bristol, UNITED KINGDOM
Stephen ROBERTS, University of Southampton, Southampton, UNITED KINGDOM
Andrew DALL, Globe, AZ 85502, USA

Student Members

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Suzanne BROWN, Nedlands, AUSTRALIA
Veronica BROWN, Cranbrook, Queensland, AUSTRALIA
Michal CAREW, James Cook University, Townsville, AUSTRALIA
Charlie DAVIES, James Cook University, Townsville, AUSTRALIA
Allison DUGDALE, Stawel, WA, AUSTRALIA
Oliver KREUZER, Mundingburra, QLD, AUSTRALIA
Will LEONARD, The University of Melbourne,Parkville, AUSTRALIA
Mark LINDSAY, James Cook University,Townsville, AUSTRALIA
Nicole PATISON, James Cook University, Townsville, AUSTRALIA
Kylie PRENDERGAST, James Cook University,Townsville, AUSTRALIA
Christopher REED, The University of Melbourne, Parkville, AUSTRALIA
Claire Marie MULHALL,Trinity College Dublin, IRELAND
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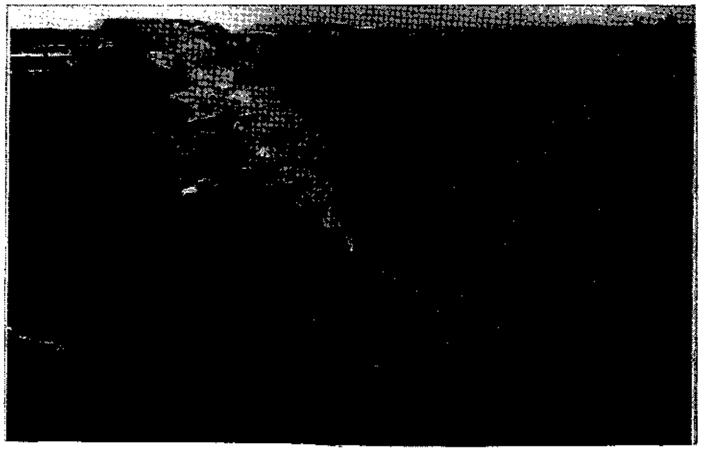
Filipa RAMOS,Vila Nova de Gaia, PORTUGAL
Monica Gabriela da SILVA SOUSA, V.N. Gaia, PORTUGAL
Isabelle CHAMBEFORT, University of Geneva, Geneva, SWITZERLAND
Nicholas G. LE BOUTILLIER, Camborne, Cornwall, UNITED KINGDOM

Senior Members

Richard HAGNI, University of Missouri-Rolla, Rolla, USA
Richard P. VILJONEN, University of Witwatersrand, Johannesburg, SOUTH AFRICA

Announcing SGA Short Course Series Volume 1

Wallrock Alteration and Primary Geochemical Dispersion in Lode-Gold Exploration
***by* Pasi Eilu, Edward J. Mikucki, and David I. Groves, 65 pages.**



The Golden Mile open-pit at Kalgoorlie, Western Australia, one of the world's largest lode-gold deposits.

The book describes:

- Wallrock alteration of lode-gold deposits
- Lithogeochemical techniques for exploration
- Trace-element variability between deposits
- Recognition of favourable structural sites
- Dispersion aureoles
- Geochemical vectors to ore using case studies

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1: INDUSTRIAL MINERALS SUPPORT ECONOMIC GEOLOGY IN A GLOBALIZED WORLD

Specifications of raw materials become ever more stringent. Fast, automated methods of manufacture demand raw materials of high degree of uniformity. In glassmaking, for example – where there is no „slagging stage", and what goes in, stays in – precise control of the charge to the furnaces is essential. The same applies to production of high-quality paper using the finest grades of filler and coating material, in manufacture of advanced ceramics and other fields.

Under these conditions, processing of raw materials based on knowledge of their physical properties is indispensable. Kaolin may be ground and airfloated to produce filler for rubber (with less than 0.001% Cu, 0.002% Mn, 0.15% Fe), waterwashed for use as a filler in paper; or floated, delaminated, calcined and magnetically separated to produce bright lightweight coated grades of paper. Flotation is applied to finely ground sylvite, feldspar, fluorspar, barite, phosphates, graphite, talc, sulfur. Mica and talc may be micronized, i.e., subjected to ultra-fine pulverising. Progress in mineral raw materials can be expected through improvements in the following methods: ultrasonic method, triboadhesive separation, molecular or ion flotation, ultrasonic sorting, bacterial leaching, etc.

Knowledge of colloidal physics is necessary where ultra-finely pulverised particles are studied. Electrostatic separation, optical sorting, and various chemical processes are applied to study industrial minerals. Surface treatment with silanes or titanates is used in plastics industry to alter the characteristics of mineral filler. This treatment prevents the filler from repelling the resin and maximizes dispersion.

The relative age of industrial mineral deposits as concerns, e.g., the search for new deposits, can be based on field observations (intersections of mineral bodies, stratigraphic sequence) or absolute age derived from radiometric and paleomagnetic measurements carried out in the laboratory. The U-Pb method can be used to establish the age of nonmetallic mineral deposits if zircon, sphene, apatite or epidote are present. The Rb-Sr, K-Ar and Ar-Ar methods are more frequently used in dating of mica, feldspar, amphibole. Paleomagnetic dating requires the presence of magnetic minerals (most often magnetite or hematite) in the deposit under study or formed in its wall-rock during mineralization, minimum oxidation or alteration, which may be overprinted by later period of magnetization, and the availability of an accurate polar wandering curve for the continent or plate to which the deposit is confined.

Stable isotope study of asbestos, phosphates, beryl, kaolin and other nonmetallics may help explaining the genesis of industrial minerals.

Nonmetallics in world trade and marketing

The difference between the market structure of the metallic mineral and fuel sector on one hand and the nonmetallics mineral sector on the other is the marked separation between mining and marketing for the first group, and the interconnection between mining and marketing in the case of nonmetallics. Metals and fuels have a guaranteed two-stage market. The guarantee is based on Metal Exchanges, the first stage of trading being that of ore concentrates to the smelters; the second stage being the trade with the metals themselves. The oil industry displays a similar pattern: prices are influenced by the OPEC, the first stage concerning crude oil, the second one concerning products of refineries. For the nonmetallics this is different. The mine and the (one-stage) market are very close to each other in geographic sense. Earth scientists may often be in close contact with the customer, or, more often with several customers, because there is more than one end-use of the raw material. A guaranteed market is usually missing. Fluorite, mica (large sheets), asbestos, diamond and quartz crystals were considered in the past as strategic raw materials.

Typical features of industrial raw materials are the wide price difference between the common and high-grade material. In asbestos varieties, the difference is two orders of magnitude. There is also a great difference between the cost of bulk and bagged raw materials. The prices of industrial minerals and rocks vary within a wide range due to different grades and uses. Because of inflation, their prices in real terms have even shown a relative decrease in some commodities, after conversion to a constant dollar value.

Unfortunately, mineral resources are not evenly distributed over the globe. International trade «corrects» this «outcome» of Mother Nature. Deep-sea trade between industrial countries grows steadily. Talc is shipped from Montana to Belgium, salt from Mexico to Japan, feldspar from Finland to Malaysia, gypsum from Mexico to California, bentonite from Wyoming to oil rigs all over the world, rutile and ilmenite from Australian placers to TiO_2 pigment factories on other continents. The demand for materials of unique properties can be satisfied no matter where these materials are found. Kaolin and calcium carbonate can be shipped in form of slurry, unit trains can carry potash from Saskatchewan to the corn belt of the United States or to the port of Vancouver, soda ash is in similar way transported from western US ports, and delivered uncontaminated to glass works on the Pacific Rim, Latin America included. Aggregate from a sea-side quarry in Scotland is exported to Texas.

Most countries either import or export some raw materials during prolonged periods of time. China is not so predictable. Its dynamically growing economy disrupts imports and exports with the result that this country alternates continuously between being a net exporter and a net importer. It is difficult to predict what is going to happen when, with its more than 1 billion inhabitants, China will fully join the industrial world. Similar prospects are also elsewhere in SE Asia, particularly in South Korea, Taiwan, Thailand, Malaysia, the Philippines, as well as in Latin America with almost 600 million people.

The Council for Mutual Economic Aid (COMECON) in Central and Eastern Europe disappeared and new partnerships in international trade emerged: the European Union - EU (to 1992 European Economic Community) with 370 million customers (1999), and the Free Trade Area of the Americas (FTAA), with 850 million customers. Third main economic centre of the world, SE Asia has not yet strictly defined its organizational structure as did EU and FTAA. The Economic and Social Commission for

Asia and the Pacific (ESCAP UN) and the Associacion of SE Asian Nations (ASEAN) will join the competition after healing the wounds suffered in 1997.

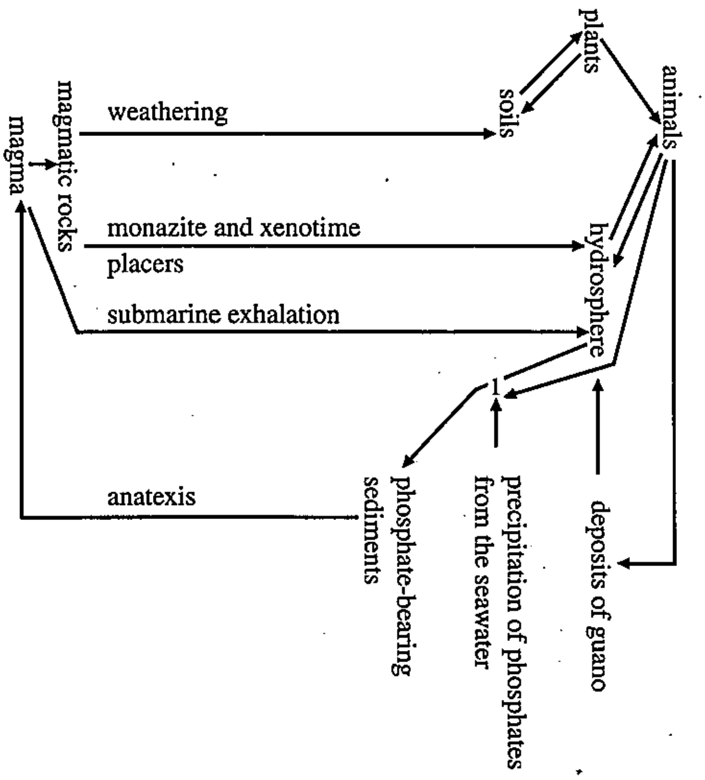

Figure 1: Phosphorus cycle. Intensity of phosphate accumulation (point 1) increases from the Caledonian to Alpine orogeny.

Closest to monopolistic control of the trade were several nonmetallics, covering more than 50% world production from a single country: asbestos from Russia in the past, attapulgite –sepiolite from the USA, beryl and bertrandite from the USA, emery from Turkey, fluorspar from China, pyrophyllite from Japan, sillimanite group minerals from the Republic of South Africa.

Oligopolistic market better secures the supply. Borates from Turkey and USA compete now with raw material from Argentina, Chile and Russia. Australia´s diamonds in lamproites have broken the monopoly of DeBeers Consolidated.

Trade with the nonmetallics emphasizes new trends within industries. Decline of the Frasch sulfur is caused by growth of recovered sulfur. Sea water as source of MgO succeeded magnesite in some areas of the world. Natural trona from Wyoming and California is now the main source of soda ash instead of Solvay plants. Precipitated calcium carbonate competes with ground calcium carbonate in many applications.

The share of international trade in world production of individual nonmetalics is as follows: more than 80% of production enters the trade as nitratine, iodine, borates; 60-80% as dimension stone, nepheline syenite; 40-60% as bauxite, fluorspar, sulfur, barite, asbestos, 20-40% as perlite, graphite, phosphates, diatomite, mica, vermiculite, kaolin, magnesite, talc.

The marketing study of a nonmetallic project starts if there are possible unexploited reserves of a mineral and/or existing exclusive imports of the same mineral for the local industry, or imports of products based on the mineral in question; and if there is capital available to be invested in prospection, exploration, and development of any possible deposit, building of a dressing plant, etc.

The first idea gives an impulse for (a) an initial marketing study which should establish a detailed nationwide inventory of known occurrences and deposits on the basis of existing reports, maps, and information of any kind which should be critically assessed. The value of imported minerals or products should be estimated and the possibility of exports to neighbouring countries should be considered.

If such a marketing study results in a positive assessment, stage (b), regional reconnaissance, follows, which includes inspection of known occurrences in the field to assess their approximate extent, and random sampling intended to determine whether an exploration programme is to be implemented. In this stage mineral occurrences and potentially economic deposits are distinguished, and priority areas and exploration targets are outlined. The preliminary analysis of collected samples should indicate if the raw material has the required or expected mineral composition. Should the overall results of stage (b) contained in the first stage feasibility study be positive, stage (c), exploration by grid pitting, trenching and percussion or diamond drilling, starts on the deposit, selected as being the most promising. Geological mapping, geochemical studies and geophysical exploration may be carried out simultaneously. Bulk samples (tons) are collected for pilot plant experiments. The reserves are calculated assuming that the economic demonstrated reserves will cover the expected production of the mine or quarry for at least 10 years, economic inferred reserves for 15 years more, and hypothetical resources for another 25 years. A second stage feasibility study will contain results of stage (c), i.e., reserves, composition (content of the useful and harmful component(s), beneficiation characteristics, and suggested utilization of the raw material based on pilot plant experiments; location, access, transport; mineral, water and surface rights; water and energy supply; manpower; mining method, production capacity, protection of the environment, etc.

The second stage feasibility study is followed by drawing up a detailed project (d) of the mine or quarry, development of the selected site, including buildings and infrastructure, mechanical and technological design.

Simultaneously with the construction of the processing plant and development of the deposit, in stage (e) a detailed marketing study is carried out, to forecast demand, determine the plant capacity, and production costs, etc., including distribution of letters of intent for sales to potential customers in the country and abroad. This study must also make clear the size of the market for the mineral to be produced, the overall financial appraisal of the project, the net profit after deducting the transport, packing and storage costs from the delivery price, the taxes and possible exemptions from them, the competing raw materials, the best range of product grades, the real danger of local government's intervention in the operation (possible nationalization, ban on export of unprocessed minerals or fixing of floor prices on minerals for export included), the maximum percentage of foreign ownership allowable, ease with which profits can be transferred abroad, etc.

The duration of the individual stages will typically be as follows (in months): (a) 2 to 6; (b) 4 to 20; (c) 6 to 24; (d) 3 to 6; (e)

24 to 36. All stages from the initial to the debugging of the technical equipment during the start up of the operation can last 3 to 7 years. Geological exploration should continue to allow permanent production planning.

There are several non-economic and non-geological factors influencing the industrial minerals market: OPEC-like cartels influencing a commodity supply (e.g., phosphate in 1974), government-imposed floor prices (e.g., zircon in Australia 1975), government control of mineral exports, or banning of exports of unprocessed minerals, or government participation in mining.

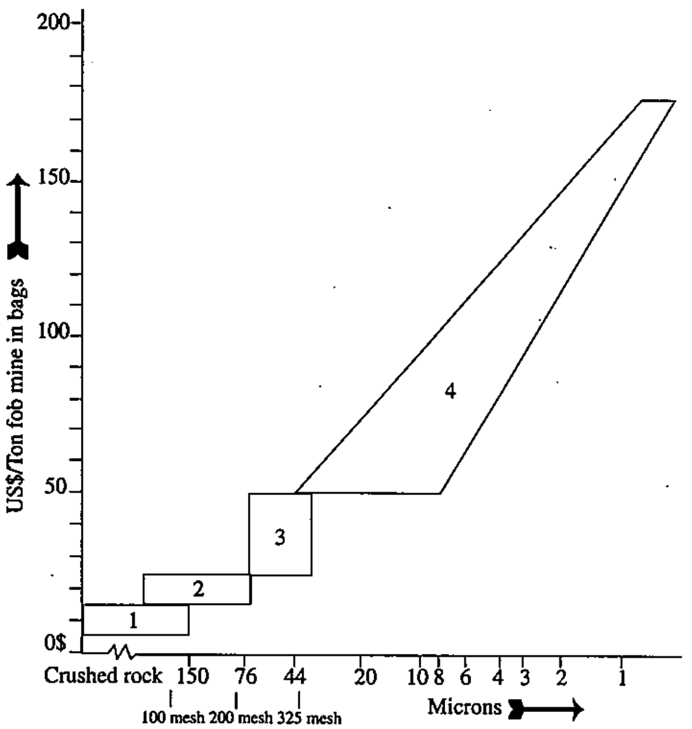

Figure 2: Natural calcium carbonate: price vs. particle size (Harben 1989). 1 – agglomerates, 2 – glass, 3 – filler for adhesives, rubber, paint, floor tiles, 4 – filler for paper, plastics, paint, rubber, ink.

New utilization of traditional nonmetallics and new materials from nonmetallics

The future of the building industry is in the application of brick panels or extra-large monolithic bricks which are cheaper than concrete panels and have better insulation properties. Hydraulic and dolomitic limes have attracted attention because they have lower firing temperature than the pure limestone. Quite a few rocks can be used as roofing granules in shingle production. Diamond saws cut tiles of decorative stone only 6-9 mm thick.

In energy saving, insulation materials like expanded vermiculite and perlite will be used. Heat-insulating mineral fibers will be produced by melting of igneous rocks containing less than 52% of SiO_2, e.g., from basalts. Crushed tourmaline hornfels with 8% B_2O_3 will be used as a filler in concrete which shields nuclear reactor generating neutron radiation.

Metallurgy can expect supply of alumina and aluminium from non-bauxite sources such as nepheline rocks, alunite, low-grade kaolin and clay. The consumption of fluorspar is expected to decline. Beryllium for alloys no longer comes only from beryl in pegmatites but also from bertrandite in tuffs. Silica foundry sand will compete with olivine, zircon, chromite, kyanite and staurolite.

Ceramic industry is looking for fluxing raw materials, usually containing alkalies, which will reduce the firing temperature of ceramic products, thus saving energy. Carbonates will be more used in production of porous wall tiles. High alumina kyanite refractories are gradually replacing fireclay refractories. Basic oxygen process in steel-making will require basic (magnesite-chromium) firebricks.

The majority of carbonates will still be used in production of cement and lime. Underground mining of limestone is gaining favour in the US because it permits efficient exploitation of reserves covered by thick overburden, allows all year round selective mining, is more environment-friendly than quarrying, and eventually offers a space for underground storage once the mining operations are completed. In 1989, there were 127 underground mining operations in the US producing 57 million tons of limestone (7.5% of the total US limestone output).

From the technological point of view the most progressive application of industrial minerals lies in the field of new materials-composites, special ceramics, ceramic superconductors and optical fibres. The minerals for these new materials should be very pure and treatable, but their deposits or reserves are usually small. The so-called cermets (ceramic-metallic composite materials) are highly refractory being used in aerospace industry. Cermets are occasionally used in combination with whiskers, i.e., thin monocrystalline fibres with remarkable physical properties. A small airplane built of graphite fibres can carry five times its weight. The refrasil (refractory glass fibres on silica basis) is used in tiles covering the fuselage of space shuttle Columbia and tolerates a temperature of 2842^{o} C for a period of 180 seconds.

Special or technical ceramics employ combination of oxides, nitrides or metals for production of sensors, electronic devices, machine components, nuclear and solar energy materials, bioceramics, catalysts, etc. Silicium nitride and carbide and boron carbide will become a part of car engines - the so-called ceramic combustion engines.

Ceramic superconductive materials allow to attain superconductivity at higher temperatures (around 100°K) than in the past (5°K only). Superconductive magnets will enable magnetically levitating trains to travel 500 km/h. The electricity will be transmitted without any loss due to zero resistance. Electric power generators will double their output. Harnessing of the energy in fusion of hydrogene nuclei by powerful magnetic field may become a reality in not a too distant future.

Optical fibres based on silicon or zirconium fluoride speed up connections and save materials in integrated optical systems, telecommunications and lasers (ruby has been also used).

Incredibly pure glass for optical purposes with remarkable characteristics can be produced in near-zero gravity and near-total vacuum abord space-ships orbiting around the Earth. The same is valid for gallium arsenide semiconductors for electronics, superstrength metal alloys and ultra-pure crystals free of defects caused by gravity which can replace conventional silicon chips in the next generation of supercomputers able to make millions of operations per second.

Table 1a: Mesothermal nonmetallics with origin comparable to that of some metallic ores.

Useful minerals and rocks	Wall rock	Characteristic conditions of origin	Shape of the deposit	Examples of deposits
barite $BaSO_4$	acid+alkalic intrusions	reaction of $BaCl_2$+BaS-bearing hydrothermal water with vadose waters containing SO_4^{2-}	veins,lenses,barite breccias,metasomes	metasome: Magnet Cove District, Arkansas, USA veins: Salair, Russia
fluorite	sericitized,berezitized or silicified granite	accompanying minerals: quartz, barite, calcite, sulphides	veins and metasomes	Solonechnoye dep., Russia, Illinois, Kentucky, USA
crystalline magnesite dolomite	various rocks,usually metamorphosed sediments near coral reefs; graphitic and sericitic phyllites	metasomatism of limestones of different ages $CaCO_3+MgCO_3$ $= CaMg(CO_3)_2$; $CaMg(CO_3)_2+MgCO_3$ $= 2MgCO_3+CaCO_3$	beds of great thickness, metasomes with relics of limestone and dolomite	Satka, Urals, Russia,Veitsch, Austria; Bankov-Podrenany, Slovakia; Gabbs, Nevada, USA.
massive magnesite	serpentinized ultrabasics	$2(Mg,Fe)_2SiO_4 + 2H_2O + CO_2$ $= H_4 + (MgFe)_2Si_2O_9 + MgCO_3$ antigorite+magnesite	veins and lenses in places with serpentinite relicts	Euboia, Greece
talc and soapstone	1. magnesite + dolomite, silicate rocks 2. 2.ultrabasics, picrites and serpentinites derived from them	1. contact between Mg- and Si- bearing rocks, under coaction of hydrotherms with SiO_2 (talc) or CO_2 (soapstone): $MgCO_3 + 4SiO_2 = H_2Mg_3Si_4O_{12} + 3CO_2$ 2. reg. metam, or mesothermal cond. $H_4Mg_2Si_2O_9$ (antigorite) $+2SiO_2 = H_2Mg_3Si_4O_{12}$ (talc) $+ H_2O$	veins, impregnations, metasomes, mostly at the contact between Mg- and Si- bearing rocks	1. Kirgitei dep. in the Yenisei Mts., Russia ; Inyo Mts., California, USA. 2. Shabry, Urals, Russia; Lamoille County, Vermont, USA.
chrysotile (1) amphibole asbestos (2)	1. serpentinites (with relics of peridotite, dunite, pyroxenite) 2. Fe-silicate rocks (near dep. of crocidolite and amosite), serpentinites, ultrabasites, metamorphics with amph., talc or carbonates (near anthophyllite, actinolite, tremolite deposits)	1. autometamorphous hydrothermal serpentinization of ultrabasics followed by recrystallization of antigorite (away from joints) through serpophite (massive, light green), under hydrothermal conditions 2. reg. metamorphism with hydrothermal supply of Na+Mg (amosite); bimetasomatism at the contact of serpentinite with acid intrusion (other amph. asbestos)	transversely fibrous asbestos veinlets in wall rock	1.Bazhenovo,Urals, Russia; Quebec, Canada 2. Mochalovo dep. near Sysertsk, Russia -anthophyllite; Cape Province, Republic of South Africa – crocidolite, amosite

Table 1b: Residual nonmetallics of weathering origin, mosty different from the origin of metallic deposits.

Useful minerals and rocks	Wall rock	Characteristic conditions of origin	Shape of the deposit	Examples of deposits
kaolin	granite, orthogneiss, pegmatite, arkose, rarely rocks with phyllosilicates	red tropical weathering (mean annual temp. ca 20 ° C, precipitation 1000 mm/year) below tropical forest, pH of ground water 4 to 5 (H_2CO_3 or H_2SO_4 or fulvic acids), deferrization: Fe^{3+} by the action of org. substances → Fe^{2+}, which is leached out	areal or linear weathering crust (i.e. horizontal sheets or elongated pockets)	Karlovy Vary, Kadan, Plzen, Czech Republic; Glukhovtsy, Ukraine; Spruce Pine District, N. Carolina, USA.
Al-laterite (bauxite laterite)	granitoids with feldspathoids, rocks with low silica	laterite weathering (mean annual temp. 20 ° C, precipitation 500-1500 mm/year in rain seasons) below savannah on hilly land, pH above and below 7; leaching of K, Na, Ca, Mg, SiO_2, low deferrization	extensive weathering crust or their remnants	Demerara River, Guyana; Yenahin, Mt. Ejuanema, Ghana; Los Islands, Guinea; Arkansas, USA;. Weipa, Australia
bentonite	acid and basic volcanic glasses	weathering in alk. medium of volcanic ashes; epithermal alteration in pools of water heated by fallen ash; alteration in sea .	subhorizontal tabular and lens-shaped bodies	Black Hills, USA; Cherkasy,Ukraine; Branany near Most, Czech Republic
massive magnesite	serpentinized ultrabasics	$H_4Mg_3Si_2O_9$ (antigorite) $+ 2H_2O_2 + 3CO_2 =$ $3MgCO_3$ (massive magnesite) $+ 2SiO_2$ (opal-chalcedony-quartz) $+ 4H_2O$	nodules and lenses at the base of weathering crust	Khalilovo, Russia; Zabkowice, Poland
vermiculite	rocks with Mg-Fe micas (biotite, phlogopite)	hydration of Mg-Fe micas	weathering crust (below depression bottoms greater thickness)	Potanin, deposit, Urals, Russia
graphite	graphitic crystaline schists	leaching of rock-forming silicates – residue: graphite, quartz	weathering crust of graphite deposits	Tamatave-Marovintsy, Madagascar
phosphates	carbonate rocks	chemical weathering of slightly phosphatized carbonate rocks	filling of karst depressions on the surface of carbonates	Ashin dep., Urals Russia, Tennessee, USA. -brown rock-blanket deposits

Thin layers of abrasive diamond can synthetically be produced from gaseous hydrocarbons under low pressure in the presence of hydrogene.

Minerals and rocks can become unconventional raw materials due to

1. new industrial uses for raw materials already exploited (e.g., graphite fibres, silicon in semiconductors),
2. the newly discovered technical and economical importance of hitherto non exploited rocks (e.g., phonolite as fluxing agent, tourmaline hornfels for shielding of reactors), or minerals (e.g., zeolites in agriculture),
3. new genetic types or mineral assemblages (e.g., phosphates and carbonatites as a source of fluorine; non-kimberlite diamond).

Finally, the raw materials can be considered unconventional in view of the

4. substitution of one raw material for another due to its superior properties or lower price (finely ground calcite instead of washed kaolin as paper filler) ;
5. mining, dressing and industrial wastes, formerly dumped, at present increasingly used as raw materials as a result of efforts to develop wasteless technologies.

The time factor can be introduced in the sphere of unconventional raw materials through classification in 1. unconventional materials sensu stricto, 2. prospective and 3. potential ones.

Unconventional raw materials s.s. are already being used in some technologically advanced countries (e.g., non-pegmatite rocks as a fluxing agent in ceramics). The use of prospective raw materials in near future can be assumed from trends in technological progress and economic development (e.g., a widespread use of non-bauxite sources of alumina). Potential raw materials are not used anywhere in the world nowadays. A prerequisite for their utilization is a considerable progress in technology of mineral processing and abundance of cheap and clean energy, e.g., after resolving the controlled fusion process (perhaps around the year 2050). As an example can be used the extraction of components from alumosilicate rocks, e.g., granite, of which 100 tons contain 8 tons of Al, 5 tons Fe, 0,5 tons Ti, 32 kg Cr, 15 kg V, 3 kg Cu, 1.8 kg Pb, etc.

New technological processes require new raw materials to be found (e.g., the direct reduction of Fe-ores in steel production requires refractories of high quality). Newly discovered properties of minerals and rocks stimulate the search for new uses (e.g., as in the case of wollastonite 50 years ago). New materials lead to innovation or introduction of new laboratory methods for identification and meassurement (e.g., zeolites 40 years ago).

The spectrum of industrial minerals and their applications are endlessly challenging. Can the research fix a „fiber cocktail" that would be price-wise and with properties close to asbestos, potentially carcinogenic? When, if ever, will natural zeolites replace their synthetic equivalents? Will brucite join other Mg-minerals in the markets? Any chance for fluorine from phosphate containing rocks to reduce fluorspar's pre-eminence as the only source of fluorine? When gypsum from desulphurization of coal burning power plants or from phosphate processing will substitute natural gypsum in wallboard production? Will the market for wollastonite expand following its increased output? Will bertrandite in rhyolite tuffs replace pegmatite beryl on the beryllium market? Is there any chance for exploration geologists to discover another trona field like Green River (Wyoming)?

To find answers or to raise new questions makes the field of industrial minerals and rocks extremely complex, difficult to predict, but highly interesting and challenging.

History of nonmetallics utilization

Nonmetallics were of great importance for mankind as early as the primeval age. The first mineral raw material to be used by man was unquestionably stone. Primitive tools were rough stones, which man used in hunting, for breaking bones or sharpening the ends of branches. In the Old Stone Age, some 200,000 years ago, man learnt to work stone (at first flint, quartzite and hornfels), and to make dyes from them (e.g., ochre, asbolan and chalk). In the Late Stone Age, man made polished and perforated tools from obsidian, amphibolite, pitchstone and others. The first mineral raw material to be worked by mining was flint, which was extracted from the chalk in southern England and in The Netherlands. Flint was dug from pits and adits excavated at several levels, using antler hoes and flint crushers.

Industrial minerals did not loose their importance even when smelting of ores and working of metals had been discovered. With a few exceptions (millstone and hand axes which were last used in the Battle of Hastings in 1066) they were no longer used for making tools, but they served as building materials – as unburnt bricks used for ziggurats in Mesopotamia, burnt bricks in Mohenjodaro on the river Indus, limestone for pyramids in Egypt, calc-silicate marble from Pentelicon for the Acropolis in Athens, Carrara marble from Apuan Alps and travertine from Tivoli for buildings in Rome, sandstone and limestone for medieval churches in most of Europe (granite in Brittany and Galicia), volcanic tuff for monuments in Teotihuacan in Peru, granite from the Stone Creek quarry in Connecticut for blocks and slabs for the socle of the Liberty Statue, Columbia University, Smithsonian Museum and Grand Central Station in New York City, and for various skyscrapers.

Most of the building stones were used also by sculptors for statues. Extraordinary stones were used occasionally – basalt for statues of pharao Menkaure and his wife (4th dynasty), quartzite for collosses of Memnon, and greenschist for the so-called Green Head of a priest (2nd century B.C.).

Stones and minerals were also used as jewels (e.g., turquoise from Sinai during the reign of the 3rd dynasty in Egypt, i.e., 2778-2723 B.C.). Glass jewels were made from quartz sand in Egypt already around 3500 B.C., and hollow glass was known in Phoenicia as early as 100 B.C. Clay was used for ceramic vessels throughout the ancient world. Faience was manufactured from calcareous clay in Egypt in 2000 B.C. Later, clays became important refractory materials employed in smelting of metals. Salt has been an indispensable component of food since immemorial time.

During the Middle Ages, the mode of using industrial minerals did not change substantially. Conditions changed considerably in the modern period, particularly in the 19th and 20th centuries, when new materials were applied in agriculture, chemistry, manufacture of refractory, acid-resistant, filtration and insulating products, and in the ceramic, metallurgical, optical, paper, rubber and foodstuff industries.

Table 2: Price categories for industrial minerals (in US dollars per metric ton) (Harben, 1989).

Over 10,000,000:	industrial diamonds
Over 10,000:	iodine, REE
Over 1,000:	lithium, silicon, quartz crystal
100 – 1,000:	asbestos, boron, bromine, corundum (and emery), diatomite, dimension stone, garnet, graphite, kyanite, mica, nitrates, potash, rutile, wollastonite, zircon
10 – 100:	barytes, bauxite, bentonite (cement), feldspar, fluorspar, ilmenite, kaolin, magnesite, nepheline, syenite, olivine, perlite, phosphates, pumice, salt, silica sand, sodium carbonate, sodium sulphate, strontium, sulphur, talc, vermiculite
1 – 10:	common clay, gypsum, crushed stone, limestone and dolomite, sand and gravel

Globalized world

Globalization is the result of high-tech communications (100 million people are on internet), low transport charges, trade without frontiers between giant economic blocks (EU, FTAA, SE Asia), free movement of supranational capital in lightning speed transactions between stock exchanges, free movement of labour across frontiers.

6.1. Globalization before and after Columbus

The motive for trade contacts between Phoenicia and Baltic was amber, as was also between Birka, the Viking capital near Stockholm, and Miklagaard (Constantinople) or Caspian Sea and the East. The Silk Road connected Rome (later Byzantium) with the Far East.

Global contacts (trade, plunder and slave trade) go back to the discovery of America; Mexican silver and Peruvian gold financed the rise to power of Spain, and soon afterwards of England, France and Holland, and were in the background of Rennaissance. Shortly after the year 1500, the European civilization and culture for the first time surpassed the East (Turkey, Persia, China). Euroamerican civilization was the first that embraced the whole planet, when Alaskan Russians met with Americans in Fort Ross near the Russian River in California, in 1812.

Globalization and economic geology

During the World War I and II and the Cold War the opposing parties strove after self-sufficiency in strategic raw materials. The expenditures for exploration, extraction, dressing and further working costs were unimportant. Years of Glory for economic geology were between 1949 and 1977 (or 1989). Reduced fear of the opponent resulted in the diminished role prevalently of metal mining, accompanied by the more efficient use of various materials, recycling, substitution, market saturation, shift of customer preferences, growth of influence of the financial sector, with diminishing role of gold during the last 20 years (A.P. Juhas, G.G. Snow, 2000, SEG Newsletters No. 42). Presently the shareholders of mining enterprises want quick profits that yield increased share price, which requires, among other things, to lower cost of production, exploration and staff. This can be achieved by increasing the output, with the result that the surplus of the raw material in question on the market will reduce the price. The „vicious circle" began. Who is going to wait years nowadays for the return of investment capital in mining, if the gamble in the world casino of internet stocks can bring profit in seconds?

Supranational mining corporations

There are 20,000 supranational corporations of all types active in at least three countries (and approximately the same number of nongovernmental civic associations, some of them oppose globalization). The most important mining corporations (non fuel minerals) are: Anglo-American, Rio Tinto Minera SA, TVX, BHP, CVRD (Compania Vale do Rio Doce), Codelco, Phelps Dodge Mining Co., Freeport McMoRan, Noranda, Placer Dome, Newmont, Falconbridge, a.o.

Environmental problems caused and solved by nonmetallics

The environmental impact of mining include the stripping of the overburden and the excavation of a pit, or in the case of underground mining, setting-up of a refuse dump near the shaft or adit, in both cases probably also accompanied by the settling ponds of the concentrator plant, and air pollution. The resolution of conflicts between mining and environmental protection may involve the payment of compensation for the cost of reclaiming the mined-out or damaged area after the operation has ended, and by planting trees or grass on the surface to prevent erosion.

Most nonmetallics are extracted in opencasts and stepped quarries (on the hill slopes), gravel mostly in river beds, valley bottoms or river terraces. The latter, after termination of extraction may form ponds, reservoirs of industrial or drinking water, or places for various water sports. In cases of exploitation of stone and other nonmetallics recultivation and revitalization of the area should follow. Natural re-introduction of local genofond should be preferred to artificial re-introduction of plants alien to the region. Illite and montmorillonite in soils applied in recultivation play a positive role in the recultivation of brick loam pits and elsewhere.

In general, mineral substances protecting natural environment can be divided into substances protecting (a) the atmosphere, e.g., carbonates removing SO_2 from flue gases, (b) the waters, e.g., expanded perlite with cellulose fibres, silicon oil and vaseline to remove crude oil from water; bentonite and zeolite to absorb metals and organic substances from water, and (c) the agricultural land. Other minerals reduce energy demands in production lines or cut down the volume of burned coal (e.g., ceramic raw materials with lower firing temperature, heat insulating materials such as expanded perlite or vermiculite, etc.).

Industrial minerals also help in storage of communal waste, e.g. bentonite used as a liner, barrier or cover of waste.

The SO_2 in flue gases has the greatest harmful impact on vegetation (acid rain), buildings (crystallization of gypsum in slightly weathered calcite-containing rocks) and human health (bronchitis). About 60 million tons of sulfur are produced annually in the world. Pyrite and pyrrhotite at the burning temperature of coal (1200° C) change into magnetite and SO_2 ($3FeS_2 + 8O_2 \rightarrow Fe_3O_4 + 6SO_2$). Addition of carbonate in desulphuration process results in formation of anhydrite and gypsum (the so-called desulphogypsum) which may be used in plaster or wallboard.

Artificial cordierite – produced from special grade kaolin, talc and alumina – is employed as support of special catalyst system removing harmful gazes from exhausts of combustion engines.

Bentonite activated with aluminium sulphate can be used for cleaning of waste waters containing acrilate dispersions on the polymer basis. The contamination is reduced by 93 to 99% in accordance with the volume of added bentonite (8-16 g/l). The resulting waste can be further used as a fertilizer in agriculture, in animal feed and also in silicate industry.

Nonmetallics are used also for storage of low-level radioactive waste. All problems related to the storage of all kinds of radioactive waste will be eliminated as soon as a "clean" thermonuclear synthesis of hydrogen nuclei is introduced which may occur on industrial scale some fifty years from now. Harnessing of plasma in this reaction by strong magnetic field is generated by superconductive special ceramics.

Barite can substitute for more expensive ferrosilicon in heavy media liquids used for separation of metals from shredded automobile parts. Barite can readily be washed from the recovered metals (Al, Fe, Zn, etc.) by water, whereas ferrosilicon is to be removed magnetically. Barite with 20% of specularite (and less than 3 ppm Cd and 1 ppm Hg) is more cost effective than pure barite in well drilling for oil and gas. Before recession, the production of barite for drilling doubled every 10-20 years.

Industrial minerals will also help in agriculture to feed the rapidly growing population on the Earth. Zeolite with 80% of clinoptilolite in a volume of 16 tons per hectare improves the crop of rice by 40%. Cows with 2% of zeolite in feed increased their milk yield by 7% and the use of nutrients in feed almost doubled.

The alkaline or alkali-calcium type of bentonite (after activation) can be used in farming (as well as in drilling mud). The application of 20 tons of bentonite per hectar in sandy soils, with 10% of its particles under 0.01 mm and with an admixture of 1.5% of humus makes the crop per hectar to increase by about 18% for potatoes, by 16% for rice, by 11% for barley and by 9% for maize.

On the other hand, industrial minerals may cause some health problems. Amphibole asbestos cause cancer but chrysotile was declared to be harmless by the US EPA in 1993. The European Union´s proposal to consider all substances with more than 0.1% of crystalline silica as potentially carcinogenic is rather a misunderstanding because only quartz particles of micron size with razor sharp edges may cause cancer. Such quartz grains usually result from underground drilling in quartz veins.

Elimination of chlorofluorocarbons and halogens through the Montreal protocol (1987) depressed the market of fluorspar. With the prohibition of leaded gasoline, bromine lost his market as ethylene dibromide, but found new applications in fire retardants and drilling muds.

Conflicts over land use start with the acquisition of area for exploration and mining, with environmental impact assessment (EIA) of future extraction and processing of the material, project of the quarry, granting license for mining, and result of the whole procedure according to the attitude of the authorities, the mining company and the public. Seismic tremors caused by blasting in the quarry are penalized if they surpass 3 mm/sec. Dust originating by blasting and traffic might be made more tolerable for the inhabitants living close to the quarry, if they are paid an agreed negotiated sum of money each year. A peaceful coexistence with local villagers should be preferred to law suits. The NIMBY (Not In My Back Yard) attitude can be overcome by negotiated benefits for the local community.

It is a matter of state legislation how to tax the area granted to the miner, how to tax the extracted raw material, and how to ensure deposition of money for recultivation after termination of the mining activities. It is certain that mineral raw materials are non-renewable resources, and therefore cannot be compared with agricultural crops, which can be repeated (seemingly) to infinity. This special position of minerals may be considered by law asking the mine to invest approx. 30% of his profit in the country where it originated. The new investment will bring profit to the mine, and employment to local people. Under the conditions of high productivity of labour in globalized world employment will be important for securing the world stability.

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SOCIETY OF ECONOMIC GEOLOGISTS FOUNDATION STUDENT RESEARCH GRANTS AVAILABLE IN 2002

Students of mineral resources throughout the world may apply for thesis research grants available in 2002 from the Society of Economic Geologists Foundation. The purpose of the grants is to provide partial support of master's and doctoral thesis research for graduate students. A limited number of grants are also available for undergraduate students to support exceptional honors degree thesis research projects. Grants from the Hugh E. McKinstry Fund are awarded to support research with a substantial field component. The Hickok-Radford Fund awards are granted for field projects in challenging arctic or sub-arctic regions. Other research grants, in part funded by gifts from BHP Exploration, provide funds for economic geology research that focuses on new description of ore deposits and mining districts outside of North America, and on topical subjects. Applicants will be considered for all awards.

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The SGA homepage has a new address on INTERNET. From this homepage you can get information about biennial scientific meetings in Europe, world-wide field trips and workshops, membership application form for the SGA and authors and titles of this year contributions to Mineralium Deposita as well as the electronic edition of SGA News.

http://www.min.tu-clausthal.de/www/sga/sga.html

GEOCHIM 2001

Postgraduate certified training course in geochemical exploration methods and their environmental applications successfully terminated in Czech Republic

Introduction

It has been tradition to organize very successful UNESCO Postgraduate Courses on Geochemical Prospecting Methods in the former Czechoslovakia from mid 70's. The first certified course - GEOCHIM PRAHA UNESCO 1975 was launched on September 5, 1975 and lasted till October 25, 1975. Since that time this course has been organized biannually by the Czech Geological Survey in Prague together with the Dionyz Stúr Geological Survey in Bratislava and sponsored by the Division of Earth Sciences (UNESCO/Paris) and the International Association of Geochemistry and Cosmochemistry (IAGS). The course was specialized on both theoretical and practical training in classical geochemical prospecting methods. A team of internationally experienced geoscientists such as Drs. J. Pokorny, F. Mròa, J. Maòour, V. Lomozová, Z. Sulcek, I. Rubeska, A. Spaèková, V. Sixta, J. Juna, J. Vesely, J. Dornié and others, co-ordinated by Dr. Zdenek Pácal from the Czech Geological Survey in Prague has soon earned high international reputation and the GEOCHIM CSSR UNESCO Postgraduate Course developed into one of the most successful Postgraduate Training Programmes of UNESCO.

The major political and economic changes initiated in 1989 and which led to a split up of the former Czechoslovakia into two independent countries - the Czech and Slovak Republic have had a significant impact on the evolution of earth sciences and related mining activities. Following decades of extensive exploration programmes and also underground and surface exploitation, new policies have been formed which will result in a more responsible approach to the environment.

A very old and famous prospecting and mining tradition, coupled with a strong emphasis on environmental issues, are reflected in the character of a newly recovered certificated GEOCHIM Postgraduate Training Course. Our new group intends to offer more complete view, showing how these classical geochemical prospecting methods can be successfully used in the solution of various environmental problems.

The GEOCHIM 99 was held in Prague and Dolní Rozínka (Czech Republic) from September 6-20, 1999 and 12 scientists (of which 7 were female), representing 8 countries (Albania, Argentina, Brazil, China, Jordan, Republic of Congo, Romania and Tunisia), were trained both theoretically and practically in the geochemical exploration methods and their environmental applications. For more description see Episodes, 1999, vol. 22, no. 4. The GEOCHIM 2000 was held in Prague and Dolní Rozínka (Czech Republic) from September 4-18, 2000 and 13 scientists (of which 6 were female) went through similar training program (for more details see Episodes, 2000, vol. 23, no. 4).

GEOCHIM 2001

The GEOCHIM 2001 was held in Prague and Dolní Rozínka (Czech Republic) from September 3-17, 2001 and 12 scientists (of which 7 were female), representing 7 countries (Albania, Canada, Jordan, Kazakhstan, Mongolia, Russia and Zambia) were trained both theoretically and practically in the geochemical exploration methods and their environmental applications.

This course was organized by the Czech Geological Survey and IGCP 429 under the auspices of the Ministry of the Environment, Czech Republic, Czech Commission for UNESCO and the Czech IGCP National Committee and financially sponsored by the Czech Government (through the Program of Technical Assistance of the Czech Republic to developing countries), Czech Geological Survey in Prague, Division of Earth Sciences - UNESCO/Paris (through the contract no. SC/RP 205.562.1), and the International Geological Correlation Programme - IGCP 429 "Organics in Major Environmental Issues".

It should be noted that the course was officially launched on September 4th, 2001 in the building of the Czech Geological Survey in Prague by opening speeches delivered by Mr. Z. Kukal (on behalf of the director of the Czech Geological Survey), Mrs. P. Procházková from the Czech Commission for UNESCO, Mrs. L. Hradecká, Head of the Department of Foreign Affairs, Czech Geological Survey and Mr. J. Pasava, Chairman of the Czech IGCP National Committee, Co-leader of the IGCP 429 and Director of the GEOCHIM Courses. Lectures, seminars and practical field training started on September 5th, 2001 in Dolní Rozínka and included the following subjects: (1) Introduction to the geochemical prospecting methods, (2) Principles of environmental geochemistry, (3) Principles of analytical methods, (4) Heavy minerals prospecting and evaluation of HM concentrates with environmental applications, (5) Stream sediment prospecting with environmental applications, (6) Soil prospecting with environmental applications, (7) Biogeochemical prospecting with environmental applications and up to date results of the IGCP 429, (8) Lithogeochemical prospecting, (9) Hydrogeochemical prospecting with environmental applications, (10) Geophysical prospecting methods with environmental application and radon risk, and (11) Computer modeling of prospecting and environmental data. Individual lectures covering various geochemical methods which were presented during morning sessions were followed by afternoon practical field and computer training. The underground visit to the uranium mine as well as processing plant and remediated sites at Dolní Rozínka (Moravia) and also full day field trip observing surface lignite mining operations and examples of various types of remediation in the North Bohemian Coal Basin (North Bohemia) were a part of this course. The aim of these visits was to demonstrate possible ways of effective usage of geochemical methods in both prospecting and environmental fields.

The following special textbooks were prepared for the purpose of the GEOCHIM Postgraduate Training Course on the Geochemical Prospecting Methods and Their Environmental Applications:

Pasava, J. and Kríbek, B., (eds.), 1999, *Geochemical prospecting methods and their environmental applications.* Special Publication, 132 p., Czech Geological Survey, Prague, ISBN 80-7075-357-9.

Geochim 2001 Postgraduate Training Course - *Field trip guide to the North Bohemia (2001).* Terratest and Czech Geological Survey, 12 pages.

Conclusions and future plans

It is apparent that renewed GEOCHIM Courses have become very popular among geoscientists from especially developing countries. Many participants very highly appreciated both organization and scientific level of the course through their personal letters mailed either to organizers or to Mr. F. Repetto from the Division of Earth Sciences, UNESCO, Paris.

Moreover, the organizers have already started seeking funds for GEOCHIM 2002 which should be organized from September 2 to September 16, 2002, if sufficient funding available.

Acknowledgements

On behalf of the Organizing Committee, I wish to extend best thanks to the following sponsors for their financial and/or moral support:

Government of the Czech Republic,
Czech Geological Survey in Prague,
Division of Earth Sciences, UNESCO (Paris),
IGCP 429,
Czech Commission for UNESCO, and
Czech IGCP National Committee.

It would not have been possible to organize this course without efforts of members of the Organizing Committee (D. Masek, B.Kríbek, R. Cadská, V. Bláha and J. Tesar from the Czech Geological Survey in Prague) as well as considerable understanding of the management of the DIAMO/GEAM State Enterprise in Dolní Rozínka. The leadership of the North Bohemian Mines j.s.c. also supported our activities. Mr. Repetto from the Division of Earth Sciences, UNESCO (Paris) helped to get the course funded through the UNESCO administration. Last, but not least I wish to thank all lecturers.

More information on GEOCHIM 2002 is available from <pasava@cgu.cz>.

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SGA's FIRST STUDENT CHAPTER NEWS

Hola, bonjour, hallo, ciao, hello from the Society of Geology Applied to Mineral Deposits FIRST Student Chapter at the Colorado School of Mines (CSM). On April 8, 2001 the SGA Executive Council approved the Colorado School of Mines application to become the first SGA Student Chapter and recently reconfirmed this on August 26, 2001. We are very pleased to be the home of the first SEG Student Chapter and now the home of the first SGA Student Chapter. Without further ado, let us present ourselves. We are the Colorado School of Mines SGA Student Chapter located in the beautiful foothills just west of Denver, Colorado, USA. The CSM SGA Student Chapter is composed of about 20 active graduate and undergraduate members, as well as substantial participation by the local minerals industry. Lead by Drs. Murray Hitzman and David Leach, and situated only minutes from historic mines and mining districts (Leadville, Idaho Springs, Climax, Henderson, etc.), we are favorably situated for the study of mineral deposits.

CSM's proximity between the historical minerals industry of Denver and the historic mineral deposits of the mountains has allowed CSM to become a top-notch center for mineral deposit studies. In addition, our proximity has allotted us access to numerous speakers from throughout the world. Some of these speakers have included: Dr. Grant Garven (John Hopkins University), Dr. Richard Goldfarb (US Geological Survey), Dr. Holly Stein (Colorado State University), Dr. David Groves (University of Western Australia), Dr. Mohammed Bouabdellah (University of Oujda, Morocco), Dr. David Leach (US Geological Survey), Dr. Jim Franklin (GSC), Mr. John Thompson (TeckCominco), Charles Carter (Anglogold), Dr. Mike Lesher (Laurentian University), and many, many more.

Potential speakers and topics for this year (2001-2002) include Dr. Karen Kelley (US Geological Survye) speaking of the Red Dog Zn-Pb-Ag deposit of Alaska; Dr. Cliff Taylor (US Geological Survey) speaking on the polymetallic ore zones of the Greens Creek Mine, Alaska; Dr. Ion Berbeleac speaking on neogene epithermal gold Deposits in Romania; Dr. Lucy Chapman (Colorado School of Mines) speaking on hydrothermal carbonate alteration at the George Fisher deposit, Australia; Mr. Steve Turner (Newmont Mining Corp.) speaking on South America – opportunities and challenges in exploration; Dr. Fred Meissner (Colorado School of Mines) speaking on the Doctor Mine in the Leadville district; Dr. Marty Goldhaber (US Geological Survey) speaking on large-scale fluid flow in the Illinois Basin and the relationship to MVTs; and many, many more.

In the past, both mineral deposit faculty and students have undertaken field trips to the lead-zinc and iron-oxide deposits of SE Missouri, porphyry-copper deposits of Arizona and New Mexico, porphyry-copper and epithermal deposits of northern Chile and Argentina, lead-zinc deposits of northern New York and New Jersey, sediment-hosted deposits of northern Nevada, gold tellurides of Cripple Creek, Homestake gold mine, underground tour of the Leadville Zn-Pb-Ag district, and a student organized visit to the base metal sulfide deposits of the northwestern US and southwestern British Columbia, Canada.

This past spring, the CSM mineral deposits students in conjunction with the CSM SEG Student Chapter, organized and coordinated a spring break trip to the northern Cordillera of British Columbia-Washington-Idaho-Montana. Lead by Craig McClung, recent CSM graduate and Eric Dillenback, CSM M.Sc. candidate, twelve individuals participated in the trip. Funding for the trip was made possible by a grant from the Society of Economic Geologists (SEG) Foundation, Colorado School of Mines Department of Geology and Geological Engineering, and TeckCominco Ltd. The first stop of the visit was to TeckCominco's Pend Oreille project in northeastern Washington state. The Pend Oreille deposit is a carbonate-hosted zinc-lead deposit. The second stop of the trip was to TeckCominco's world class Sullivan Mine in southeastern British Columbia, Canada. The Sullivan deposit is a classic zinc-lead-silver SEDEX deposit. Following our visit to the Sullivan Mine, we returned to the United States where we toured the now closed Lucky Friday Mine in the Coeur d'Alene district of northern Idaho. The Lucky Friday deposit is a silver-lead±zinc vein deposit hosted by metasedimentary rocks. Nearing the end of our trip, we visited the Continental Pit operated by Montana Resources in Butte, Montana. Historically, the Butte porphyry hosted numerous high-grade copper veins in igneous host rocks. The final stop of the trip consisted of the visit to Stillwater Mining Company's Stillwater Mine in south-central Montana. The Stillwater deposit is a PGE deposit hosted by a faulted and tilted layered mafic intrusion.

This year (2001-2002) has already presented several potential field trips including: the world class Sweet Home rhodocrosite Mine, near Alma, Colorado; Newmont Mining Corporation's Technical Facilities; and a week long field trip to visit the world famous MVT deposits of Tennessee and southeast Missouri.

As the first SGA Student Chapter, we would like to invite all in the Denver area to attend our SEG-SGA Joint Student Chapter meetings. For more information, please feel free to contact me directly at cmcclung25@excite.com. We look forward to meeting and greeting you.

Craig R. McClung, Acting SGA Student Chapter President

FORTHCOMING EVENTS

★ marks a new entry

2002

★ January 21
Forum on Asian Mineral Potential, Vancouver, Canada - Contact address: BCYCM; phone: +1 604 681 5328; e-mail: chamber@chamberofmines.bc.ca; web-site: www.chamberofmines. bc.ca/rdup2002. For more information contact Jeff Hedenquist, MMAJforum@aol.com (see page 20)

January 27-30
TAILINGS AND MINE WASTE '02, Fort Collins, CO USA - Contact address: Linda L. Hinshaw. Dept. of Civil Engineering, Colorado State University, Fort Collins CO 80523-1372 USA; phone: +1 970 491 60 81; fax: +1 970 491 35 84/77 27; e-mail: lhinshaw@engr.colostate. edu; website: http://www.tailings.org

February 25-27
SOCIETY FOR MINING, METALLURGY AND EXPLORATION (SME), ANNUAL MEETING, Phoenix, AZ, USA - Contact address: William Wilkinson Jr., Phelps Dodge Mining Co., 2600 N., Central Ave., Phoenix, AZ 85004, USA; phone: +1 602 234 60 80; fax: +1 602 234 48 47; e-mail: wwilkinson@phelpsd.com

March 10-13
PROSPECTORS & DEVELOPERS ASSOCIATION OF CANADA, Annual Convention, Toronto, Canada - Contact address: PDAC, 34 King Street East, 9th Floor, Toronto, Ontario, Canada M5C 2X8; phone: +1 416 362 19 69; fax; +1 416 362 01 01; e-mail: info@pdac.ca; website: http://www.pdac.ca

★ March 11-13
SME, ANNUAL MEETING & EXHIBITION, Phoenix, AZ, USA - Contact address: Society for Mining, Metallurgy and Exploration, P.O. Box 625002 Littleton, CO 80162-5002, USA; phone +1 303 9739550; fax: +1 303 9793461; e-mail: smenet@aol.com

★ March 24-27
NINTH INTERNATIONAL SYMPOSIUM ON EXPERIMENTAL MINERALOGY, PETROLOGY AND GEOCHEMISTRY (EMPG-IX), Zurich, Switzerland - Contact address: EMPG IX Organizing Committee, Department of Earth Sciences, Institute for Minerlalogy and Petrology, ETH-Zentrum, Sonneggstrasse 5, CH-8092 Zurich, Switzerland; phone: +41 1 632 3779 (Claudia Büchel) or 3955 (Peter Ulmer); fax: +41 1 632 1294; e-mail: empg@erdw.ethz.ch; web-site: http://www.erdw.ethz.ch/ empg

★ March 25-28
MINTEK 2002: 6TH RUSSIAN INTERNATIONAL MINING, EXPLORATION AND MINING EQUIPMENT EXHIBITION, Moscow, Russia - Contact address: ITE Group Plc., Industrial Division, 105 Salusbury Road, London NW6 6RG, UK, Mr. Oleg Netchaev, Project Manager; phone: +44 (0)20 7596 5213; fax: +44 (0)20 7596 5128; e-mail: oleg.netchaev@ite-exhibitions.com; web-site: http://www.ite-exhibitions.com

★ April 14-16
GLOBAL EXPLORATION 2002: INTEGRATED METHODS FOR DISCOVERY (SEG), Denver, CO, USA - Contact address: Quality Business Services (QBS), 3110 S. Wadsworth Blvd., Suite 307, Denver, CO 80227, USA; phone: +1 303 914 0694; fax: +1 303 914 9651; e-mail: darline@qbsoffiice.com, web-site: www.seg2002.org

April 14-17
5TH INTERNATIONAL GOLD SYMPOSIUM, Lima, Peru - Contact address: National Mining Oil and Energy Society (SNMPE); fax: +51 14 60 1616; e-mail: cmendoza@snmpe.org.pe

April 21-24
15TH INDUSTRIAL MINERALS: INTERNATIONAL CONGRESS, Meridien Etoile, Paris, France - Contact address: Industrial Minerals Conference Department, Park House, Park Terrace, Worcester Park, Surrey, KT4 7HY, UK; phone: +44 207 827 99 77; fax: +44 208 335 39 94 or 337 89 43; e-mail: conferences@metalbulletin.plc.uk; website: http://www. mineralnet.co.uk

★ April 24-26
15TH ARGENTINE GEOLOGICAL CONGRESS, El Calafate, Santa Cruz Province (Southern Patagonia), Argentina - Contact address: President Dr. Miguel Haller, Secretary Dr. Roberto Page, Asociación Geológica Argentina, Maipu 645, ler Pico, Buenos Aires, Argentina; fax: +54 11 43253104; e-mail: haller@cenpat.edu.ar or fomicruz@ internet.siscotel.com; web-site: www.cenpat.edu.ar/xvcga

★ May 12-15
RESOURCING THE FUTURE: THE GLOBAL MINING INITIATIVE CONFERENCE: MINING, MINERALS AND METALS FOR SUSTAINABLE DEVELOPMENT, Toronto, Canada - Contact address: C/o Pinnacle Group, 2 Pardee Avenue, Suite 300, Toronto, Canada M6K 3H5; phone: +1 416 588 5051; fax: +1 416 588 5047; e-mail: pinn@pinngroup.com or Global Mining Initiative, c/o 6, St James's Square, London SW1Y 4LD, England; phone: +44 (0)20 7753 2273>; fax: +44 (0)20 7753 2309; e-mail: contact@globalmining.com; web-site: www.globalmining.com

★ May 14-18
AAPG HEDBERG RESEARCH CONFERENCE "DEFORMATION, FLUID FLOW AND RESERVOIR APPRAISAL IN FORELAND FOLD AND THRUST BELTS", Palermo, Italy - Contact address: François Roure francois.roure@ifp.fr or Rudy Swennen rudy.swennen@ifp.fr (see page 20)

★ May 20-24
THE SIXTH INTERNATIONAL SYMPOSIUM ON THE GEOCHEMISTRY OF THE EARTH'S SURFACE (GES-6). Honolulu, Hawaii, USA - Contact address: e-mail ges6@soest.hawaii.edu, web-site: http://imina.soest.hawaii. edu/oceanography/ges-6/

★ May 25-26
MINERALOGICAL ASSOCIATION OF CANADA SHORT COURSE ON SYNCHROTRON RADIATION: EARTH, ENVIRONMENTAL AND MATERIALS SCIENCES APPLICATIONS, Saskatoon, Saskatchewan, Canada - Contact address: Grant S. Henderson, henders@geology.utoronto.ca; web-site: www.usask.ca/geology/sask2002/ (see page 20)

★ May 29-31
GREEN PROCESSING 2002: INTERNATIONAL CONFERENCE ON THE SUSTAINABLE PROCESSING OF MINERALS, Cairns, Australia - Contact address: Miriam Way, AusIMM, P.O. Box 660, Carlton South, Victoria, Australia 3053; phone: +61 3 966 23166; fax: +61 3 966 23662; e-mail: conference@ausimm.com.au, web-site: www.ausimm.com

★ June 3-7
ZEOLITE 2002: 6TH INTERNATIONAL CONFERENCE ON THE OCCURRENCE, PROPERTIES AND UTILIZATION OF NATURAL ZEOLITES, Thessaloniki, Greece - Contact address: web-site: http://www.chem.auth.gr/ activities/ zeo2002/

★ June 11-13
SECOND INTERNATIONAL CONFERENCE ON THE IRON ORE INDUSTRY: TODAY AND TOMORROW, Kiruna, Sweden - Contact address: Dr. K. Hanumantha Rao, Convener, TIOITT-2002, Division of Mineral Processing, Luleå University of Technology, SE-971 87 Luleå, Sweden; phone: +46 920 91705; fax: +46 920 97364/91199; e-mail: Hanumantha.Rao@km.luth.se

★ June 17-21
CHAPMAN CONFERENCE: VOLCANISM AND THE EARTH'S ATMOSPHERE, Thera, Greece - Contact address: A. Singer, AGU Meetings, 2000 Florida Avenue, NW, Washington, DC 20009, USA; phone +1 202 462 6900; fax: +1 202 328 0566; e-mail: meetinginfo@agu.org; web-site: www.agu.org/meetings/cc02bcall.html

★ June 24-28
IGARSS 2002 AND THE 24TH CANADIAN REMOTE SENSING SYMPOSIUM, Toronto, Canada - Contact address: Lisa Ostendorf, IEE GRSS Director of Information Services, 63 Live Oak Lane, Stafford, VA 22554; phone: +1 540/658 1676; e-mail: ostendorf@email.msn.com, web-site: http://www.igarss02.ca

★ June 30-July 5
16TH AUSTRALIAN GEOLOGICAL CONVENTION. GEOSCIENCE 2002: EXPANDING HORIZONS, Adelaide Convention Centre, Adelaide SA, Australia - Contact address: The Organising Committee, 16th Australian Geological Convention, c/-the Secretary GSA (SA Division), P.O. Box 295, Kent Town, SA 5071; e-mail: 16thagc.gsa.org.au; web-site: www.16thagc.gsa.org.au

★ July 17-August 2 SGA-Cosponsored
9TH INTERNATIONAL PLATINUM SYMPOSIUM AND FIELD TRIPS TO THE STILLWATER COMPLEX (IGCP 427/SEG/SGA), Billings, MT, USA – Contact address: Roger Cooper, Dept. of Geology, Lamar University,P.O. Box 10031, Beaumont, TX 77710; phone: +1 409 880 8239; e-mail: cooperrw@hal.lamar.edu; web-site: http://www.platinumsymposium.org

July 22-27 SGA-Cosponsored
11TH IAGOD QUADRENNIAL SYMPOSIUM/ GEOCONGRESS 2002, Windhoek, Namibia - Contact address: The Secretary IAGOD/GEOCONGRESS 2002, P.O. Box 44283, LINDEN 2104, SOUTH AFRICA; web-site: http://www.wits.ac.za/gssa (see page 21)

August 18-23
12TH V.M. GOLDSCHMIDT CONFERENCE, Davos, Switzerland – Contact address: Prof. A. Halliday, Institut für Min. und Petrographie, ETH-Zentrum, CH-8092, Zürich Switzerland; e-mail: halliday@erdw. ethz.ch; website: http://gs.wustl.edu/conferences/

★ August 25-30
GONDWANA 11: CORRELATIONS AND CONNECTIONS, University of Canterbury, Christchurch, New Zealand – Contact address: Susannah Hawtin, Gateway Antarctica, University of Canterbury, Private Bag 4800, Christchurch, New Zealand; phone: +64 3 364 2136; fax: +64 3 364 2197; e-mail: s.hawtin@anta.canterbury.ac.nz; web-site: www.anta.canterbury.ac.nz

★ September 1-6
IMA 2002: 18TH GENERAL MEETING OF THE INTERNATIONAL MINERALOGICAL ASSOCIATION: MINERALOGY FOR THE NEW MILLENNIUM, Edinbourgh, Scotland, UK – Contact address: Executive Secretary: Mr K. Murphy, Mineralogical Society of Great Britain and Ireland, 41 Queen's Gate, London SW7 5HR, United Kingdom; phone: +44 171 584 7516; e-mail: IMA2002@ed.ac.uk or info@minersoc.org; web-site: http://www.minersoc.org

★ September 9-11
IRON ORE 2002, Perth, Australia – Contact address: web-site: www.ausim.com

★ September 10-11
International Workshop, Uranium Deposits: From their Genesis to their Environmental Aspects (IAGOD), Prague, Czech Republic - Bohdan Kribek, Czech Geological Survey, Geologicka 6, 15200 Prague 5, Czech Republic; phone/fax: +420 2 581 7390; e-mail: kribek@cgu.cz; web-site: http://xrd.cgu.cz/uranium.htm

★ September 15-21
URANIUM MINING AND HYDROGEOLOGY III, INTERNATIONAL MINE WATER ASSOCIATION SYMPOSIUM - MINE WATER AND THE ENVIRONMENT, Freiberg, Germany – Contact address: Prof. Dr. B. Merkel/Dr. Shristian Wolkerdorfer, Lehrstuhl für Hydrogeologie, Gustav-Zeuner Street 12, D-09596 Freiberg/Sachsen, Germany; phone: +49 3731 393309; fax: +49 3731 392720; web-site: http://www.geo.tu-freiberg.de, www.IMWA.de

★ September 16-18
5TH INTERANTIONAL SYMPOSIUM ON ANDEAN GEODYNAMICS, Toulouse, France – Contact address: ISAG, IRD, LMTG, 38 Rue des 36 Ponts; 31000 Toulouse, France, Attn.: Patrice Baby, Gerard Herail, Alain Laenu; e-mail ISAG@cict.fr

★ September 18-20
INTERNATIONAL SYMPOSIUM "METALLOGENY OF PRECAMBRIAN SHIELDS", Kyiv, Ukraine – Contact address: Symposium Secretariat, 13A Tymoshenka str. 128, Kyiv, 04212 Ukraine; phone/fax: +380 44 295 72 98; e-mail: bt@ukrdgri.gov.ua

★ September 22-27
SOCIETY OF EXPLORATION GEOPHYSICISTS (SEG), INTERNATIONAL EXPOSITION AND 72ND ANNUAL MEETING, Las Vegas, Nevada, USA – Contact address: SEG Business Office; phone: +1 918/497 5500; fax: +1 918/497 5557; web-site: http://seg.org

★ September 23-25
APPLIED STRUCTURAL GEOLOGY FOR MINERAL EXPLORATION AND MINING, INTERNATIONAL SYMPOSIUM, Kalgoorlie, Western Australia – Contact address: AIG, P.O. Box 1094, West Perth 6827, Australia; phone: +61 8 9226 0500; fax: +61 8 9226 0700; e-mail: aig@aig.asn.au, web-site: http://www.aig.asn.au

★ October 7-10
INTERNATIONAL SYMPOSIUM ON ENVIRONMENTAL ISSUES AND WASTE MANAGEMENT IN ENERGY AND MINERAL PRODUCTION (SWEMP-2002), Cagliari, Italy – Contact address: Prof. R. Ciccu, Departimento di Geoingegneria e Tecnologie Ambientali, Universita degli Studi di Cagliari, Piazza d'Armi 09123, Cagliari, Italy; e-mail: ciccu@unica.it; web-site: http://geoing.unica.it/digita/swemp/index.htm

★ October 20-24
SEG, MINERAL PROCESSING PLANT DESIGN, OPERATING PRACTICE AND CONTROL CONFERENCE, Vancouver, BC, Canada – Contact address: SME, Meetings Department, P.O. Box 625002, Littleton, CO 80162-5002, USA; phone: +1 303 973 9550; fax: +1 303 979 3461; e-mail: sme@smenet.org

★ October 28-31
GEOLOGICAL SOCIETY OF AMERICA (GSA), ANNUAL MEETING, Denver, CO, USA – Contact address: GSA, P.O. Box 9140, Boulder, CO 80301-9140, USA; phone: +1 303 447 2020; fax: +1- 303 447 0648; e-mail: meetings@geosociety.org; web-site: http://www.geosociety.org/meetings/index.htm

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★ February 24-26
SOCIETY FOR MINING, METALLURGY AND EXPLORATION (SME), ANNUAL MEETING, Cincinnati, OH, USA – Contact address: SME, Meetings Department, P.O. Box 277002, Littleton, CO 80127, USA; e-mail: sme@smenet.org

★ March 9-12
PROSPECTORS & DEVELOPERS ASSOCIATION OF CANADA, ANNUAL CONVENTION, Toronto, Canada – Contact address: PDAC, 34 King Street East, 9th Floor, Toronto, Ontario, Canada M5C 2X8; phone: +1 416 362 1969; fax: +1 416 362 0101; e-mail info@pdac.ca; wevb-site: www.pdac.ca

★ April 7-11
JOINT MEETING: EUROPEAN GEOPHYSICAL SOCIETY (EGS) XXVIII GENERAL ASSEMBLY AND THE AMERICAN GEOPHYSICAL UNION (AGU) SPRING 2003 MEETING, Nice, France – Contact address: EGS office, Max-Planck-Str. 13, 37191 Katlenburg-Lindau, Germany; phone: +49 5556 1440; fax: +49 5556 4709; e-mail: egs@copernicus.org; web-site: www.copernicus.org/EGS/ or AGU Meetings Department, 2000 Florida Avenue, NW, Washington, DC 20009 USA; phone: +1 202 462 6900; fax: +1 202 328 0566; e-mail: meetingsinfo@agu.org; web-site: www.agu.org/meetings/

★ April 13-17
EUROPEAN UNION OF GEOSCIENCES (EUG) XII, Strasbourg, France – Contact address: EUG Office-EOST, 5, rue Rene Descartes, 67084 Stasbourg Cedex, FRANCE; phone: +33 3 88 45 01 91; fax: +33 3 88 60-38 87; e-mail: eug@eost.u-strasbg.fr; web-site: eost.u-strasbg.fr/EUG

★ June 22-27
8TH INTERNATIONAL KIMBERLITE CONFERENCE, Victoria, British Columbia, Canada – Contact address: Dr. Roger H. Mitchell, Geology Department, Lakehead University, Thunder Bay, Ontario, Canada P7B 5E1; phone: +1 807 343 8287; fax: +1 807 623 7526; e-mail: Roger.Mitchell@lakeheadu.ca; web-site: www.venuewest.com/8IKC

★ August 29-September 3
THE 21ST INTERNATIONAL GEOCHEMICAL SYMPOSIUM (IGES) OF THE ASSOCIATION OF EXPLORATION GEOCHEMISTS, Dublin, Ireland – Contact address: Eibhlin Doyle; e-mail: eibhlindoyle@gsi.ie; web-site: http://www.aeg.org/Symposia/21stSymposiumTrip/21st_international_geochemical_s.htm

★ August 31-September 3
NORTH ATLANTIC MINERALS SYMPOSIUM (NAMS-2003), Dublin, Ireland – Contact address: web-site: www.gov.nf.ca/nams/

★ September 7-11
6TH INTERNATIONAL SYMPOSIUM ON ENVIRONMENTAL GEOCHEMISTRY (ISEG), Edinburgh, Scotland - Contact address: John Farmer, Department of Chemistry, The University of Edinburgh, Joseph Black Building, Kings Buildings, West Mains Road, Edinburgh EHP 3JJ Scotland; phone: +44 131 650 1000; fax: +44 131 650 4757; e-mail: J.G.Farmer@ed.ac.uk

★ September 15-18
INDUSTRIAL MINERALS AND BUILDING STONES, INTERNATIONAL SYMPOSIUM (IAEG), Istanbul, Turkey - Contact address: Prof. Dr. Erdogan Yüzer, Istanbul Teknik Universitesi, Moden Fakültesi, Ayazaga Kampüsü 80626-Maslak, Istanbul, Turkey; phone/fax: +90 212 2856 146; e-mail: yuzer@itu.edu.tr

★ September 28-October 3
SOCIETY OF EXPLORATION GEOPHYSICISTS (SEG), INTERNATIONAL EXPOSITION AND 73RD ANNUAL MEETING, Dallas, TX, USA – Contact

address:SEG Business Office; phone: +1 918/497 5500; fax: +1 918/497 5557; web-site: http://seg.org

★ **October 5-10**
THE XXII INTERNATIONAL MINERAL PROCESSING CONGRESS, Cape Town, South Africa – Contact address: Mrs. Meg Winter, Dept. of Chemical Engineering, University of Cape Town, Rondebosch 7700, South Africa; fax: +27 (0)21 689 7579; e-mail: mw@chemeng.uct.ac.za; web-site: http://www.impc2003.org.za/

★ **November 1-5**
19TH WORLD MINING: MINING IN THE 21ST CENTURY - QUO VADIS? CONGRESS & EXPO – 2003, New Delhi, India – Contact address: The Institution of Engineers (India), Indian National Committee of World Mining Congress, 8, Gokhale Road Calcutta -700020; phone: +91 33 2238311, 2238314, 2238316; fax: +91 33 2238345; e-mail: ieihqrs@vsnl.com; web-site: www.tafcon.com or http://www.19wmce2003.com

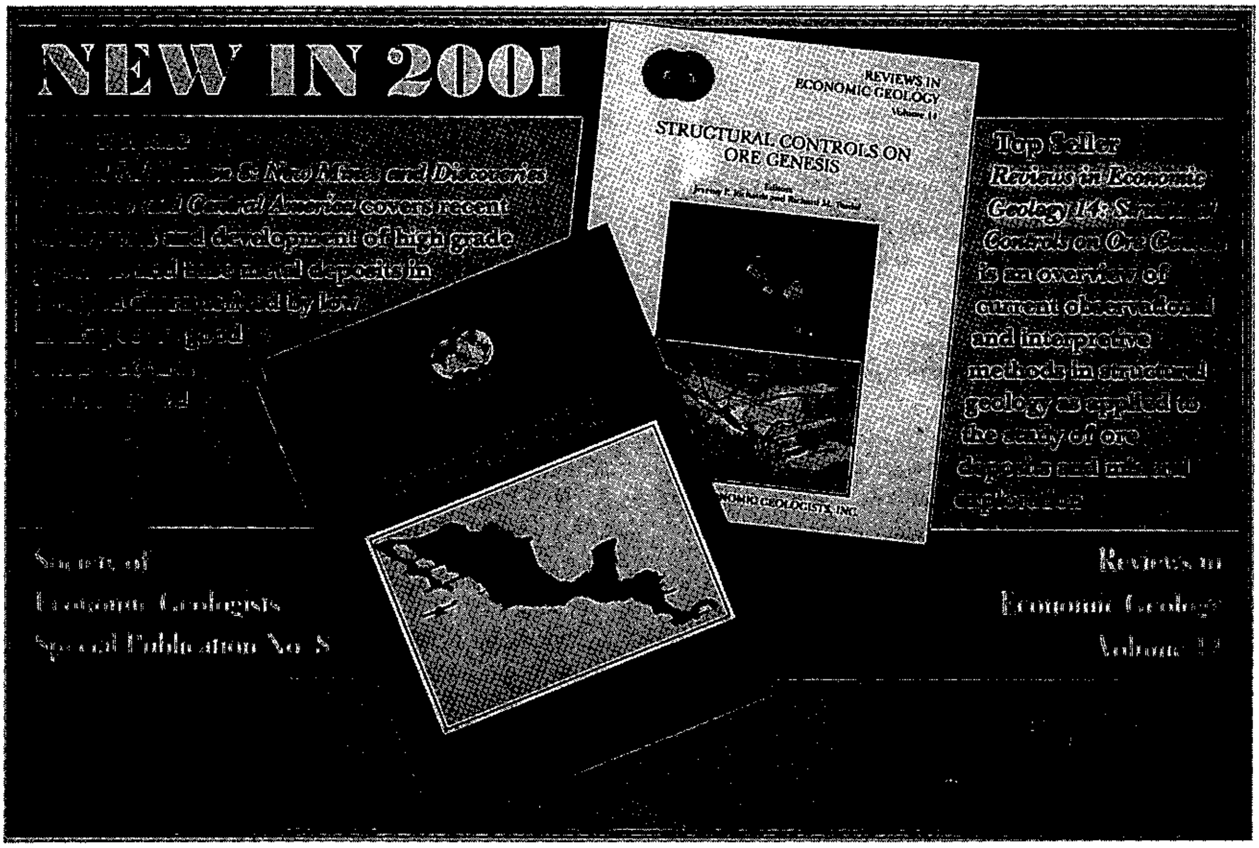
★ **November 2-5**
GEOLOGICAL SOCIETY OF AMERICA: ANNUAL MEETING, Seattle, Washington, USA – Contact address: GSA Meetings Department, P.O. Box 9140, Boulder, CO 80301-9140, USA; phone: +1 303 447 2020; fax: +1 303 447 0648; e-mail: meetings@geosociety.org; web-site: http://www.geosociety.org/meetings/index.htm

2004

★ **February 23-25**
SME ANNUAL MEETING AND EXHIBITION, Denver, Colorado, USA – Contact address: Society for Mining, Metallurgy & Exploration; phone: +1 303 973 9550; fax: +1 303 979 3461; web-site: http://www.smenet.org

★ **August 18-28**
32ND INTERNATIONAL GEOLOGICAL CONGRESS, Florence, Italy – Contact address: Matteo Moscatelli or Erica Galli, Newtours SpA, Via San Donato 20, I-50127 Florence, Italy; phone: +39 055 33611; fax: +39 055 33611250/350; e-mail: newtours@newtours.it; web-site: http://www.newtours.it or http://www.32igc.org

★ **October 10-15**
SOCIETY OF EXPLORATION GEOPHYSICISTS (SEG), 74TH ANNUAL MEETING AND INTERNATIONAL EXPOSITION, Denver, CO, USA – Contact address: Debbi Hyer, 8801 S. Yale, Tulsa, OK 74137, USA; phone: +1 918 497 5500; e-mail: dhyer@seg.org; web-site: meeting.seg.org



THE SGA HOMEPAGE ON INTERNET

The SGA homepage has a new address on INTERNET. From this homepage you can get information about biennial scientific meetings in Europe, world-wide field trips and workshops, membership application form for the SGA and authors and titles of this year contributions to Mineralium Deposita as well as the electronic edition of SGA News.

http://www.min-tu-clausthal.de/www/sga/sga.html

ANNOUNCEMENTS

MEETINGS, CONFERENCES, FIELD TRIPS AND SHORT-COURSES

FORUM ON ASIAN MINERAL POTENTIAL

Vancouver, Canada

21 January 2002

Asian Mineral Potential: An MMAJ Forum

Monday January 21, 2002, Four Seasons Hotel, Vancouver, B.C., Canada

Sponsored by the Metal Mining Agency of Japan
Supported by The British Columbia & Yukon Chamber of Mines
In conjunction with the Cordilleran Roundup Exploration Convention

The Metal Mining Agency of Japan (MMAJ), a governmental body involved with metal supplies, wishes to provide information on the mineral resources of Asia to potential private investors - major exploration companies, junior companies and others - in order to facilitate new private investment in the region. The speakers, largely exploration geologists with extensive experience across Asia, will review the metallogeny, mineral deposits and potential for exploration and development across the region - from Far East Russia to Iran, and Kazakhstan to the Philippines. The regulatory and investment climate will also be touched upon. Senior managers from industry will close the Forum with a discussion of the practicalities of working in Asia.

Registration fee (includes buffet lunch): $90
Late registration (after January 9, 2002): $165
Register early as seating is limited!

To Register for the MMAJ Forum and/or the Cordilleran Roundup please see recent issues of the Northern Miner, or download forms from the British Columbia & Yukon Chamber of Mines web site: www.chamberofmines.bc.ca/rdup2002
or contact the BCYCM directly tel: 1-604-681-5328, email: chamber@chamberofmines.bc.ca

For the Final Program and list of speakers, watch for updates at www.chamberofmines.bc.ca/rdup2002
Or contact Jeff Hedenquist at MMAJforum@aol.com

AAPG HEDBERG RESEARCH CONFERENCE "DEFORMATION, FLUID FLOW AND RESERVOIR APPRAISAL IN FORELAND FOLD AND THRUST BELTS"

Palermo – Mondello (Sicily, Italy)

14-18 May, 2002

Exploration in Fold and Thrust Belts is a very challenging task in present-day petroleum exploration. Over the last years new developments and new concepts have evolved. Some of these new developments rely on results achieved from integrated field, petrographical and geochemical studies (involving stable isotope, Sr-C-O-isotope, maturation of organic material, apatite fission tracks, clay authigenesis data, paleomagnetic analysis) and diagenetic, fluid flow and pore fluid pressure modelling.
There is however a need to bring researchers, explorationists and reservoir engineers together within an interdisciplinary conference to discuss current research efforts focussing on integrating structural geology, kinematic modeling, fracture prediction, aquifer modeling, reactive transport modeling, diagenesis and reservoir geology. It is also hoped to attract researchers developing scenarios for ore exploration in similar tectonic settings.

Preliminary Research Conference Themes (You may contribute to the success of this research conference by suggesting additional themes)
* Kinematic modelling of FFTB deformation histories
* Fluid flow reconstruction, heat transport and diagenesis in FFTB systems
* Generation, migration and entrapment of hydrocarbons in FFTB-settings
* Integrated FFTB studies (regional studies)
* Coupling of reactive transport modeling and FFTB development
* P, T, V and X reconstruction during FFTB development
* FFTB's and ore deposits
* Laboratory experiments simulating FFTB development and fluid flow

Abstract Submittal: Please send a 1 to 4 page(s) abstract, including optional figures (up to 2) to: Debbie Boonstra, AAPG Educational Dept., P.O. Box 979, Tulsa, OK 74101-0979. Fax: 918/560-2678, e-mail: debbi@aapg.org with copy to Rudy.Swennen@ifp.fr. Please specify that your abstract is for: ***AAPG Hedberg Research Conference on Exploration in Fold and Thrust Belts***. Include ALL co-authors names (including contact information for the primary author). **Deadline for submission of abstracts: January 1, 2002.**

Scientific contact: François Roure
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MINERALOGICAL ASSOCIATION OF CANADA SHORT COURSE ON SYNCHROTRON RADIATION: EARTH, ENVIRONMENTAL AND MATERIALS SCIENCES APPLICATIONS

University of Saskatchewan campus, Saskatoon (Canada)

25-26 May, 2002
(prior to the 2002 GAC-MAC meeting in Saskatoon)

The short course will present what synchrotron radiation is, what the latest techniques are, what types of Earth, environmental and materials science problems can be investigated using synchrotron techniques, what the Canadian Light Source can do, how one gains access to the CLS and other sources, and how data are reduced and analyzed for specific techniques. Most of the material will be at a level of understanding for most upper undergraduate and graduate students although recent results and ideas presented through-out the lectures will appeal to both pure and applied researchers working on Earth, environmental and materials sciences. The presentations of the first day (90-minute lectures) will be broad overviews of various aspects of synchrotron research. The second day will be dedicated to more specific applications, and some of the lecturers will go through the reduction and analysis of real raw data with the audience (where appropriate). On the afternoon of the second day, there will be a tour of the Canadian Light Source. A symposium on APPLICATIONS OF SYNCHROTRON LIGHT SOURCES TO THE EARTH SCIENCES will also be held during the GAC-MAC meeting. Both oral and poster presentations are welcome.

Organizers
G. Henderson, University of Toronto
D. Baker, McGill University

Contributors
G. Michæl Bancroft, Director, and De-Tong Jiang, Canadian Light Source, Saskatoon

Gordon E. Brown, Stanford Synchrotron Radiation Laboratory, Stanford University
T.K. Sham, Department of Chemistry, and H. Wayne Nesbitt, Department of Earth Sciences, University of Western Ontario
J.S. Tse, Steacie Institute for Molecular Sciences, NRC, Ottawa
John B. Parise, Departments of Geology and Chemistry and Center for High Pressure Research, SUNY, Stony Brook

Registration fee: $275CDN (Students $150CDN)

For more information, contact Grant S. Henderson at henders@geology.utoronto.ca
Or visit the web site of Saskatoon 2002:
www.usask.ca/geology/sask2002/
P.O. Box 78087, Meriline Postal Outlet, 1460 Merivale Road Ottawa ON, Canada K2E 1B1; Tel. & fax: +1 613 226-4651
e-mail: canmin.mac.ottawa@sympatico.ca

11TH IAGOD QUADRENNIAL SYMPOSIUM/ GEOCONGRESS 2002

Windhoek, Namibia

22-27 July, 2002 SGA-COSPONSORED

Earth Systems and metallogenesis
COMPRESSIONAL AND EXTENSIONAL TECTONIC ENVIRONMENTS AND THEIR ASSOCIATED ORE-FORMING PROCESSES, with a focus on Africa

HOSTS: The Geological Societies of Namibia, South Africa and Zambia

CONFERENCE VENUE: Safari Hotel, Windhoek

SCHEDULE:
16 – 21 JULY, Pre-Conference Excursions
22 – 27 JULY, Conference in Windhoek, Namibia
27 JULY – 2 AUGUST, Post-Conference Excursions

Most conference fees have been significantly reduced, e.g. for members of hosting and sponsoring societies the "early bird" delegate fee (until 31 March 2002) has been reduced to **US$ 325** (international) or **NS$2700** (residents of SADC countries). Please consult our Web-site for details.
The conference incorporates the 11th Quadrennial Symposium of the International Association on the Genesis of Ore Deposits (IAGOD) and GEOCONGRESS 2002 of the Geological Society of South Africa, and is hosted by the Geological Societies of Namibia, South Africa and Zambia. The conference is as much sedimentary, magmatic and tectonic as it is economic. Besides creating a platform for the exchange of the latest geological research results, the conference provides also exposure to mining investment opportunities in the Southern African region. An exhibition allows the presentation of investment opportunities, and services and goods for the mining industry. Various workshops and/or short courses and a wide selection of geological excursions are also being offered. The conference is sponsored by the Geological Survey of Namibia, the Council for Geoscience of South Africa, IUGS/UNESCO, The Society of Economic Geologists (SEG) and The Society for Geology Applied to Mineral Deposits (SGA).

You can register via our Web-site.

The Final announcement contains full details on the conference including details on our invited speakers:

- our Keynote speakers: Dr. Richard Sillitoe, Consulting Geologist, UK, "Iron oxide-copper-gold deposits an Andean perspective", and Prof. Ross Large, Director, CODES Special Research Centre, University of Tasmania on "Stratiform Sediment Hosted Zn-Pb-Ag Deposits: Ore deposit Models and Exploration Criteria";

-SEG lecturers: Dr. Steve Walters, Director GeoDiscovery Group, Australia, "An overview of world-class Broken Hill-type Pb-Zn-Ag deposits - new lessons from old ore bodies", and Prof Lluis Fontbote, Department of Mineralogy, University of Geneva; "Zn-Pb materialisation in high sulfidation epithermal environment - examples from Peru";

-Plenary speakers: Prof Uwe Reimold, President Geological Society of South Africa 2002 on "Mineralisation associated with impact structures, with special reference to the Vredefort-Witwatersrand system" and Dr. Erik Hammerbeck, President IAGOD 2002 on "Topical aspects of the geotectonic and metallogenic evolution of Africa"; and

-the 2002 Alex. L. du Toit Memorial Lecturer, Prof Bruce Rubidge, University of the Witwatersrand on "Re-uniting lost continents - fossil reptiles from the ancient Karoo and their wanderlust".

The selection of Geological excursions is being expanded. Please consult our Web-site for details.

CONTACT ADDRESS - Ger Kegge, P.O. Box 90469, Klein Windhoek, Namibia, Fax +00264 61 246 128; e-mail: kegge@iafrica.com.na or ehammerb@geoscience.org.za

A New Web Resource: Mineral Abbreviations for Studies on Ore Deposits

Lluìs Fontboté and Pierre Perroud, Section des Sciences de la Terre, University of Geneva, Switzerland

When writing, editing, or reading scientific articles and reports, most of us have been confronted with the inhomogeneous use of mineral abbreviations. It is a minor problem but disturbing. In cooperation with several colleagues and largely based on existing suggestions by Chace (1956) and Kretz (1983) we have posted in the web a preliminary and not exhaustive list of

"Recommended mineral abbreviations for studies on ore deposits"
http://www.unige.ch/sciences/terre/mineral/ore/min_ore.html

Most ore minerals are abbreviated according to Chace (1956) and most gangue minerals according to Kretz (1983). Following Chace (1956) and in accordance with the dominant use in publications on economic geology, but in contrast to Kretz (1983), mineral abbreviations are written in lowercase. Native elements are capitalized. The list has been establised following the idea that abbreviations should be short (!), logical, and consistent and at the same time reflect established use (ab, an). They should also respect IMA English names (nk nickeline; not nc niccolite), and, as much as possible, etymology, prefixes and suffixes (digenite dg). Further, mineral abbreviations should not coincide with atomics symbols (arsenopyrite: asp and not as).

The list has alphabetic entries after mineral names and abbreviations. Each mineral has a direct link to the mineral data-base "Athena"(http://un2sg4.unige.ch/athena/mineral/mineral.html)

For a few minerals, and following differing suggestions, several mineral abbreviations are listed. It is planned, in a further step, to reduce the choice to one abbreviation per mineral... but, possibly, to reach consensus on some problematic cases will be quite difficult...

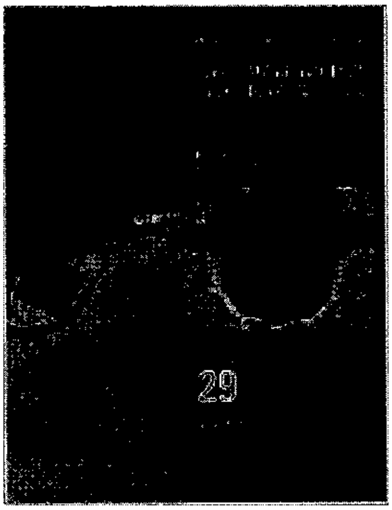
Please, consult the list and send your comments, criticisms and suggestions to the addresses indicated in the web page http://www.unige.ch/sciences/terre/rnineral/ore/rnin_ore.ht rnl

Chace (1956), Abbreviations in field and mine geological mapping, Economic Geology, v. 51, p. 712-723.
Kretz, R. (1983), Symbols for rock-forming minerals, American Mineralogist, v.68, p.277-279.

BOOK ADVERTISEMENT

MINERALOGICAL ASSOCIATION OF CANADA
SHORT COURSE VOLUME 29

Laser Ablation-ICPMS in the Earth Sciences
Principles and Applications



LASER ablation-ICPMS is arguably the most exciting new analytical development in geochemistry in the last decade, opening up approaches to pure and applied geologic problems that were only dreamed of before. This short course volume presents how laser ablation-ICPMS works, what is being done in the Earth sciences with the method now, and what could be done in the future. It will appeal to all those Earth scientists who are interested in solving geologic problems with chemical data. Material is presented at the level of understanding of most graduate students in the Earth sciences.

Technical topics discussed include: Nd-YAG and excimer laser instrumentation; laser beam delivery systems; ablation cell design; quadrupole, magnetic sector and time-of-flight ICPMS instrumentation; collision cell technologies; sample preparation; data acquisition, calibration and quantification strategies; laser ablation phenomena and element fractionation.

Examples of Earth sciences applications: whole rock geochemistry using fusion disk analyses; lithophile element studies of silicate and oxide minerals in the mantle and crust; noble metal element studies of sulphides, oxides and metals in ores and rocks; experimental mineral-melt partitioning; melt inclusions and magmatic processes; fluid inclusions and ore genesis; metamorphic minerals and diffusion-rate processes; trace-element geothermometry/geobarometry; environmental pollution tracing and monitoring; radiogenic isotope systematics of minerals; U-Pb accessory mineral geochronology.

Contributors

Detlef Günther, Professur für Analytische Chemie und Spurenanalytik, ETH Zürich, Switzerland

Simon Jackson, Lecturer, School of Earth Sciences, Macquarie University, Australia

Jan Kosler, Lecturer, Department of Geochemistry, Charles University, Czech Republic; and Research Associate, Department of Earth Sciences, Memorial University of Newfoundland

Henry Longerich, Professor Emeritus, Department of Earth Science, Memorial University of Newfoundland

Nuno Machado, Professeur associé et Agent de recherche et de planification, Sciences de la Terre, Université du Québec à Montréal

Paul Mason, Research Officer, Faculty of Earth Sciences, University of Utrecht, The Netherlands

Marc Norman, Senior Research Fellow, School of Earth Sciences, University of Tasmania, Australia

Paul Sylvester, Associate Professor, Department of Earth Sciences, Memorial University of Newfoundland

Geoff Veinott, Research Scientist, Department of Fisheries and Oceans, Environmental Sciences Division, Northwest Atlantic Fisheries Centre

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SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS

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Are you a member of the Society of Economic Geologists? (If yes, no sponsors are necessary) ❑ Yes ❑ No

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SGA Executive Secretary
Czech Geological Survey
Klárov
CZ-11800 Prague 1
CZECH REPUBLIC

Tel.: +420 2 58 17 390
Fax: +420 2 58 18 748
e-mail: pasava@cgu.cz

Join the SGA now...

The Society of Geology Applied to Mineral Deposits was established in 1965 by an international group of economic geologists. Its Journal *Mineralium Deposita* is now recognized as a premier international mineral deposits journal.

GOALS

-The promotion of science of mineral deposit geology
-Personal contact of its members in order to exchange knowledge and experience
-Organization of scientific meetings, field trips, workshops. For these events, SGA members have reduced registration fees and in certain cases may apply for travel grants
-Cooperation with other scientific societies, especially with SEG and IAGOD
-Publication of *Mineralium Deposita* and scientific volumes

MEMBERSHIP

Membership in SGA is open to all persons interested in economic geology, mineral resources, industrial minerals and environmental aspects related to mineral deposits. SGA is an international society with global membership in over 50 countries. Members have reduced registration fees in SGA-sponsored events and in certain cases are eligible for travel grants. Subsides for publication of color plates in *Mineralium Deposita* also may be applied. Current membership fees are listed on the left-side column of this page.

MINERALIUM DEPOSITA

Editors: Richard Goldfarb (Denver, CO, USA) and Bernd Lehman (Clausthal, Germany).
Mineralium Deposita publishes papers on all aspects of the geology of mineral deposits. It includes new observations on metallic and non metallic minerals and mineral deposits, mineral deposit descriptions, experimental and applied inorganic, organic and isotope geochemistry as well as genetic and environmental aspects of mineral deposits. *Mineralium Deposita* is published bimonthly. Fast publication: *Mineralium Deposita* publishes *Mineral Deposita Letters* within 3 months and regular papers normally within 4 months after manuscript acceptance and usually 6-9 months after manuscript submission.

..and receive

MINERALIUM DEPOSITA & SGA NEWS!!!

Additional information in the SGA homepage on Internet: http://www.min.tu-clausthal.de/www/sga/sga.html

SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS (SGA)

in collaboration with

SOCIETY OF ECONOMIC GEOLOGISTS (SEG)

in cooperation with

INSTITUTE OF GEOLOGY AND MINERAL EXPLORATION
ATHENS TECHNICAL UNIVERSITY
ATHENS UNIVERSITY
UNIVERSITY OF THESSALONIKI
GEOLOGICAL SOCIETY OF GREECE - SECTION OF ECONOMIC GEOLOGY AND GEOCHEMISTRY

August 24-28, 2003
Athens (Greece)

Seventh Biennial *SGA* Meeting

"Mineral Exploration and Sustainable Development"

Preliminary information

The 7th Biennial SGA Meeting will be held in Athens, Greece, August 24-28, 2003. Athens is the historical capital city of Greece, a scientific and cultural center and the Host City of the Olympic Games of 2004.

Under the general theme "Mineral Exploration and Sustainable Development" the organizers would like to bring together economic geology scholars and professional exploration geologists to discuss current issues on ore geology, exploration and sustainable development. Participants are kindly invited to offer papers for oral and poster presentations. There is an opportunity to have meetings and sessions of ongoing and planned Projects and Working Groups. Proposals for conveners and topics of the sessions are welcome.
Several pre- and post-meeting field trips will be organized and the participants will have the opportunity to visit different metallogenic provinces of Greece and neighboring countries.
The first circular will be in our website in January 2002, in the following address:

www.igme.gr/sgaconference.htm

Deadlines
April, 2002, Pre-registration
August 31, 2002 Second Circular
January 31, 2003 Abstract submission
April 15, 2003 Registration and Field trip

Contact address
7th Biennial SGA Meeting
Secretary: Dr. Demetrios Eliopoulos
Institute of Geology and Mineral Exploration
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e-mail: eliopoulos@igme.gr