

Australian Institute of Geoscientists

AIG NEWS

Quarterly Newsletter • No 112 • May 2013

The AIG Registered Professional Geoscientist (RPGeo) Program

By Mike Erceg and Mike Smith (AIG Registration Board)

THE REGISTERED PROFESSIONAL GEOSCIENTIST (RPGeo) program has now been running for 15 years. Since inception of the programme 141 members of AIG have now been recognised as RPGeos. The AIG has never granted RPGeo status without the applicant fulfilling the complete accreditation process. These 141 members are recognised as leaders in their fields of practice.

AIG's RPGeo program is Australia's most rigorous recognition program for continuous professional development by Australian geoscientists. The RPGeo program recognises Fellows and Members who have committed to the maintenance and continuous development of their technical and professional skills and capabilities. This commitment is widely recognised by employers. Importantly, the program provides a means by which self-employed geoscientists and consultants may demonstrate their commitment to continuous professional development to both existing and potential clients. Some testimonials follow:

Philip Commander, RPGeo No. 10056 (Hydrogeology)

At the inception of AIG's Registration Program, through the membership of both organisations in the Australian Geoscience Council, the International Association of Hydrogeologists in Australia had offered assistance in establishing the category of Hydrogeology. During my term as National President of IAH, I took the lead in encouraging members to apply for RPGeo status, and as a result there has been consistent growth in RPGeo uptake in Hydrogeology. I believe this strengthens our branch of geoscience within the geoscience profession, and the community at large now has a clear/straightforward mechanism to identify practitioners who are recognised as skilled in this field and who maintain constant professional development.

Greg Kotze, RPGeo No. 10025 (Geotechnical and Engineering)

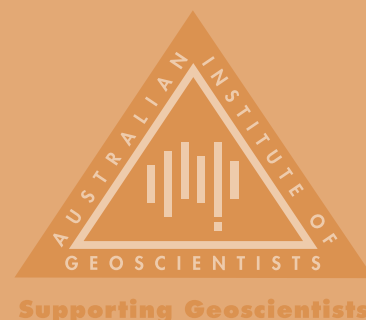
Engineering Geology and Geotechnics are becoming increasingly competitive in the consulting market. As always, technical excellence remains a key differentiator over mediocrity. In this regard, quality technical performance is generally rewarded by repeat business, but for as-yet unknown clients and potential new markets, other preferential differentiators are sought, including the attainment of registered professional status.

RPGeo status is recognition of an individual's aspiration to achieve the highest level of technical quality, through continuing professional development and industry interaction. This differentiator is now being rightly recognised by an increasing number of government bodies, as a prerequisite for professional engagement. I would encourage all Engineering Geologists to seek RPGeo status, to enhance the advancement of their careers.

RPGeo is a voluntary grade of the AIG membership and is defined in the "Guidelines for the Registration of Geoscientists" AIG, (1996) available on the AIG website at www.aig.org.au.

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The AIG Registered Professional Geoscientist (RPGeo) Program

Cont. from Page 1

Applicants for registration may nominate one or more Fields of Practice and demonstrate competency suitable for registration in one or more of the following:

Mineral Exploration, Mining, Petroleum, Coal, Hydrogeology, Industrial Minerals, Geotechnical and Engineering, Environmental Geoscience, Regional Geology, Geophysics, Geochemistry, Information Geoscience and Other Specialist Geoscience.

The voluntary registered grade of membership is designed to be self-regulatory, meet the minimum requirements of any State or Federal legislation for professional standards, and help maintain professional standards along with a high level of competence among geoscience practitioners.

The requirements for RPGeo include a formal qualification of a tertiary geoscience degree or equivalent approved by the AIG Federal Council, and a minimum of five years of experience of a responsible nature and involving exercise of independent judgement in the nominated Field of Practice. Four referees must attest to the knowledge of the applicant's professional work and experience in the nominated Field of Practice. The names of applicants for registration are published in the AIG News for peer review and acceptance. Interviews are an option at the discretion of the Registration Board.

As members of the AIG, Registered Professional Geoscientists are bound by the Institute's Code of Ethics as a condition of their membership. They may use the postnominal denoting their status; RPGeo Registered Professional Geoscientist. RPGeos' are issued with a stamp identifying the Institute, the position of Registered Professional Geoscientist, the member, and a registered number. This may be used in endorsing reports to identify the author's status.

Testimonials

Mike Erceg RPGeo No. 10003 (Mining and Mineral Exploration)

"I have always been very conscious of the fact that being a geologist is often overlooked as a profession worthy of the recognition of engineers, lawyers, accountants and doctors. The RPGeo program goes a long way towards recognising the contribution of leading geoscientists. In addition the continuous professional development ensures the highest standards are maintained. By attending meetings of the AIG and sister societies and through my technical reading, I have no problem meeting the average 50 hours CPD per year"

Sam de Beer, RPGeo No. 10084 (Mining)

I am pleased to be approved as an RPGeo in the field of Mining under the AIG's RPGeo scheme. This recognition complements my

Cont. on Page 4

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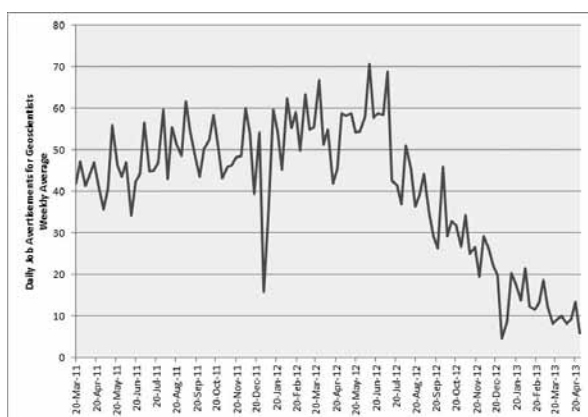
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From Your President - Kaylene Camuti

BY THE TIME YOU RECEIVE this issue of AIG News we'll be almost halfway through the year. And what a challenging year it is proving to be.

News of job losses and the closure or down-sizing of resource projects continues. Results from the April AIG employment survey confirm the anecdotal evidence and indicate that rates of unemployment and underemployment are rising rapidly, particularly in the mineral exploration sector, but other sectors are also in decline (see Andrew Waltho's article on page 10). The downward trend in advertised job vacancies is also adding to the sense of uncertainty. Job vacancy data over the last two years, compiled by AIG member Ian Hodkinson, shows a very marked decline in the number of advertised positions for exploration geoscientists over the last nine months (see graph below).

Given the current uncertain employment conditions, AIG is offering a twelve month deferral of membership fees to members who are experiencing financial hardship. State branches are also offering a wide range of professional development opportunities - conferences, workshops, seminars - which provide opportunities to update skills and maintain professional networks. Many of these events will offer reduced registration fees for unemployed geoscientists.



Weekly averages of daily job advertisements for Geoscientists on seek.com.au.

While the AIG has been keeping a close watch on the employment environment for members, we have also continued to experience rapid growth. In 2012 applications for membership averaged 35 to 40 per month, and in 2013 this trend has continued. The AIG continues to provide services to members, however, a growing and increasingly diverse membership, the need for increasing interaction with regulatory and professional bodies, and an aim to continually improve member services, is increasing the demands on the volunteer members of AIG Council and its subcommittees. In response to these increasing demands the AIG is seeking to employ a part-time Executive Officer to provide support to councillors and committee members. An advertisement for this position is included on page 9 of this issue of AIG News, has been announced in recent AIG e-updates, and is included on the AIG web and LinkedIn sites.

It is good to report that the AIG is in a healthy financial position at the moment. This is largely due to the efforts of the state

branch committees whose volunteers regularly organize events that are both technically and financially successful. The recent few years of buoyant employment have allowed the state branches to build up their reserves so they can continue to offer events and support to

students during a downturn. The Federal AIG funds are also healthier than 12 months ago, thanks to a return on our seed funding of the IGC, and these funds can be used to develop new initiatives and also provide back up during a downturn. While events-related income has boosted the AIG financial reserves, AIG membership fees have remained low for many years. As AIG Council considers that increasing and ongoing administration costs should be funded by membership income, rather than the ad hoc proceeds of events, there will be a small increase in membership fees from the 1st July 2013, in order to meet the increasing overheads of running the Institute and help finance the position of Executive Officer. This is something we do reluctantly, but in the interests of maintaining and improving services to members in the coming years.

In this issue of AIG News we highlight the AIG Registered Professional Geoscientist (RPGeo) program. This is a rigorous program that acknowledges geoscience experience and skills, and promotes continuing professional development (CPD). It is a timely article as, globally, the professional practice of geoscience is receiving increasing attention from professional and regulatory bodies. As evidence of this global recognition, in August last year the International Union of Geological Sciences approved the formation of a Task Group on Global Geoscience Professionalism; AIG is a founding member of this group. The professional issues that are a focus of the professionalism task group, and of other professional bodies, include:

- standards for geoscience practice, including ethical standards;
- standards and content of academic training; and
- continuing professional development.

Geoscientists in some other regions - notably North America - practice in a professional environment with ethical, regulatory and CPD obligations. In some regions professional issues are considered from the very beginning of undergraduate training, as subject choices will affect a graduate's eligibility for professional licensing. While geoscientists practicing in Australia, in most fields of practice, do not have legal or industry requirements for registration, this doesn't mean that professional issues are irrelevant. In fact, it should be the profession itself that drives continuing improvement in geoscience practice, rather than looking to external bodies to set the standards. AIG encourages all eligible members to consider becoming an RPGeo. Apart from the personal and professional satisfaction that comes with being acknowledged by your peers, registration potentially provides an advantage in what is becoming an increasingly competitive work environment. ▲▲



The AIG Registered Professional Geoscientist (RPGeo) Program

Cont. from Page 2

accreditation as a Professional Geologist in British Columbia, Alberta, Nunavut and the Northwest Territories, as well as in South Africa. The establishment of a nation-wide scheme in Australia has benefits over the province and state based systems in Canada and the USA. I believe registration is important because our geological world has become very small and every geologist can have the opportunity to pull up stakes and move to another country in the blink of an eye. Having arrived in Canada after such a move I was quick to realise the importance of being accredited as a geologist when I couldn't find work in my profession. After an extended period as a fly fishing consultant and chef and earning dollars per hour instead of a salary, I started the process of qualifying to be registered as a geologist in Alberta, Canada. It took a long time but it was well worth the effort. When I moved to Nunavut I could set up my own consultancy and years later I could walk into a position in the Northwest Territories and later in British Columbia. However, I had to go through the registration process every time I moved to a new province. Coming to Australia was easy as was accreditation with the AIG. I know now that when I want to move on to another position in another state in Australia or even in another country, I will not have to jump through the same hoops again.

Geoff Turner RPGeo No. 10004 (Mineral Exploration)

I initially applied for RPGeo grade of membership as I wanted to enhance my credibility as a professional in a business environment where such credibility was low at the time. It worked, and now as

an independent contractor running a service company, I have found that RPGeo status gives comfort to my clients in that they are engaging someone with a commitment to keeping abreast of methodologies and technology, as well as someone who is a committed professional.

With the trend in some countries in the recognition of Competent Persons for the purpose of public reporting moving towards Registration within local Professional Organisations, I feel that this requirement may become universal in the near future. But for the time being, I know that my RPGeo status will allow me to sign off on reports in a number of countries.

RPGeo applications

Applications for RPGeo are initiated via the AIG website. To be eligible for election as an RPGeo an applicant must have satisfied the requirements for Member and approved as a Member by AIG Council. Applicants may nominate more than one field of practice but must have at least 5 years of experience in the primary field of practice and at least three years in each of the other fields of practice.

Written references are required from four referees. Two referees, the proposer and seconder must be members of the AIG. All referees must be members of recognised professional or learned societies and be competent to referee in the nominated fields of practice. In some cases it is beneficial to have more than the minimum of 4 referees.

The names of applicants for registration are published in the AIG

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news for peer review and acceptance. Confidential written submissions either supporting or opposing nomination can be lodged. A sub-committee of the AIG State Branch where the applicant resides reviews all applications, references and any submissions received as a result of the peer review process, and advises the Registration Board of its recommendation. In the case of an overseas applicant, a multi-state committee undertakes the assessment.

The current Registration Board comprises Mike Smith (Chairman), James Lane, Iain Paterson, Lindsay Furness, Peter Lewis, Michael Leggo and Mike Erceg (representative on AIG Council).

Continuous Professional Development

RPGeos must participate in continuing professional development activities over the period of their registration. Activities typically include attendance at conferences, undertaking relevant post-graduate education including extension courses, in-house courses, distance learning, on-the-job training and private reading of learned publications. The CPD activities must be directly relevant to the field(s) of practice. RPGeos are required to maintain a record of Continuing Professional Development (CPD), subject to a minimum of 50 weighted hours per annum over a three year period.

Industry recognition of RPGeo

Within the membership there has been an increasing rate of RPGeo applications indicating a desire for professional recognition. There is

also a growing number of companies that are significant supporters of AIG's RPGeo scheme. Consultants and contractors in particular reap an immediate benefit from RPGeo status as they present their credentials to prospective clients.

RPGeos are recognised internationally. However there is no direct or automatic reciprocal arrangement between the AIG's RPGeo scheme and other national accreditation standards, due to the distinctive differences between various approaches. The AIG has approved many RPGeos who previously held PGeo status in Canada or the USA, with the latter accreditation serving to expedite the progression through the normal AIG process. ▲▲



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Geology of Gold Up-skilling Workshop Report

Mario Zelic

BSc MSc PhD MAIG MSEG (mario@sjsresource.com.au)

THE THREE-DAY COMBINED LECTURE and field-based course "Geology of Gold: Up-skilling Workshop" provided a magnificent insight into basic concepts and latest ideas of geology of gold.

The course was held during the 1-3 of May, 2013 in Kalgoorlie, as the latest in a series of courses and conferences organised by Geoscientists Symposia and AIG (and held after the one-day summary course in Perth, on 29th of April). 23 delegates (in Kalgoorlie; 28 in Perth) attended and provided a high-level of interaction with lecturers Neil Phillips, Julian Vearncombe and David Nixon, both in a classroom and field trip context.

Lecturers Neil Phillips (Professor at Universities of Melbourne and Stellenbosch) and Julian Vearncombe (SJS Resource Management) brought to the classroom their specific and extensive experience on gold deposits of all continents. They provided the audience a broad overview of the geology of gold, from economics to science. The course demonstrated basic concepts of gold in a framework of past and today's global economy, basics genetic models and processes, alteration and metamorphic petrography of gold deposits, structural



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geology of gold deposits, management of structural geology in mine and exploratory environment. The course raised many questions, such as new opportunities of gold discoveries in metamorphic high-grade terrains. The course was organised with a visit to the KCGM Super Pit, and La Mancha's pit and core yard (on Tuesday, 2nd of May), where delegates had the opportunity to log representative diamond core, with emphasis on alteration and structures.

In conclusion, the course provided a wide range of aspects relevant to mine and exploration geology of gold. The talk "What is Exploration Success" and how to be successful in the exploration for gold stressed the importance of being focused, motivated, open, and critical while doing geology and observing rocks that can lead to the next discovery. ▲▲



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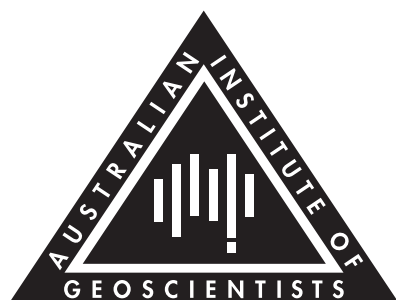
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Supporting Geoscientists

AIG Registered Professional Geoscientist Programme

RPGeo – Recognising professional geoscience skills, experience and competence.

- The AIG RPGeo Programme is an internationally recognised professional registration programme.
- There are currently over 140 RPGeo members worldwide, working in a range of geoscience fields.

RPGeo Fields of Practice include:

Mineral Exploration	Mining
Industrial Minerals	Coal
Petroleum	Hydrogeology
Geotechnical and Engineering	Environmental Geoscience
Regional Geology	Geophysics
Geochemistry	Information Geoscience
Other Specialist Geoscience	

Acceptance as a Registered Professional Geoscientist (RPGeo) confirms that:

- A geoscientist is skilled in one or more specified fields of geoscience.
- A geoscientist is committed to maintaining standards of expertise through ongoing Continuing Professional Development (CPD).

Benefits

- Recognition of your achievements as a geoscientist.
- Identification of your areas of geoscience specialisation.
- Credible acknowledgement of your skills and experience for potential employers and clients.

Application Process

- Application forms are available on the AIG website.
- Four accredited referees (two MAIG) provide support for the application.
- Applicants' names and Fields of Practice are published in AIG News for peer review.
- Applications are reviewed:
 - by an AIG State Branch review committee
 - by the RPGeo Registration Board
 - by the AIG Federal Council.



Image courtesy of the Victorian Department of Primary Industries



Image courtesy of the Victorian Department of Primary Industries



For application forms and more information visit www.aig.org.au or contact the AIG RPGeo Registration Board at registration@aig.org.au





AIG Executive Officer – call for applications

The Australian Institute of Geoscientists is a rapidly growing organisation. Membership numbers are increasing and the functions and activities of the Institute are expanding. In order to continue to improve services to members, the AIG is seeking the assistance of a part-time Executive Officer to assist Council and subcommittees with meeting the increasing demands of a growing institute.

The Executive Officer will be responsible for the day to day management of many aspects of the Institute's activities, encompassing:

- ▲ promoting the Institute's role and activities both within the geoscience profession and to the general public; and
- ▲ providing a point of high-level contact for members on issues of professional concern.

The Executive Officer requires the professional experience and judgement, and industry knowledge, to be able to act in the Institute's interest with a degree of autonomy, supporting the volunteer officers of the Institute to help ensure and continuously improve Institute services and representation of members' professional interests.

The position is offered as part-time with flexible working hours.

Duties

The duties of the Executive Officer will include:

- ▲ Advancing the work of the Institute through completion of defined projects on behalf of the AIG Council.
- ▲ Providing professional support to AIG Council and to Council subcommittees responsible for the maintenance of professional standards and the conduct of members.
- ▲ Assisting in the delivery of policy objectives.
- ▲ Assisting in the preparation of submissions to government and other bodies regarding the status of members' and the geoscience profession in Australia.
- ▲ Assisting in the assessment of the suitability of applicants for AIG membership.
- ▲ Promoting the Institute's activities, the benefits of membership, and maintaining effective communication with members, through preparation of promotional resources and via the Institute's newsletters, web site, LinkedIn group, Facebook page, YouTube channel and other social media.
- ▲ Maintaining statistical information relating to AIG members' employment and demographics.
- ▲ Acting as a liaison between Council and the Institute's secretariat service.
- ▲ Working in conjunction with the secretariat when required to ensure timely and effective delivery of back-office services and compliance with Australian corporate governance requirements.
- ▲ Assisting with sourcing and managing other forms of professional assistance required to further the objectives of the Institute.
- ▲ Providing assistance to AIG state branch committees as requested.
- ▲ Providing other assistance to the AIG Council as directed from time to time.

The Executive Officer position reports directly to the AIG President.

Selection Criteria

- ▲ Self starter with ability to work under limited supervision.
- ▲ Excellent interpersonal and written and verbal communication skills.
- ▲ Formal geoscience qualifications coupled with relevant, postgraduate professional experience. Applicants who are existing AIG Members, or eligible for AIG Membership, are preferred.
- ▲ Experienced in the efficient and effective use of Microsoft Office, including Access.
- ▲ Commercial acumen to assist in the management and commercially sustainable development of the Institute.
- ▲ Ability to undertake limited travel to represent the Institute at meetings, major conferences and other events.

Interested applicants are invited to submit their applications to:

EO Review Committee
 Australian Institute of Geoscientists
 Email: executive@aig.org.au

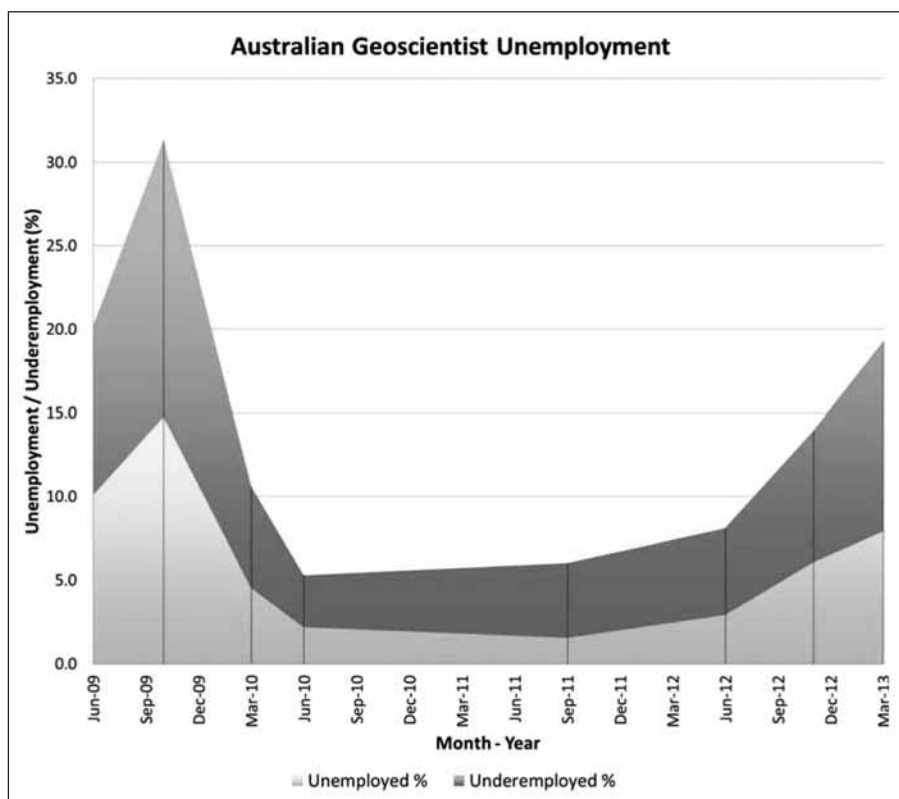
AIG Survey Shows Australian Geoscientist Employment Continues to Fall

THE LATEST AUSTRALIAN Geoscientist Employment survey conducted by the Australian Institute of Geoscientists (AIG) shows that geoscientist employment in Australia continued to fall during the first three months of 2013.

The unemployment rate at the end of March was 7.9%, up from 6.1% at the end of December 2012.

The underemployment rate amongst consultants and self-employed geoscientists increased to 11.3% from 7.8% for the same period.

Victoria is the state most affected by the continued downturn, with an unemployment rate of 14%, followed by Tasmania with 13%, New South Wales with 10% and Queensland with 8%. The unemployment rate in Western Australia was 7%. South Australia defied the national trend with an unemployment rate of 3%, although this represents an increase from no unemployment reported at the end of 2012. Underemployment rates peaked at 38% in Tasmania, followed by both New South Wales and Victoria on 13%, Queensland on 11%, Western Australia at 10% and South Australia on 7%.



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Geoscientists working in mineral exploration have been hit hardest by the employment downturn with unemployment of 9.9% and under-employment of 13.4% affecting this important sector, up from 4.9% and 9.3% in the final quarter of 2012 respectively. The mineral exploration sector provides over 60% of all geoscientist employment in Australia and is critical to the longevity of Australia's mineral resource industries. Survey responses also pointed towards deteriorating employment conditions for geoscientists employed in both metalliferous mining where unemployment reached 8%, up from 3% recorded for the last quarter of 2012. All survey respondents in the environmental geoscience sector, which is growing in significance in Australia, reported being underemployed in the first quarter of 2013.

Some 36% of unemployed and underemployed geoscientists lost full time employment since the beginning of 2013, adding to the 39.3% who lost full time employment during the fourth quarter of 2012. Only 4% of unemployed and underemployed geoscientists regained full employment in the first quarter of 2012. More than half (54%) of unemployed and underemployed geoscientists expressed no confidence in returning to full time employment during the next 12 months. Amongst geoscientists in full employment, 19% reported not being confident of remaining employment during the next three months and only 48% expressed confidence in retaining employment for 12 months or more. More than 6% of unemployed and

underemployed geoscientists, nationally, reported that they are seeking long term employment outside the profession.

The survey is interpreted to provide clear evidence that exploration, critical to the future of Australia's resource industries, is entering a downturn, with the combined rate of unemployment and underemployment amongst professionals in the sector continuing to increase. While global economic conditions have some impact on this, a range of domestic factors are arguably significant, with the competitiveness of exploration investment in Australia, difficulties in accessing land for exploration, and time-consuming, bureaucratic processes for permitting exploration work, all contributing to available capital being invested elsewhere. The federal government, in particular, has the ability to help smooth out cyclicity in exploration investment. The risks associated with the loss of geoscience knowledge, the erosion of Australia's geoscientific skills base, and the sharp slow-down in exploration and research on individual exploration projects, should be recognised as they have a pronounced impact on productivity, and on both the rate and cost of discovery in the Australian exploration sector. ▲▲


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The Value of the Independent QA/QC Audit for Sampling and Analysis Procedures

Margaret M. Fairhurst

PG (AELSLAGID,) MAusIMM, BA (Geology)

(The following article is based on a paper written by the author and a presentation at the AIG-BEDG Seminar, Brisbane, 22 February 2013.)

Introduction

Accurate and reliable estimates of ore reserves are clearly fundamental to the development of any successful mining venture. Although errors are an inherent part of the estimation process, collection of samples in the field and their analysis in the assay laboratory are vulnerable to mistakes that can be very difficult to identify at later stages of reserve determination.

Establishing the value of a mineral resource is divided into six key steps. The presentation focussed on the first two steps:

1. Field drilling, collection, logging, sampling; and
2. Laboratory assay & reporting.

Regular annual or biennial external laboratory audits are recommended for base and precious metal resource delineation and mining operations. Such audits assist management in demonstrating a commitment to Quality Assurance and Quality Control (QA/QC) with respect to reported assay values, and the Annual Reporting of resources.

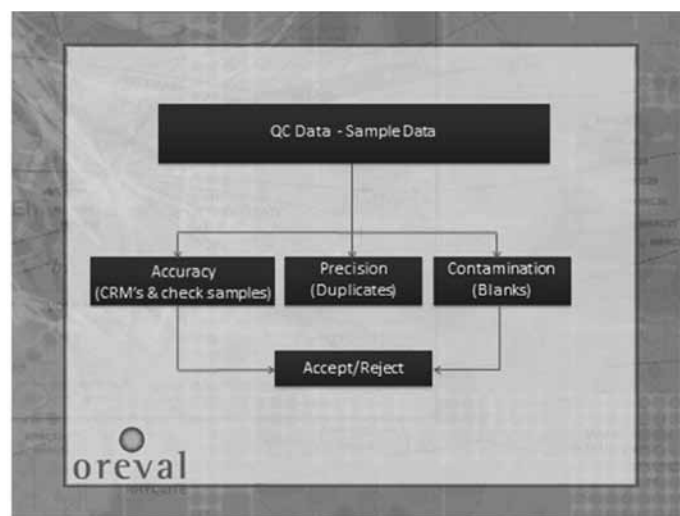


Figure 1: Illustration of Laboratory Procedures to Minimise Ore Estimation Errors.

Background & History

Although not mandated by current legislation or industry Best Practices; the use of independent audit services for data base, data quality and laboratory procedures provides assurance and confidence at all stages of the mining process - exploration, development and construction, operations, expansion, and reworking of tailings.

Independent audits have identified errors in both sampling and assaying procedures; including sample collection, sample transport and storage, assay preparation and testing, contamination, and in the accuracy and precision of data recording. All of these factors can affect the outcome of the sampling and analyses program and therefore the value of a mining project. Additionally, independent audits help provide confirmation and recognition of laboratories which maintain best practices.

An increase in the number of laboratories operating as part of larger groups is a concern that should also be addressed. The clustering of ownership makes it difficult for clients and auditors and Certified Reference Material (CRM) providers to complete 'independent' testing and assessments.

Early concern over "unacceptable reporting practices" was stimulated by the 'boom and bust' events of the Poseidon nickel discovery¹ in the late 1960's. Australia established JORC (the Joint Ore Reserves Committee) in 1971. JORC is now a permanent committee intended to ensure that ore reserve estimates are as reliable as possible [see <http://www.jorc.org/> for details]. JORC introduced the notion of a 'Competent Person' – an expert responsible for a report, who must have certain defined professional qualifications. The Competent Person concept is now widely used in other professional fields.

Following Australia's lead, other countries have since established similar groups. In Canada the Ontario Securities Commission (OSC) in 1998 promulgated National Instrument NI 43-101 establishing 'Standards of Disclosure for Mineral Projects'. NI 43-101 is subject to constant review, intended to ensure that any shortcomings and possible improvements are identified.

[see <http://www.osc.gov.on.ca/en/15019.htm> for details]

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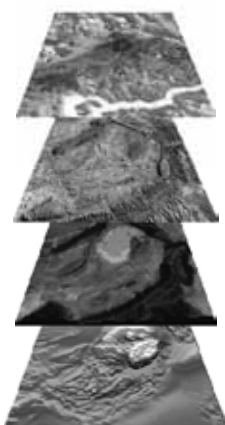
1. Details of the 'Poseidon Bubble' can be found at http://en.wikipedia.org/wiki/Poseidon_bubble

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The Value of the Independent QA/QC Audit for Sampling and Analysis Procedures

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Value of Independent QA/QC Audits

Key items for the resource developer and investor:

1. Are we on track?
2. Are we drifting off track?
3. How do we get back on track?

Why are these questions critical? Because we manage to invent ways to screw-up accidentally and deliberately.

Examples of Macro Errors Identified/ Should Have Been Identified

- Poseidon nickel resource reporting- deliberate & accidental, benchmark;
- SE Asian export of nickel ore- analysis at destination showed nickel content was only 50% of what was reported by the seller, but no independent audit was completed;
- Bre-X scandal in the 1990s was a pivotal example for Canadian regulators, where samples were salted with gold to attract investors, when very little gold existed in the first place;
- Australia - A gold company lost 30% of its stock value overnight due to in-house lab errors;
- Canada - A competent person internal to the company adjusted over 90% of assay results with inflated values; since resigned as a competent person and spending 6 ½ years in jail.

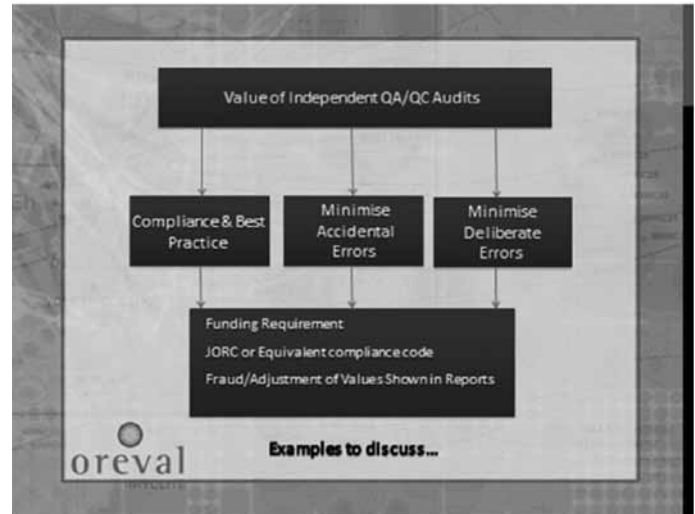


Figure 2: Illustration of Audit Procedures to Minimise Ore Estimation Errors.

Examples of Micro Errors Identified/ Should Have been Identified

- Lab - Significant accidental error identified in Blank Sample analysis at a laboratory, identified when the Laboratory Manager was on holidays - leaving a student in charge of the lab!
- Field - Sieving of RC chips was occurring next to other samples

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already collected in calico bags. The fines from one sample were accidentally introduced into another sample;

- Field - Use of calico bags for samples are standard practice, but when multiple calico bags are placed in a single plastic bag then transported to the laboratory 30km away, cross contamination occurs;
- Lab - Australian laboratories use on average only 40% of world 'norm' of lead in litharge- which results in lower costs but poor flux chemistry, and source of assay error.

Conclusions

Periodic audits by a Competent Person independent of the group(s) involved in the resource evaluation can avoid potentially serious errors in the early stages of defining a mineral resource, i.e. field drilling to obtain samples of the ore and laboratory assays of these samples.

Such independent audits provide several benefits, including:

1. A cost-effective way to improve field and laboratory practices, education & observation.
2. Communication of 'best practice' standardisation within a single company and between various laboratories that a person associated with a single company only may not be aware.
3. Give confidence to investors that all stages of the resource

development process are given careful scrutiny.

4. Provide confidence to the Competent Person within a company that the data he/she approves are accurate, precise and representative of the field sample taken at the drill.
5. Align certification of the accuracy of mineral resource estimates with established practice in other professional disciplines where evaluations have major financial implications for the customer.

Ask yourself - am I contributing to accuracy and precision for my investors to consider? Or am I contributing to contamination and errors? ▲▲

Acknowledgements

The author wishes to acknowledge Dr. Barry Smee, Mr Dale A. Sketchley and Mr. Keith Kenyon who provided valuable insights and kindly provided background material.

AIG Victorian Branch News

A "Sampling in Exploration" workshop will be held by the Victorian branch at Copes Williams Winery, Romsey, Victoria, on the 25th July 2013.



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17 May, 7 June, 19 July, 23 August, 25 September, 18 October, 22 November, and 11 December

Presenters: Peter Stoker and Mark Berry

This workshop will present the fundamental requirements of the JORC Code, including new and changed provisions adopted in 2012. Examples of compliant and non-compliant reports will be reviewed, including case studies. This workshop is designed for existing and intending Competent Persons and management staff at all levels.

Assessment of Geological Uncertainty in Mining and Management of Risk (one day)

16 May, 22 August, and 21 November

Presenter: Mark Berry

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Gold: The Metal and Deposit Price Relationship

J.A. Bell¹, S. Gotley², B. Maybee³

THE MARKET PRICE OF GOLD metal is a major consideration in determining the selling price for a gold deposit. While it may be possible to determine its impact on value, the transaction price is less certain, in part due to the relationship between gold and 'fear'.

To account for gold price fluctuations, it is common industry practice to express deposit transactions as a percentage of the gold price in an attempt to reduce the noise created by this variable. Through a two-dimensional analysis of 370 gold deposit transactions, it is shown that this 'yardstick' method can have a negative relationship with the gold price, has equal volatility and yields no tangible benefit over the simpler dollars per ounce measure. A three-dimensional (block-model) analysis of the same dataset shows that the market is very dynamic in how it attributes price. Small deposits appear to have the potential to exceed metal price growth rates, while larger equivalents underperform, sometimes significantly. Consequently, this article empirically challenges the validity of expressing a transaction as a percentage of the prevailing gold price, and highlights the different responses that are possible based upon the size of a deposit.

Background

It is important to differentiate the terms value and price at the outset of this article, as the two terms are often used interchangeably. This article concerns the price, or likely price at which a gold deposit may transact. The authors make a clear distinction from the term value, whereby:

"Price is what you pay; value is what you get"
– Warren E Buffet (2008)

Therefore, value is an input into the price determination process. While value may be calculated using cashflow models and/or probability models, price includes other factors such as negotiation skills, extraneous supply and demand forces, and the psychology of the decision making process.

As a key revenue driver, the prevailing gold price at the time of transaction influences the price of a gold deposit (Wellmer, Dalheimer

& Wagner, 2010). Despite being a prominent input into the decision-making process for both the vending and acquiring parties, the relationship between gold price and deposit price (the 'price-price relationship') is not well understood. To account for the variability in metal price, it is common industry practice to express transactions as a percentage of the prevailing gold price (e.g. \$10/oz transaction ÷ \$1,000/oz = 1%), which is dubbed the 'yardstick' method for the purposes of this article. The underlying assumption to the yardstick method is that the market attributes a consistent, proportional price to a deposit that is linearly related to the commodity price. This method is appealing in its simplicity, but like most heuristic methods, it is subject to the risk of systematic bias and error (Kahneman & Tversky 1979 and Kruglanski & Ajzen, 1983). A more thorough discussion of heuristic error and the associated systematic bias can be found in the February 2011 and November 2012 editions of the AIG News.

Some factors which may undermine the 1:1 linear assumption that underpins the yardstick method include:

- In the absence of money printing, gold price is often considered to be a measure of fear. When the markets are fearful, it is reasonable to expect that higher risk asset classes, such as mining and exploration projects, will be avoided. This creates divergent tension between a gold deposit's intrinsic value and the price it may command in the market, as observed in the year 2012 mergers and acquisitions activity (Downham et al, 2013).
- A high gold price may be indicative of limited capital sources, thereby putting downward pressure on demand or the ability to fund acquisitions.
- Established mining projects tend to have a fixed cost base (Macfarlane, 2011) and consequently, as price increases, the profit margin grows disproportionately to the metal price.
- Higher gold prices may make peripheral low-grade mineralisation economically viable, thereby increasing the resource base, and potentially lowering the \$/oz unit price or profit margin.
- Gold price is not the only variable that may affect the deposit price. The reality of the situation is that there are multiple price drivers, each of which may have different weights at different times under different circumstances.

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Gold: The Metal and Deposit Price Relationship

Cont. from Page 17

Given the financial magnitude of deposit transactions and the risk posed by mispricing these transactions, the authors undertook an analysis into the price-price relationship using two techniques:

- A two-dimensional analysis where unit prices are plotted against the gold price. While this representation ignores the important size and grade drivers of a transaction, it does replicate the industry practice implied by the yardstick method.
- A three-dimensional (block-model) analysis. This method spatially distributes gold deposit transactions based on their size, average grade, the spot gold price at the time of transaction and the transacted unit price (\$/oz). The strength of this method is that it draws upon powerful and industry accepted interpolation techniques to account for trends in the dataset together with transaction price variability.

Dataset

To undertake a market analysis of the sensitivity associated with the yardstick method, a dataset comprising 370 gold deposit transactions from Australia, Canada and the USA was used.

Study period

The study period of this research spans the period January 2002 to June 2012. During this time-frame, the price of gold increased more than seven-fold, from USD259/oz to a peak of USD1,896/oz in September 2011. As the study period covers a complete business cycle that started when gold was an undesirable asset and finished

when it had near record prices, the authors considered it to be a suitable time frame over which to study the effects of the gold price on gold deposit valuations.

Qualities

The 370 transactions used in the gold price sensitivity dataset are worth USD7,736 million and have the following qualities:

- all transactions involved deals where the acquiring party did not have a pre-existing interest in the deposit. Incremental increases in interest (eg from 51% to 75%) are excluded from this analysis due to the difficulty in accounting for variable/co-incident reference points;
- only transactions involving more than 50% equity in a deposit are included;
- 29 transactions (8%) involve producing mines;
- 62 transactions (17%) involve projects at the scoping study to feasibility study level;
- 89 transactions (24%) involve projects that were previously in production;
- 189 transactions (51%) involve advanced exploration projects on which mining activity has not previously occurred;
- 197 transactions (53%) were largely near-surface ($\geq 50\%$ by metal weight);
- 332 transactions (90%) involve gold only mineralisation;
- 42 transactions (11%) include current Reserves;

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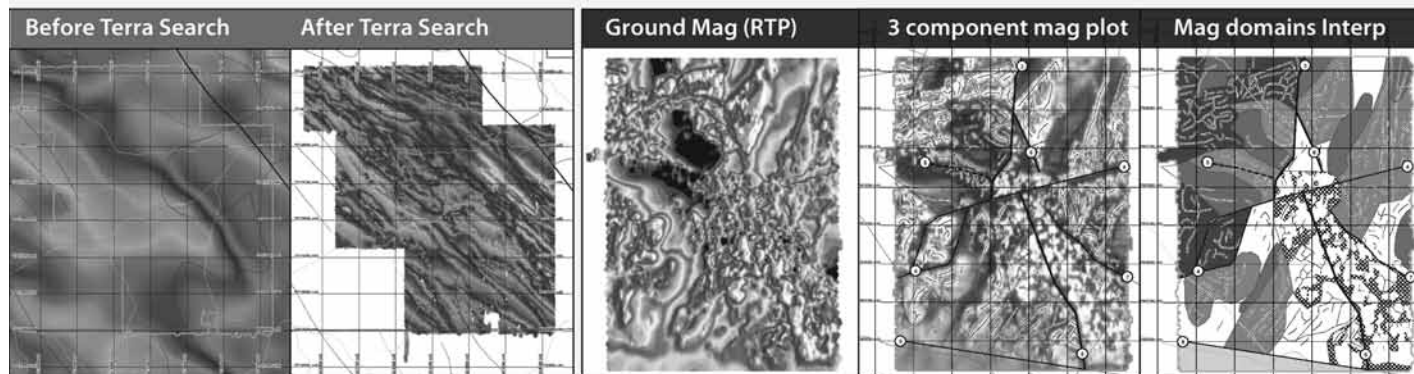
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- 6 transactions (2%) contain only Probable Reserves;
- 6 transactions (2%) contain historical 'reserve' estimates;
- 119 transactions (32%) include at least Measured Resources;
- 88 transactions (24%) contain an Indicated Resource as the maximum level of confidence;
- 52 transactions (14%) have only an Inferred Resource level of confidence; and
- 110 transactions (30%) contain estimates that do not meet the minimum reporting criteria to be classified as a resource under the JORC Code (2004) or its international equivalent.

Analysis

Two-dimensional

As a first pass review, this study used gold price brackets analysis of gold deposits in a linear two-dimensional analysis. This simple technique is useful as it:

- allows for big-picture trends to be easily identified,
- is a technique that is easily replicated by industry practitioners, and
- can be compared with the yardstick method to be tested in a like-for-like (two-dimensional) manner.

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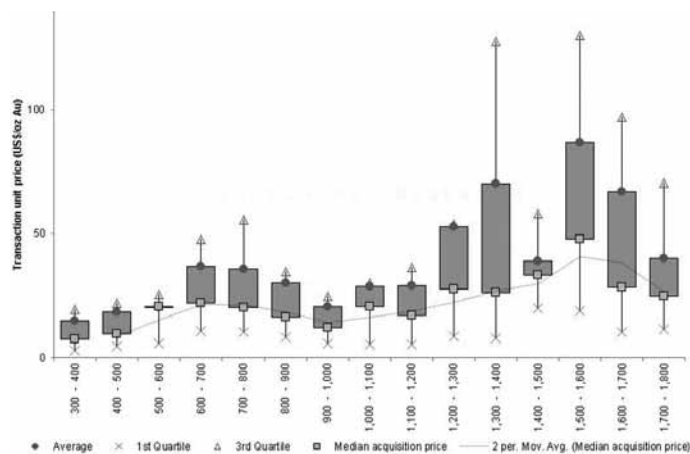


Figure 1. Price bracket statistics of the entire dataset.

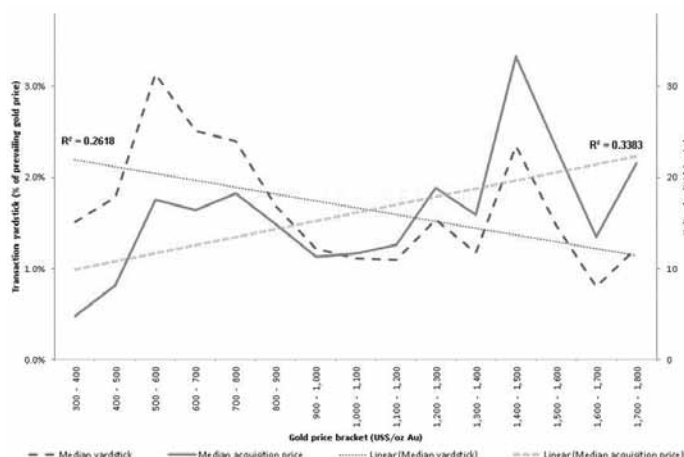


Figure 2. Distribution of the dataset when expressed as a yardstick.

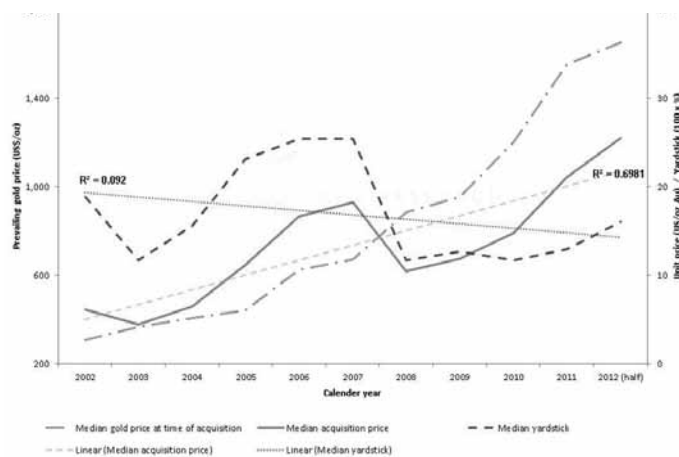


Figure 3. Time-series distribution of the smoothed dataset.

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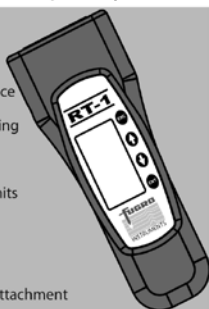
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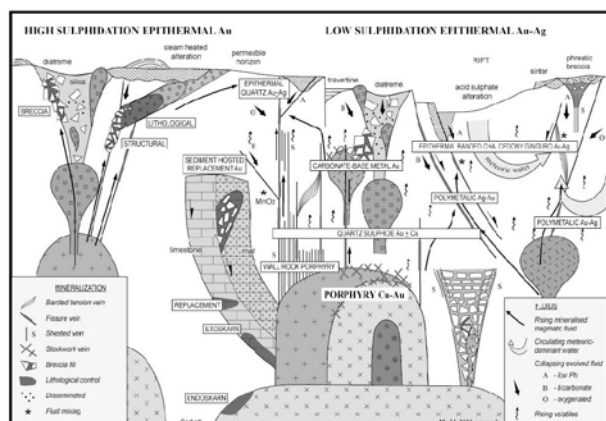
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Gold: The Metal and Deposit Price Relationship *Cont.*

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All datapoints

A linear analysis of the full dataset suggests that while the unit price of a deposit does increase with the prevailing gold price, it does not appear to be a simple 1:1 price-price relationship. As Figure 1 shows, the median prices fell consecutively within the USD700–1,000/oz bracket, with smaller declines in higher price brackets. This feature can reasonably be attributed to the initial securities market crash associated with the global financial crisis (“GFC”). The unit price anomaly in the USD1,500–1,600/oz price environment may be due to it spanning two distinct periods of time, from April to July 2011 and after May 2012. However, a review of the raw data shows that in this bracket there are 17 transactions, four of which involve operating mines and five with unit values over \$100/oz Au (two being mines and the other three being high- to very high-grade prospects). The effect of removing the operating mines and transactions with a unit price over USD100/oz from the dataset resulted in 29 mines and 24 very expensive transactions being removed from the analysis (15% overall reduction). The overall sinuous shape is retained in the smoothed dataset as is the downward trend for gold prices above USD1,500/oz, although there are slight shifts in the locations of the peaks and troughs. The sinuous price response suggests that aside from the gold price and technical aspects (size, grade, maturity, etc.), there are other price drivers which are taking affect over time. As an initial indicator, the sinuous shape suggests that the 1:1 price-price assumption which underpins the



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yardstick method may not be valid, as it should theoretically yield a straight-line projection that is in step with the gold price growth.

Yardstick percentiles

In an alternate representation of the price bracket data, the transactions are presented as percentages of the prevailing gold price at the time of announcement (Figure 2). This representation shows that yardsticks respond similarly to the \$/oz unit prices. However, the yardstick measure has a negative sloping long-term trend, as opposed to the positive slope associated with the long-term trend in the acquisition price. This has implications for the yardstick's premise that deposits trade at a fixed proportion relative to the gold price, as it should plot horizontally in Figure 2.

Time-series

An alternative method of interrogating the dataset is to plot it as a time-series (Figure 3). The distinct feature of this time-series is that it shows how in both the unit prices and the yardstick underwent a 'resetting'. This representation of the data, while less connected to the gold price, shows how the unadjusted unit prices do appear to broadly follow the gold price trend, although the rates of growth differ. This is an important point, as the differing growth rates result in the yardstick trend being less obviously related to the prevailing gold price. Visually, the case for using \$/oz unit prices is much more appealing than yardstick percentiles.

Volatility

One of the key underlying motives for using the yardstick method is that it takes into account the prevailing metal price. As it is supposed to neutralise one of the many price drivers, there should be a noticeable decrease in the volatility of the dataset. This is not evident in the 370 transactions analysed in this study. Table 1 shows that the volatilities (using the logarithmic cashflow return technique, Mun, 2002) of the yardsticks are similar to those of the unit prices for both the gold-price and time-series representations. Furthermore, r^2 trendline regressions for the lines in Figure 2 (0.34 comparable vs 0.26 yardstick) and Figure 3 (0.70 comparable vs 0.09 yardstick) show a much weaker relationship for the yardstick measures. For reference, the gold price has an r^2 (correlation coefficient) of 0.93.

Implications

Using a number of ways to interrogate the dataset using the like-for-like two-dimensional analysis, there is little support for the yardstick method. The minimal difference in volatilities and decrease in trendline correlation is problematic for proponents of the yardstick method. In theory, adjusting the transaction price for fluctuations in the prevailing gold price using a 1:1 price-price relationship, however imperfect, should meaningfully decrease the dataset volatility and increase r^2 . Neither of these appears to hold true. Given the added difficulty in observing trends and the lack of

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Gold: The Metal and Deposit Price Relationship

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Using gold price brackets			
Comparable		Yardstick	
Bracket (USD/oz Au)	Ln (t1/t0)	% oz Au \$	Ln (t1/t0)
300 – 400		1.52	
400 – 500	0.5304	1.78	0.1597
500 – 600	0.7592	3.14	0.5673
600 – 700	-0.0657	2.51	-0.2216
700 – 800	0.1039	2.40	-0.0451
800 – 900	-0.2047	1.69	-0.3532
900 – 1,000	-0.2717	1.22	-0.3261
1,000 – 1,100	0.0300	1.11	-0.0902
1,100 – 1,200	0.0778	1.09	-0.0185
1,200 – 1,300	0.4022	1.54	0.3424
1,300 – 1,400	-0.1707	1.18	-0.2685
1,400 – 1,500	0.7398	2.34	0.6894
1,500 – 1,600	-0.3562	1.38	-0.5272
1,600 – 1,700	-0.5510	0.80	-0.5496
1,700 – 1,800	0.4724	1.23	0.4314
Volatility	40%		38%

Using a time-series			
Comparable		Yardstick	
Year ended	Ln (t1/t0)	% oz Au \$	Ln (t1/t0)
2002		18	
2003	-0.3264	12	-0.4814
2004	0.3901	16	0.2912
2005	0.5453	23	0.3918
2006	0.3999	25	0.0980
2007	0.0910	25	-0.0004
2008	-0.5593	12	-0.7751
2009	0.1265	13	0.0757
2010	0.2223	12	-0.0808
2011	0.3539	13	0.1007
2012 (half)	0.1917	16	0.2475
Volatility	33%		34%

Table 1. Dataset volatilities for conventional unit pricing and yardsticks.

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empirical support, the yardstick method has the potential to decrease the accuracy of both statistically and visually-based price predictions. Consequently, on a simple two-dimensional basis, there seems to be little evidence to support the 1:1 price-price assumption which underpins the yardstick method. As there are no significant improvements in the dataset volatilities, and a possible inverse relationship with the gold price exists, then the ability of the yardstick method to improve the price estimation process is questionable.

THREE-DIMENSIONAL

While it is common practice to analyse market behaviour using two dimensions, it is the authors' experience that ignoring the size-grade-price drivers can lead to erroneous conclusions. Often this is because the supply-demand function for gold deposits is greatly affected by the size-grade combination, not just in \$/oz terms, but also in how discounts and premiums are applied. Consequently, this section of the paper examines the price-price relationship using the block-model method which takes into account the size of a deposit.

Methodology

The generation of block-models within the minerals industry entails a common and accepted form of geospatial statistical analysis and estimation. This study leverages that extensive industry experience by spatially expressing gold deposit transactions where the:

- X axis represents the grade of the deposits;
- Y axis represents the size of the deposit in terms of contained metals;
- Z axis being the spot gold price at the time of the transactions announcement; where
- The X-Y-Z defined point has a magnitude, expressed as the deposit sale price in \$/oz Au.

A transformation of the transactions is required to evenly distribute the data in three-dimensional space for geostatistical evaluation. The transformed points were spatially analysed using semi-variograms of the price variable within the dataset to determine their continuity. The price variable continuity was determined for directions along the X, Y and Z axes. The same semi-variogram and estimation parameters were used to estimate the value of the price variable in each of the blocks in the model. This technique ensured that the relationships seen in the most closely associated data points are reflected in the variable estimated.

For the purpose of discussing the results of these models, three domains were chosen for the Z axis. These represent artificial boundaries of USD700/oz and USD1,000/oz. During the study period, gold prices below USD700/oz generally occurred prior to the onset of the US housing crisis in 2007, which culminated in the GFC of 2008. Gold prices above USD1,000/oz occurred after mid-2009 when the metal's growth trajectory increased significantly. The result is that 79 transactions (26%) occur in the low-price domain, 104 (28%) in the medium-price domain and 168 (46%) in the high-price domain. While fixed domains are used for discussion purposes in this study, should the user deem them more relevant, a block-model can be analysed at any point or plane in three dimensional space.

All transaction data model


In an ideal study, all data would be comparable and there would be no distorting effects from variables outside the scope of the research. However, gold deposits transact relatively infrequently and there is a high degree of variability, which results in the datasets also being variable. While the temptation is to cull the dataset so it is very similar (e.g. only 100% equity, only near-surface deposits that have not been subject to detailed economic studies, etc.), such processes often reduce the available information to a fraction of the original dataset and may distort the 'big picture' trends. As a first pass in this study, a block-model was generated that used all the available information, and relied on the assumption that the variability is uniformly distributed across the size-grade-price space. This allows the ordinary kriging estimation technique to account for distortions that are difficult to address using simple statistics/human-centric analysis.

An analysis of the deposit prices estimated into the block-model shows that they are:

- Vertically consistent, with increasing unit prices in response to higher grades. There is a minor aberration in the high-gold price bracket, however, this is considered to be an artefact of the dataset rather than a market trend/behaviour.
- Horizontally consistent, with unit price increases when going from medium to large deposit transactions.

A common feature amongst all gold deposit block-models is that small deposits have relatively high unit prices (\$/oz). This 'small deposit effect' is shown in Figure 4. It is speculated that the high unit

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prices of small deposits may be related to their affordability and potential exploration upside (thus increasing market depth and demand). This effect is strongest in the medium gold price environment, presumably as numerous junior corporations compete for deposits so that they can rebrand themselves and have their shares re-rated.

The small deposit effect isn't only important in terms of absolute unit prices, but also in the relative nature of the price-price relationship. The unit price appreciation in response to a growth in the gold metal price appears to be dynamic as shown in Figure 5. The shift between low (<USD700/oz), medium (USD700-1,000/oz) and high (>USD1,000/oz) gold price environments elicits different responses, such as:

- In the shift between the low and medium gold price environments:
 - Overall, the blocks have an appreciation factor of 1.39, compared to the median metal price growth of 1.97 for the underlying data points. This poor performance of the price-price relationship may be due to the medium price environment representing the period when there was significant turbulence in the global financial and securities markets.
 - The average unit price appreciation appears to have a weak positive price-price relationship with increased deposit size (ie. the bigger the deposit, the better it performed).
 - There is little in the way of differentiation between the growth rates of small, medium and large deposits.

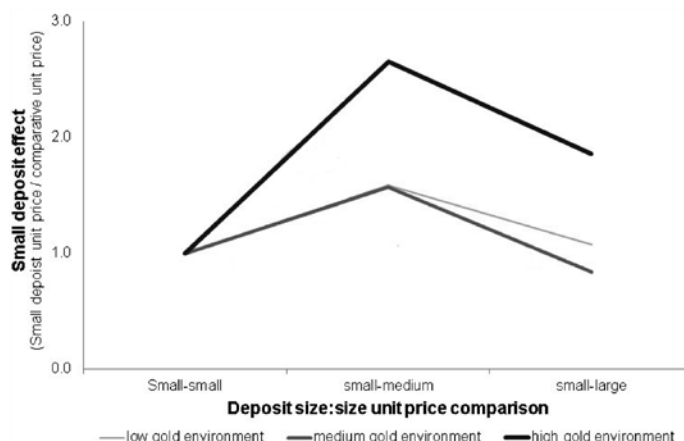


Figure 4. The small deposit unit price multiples over the larger equivalents.

- In the comparison of the low and high gold price environments:
 - The blocks have an overall appreciation factor of 2.23 compared to the underlying data point median of 2.86 for the gold metal price, maintaining the overall underperformance.
 - There is significant market differentiation based on a deposit's size with a strong negative relationship with increased size. Price growth of the small deposits appears to have exceeded that of the metal price. However, the medium and large deposits fared poorly in the transition from the medium to high

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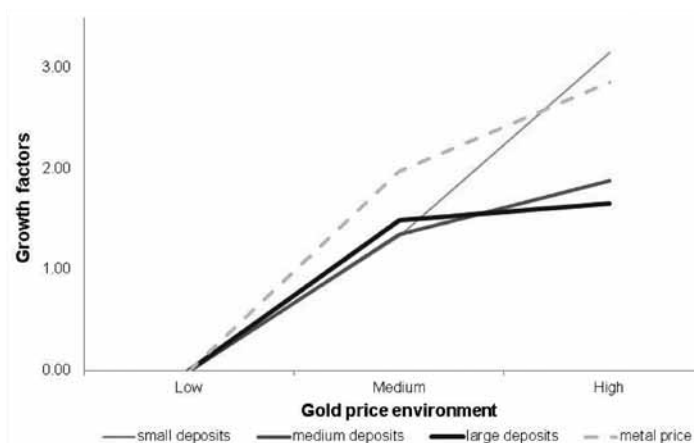


Figure 5. Price appreciation factors using all available transactions.

gold price environment. This divergence may be due to the larger corporations being conservative in a capital constrained world, whereas the small corporations are forced to re-invent themselves into gold deposit owners in order to remain relevant in the market, and are therefore willing to pay a higher unit price.

Given the discussion above, it is clear that there are distinctly different price responses for small, medium and large deposits in relation to changes in the gold metal price. This highlights the importance of the market dynamics associated with deposit size, and the folly in using two-dimensional methods that do not take into account the differences in supply and demand.

Near-surface and deep deposits model

In addition to the block-model described above, a number of model alternatives were generated. In this section, the price-price relationship differences between deposits that are near surface, and those that are at depth and more likely suited to underground mining techniques is examined.

As with previous block-model studies, the unit prices for the two data subsets is quite different, with the deeper deposits appearing to command higher prices on a like-for-like basis, even though there may be higher operating and capital cost requirements for the same size-grade combination. This observation is consistently observed in the block-model research to date and is speculated to reflect a notion of increased blue-sky potential (optionality) that may be more readily sterilised in near-surface deposits.

As for the price-price relationship differences shown in Figure 6 and Figure 7, it appears that the two datasets behave quite differently, such that:

- In the shift from the low to medium price environment:
 - deep deposits price appreciation kept up with the gold price growth. However, the near-surface deposits underperformed against the gold metal price by 50%.
 - there is a positive relationship between the size of the deep deposits and the size of the associated factor. Near surface deposits, while also having a positive relationship, had much smaller factors.

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Gold: The Metal and Deposit Price Relationship

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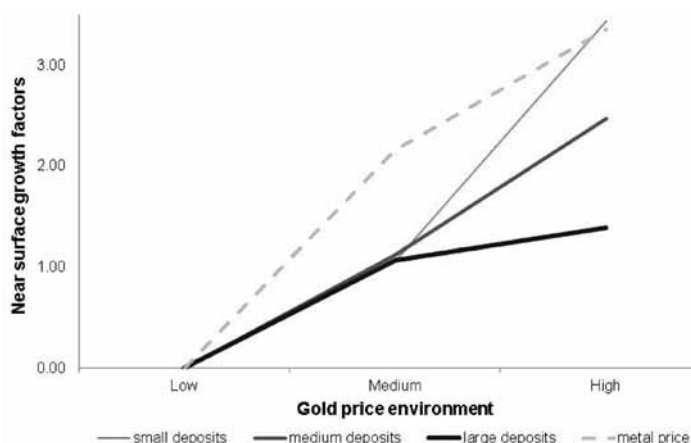


Figure 6. Price appreciation factors for near surface deposits.

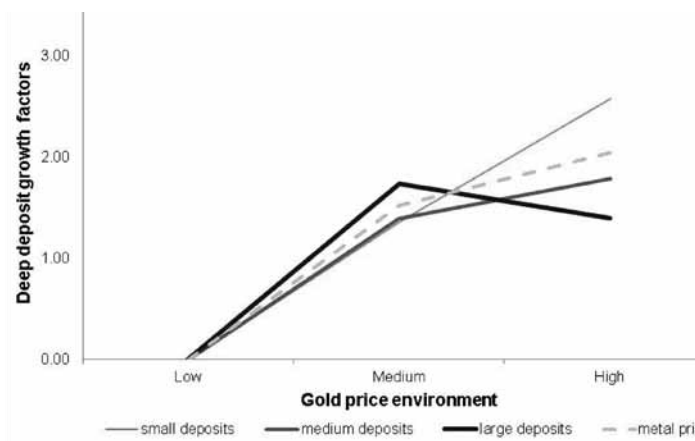


Figure 7. Price appreciation factors for deep deposits.

- In comparing the low and high gold price environments:
 - deep deposits underperformed by a reasonable 94% of the gold price growth, whereas the near surface deposits only managed 73% of the metal price appreciation.
 - Both deep and near surface deposits developed the negative correlation between deposit size and the quantum of the factors (i.e. the larger the deposit, the poorer the unit price performed).

It seems that deep deposits not only have higher unit prices, they are also better at tracking movements in the prevailing gold price. The reason for this can only be speculated on as the market never gives a reason as to why it behaves the way it does, but it may be attributable to:

- a divergence in improved economics for near surface and deep deposits. This may be either perceived, or linked to, the justification for the higher capital and operating cost requirements generally associated with deeper deposits.
- an artefact of splitting the dataset four ways. While loss of market data integrity can never be discounted, the reasonably consistent (although not perfect) behaviour of the underlying unit prices suggests that the price-price observations are valid.

Outright acquisitions model

Another block-model variant was created whereby only transactions using 100% equity interest was used. This resulted in 260 transactions (down from 370) being used to populate the block-model. By removing partial ownership transactions from the dataset (Figure 8),

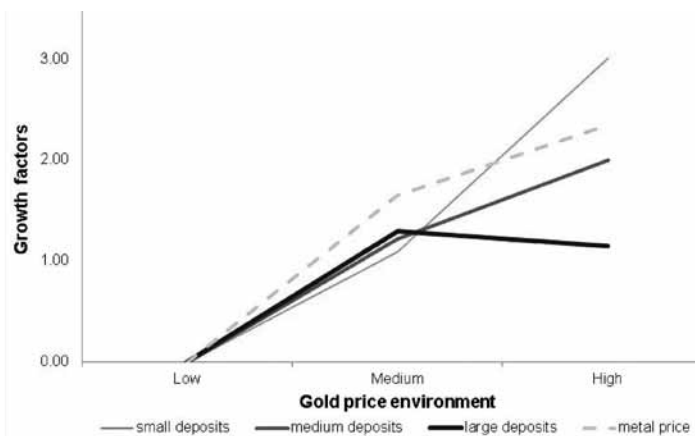


Figure 8. Price appreciation factors for 100% equity transactions.

the overall trends remain the same, however, the size-base performance difference becomes more pronounced.

The research into control premia and discounts (refer to the August 2011 AIG News) demonstrated that there are significant behavioural and price impacts conveyed by partial ownership. In particular, partial acquisitions have the effect of increasing the unit price, presumably as a reflection of lower capital outlay requirements, project specific risk-sharing and portfolio diversification. By removing partial acquisitions, it appears that the implied price-price relationship appears to be more orderly due to the effect of removing a variable outweighing the loss in the number of data-points.

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However, this observation should be treated with caution as it may equally be a function of random error associated with a smaller dataset.

Conclusion

"In modern business it is not the crook who is to be feared most, it is the honest man who doesn't know what he is doing"

– William Wordsworth (2012)

This paper demonstrates that the relationship between the sale price of a gold deposit and the prevailing metal price is not a static one. This has significant implications for the commonly accepted practice of using a percentage of the gold price (yardstick method) as a basis for pricing a mineral deposit. This simple two-dimensional method disregards size-grade combinations and can lead to erroneous calculations as:

- There may be a negative correlation between the prevailing metal and unit prices over the long term. Even on a visual trend analysis basis, it is harder to anticipate what the trends* are when using a yardstick measure rather than conventional \$/oz unit prices.
- The yardstick method appears ineffective at decreasing the volatility of the datasets. Given that this method's main purpose is to reduce gold price induced volatility, this failing undermines the method's very reason for existence.

When a more comprehensive and realistic three dimensional analysis is undertaken, the market is shown to be very dynamic in how unit

prices change in relation to metal price changes. Small deposit unit prices have the potential to appreciate at a higher rate than the metal price. Conversely, large deposits may fail to keep pace with the prevailing metal price. This divergence in performance highlights the folly in oversimplifying the market by assuming that the behaviour is the same for small, medium and large deposits. The number of participants and their behaviour in attributing price to small deposits is significantly different to that for the larger equivalents, and consequently must be treated separately not only for absolute \$/oz prices, but for interpreting the price-price relationship.

In consideration of such published empirical evidence, the authors caution that the use of overly simplistic methods such as yardsticks may not only be misleading, but a liability for those who rely on its outcomes. ▲▲

*Note that chart analysis does not lend itself to estimating prices for individual deposits but is useful for gauging the herd-mentality (Rudenno, 2004)

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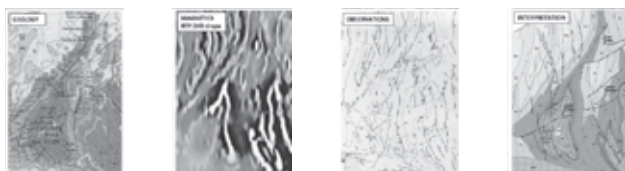
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October 21-25 (MON-FRI) 2013



This workshop is designed to develop skills in integrating aeromagnetics with geology, particularly in the exploration environment. It is suitable for all those directly involved with field exploration and mapping and requires no previous experience with aeromagnetics.

The field component of the course will be conducted at Mt Hunt, 10kms south of Kalgoorlie and will include lithological & structural mapping and field use of magnetic susceptibility meters.

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Risk Management and Insurance for Geoscientists

Travis Kenzle

National Mining Practice Leader, Honan Insurance Group

The area of risk management and insurance for Geoscientists is quite broad and typically overlooked. The reality is that most insurance brokers are generalists and do not focus on this profession, so they are unaware of the unique risks that geoscientists might face in their daily operations. The other thing that makes insurance and risk management for geoscientists complex is that exploration projects are not just domestic but foreign and can be in remote and exotic places, which have their own unique risks. I will touch on some, but not all, areas that I feel are appropriate for geoscientists.

How to buy your insurance

From an overall risk management and risk transfer (by way of insurance) strategy, we suggest a two-pronged approach. Firstly, you want to review what exposures can be covered by insurance versus which exposures can be self-insured. Secondly, you want to do an analysis of the insurance policies to make sure they are appropriate for your operations.

Risk Profile shows the dangers

The first area of review can be handled by a risk profile that outlines exposure and whether there is a risk transfer in place or the risk is currently self-insured. Individuals, companies, and boards of directors

need to know what is currently self-insured. A good example is that many companies carry corporate travel policies, but don't realise that it doesn't cover kidnap & ransom or evacuation in a political unrest situation. Another hot topic when reviewing the risk profile is workers compensation coverage versus disability and income protection insurance. Where does one area of coverage end and when does the other start?

You may not be covered when you think you are

The second part of the exercise, the coverage analysis, should shed some light on the coverage and any gaps in coverage. This will help you drill down into areas such as jurisdiction limitations, definition of insured, what's excluded, what extensions are available, and when and how do you report a claim. A good example in Australia is the North America exclusion on Professional Indemnity policies. This exclusion not only excludes any operations in North America but also any claim brought against the insured in North America, which brings up extraterritorial issues. If you are a qualified person signing off on any NI 43-101 report, this is a big issue. And you don't need to be operating in Canada or the USA for it to be an issue. If you're doing work for a Canadian or US listed company operating abroad, there is a good chance that a claim will be brought to the local courts of where the company is domiciled—this was illustrated in the *Abdula v Canadian Solar Inc.* case (*On November 29 2012 the Supreme Court of Canada denied leave to appeal in Abdula v Canadian Solar Inc.(1) In this case, investors launched a securities class action against Canadian*

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Solar Inc, alleging that it had misstated its financial results in 2009. The Court of Appeal of Ontario ruled on February 13 2012 that the statutory cause of action for secondary market misrepresentations can be raised against foreign-listed companies that maintain a "real and substantial connection" to the Province of Ontario.). In these situations, you need to have a true worldwide policy, with no jurisdictional limitations on settlement or suits. The thing to keep in mind when buying insurance is that "off-the-shelf" policies may not be right for each individual or company. Most general policies (Public Liability and Professional Indemnity) are built for a domestic standard risks and are not suitable for many foreign exposures.

Are you an employee or are you a consultant?

When does a geoscientist rely on their company's insurance and when do they need to buy their own insurance? If you are doing independent third party consulting, you should be purchasing your own insurance. If you work for a consulting firm, the firm should have insurance and you will be covered under the insured definition of employee. If you sit on a board of directors or are a competent/qualified person for a publicly traded company, you will be relying on their directors' & officers' liability insurance. I would recommend asking questions to make sure the coverage and limits are adequate on their D&O policy. There are some specific endorsements that you will want to see on their D&O policy—an endorsement adding competent and qualified persons to the definition of insured; adding an extension to cover allegations of bribery of foreign officials if you are operating abroad. These are just a few examples that may be applicable to geoscientists.

Will your retirement be as carefree as you think?

As a final comment, I think it would be appropriate to touch on retired geoscientists. Professional indemnity policies are written on claims made forms, which means you can only make a claim whilst the policy is in effect. This means that you need to keep a policy in effect even after you are retired, to pick up lawsuits related to any past acts. This can be done by purchasing a "run-off" policy up to 7 years, which is the period of statute of limitations in Australia. This sounds expensive, but it can usually be purchased for a multiple of two to three times the annual premium for the full 7 years. It is important to work with your insurance broker to make sure your policies are suitable and also ask your company questions about their insurance to make sure you're covered and comfortable with the coverage and limits. ▲▲

Building a Sustainable Earth through Remote Sensing, IGARSS 2013

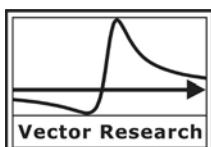
Remote sensing is an ever growing area of research and with sustainability a key issue in our society, this year's IEEE International Geoscience and Remote Sensing Symposium will look at "Building a Sustainable Earth through Remote Sensing". World renowned scientists and engineers will meet at the Melbourne Convention and Exhibition Centre between the 21-26 July to discuss the latest exciting developments in satellite imaging technologies, recent research breakthroughs, challenges and future directions of geosciences and remote sensing. Some of the key topics of discussion will include forest degradation, response of the Great Barrier Reef to climate change, disasters and hazard management, pollution and contamination, earthquake mitigation in New Zealand, sea level rise and much more.

The symposium will feature numerous keynote speakers including IEEE President Dr. Peter Staecker, an expert in microwave technologies which are today largely used in the field of remote sensing. Professor Melba Crawford, IEEE GRSS President, whose research in machine learning focuses on advanced methods for analysis of remotely sensed data, will highlight the many exciting latest developments in the field of remote sensing. The director of the Institute of Remote Sensing and Digital Earth, Professor Guo Huadong, will present the latest research specific to the Asia-Pacific region. Also addressing the audience will be Professor Mike Goodchild, one of the world's pre-eminent thinkers in geographic information sciences and their role in supporting many other aspects of scientific development. Professor Goodchild will challenge us with his thoughts on the relationship between remote sensing and the broader GIS communities.

In addition there will be two keynote speakers from Australia, Dr. Chris Pigram and Dr. Rob Vertessy. Dr. Pigram is the Chief Executive Officer of Geoscience Australia, a world leader in providing first class geoscientific information and knowledge enabling the Australian government to make informed decisions about the use and management of resources, the environment, community well being and sustainable energy. His talk will crystallize the latest Australian developments in geoscience and remote sensing.

Dr. Rob Vertessy is Director of the Australian Bureau of Meteorology. The Bureau of Meteorology is Australia's national weather, climate and water agency. Its expertise and services assist Australians in dealing with the harsh realities of their natural environment, including drought, floods, fires, storms, tsunamis and tropical cyclones. Through regular forecasts, warnings, monitoring and advice spanning the Australian region and Antarctic territory, the Bureau provides one of the most fundamental and widely used services of the Australian government. Dr. Vertessy is currently leading a number of ground-breaking initiatives in the use of remote sensing and value-added spatial and information products systems and will speak about these at the Opening Ceremony.

For further details of this global conference, visit www.igarss2013.org



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Kent Street Yilgarn Craton Earth and Environmental Science Field Trip 2013

Suzy Urbaniak
EES Teacher/Geologist

Another successful EES field trip was undertaken on the March long weekend to support the Year 12's understanding and application of theoretical geological, chemical, biological and physical scientific concepts and processes and to create greater awareness of how their EES learning relates to mining industry in WA.

Some 2000 km's were travelled from Perth, to Westonia and Evolution Mining's Edna May Gold Mine, onto Wave Rock and beyond to Western Area's Flying Fox and Spotted Quoll Nickel Mines to culminate in a World Heritage recognized Biodiversity Hotspot, the Fitzgerald River National Park and the Albany Fraser Orogeny.

A great time was had by all and here is what the students had to say...

David Levien "The benefit of the field trip was the exposure to the mine sites, to see what it takes to work there. A highlight was the Action Industrial Catering and climbing East Mt Barren in the National Park."

Kyle D'Cruz "By seeing the information in front of me, gave me a better understanding than what I would have learnt in class. My highlights including climbing East Mt Barren, sitting under Hippo's Yawn and going down the Edna May open pit."



Leigh Clarkson "The benefit of this field trip was being able to relate the Bowen's Theory to the physical i.e. Being able to see the rocks learnt in class to the ones in the field. The highlights included the Spotted Quoll mine, Edna May mine and the East Mt Barren climb."

CJ (Clement Joshua) "The overall experience was overwhelming. We learnt and drilled many concepts in the 4 days compared to weeks of theory. Alto was learnt and remembered. The two main



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highlights would be going to the two mine sites and getting hands on experience with the people and nature.”

Chris Yazbek “The benefit of the field trip was getting all the information that would have taken 4 weeks in class in just 4 days. Scaling up East Mt Barren was a highlight because it motivated me and gave me ambitions for the future. It helped me see that no obstacle is unbeatable.”

Quentin Smith “I found the field trip good because I had a good experience that helped me understand more about metamorphic rocks than I could have learnt in the classroom. My best experiences was going down the pit at Edna May, going to the Spotted Quoll Mine and climbing up East Mt Barren.”

Sanah Uppal “I learnt so much from this trip visually, which reinforced my learning. Now I’ll go to class and have some understanding. The highlights included applying my theory to rock and potentially how they got to be and seeing and proving that visually, together with seeing the nature and differences of rocks and indicator minerals within.”

Alan Ming “The benefits of this trip was the practical work which classwork and in-school is unable to provide. It showed us the environment and the future jobs associated with EES. The highlights include the East Mt Barren climb and the Spotted Quoll Nickel Mine.

Arianti Ariawan “I learnt more in this trip than I did in the classroom. By actually seeing the actual evidence, it helped with the understanding of the processes involved. The highlights included going to the two mine sites, seeing the beaches and the National Park.”

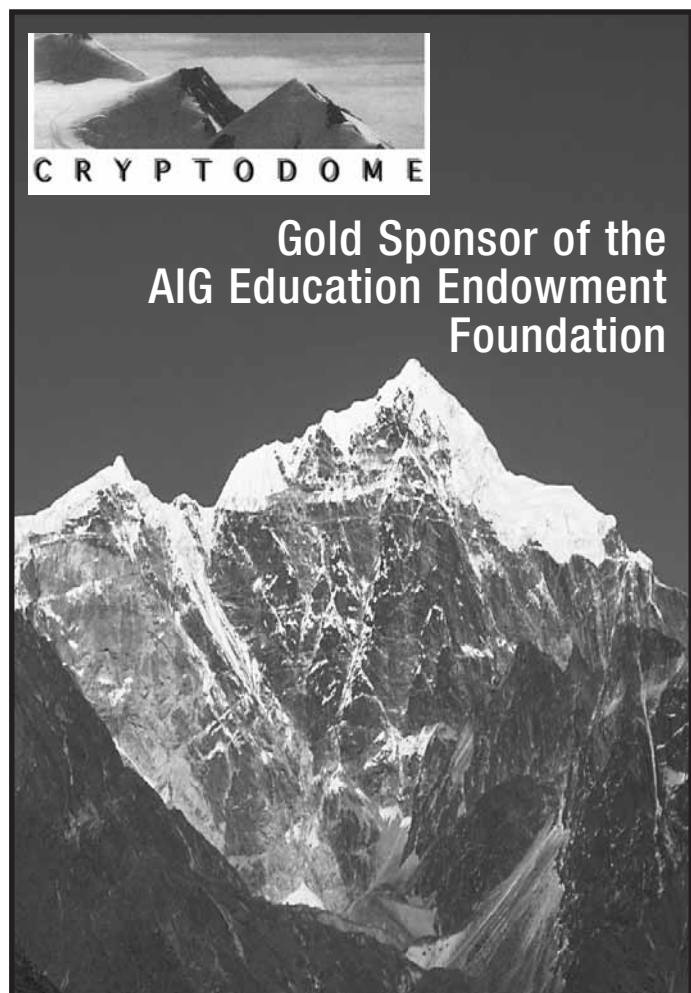
Zak Hunkin “Understanding metamorphics via seeing real life examples and seeing how the mine sites work. The best parts were climbing East Mt Barren, Climbing Wave Rock and touring the two mine sites.”

Josua Panggelo “The field trip has given hands on experience, allowing the application of theory learnt in class and apply it in real life. It also took me out of my comfort zone, a good experience. The highlights include both the Edna May and Spotted Quoll open pits and climbing East Mt Barren.”

Jessica Taylor-Berry “Definitely Wave Rock and seeing how it was formed i.e the onion skin weathering. The hike up the rock was good because it was good to see everyone supporting each other and spurring each other on. The experience has really cemented the theory that was learnt in class. It was also good to get to know all my class mates better.”


A field trip like this can not happen without the good will of teachers and parents who drive, help feed and watch over the students. An absolute huge thanks to the always there Mr Chris Broom and second time parent Mr Nev Clarkson. An extended thanks also goes to Nev whose company help support the trip by use of a car and some fuel expenses. Our thanks goes to Fuel Fix. These field trips have been financially supported and encouraged by the Australian Institute of Geoscientists (WA Branch) who also provide us with our work shirts and back packs and additional support is always there from ESWA (Earth Sciences Western Australia. Discounts were given to Kent Street from Thrifty Car Rental, Antiones Meats (Kooyong Road, Rivervale), Merriden and Wave Rock Caravan Parks. Thank you to these establishments.

In closing, a huge thank you goes to both **Evolution Mining** and **Western Areas** for affording us the time, intellectual property, encouragement as well as feeding us while we visited the Edna May Gold Mine and Flying Fox/Spotted Quoll Mine Sites respectively. A truly wonderful experience that supported numerous syllabus requirements. Thank you to Luke Cox (Evolution Mining) and Duncan Sutherland (Western Areas) for all the effort you and your team of professionals and contractors gave to the EES students of Kent Street. ▲▲



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Education Report

Kaylene Camuti

(Chair, AIG Education Committee)

The 2013 student bursary program is underway and this year's application form has been circulated to AIG student members and to universities; it is also available on the AIG web site. The closing dates for applications are the 27th June for honours and postgraduate students and the 1st August for third year students.

Bursary Sponsors and Donors

The AIG would like to acknowledge and thank sponsors of the bursary program, who are listed on this page of AIG News. We would also like to thank all the AIG members who have donated to the AIG Education Foundation. Since its inception in 2009 the Foundation has received around 100 donations from members totalling almost \$7,000. Some of those donors to the Education Foundation are listed below, but there are many more. We tried to contact all donors to ask permission to publicly acknowledge their generosity but if we didn't hear back from a donor then they are not included on the following list.

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Registered Professional Geoscientist Approvals & Applications

CANDIDATES APPROVED BY AIG COUNCIL IN MARCH 2013

Mr. Donald MacLean of Auckland, New Zealand, in Mineral Exploration and Mining

Mr. Amandus Bagayana of Southern River, WA, in Mining and Mineral Exploration

NEW CANDIDATES PUBLISHED FOR PEER REVIEW BY THE MEMBERS OF THE AIG

Mr. Grant Boxer of Perth, WA, is seeking registration in Mineral Exploration

Mr. Christopher Strachotta of Leederville, WA, is seeking registration in Hydrogeology

Mr. Otgonbayar Togtokhbayar of Wayville, South Australia, is seeking registration in Mineral Exploration

Mr. Roderick Arnold of Narellan, NSW, has requested registration in Mining, Mineral Exploration and Information Geoscience

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New Members and Upgrades at the March Council Meeting 2013

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We welcome all new members to the AIG.

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AIG NEWS

CONTRIBUTION DEADLINES

AIG News is published quarterly as per the following table.

Avoid disappointment by contacting the Editor at least several days beforehand to advise submission of items for the newsletter.

ISSUE DATE	CONTRIBUTION DEADLINE
February	January 31st
May	April 30th
August	July 31st
November	October 31st

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