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### What is happening with your Association??

**W**hen you joined GAA, you paid your dues (we hope) and now you must be wondering what has happened with the Association since, and whether you will be getting your money's worth. Well, I assure you, the Executive Committee is determined to make this happen. However, setting up a new association takes some time, a commodity which we all have to distribute amongst a number of things. This Second Newsletter is late. The editor was overseas, visiting places where writing a Newsletter was nearly impossible. Meanwhile the Executive Committee has been very busy behind the scenes. Our Treasurer has opened a bank account (no mean feat in Australia if you haven't got a tax file number yet). We have approached a large number of organisations to ask for corporate Membership, we are preparing a first regional meeting in Kalgoorlie (see this Newsletter), your President has been more out-of-the-office than in-the-office and is now brooding on an in-depth article for the next Newsletter (he and Brian Davis, as usual, have been pouring over the Constitution again, and again), your Vice-President has been asked to give a presentation to the Perth branch of the Statistical Association of Australia (to establish a firm contact with our statistics peers, something that can be of benefit to both organisations), Brian Davis has found the time to design a series of possible Certificates of Membership (Do you think this does not take up your spare time?? Just try it), and the other Committee members have been busy dreaming up a programme for the rest of the year. We have deliberately been moving slowly but progress, so far, has been steady and secure. In this second Newsletter, you will find an overview of what we are planning for you. To get this Newsletter out before the end of July, most of it has been compiled by me (so get on the phone to me if you don't like it) but there are important contributions from Brian Davis and Ivy Chen. Please let us have your contributions for the next Newsletter. Remember, this is *your* Newsletter!

*Louis Voortman, Consultant Geostatistician, Snowden Associates, Editor GAA Newsletter.*

### Reactions to the April 18 Inaugural Meeting

The Geostatistical Association of South Africa (GASA), as well as the complete(!) staff of the Ore Evaluation Department of Anglo American in Johannesburg, sent congratulatory faxes to GAA on April 18. In addition, faxes and e-mails were received by the Executive Committee from Danie Krige, André Journal, Margaret Armstrong, Peter Brooker and Peter Dowd. Needless to say that we were very pleasantly surprised by their moral support and their gesture was very much appreciated. A good start of the Association indeed. As a fitting punishment for their action, we wish to invite them all to give a presentation to GAA, next time they visit our area!!

Ian Glacken had also agreed to be our first speaker and he repeated his Wollongong paper "*Change of support and use of economic parameters for block selection*". His excellent presentation was well received and the Executive Committee wishes to thank him for being the first of what we hope will be a long series of practical and informal presentations.

GAA had invited a number of 'Distinguished Personages' within the geostatistical community in Australia. Although the distance to the "remotest capital in the world" was such that not many could attend in person, we received positive reactions from a large number of them and we know that they all were "present in spirit" on that day. Of course they also have a standing invitation to give us a presentation whenever they are in our area.

### **Affiliations**

When we set up the GAA organisational structure, we could make good use of the experiences obtained by bodies like GASA, AIG, AusIMM, and we could fall back on the personal experiences of the members of the Establishing Committee. We decided to start as an independent organisation. Recently, we have been approached by the Perth Branch of the AusIMM to meet and discuss the merits of, possibly, forging closer ties between our organisation and the Institute. Of course we are very willing to sit around a table at any time and discuss this issue, provided we find out what will be best for our members. This implies that you should come forward and give us your opinion on such matters. To assist in the discussion that we wish to have with the AusIMM, please let us have your feelings via e-mail or write to our post box address (PO Box 1719, West Perth WA 6872).

### **My own Inaugural Meeting**

The venue for the Inaugural Meeting in Perth, on Friday 18 April 1997, was ably organised by Ian Glacken and sponsored by WMC. I admit that I am rather unhappy to have missed the occasion. When the Meeting was in full swing in Perth, at around six in the afternoon, it was lunch time where I was sitting in Africa. Under a tree, in the shade, having my first drink of the day. No, not what you think! I had not had breakfast, in fact I had not had anything to eat or drink that day and was rather relieved to finally get some fluid and the chance to take my pill against the latest strains of malaria. With my thoughts I was, of course, at the other side of the globe, thinking of the QV1 Building in Perth. When I mentioned the "historic moment" to the people sitting next to me under the tree, they smiled. It was around 35 degrees in the shade, we had just visited a remote mine and metallurgical plant and were on the way back to the airstrip. Not bad, I thought, for a typical office-geostatistician. We geostatisticians in Australia are lucky, not only do we get involved in real problems at our complex mines, many of us are also working all over the world, getting exposure to a good share of practical problems. We can thus be confident that we will remain at the forefront of practical applications and developments. And GAA can be the right platform for discussing the possibilities, the merits and the limitations of the practical use of geostatistical methods. So, we can use the problems we encounter in our everyday working life, to define for example areas of statistics, computing, mine optimisation, spatial modelling, where further research is needed. You see, I did console myself on April 18.

### **Executive Committee and regional representations**

GAA's Executive Committee for the year 1997-1998 was accepted at the Inaugural Meeting and, for completeness sake, here are their names and e-mail addresses again:

<i>John Vann</i>	<i>(President)</i>	<i>geoval@ozemail.com</i>
<i>Louis Voortman</i>	<i>(Vice-President)</i>	<i>lvoortman@snowdenau.com</i>
<i>Julian Barnes</i>	<i>(Treasurer)</i>	<i>rsg_perth@rsg.com.au</i>
<i>Ian Glacken</i>	<i>(Secretary)</i>	<i>ian.glacken@wmc.com.au</i>
<i>Lyn Bloom</i>		<i>l.bloom@cowan.edu.au</i>
<i>Donna Kelly</i>		<i>dkelley@kalgold.com.au</i>
<i>Brian Davis</i>		<i>briand@avi.com.au</i>
<i>Roussos Dimitrakopoulos</i>		<i>roussos@minmet.uq.oz.au</i>
<i>John Henstridge</i>		<i>john@daa.com.au</i>

GAA is represented "in the regions" in Kalgoorlie by Donna Kelly, in Sydney by Daniel Guibal, Henry Sanguinetti and Jenette and Mike Binns, in Melbourne by John Cottle and Stuart Masters, in Townsville by Phil Agnew, in Wollongong by Ernest Baafi, in Brisbane by Roussos Dimitrakopoulos and in Tom Price by Jim Weekes. Please contact these people and set up your own local meeting!! If we can contribute, please do not hesitate to call any one of the Committee Members.

### **First Regional Meeting in Kalgoorlie**

Another historic moment is near. On Friday 25 July 1997, the first Regional Meeting of GAA will be held in Kalgoorlie. With the history of Western Australia's gold discoveries being so closely related to the illustrious Kalgoorlie area, it is rather fitting that our first regional meeting will indeed be held in this place. Another good reason, of course, is the local density of good pubs and the probability of finding sufficient local and potential new GAA members here. So, Louis Voortman and Michelle Franks have been invited to be the first victims of "talking and drinking" in Kalgoorlie. We will certainly do our very best on both accounts. The venue and the occasion are very kindly sponsored by KCGM for which GAA likes to extend its warmest thanks. Indeed, where would we be without such generous Company Members and sponsors at this stage!!

### **Company Membership**

Which brings me to the very important issue of fund raising, membership fees and company memberships. Our Treasurer, Julian Barnes, has been away overseas for a prolonged period but nevertheless has been able, thanks also to the very organised and able assistance of his secretary Mary Ann, to send out many letters to a long list of companies and organisations and invite them to join GAA as Company Members. In our next Newsletter, we hope to publish a long list of organisations that support us. At the moment the list is short but, as we have seen, consists of those very staunch supporters-of-the-first-hour who made the establishment of our society possible: Snowden Associates, Geoval, WMC, Data Analysis Australia, Great Central Mines and KCGM.

### **Use of the semivariogram model**

From the Tom Price area, Jim Weekes approached us with a question on the use of the semivariogram range of influence and the definition of the search parameters. As Jim rightly points out, there are different schools of thought on how the range of influence should be used for determining "how far a sample may be away" before it should no longer be "used in the interpolation process". This is definitely a practical subject that needs to be discussed by us. We therefore invite you to come forward with your views, for example by writing something for the next Newsletter or giving us a presentation on the issue. Please contact Louis Voortman.

### **Revision of JORC Code**

As reported in the 1<sup>st</sup> GAA Newsletter, the Joint Ore Reserves Committee of the AusIMM, the AIG and the Minerals Council of Australia has commenced a revision of the *Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves* (the 'JORC Code'). Obviously, this is of extreme importance to those involved in the field of mining geostatistics. Our President, who is a member of the JORC Committee, sent an official letter from GAA to the JORC Committee in May to establish formal contact and to let them know that we will soon be in a position to contribute. Here are two quotes from his letter which highlight the Executive Committee's feelings on this: *"The GAA has been established principally to provide a forum for professional users of geostatistical techniques in all fields (not just mining). However, it is clear so far that a majority of current and potential membership of the GAA will be mining professionals strongly interested in resource and reserve definition and classification issues. Because of this, the Executive Committee feels it is important that the GAA establish early communications with the JORC with a view to developing good working relationships"* and: *"We hope that the GAA can develop good communications with the JORC over the coming months and that we are soon in a position to make a positive contribution on behalf of the geostatistical community"*. This is your chance to contribute! GAA is organising a workshop and discussion on issues related to the JORC Code at the end of September and you are invited to send us your views on issues that should be on the agenda for this in-house discussion. Very important, therefore, is the next item on quality control for resources, which was submitted by Brian Davis.

### **Quality Control for Resources**

Most of us who work on resources/reserves are well aware of the common types of errors which consistently (or inconsistently) affect the status and confidence level assigned to a resource estimation. However, my concern is that these errors are not noticed, understood or explained to people outside the confines of the mining industry.

We must not lose sight of the following which are important to communicate to the public whenever resources are discussed:

- 1 Resources are only **estimates** of mineralisation quantity and grade and therefore no attempt should be made to suggest that they are precise calculations. Thus quoting to the nearest 10 tonnes or to the third decimal place for grades is incorrect and irresponsible.
- 2 Resources are **not** reserves ie. no suggestion of mineability is implied. A resource estimation refers to in situ mineralisation which satisfies certain geological and mineralisation continuity requirements within defined categories (eg. Measured, Indicated and Inferred Mineral Resources).
- 3 The foundation for any resource is an accurate, consistent and **high quality drill database**. No amount of modelling, manipulation or calculation will improve the quality of a resource if it has already a poor database foundation.
- 4 The foundation for any resource database is **high quality assays** which have been checked and compared with known standards, related to other laboratories, are internally consistent and show acceptable reliability and repeatability.
- 5 A pre-requisite for a high quality database is **accurately located sample points**. This normally requires surveyed drill hole collars for northing, easting, azimuth and elevation as well as downhole surveys to locate individual samples.
- 6 **Quality of interpretation** of geology and mineralisation is the greatest single measure which severely affects total resource tonnes and grade. Incorrect or inaccurate interpretation of ore zone geometry can lead to dramatic underestimation or overestimation of a resource.  
For example if a shallow dip is assumed when the true dip is steep, the location, width and grade of mineralisation will change. Generally this can increase tonnes by up to 30%. Tonnes can be reduced if the drill spacing is halved by infill drilling and the geometry of the mineralisation is more precisely known. This is due to replacing the previously interpreted straighter and smoother outlines by more irregular and more accurate outlines.
- 7 Any resource estimate is interpreted, modelled and calculated within a given **range of probability** or confidence. The scale against which these errors or “limits of variability” is often well known, but usually not stated.  
For example most geologists know that Fire Assay determinations are several percent higher than comparable Aqua Regia determinations (from several different data sets I have observed between 8% and 15% positive result of Fire Assay over Aqua Regia).  
If one resource has mixed assay determination types a bias will then be present. This bias is not usually mentioned in the final resource report.  
Likewise the lower detection limit for gold is quoted as 0.01 g/t which is equivalent to 1% of grade at 1 g/t but for heap leach or marginal deposits averaging 0.5 g/t this is equivalent to 2% of grade. Therefore either the detection limit should be stated or a mention made of the “variability factor” or similar range of confidence.

I trust the above gives some food for thought to all the geologists and geostatisticians reading this, and I would welcome any discussions or comments on this topic. I can be contacted easiest by e-mail or through the GAA.

Brian Davis, Senior Resource Geologist, GCM Ltd, email briand@awi.com.au.

### **Environmental and Geotechnical Applications**

GAA was established with the aim of being inclusive for people involved in all fields of application of geostatistics. In the 1<sup>st</sup> Newsletter, John Vann asked for environmental scientists or geotechnical engineers out there who would like to review the book by Rouhani et al., "Geostatistics for Environmental and Geotechnical Applications" (ASTM, 1996, 280pp, ISBN 0-8031-2414-7) for this newsletter. We have not had a response for such a review yet but GAA is organising a workshop on environmental geostatistics, and what GAA could be doing to assist this field, in November of this year. Again, this is your chance to contribute!! You are invited to send us your views on issues that should be on the agenda for this open discussion.

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## **THE INTERIM GAA PLEDGE**

(to be pronounced only in Greek chorus, with copious quantities  
of ethanol-based lubricants).

I, ..... (insert name if so inclined, no-one will be able to distinguish the slurred mumble anyway) do solemnly and sincerely promise in the name of the Holy Log-normal Curve of Matheron, Krige and DeWijs, to adhere to the following code of beliefs as laid out by my peers in this society:

- I. Walker Lake is the Truth, the whole Truth and nothing but the Truth
- II. Decluster, decluster, decluster
- III. Death to polygonal and inverse distance interpolations
- IV. SEMI-variogram, not variogram
- V. There is life in geostatistics, before and after conditional simulation
- VI. Stanford and Fontainebleau are as matter and anti-matter, and may meet only if  $\sqrt{-1}$  is rationalised
- VII. Normality is an artificial state of existence, created to avoid doing the hard mathematics  
(kindly provided by Ivy Chen, Snowden Associates, based on lots of practical experience)

## How to join GAA

If you haven't joined us yet, or know of any other persons that are interested in the Association, please do so conveniently by e-mailing us. There are four types of Membership:

- Ordinary Membership (full voting rights) annual contribution \$ 30.00
- Associate Membership (no voting rights) annual contribution \$ 15.00
- Student Membership (no voting rights) annual contribution \$ 5.00
- Company Membership (by invitation of the Executive Committee)

Membership forms may be requested from our secretary, Ian Glacken:

GAA Secretary, PO Box 1719, West Perth WA 6872

email: [ian.glacken@wmc.com.au](mailto:ian.glacken@wmc.com.au) or [gaa@daa.com.au](mailto:gaa@daa.com.au)

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## CALENDAR OF EVENTS PLANNED BY GAA

- Tuesday July 1, 1997 "Why we need statisticians", Louis Voortman  
Presentation to Statistical Association of Australia, Perth Branch,  
UWA, Department of Mathematics  
(at the invitation of the Statistical Association of Australia)
- Friday July 25, 1997 **First Regional GAA Meeting, Kalgoorlie,**  
**Venue: Railway Hotel, John Forrest Function Room**  
**Time: 5.30 to 7.00pm**  
**Sponsor: KCGM, ECM**  
**Speakers: Michelle Franks and Louis Voortman**  
**Subject: Sampling theory, Case Study "How the mill can**  
**drive your grade control", background information**  
**on GAA (non-GAA members also welcome!!)**
- end-August 1997 workshop and open discussion to gauge the issues which GAA  
members wish to focus on during the next year  
(venue and date to be decided)
- end- ~~September~~ 1997 workshop and open discussion on issues related to the JORC Code
- middle November 1997 Annual Social Meeting: informal get-together, venue and details  
to be decided.
- end-November 1997 Environmental and Geotechnical Applications  
(venue and date to be decided).
- end-January 1998 Geostatistical presentation, venue and details to be decided.