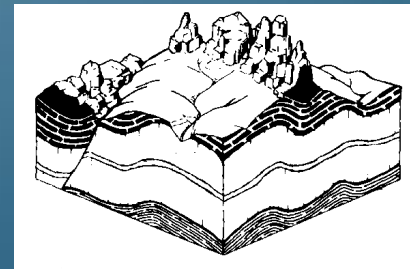


The detailed geological field analysis as key tool for the Resources/Reserves evaluation according to the JORC Code 2012 standard: case studies from China and Malaysia

Sergio Matteoli, Geologist  
(MMSA & EFG member)

GEOFIELD srl, San Miniato, Italy





In the mining sector the detailed evaluation of the resources and reserves is the key for a correct feasibility study of a project



## Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves

### ~ The JORC Code ~ 2004 Edition

*Appended to this document, at pages 21-31, are extracts relevant to the JORC Code from four Australian Securities Exchange Companies Updates: 03/08, 11/07, 03/07, 05/04. These Updates, issued subsequent to publication of the Code, are important guides in the clarification and interpretation of the Code and should be read in conjunction with it.*

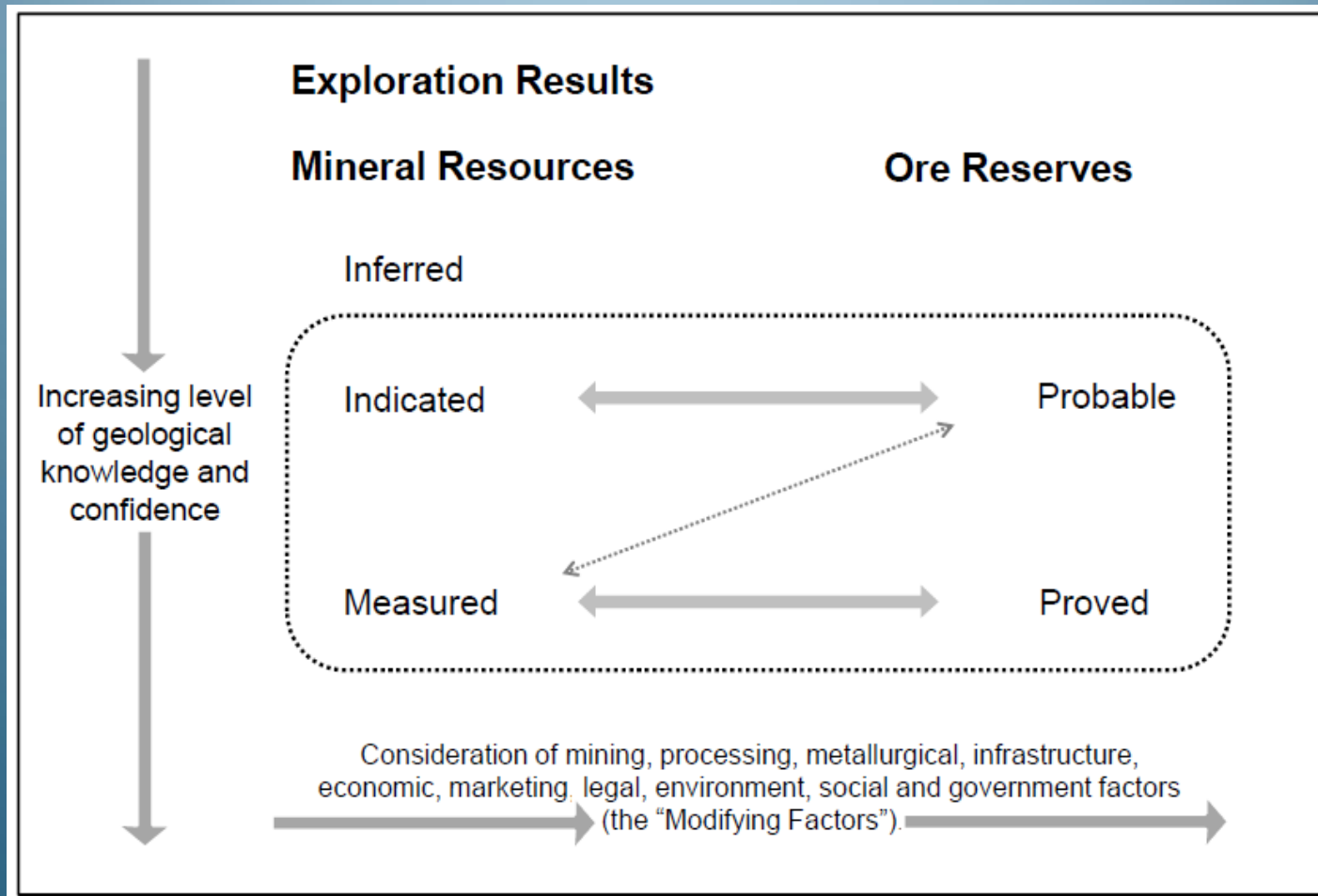
**AusImm**  
AUSTRALASIAN INSTITUTE OF MINING & METALLURGY



Effective December 2004

Prepared by:  
The Joint Ore Reserves Committee of The Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia (JORC)

The JORC Code was created to homogenize the evaluation work relating to mining and therefore provide a standardized tool for those who must evaluate it. The code then provides guidance on how it should unfold the work of those who must make a project subject to verification of people and institutions absolutely fasts of geology, identifying the standard yardsticks of deposits and entering the subdivision classes of Resources and Reserves



The transition from resource to reserve is therefore regulated by laws equal for all who want to make a project subject to banks or any other financial institution

Obviously in the world are currently utilised many different evaluation methods, but the most requested by the international financial institutions are the Jorc Code and/or the Valmin; here below the conversion between PRC Reserves/Resources Evaluation System and Jorc

**Table 1: Rule of Thumb categories of the New Chinese Classification System compared with the Old System and JORC**

Old Classification		A & B		C		D	E & F	
New Classification								
“E” Economic Evaluation (100)	Designed mining loss accounted	Recoverable Reserve (111)	Probable Recoverable Reserve (121)		Probable Recoverable Reserve (122)			
	Designed mining loss not accounted (b)	Basic Reserve (111 b)	Basic Reserve (121 b)		Basic Reserve (122 b)			
Marginal Economic (2M00)		Basic Reserve (2M11)	Basic Reserve (2M21)		Resource (2M22)			
Sub-Economic (2S00)		Resource (2S11)	Resource (2S11)		Resource (2S22)			
Intrinsically Economic (300)		-	-	Resource (331)		Resource (332)	Resource (333)	Resource (334)
“F” Feasibility Evaluation		Feasibility (101)	Pre-Feasibility (020)	Scoping (030)	Pre-Feasibility (020)	Scoping (030)	Scoping (030)	Scoping (030)
“G” Geological Evaluation		Measured (001)			Indicated (002)		Inferred (003)	Predicted (004)
JORC							Unclassified or Exploration Potential	
					Inferred			
			Probable Reserve OR Indicated Resource					
		Proved/Probable Reserve OR Measured Resource						

While here below the conversion relationship between Jorc and the Russian Resources/Reserves Evaluation System

System Russe	Code JORC
A,B	Measured Resources Proved Reserves
C1	Indicated Resources Proved/Probable Reserves
C2	Indicated/Inferred Resources Probable reserves
P1	Inferred Resources
P2	Recognizing of a mineral resources
P3	Lack of equivalence



The JORC Code, as well as standardize the methods of investigation, also determines who can claim the title of Competent Person that allows to be able to sign a work of this level.

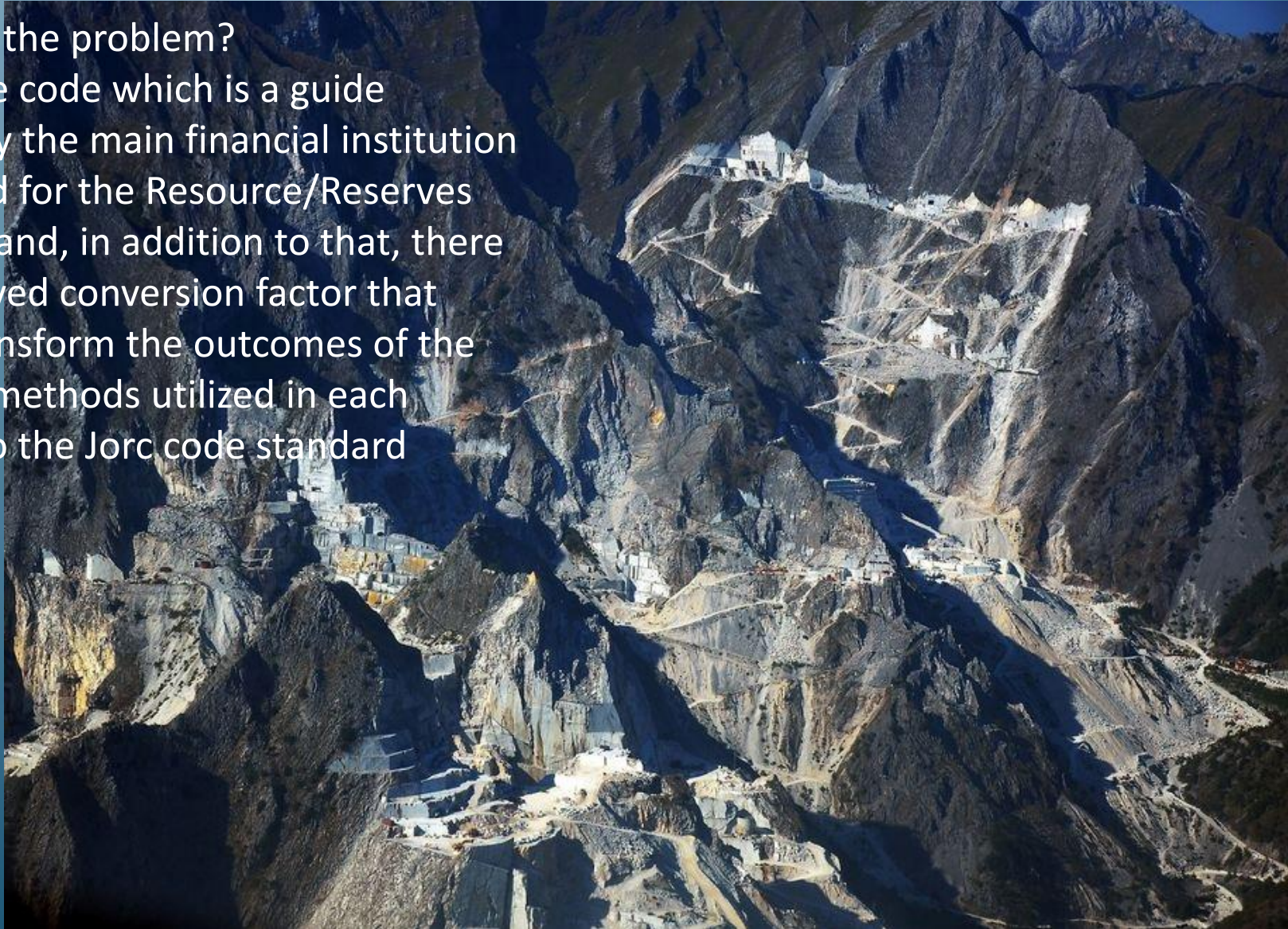
10. A 'Competent Person' is a person who is a Member or Fellow of The Australasian Institute of Mining and Metallurgy, or of the Australian Institute of Geoscientists, or of a 'Recognised Overseas Professional Organisation' ('ROPO') included in a list promulgated from time to time.

A 'Competent Person' must have a minimum of five years experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which that person is undertaking.

If the Competent Person is preparing a report on Exploration Results, the relevant experience must be in exploration. If the Competent Person is estimating, or supervising the estimation of Mineral Resources, the relevant experience must be in the estimation, assessment and evaluation of Mineral Resources. If the Competent Person is estimating, or supervising the estimation of Ore Reserves, the relevant experience must be in the estimation, assessment, evaluation and economic extraction of Ore Reserves.



So, where's the problem?  
There is one code which is a guide  
approved by the main financial institution  
of the world for the Resource/Reserves  
calculation and, in addition to that, there  
is an approved conversion factor that  
allow to transform the outcomes of the  
evaluation methods utilized in each  
country into the Jorc code standard







The first objection is a “political” issue.  
It is sufficient to have a look of “who” could be Competent  
Person according to the Jorc .

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Professional Organisation	Minimum membership class required
Institute of Materials, Minerals and Mining	Member (MIMMM) or Fellow (FIMMM)
Geological Society of London	Chartered Geologist (CGeol), Chartered Scientist (CSci) or European Geologist
Institute of Geologists of Ireland	Professional Geologist (PGeo)
European Federation of Geologists	European Geologist (EurGeol)
Mining and Metallurgical Society of America	Qualified Professional (QP)
American Institute of Professional Geologists	Certified Professional Geologist (CPG)
Society for Mining, Metallurgy & Exploration	SME Registered Member
Engineering Council of South Africa	Professional Engineer (Pr Eng)
South African Council for Natural Scientific Professions	Professional Natural Scientist (Pr.Sci.Nat.)
Geological Society of South Africa	Member or Fellow
The Southern African Institute of Mining and Metallurgy	Member or Fellow
South African Council for Professional and Technical Surveyors	Mine Surveyors and Professional Mine Surveyors
Professional Engineers Ontario	P.Eng.
Association of Professional Engineers and Geoscientists of British Columbia	P.Geo, or P.Eng,
Association of Professional Engineers and Geoscientists of Manitoba	P.Geo, or P.Eng,
Association of Professional Geoscientists of Ontario	P.Geo., P.Geo.(limited), P.Geo.(Temporary)
Association of Professional Engineers and Geoscientists of Newfoundland & Labrador	P.Eng., P.Geo.
Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories	P.Eng, P.Geo (or P.Geol., P.Geoph.)
Association of Professional Geoscientists of Nova Scotia	P.Geo.
Association of Professional Engineers and Geoscientists of New Brunswick	P.Geo., P.Eng.
Association of Professional Engineers, Geologists and Geophysicists of Alberta.	P.Eng., P.Geo., P.Geoph.
Association of Professional Engineers and Geoscientists of Saskatchewan	P.Geo. or P.Eng.
Ordre des Geologues du Québec	P.Geo., géo.
Ordre des Ingénieurs du Québec	P. Eng. or ing.
Comisión Calificadora de Competencias en Recursos y Reservas Mineras (Chilean Mining Commission or Comisión Minera)	Registered Member
Russian Society of Subsoil Use Experts (OERN)	Expert

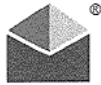




The second issue, which is the main, is that the Jorc code has been designed for the evaluation of metallic mineral ores and it cannot be applied to industrial minerals or dimension stone deposits in the same way.

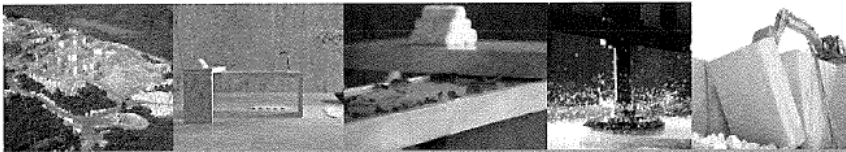
The following two cases studies will demonstrate the meaning of the above objections.





**ARTGO MINING HOLDINGS LIMITED**  
**雅高礦業控股有限公司**  
(Incorporated in the Cayman Islands with limited liability)  
Stock Code: 3313

## GLOBAL OFFERING



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**BofA Merrill Lynch**

Joint Bookrunners and Joint Lead Managers

**BofA Merrill Lynch**



ARTGO Mining is a big dimension stone project developed in China. The project has been successfully listed in the Hong Kong Stock Exchange three years ago. The CPR was issued by Behre Dolbear Asia in association with Geofield srl



CPR was carried out taking into consideration the information provided by the existing quarry







Field investigation also included geophysical prospection, trenching, sampling, chemical and physical-mechanical tests and the drilling of 31 boreholes along 12 trenches crossing the entire deposit.

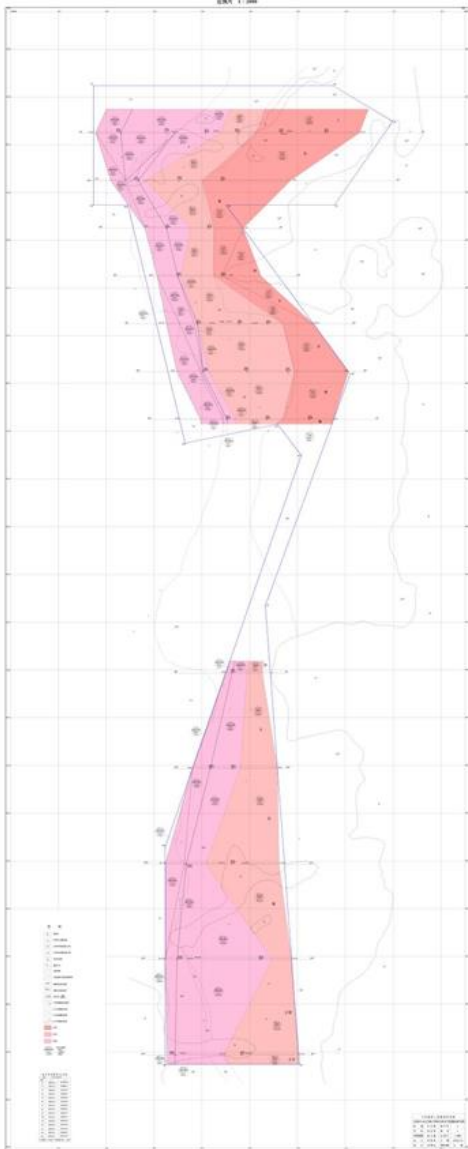


# STONECHANGE 2016 - STONE SECTOR and CHANGING TRENDS

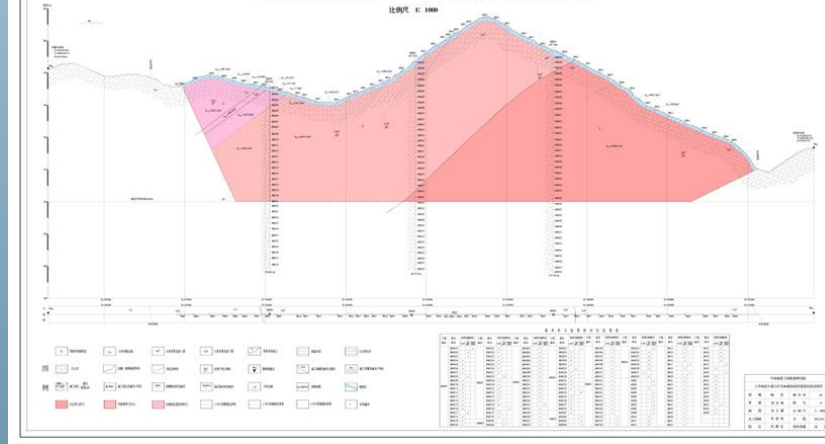
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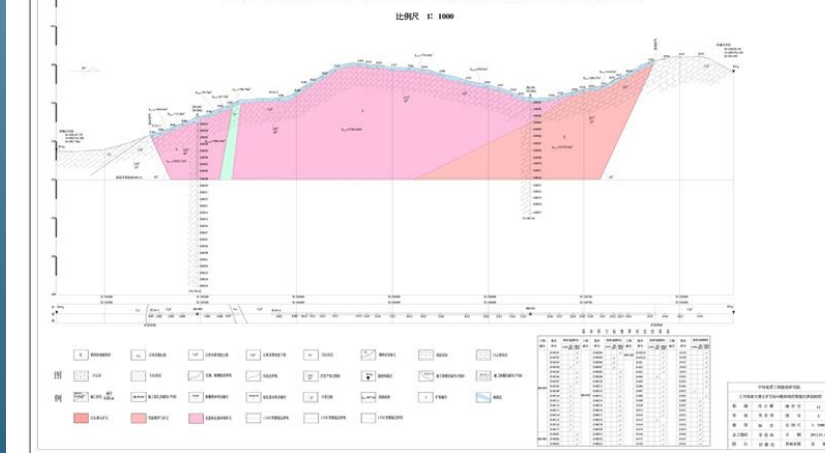
江西省永丰县石马镇上升饰面大理石矿区资源量估算平面图



上升饰面大理石矿区K6勘探线资源量估算剖面图



上升饰面大理石矿区K14勘探线资源量估算剖面图



Thanking to the outcomes of the field survey combined with the results of the drilling campaign the perfect reconstruction of the trend of the various marble levels, divided on the basis of theirs chromatic characteristics, was possible.

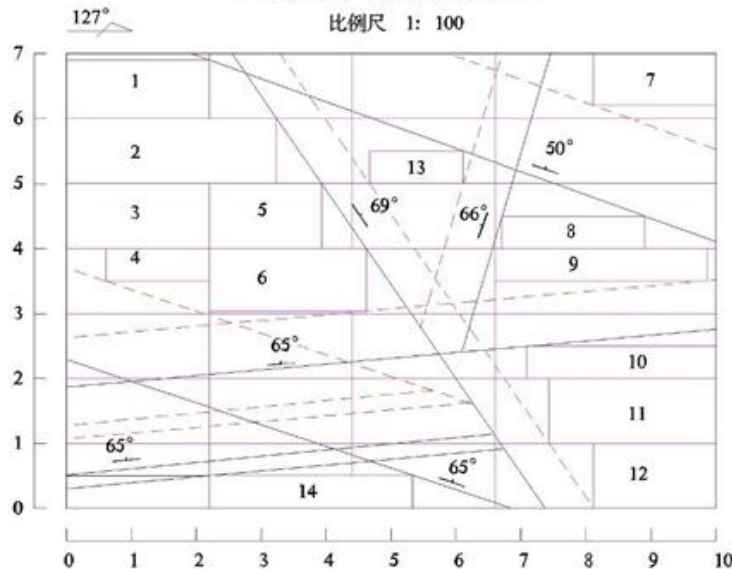
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BT6荒料率统计叠合图

比例尺 1: 100



The geo-mechanical analysis of the quarry fronts, the analysis of the cores and the graphic rate allow to evaluate a realistic Recovery Rate.



The CPR carried out on the Artgo Mining project help it to be successfully listed in the Hong Kong Stock Exchange, but nobody analyzed the most important parameter related to a dimension stone deposit just because not included in the list of the JORC TABLE 1: checklist of assessment and reporting criteria

I'm talking about the "fashion"







**GCCP Resources Limited**  
(Company Registration Number: 0-20205)  
(Incorporated in the Cayman Islands on 1 November 2013)

**OFFER DOCUMENT DATED 20 APRIL 2015**  
(Registered by the Singapore Exchange Securities Trading Limited (the "SGX-ST") acting as agent on behalf of the Monetary Authority of Singapore (the "Authority") on 20 April 2015)

This offer is made in or accompanied by an Offer Document (the "Offer Document") that has been registered by the SGX-ST acting as agent on behalf of the Authority on 20 April 2015. The registration of the Offer Document by the SGX-ST, acting as agent on behalf of the Authority, does not imply that the Securities and Futures Act (Chapter 389) of Singapore, or any other legal or regulatory requirements, or requirements under the SGX-ST's listing rules, have been complied with.

This document is important. If you are in any doubt as to the actions you should take, you should consult your legal, financial, tax or other professional adviser(s).

PrimePinnacle Corporate Finance Pte. Ltd. (the "Sponsor") has made an application to the SGX-ST for permission to deal in, and for quotation of, all the ordinary shares (the "Shares") in the capital of the Company already issued and the new Shares which are the subject of this Placement (the "Placement Shares"), the Option Shares (as defined herein) and the Award Shares (as defined herein) on Catalist. The Sponsor has submitted this Offer Document to the SGX-ST. Acceptance of applications will be conditional upon, inter alia, issue of the Placement Shares and permission being granted by the SGX-ST for the listing and quotation of all our existing issued Shares, the Placement Shares, the Option Shares and the Award Shares on Catalist. Monies paid in respect of any application accepted will be returned if the admission and listing does not proceed. The dealings and quotation of the Shares, Placement Shares, Option Shares and Award Shares will be in Singapore dollars.

Companies listed on Catalist may carry higher investment risk when compared with larger or more established companies listed on the SGX-ST Main Board. In particular, companies may list on Catalist without a track record of profitability and there is no assurance that there will be a liquid market in the shares or units of shares traded on Catalist. You should be aware of the risks of investing in such companies and should make the decision to invest only after careful consideration and, if appropriate, consultation with your professional adviser(s).

Neither the Authority nor the SGX-ST has examined or approved the contents of this Offer Document. Neither the Authority nor the SGX-ST assumes any responsibility for the contents of this Offer Document, including the correctness of any of the statements or opinions made or reports contained in this Offer Document. The SGX-ST does not normally review the application for admission but relies on the Sponsor confirming that the Company is suitable to be listed and complies with the Catalist Rules (as defined herein). Neither the Authority nor the SGX-ST has in any way considered the merits of the Shares or units of Shares being offered for investment.

**Possestors  
ONE OF THE BIGGEST  
GCC-GRADE CALCIUM  
CARBONATE RESERVES  
AND RESOURCES  
in Malaysia**

**Placement of 122,000,000 Placement Shares  
at \$0.23 for each Placement Share,  
payable in full on application**

**INVESTING IN OUR SHARES INVOLVES RISKS WHICH ARE DESCRIBED IN THE SECTION ENTITLED "RISK FACTORS" OF THIS OFFER DOCUMENT. IN PARTICULAR YOU SHOULD NOTE THAT BASED ON THE PLANNED PRODUCTION SCHEDULE FOR OUR QUARRIES OPERATIONS, IT IS EXPECTED THAT WHILE WE HAVE COMMENCED PRODUCTION IN THE SECOND HALF OF 2014, WE MAY NOT PROGRESS TO THE NEXT STAGE OF DEVELOPMENT, PLEASE REFER TO THE FOLLOWING RISKS FURTHER DESCRIBED IN THIS OFFER DOCUMENT: (I) WE HAVE A LIMITED OPERATING HISTORY AND TRACK RECORD OF CARRYING OUT OUR BUSINESS ACTIVITIES. OUR PAST FINANCIAL PERFORMANCE IS A MAJOR TRAILER OF BOTH OURS AND CANNOT BE A MAJOR INDICATION OF OUR FUTURE PERFORMANCE IN THE BUSINESS OF THE QUARRIES AND PROCESSING OF LIMESTONE. (II) WE HAVE YET TO ESTABLISH A STRONG SALES RECORD. (III) WE MAY NOT BE ABLE TO DISCOVER NEW LIMESTONE RESERVES TO MAINTAIN A COMMERCIALY VIABLE QUARRIES OPERATION. IN OUR BUSINESS, REVENUES AND PROFITS ARE AFFECTED BY THE VOLATILITY OF PRICES FOR LIMESTONE AND THE GLOBAL ECONOMY AND (IV) WE MAY NOT BE ABLE TO OBTAIN, MAINTAIN OR RENEW GOVERNMENTAL PERMITS NECESSARY FOR EXPLORATION, QUARRYING OR PRODUCTION AT OUR LIMESTONE QUARRIES.**

After the expiration of 36 (thirty six) months from the date of registration of this Offer Document, no person shall make an offer of securities, or allow, issue or sell any securities, on the basis of this Offer Document, and no officer or employee of the Company or any person of the Company who has been or will be an officer or employee of the Company shall make an offer of securities, or allow, issue or sell any securities, on the basis of this Offer Document.

Issue Manager, Sponsor and Placement Agent

**PRIME<sup>®</sup>**  
Pinnacle

PRIMEPinnacle CORPORATE FINANCE PTE. LTD.  
(Company Registration No: 202072920)  
(Incorporated in the Republic of Singapore)

GCCP resources Ltd Litmus calcium carbonate project is a big industrial mineral project developed in Perak, Malaysia.

The project has been successfully listed in the Singapore Stock Exchange on last 2015.

The IQPR was issued by Greater China Mineral & Energy Consultant Ltd in association with Geofield srl

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One quarry, the primary crushing plant and the first micronization plant for GCC were already operating during the field survey for the IQPR issuing



# STONECHANGE 2016 - STONE SECTOR and CHANGING TRENDS

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Morphology of the area is very complicated and not allow to carry out a detailed geo mining field survey and also drilling campaign cannot be carried out according to a regular grid

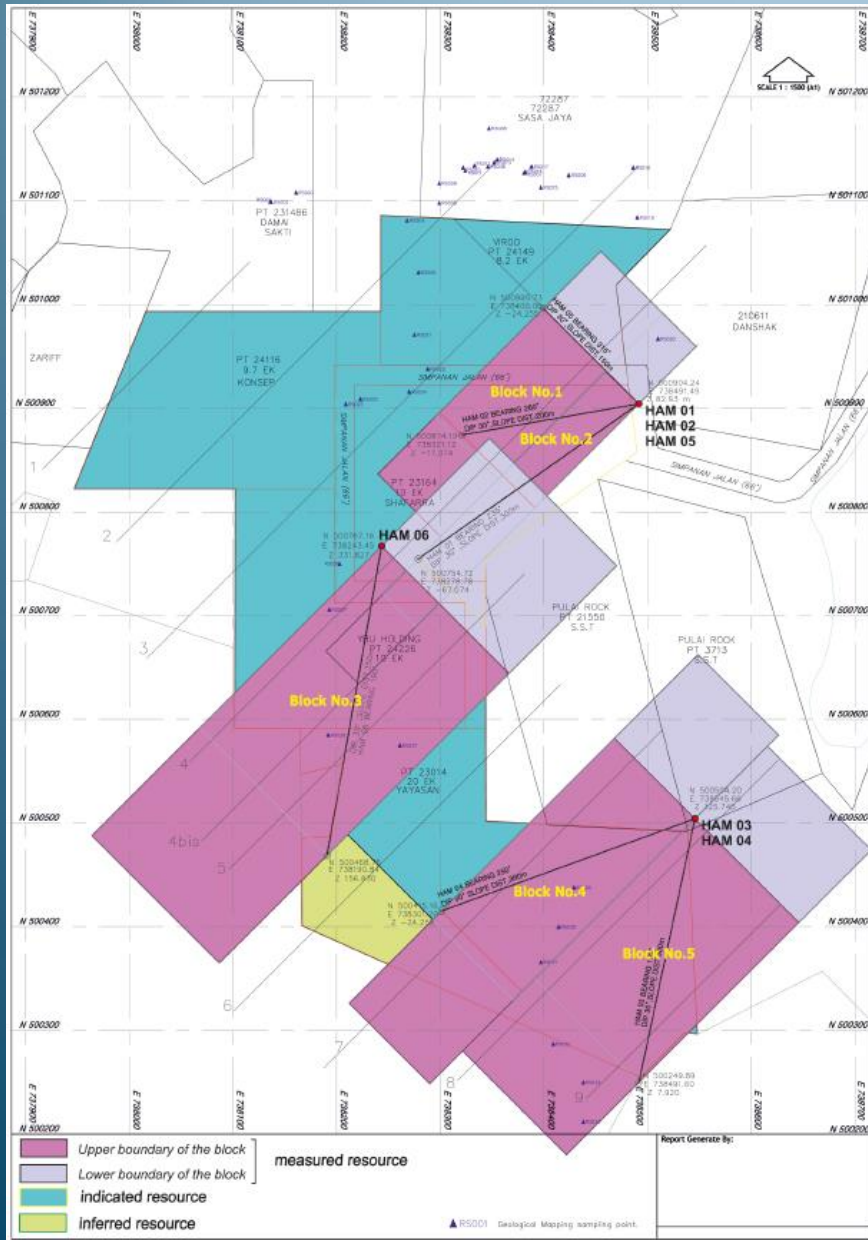




Boreholes were drilled at the feet of the vertical wall and some other on the top of the main hill bringing the equipment on the site by a rented helicopter



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Thanking to the outcomes of the field survey combined with the results of the drilling campaign and the superficial sampling, the perfect reconstruction of the trend of the various marble levels, was possible.

The knowledge of the deposit structural structure gathered by the geo-mining field survey combined with the results of the chemical analysis of the sample collected by the drilling campaign as well as by the superficial sampling allow to determine a realistic resources/reserves statement.



The two cases studies show that even if the CPR/IQPR were carried out in a very different ways and not responding to all what requested by the JORC TABLE 1: checklist of assessment and reporting criteria.

Anyhow both projects were listed successfully in two different Stock Exchanges





In conclusion we can say that, as demonstrated by the two exposed case studies, the JORC Code needs to be slightly modified to allow a proper Resources/Reserves evaluation in the case of dimension stone or industrial minerals deposits’.

The Competent Person charged with the field assessment should have a deep experience in order to decide what types of survey should be conducted to ensure the acquisition of the data necessary for a proper evaluation of the deposit.





# STONECHANGE 2016 - STONE SECTOR and CHANGING TRENDS

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*thank you for your attention*