



# Ozmine 2011

## Revised Joint Ore Reserves Committee (JORC) Code Public Reporting Standard

**Presented by Gerry Fahey**

Director CSA Global Pty Ltd

JORC Member

Board Member Australian Institute of Geoscientists

Western Australia Branch Chairman AIG



# DISCLAIMER

**Whilst Gerry Fahey is a member of the Joint Ore Reserves Committee (JORC), the views expressed herein are personal and should not be taken as necessarily representing the position of the Australasian Joint Ore Reserves Committee**

# Ozmine 2011

HISTORY AND WHY HAVE A CODE

WHAT IS THE JORC CODE

PRINCIPLES OF THE CODE

WHAT IS NEW IN THE JORC CODE

OTHER CODES WORLDWIDE



# History and Background



A—WOOD. B—BRICKS. C—PANS. D—FURNACE. E—CRUCIBLE. F—PIPE.  
G—DIPPING-POT.

- 1556 - “De Re Metallica” Georgius Agricola

*“A careful owner, before buying shares, should visit the mine and carefully examine the nature of the vein, as it is very important that he be on his guard, to avoid being the victim of dishonest sellers of shares seeking to defraud him”*



# Key Developments Prior to Formation of JORC



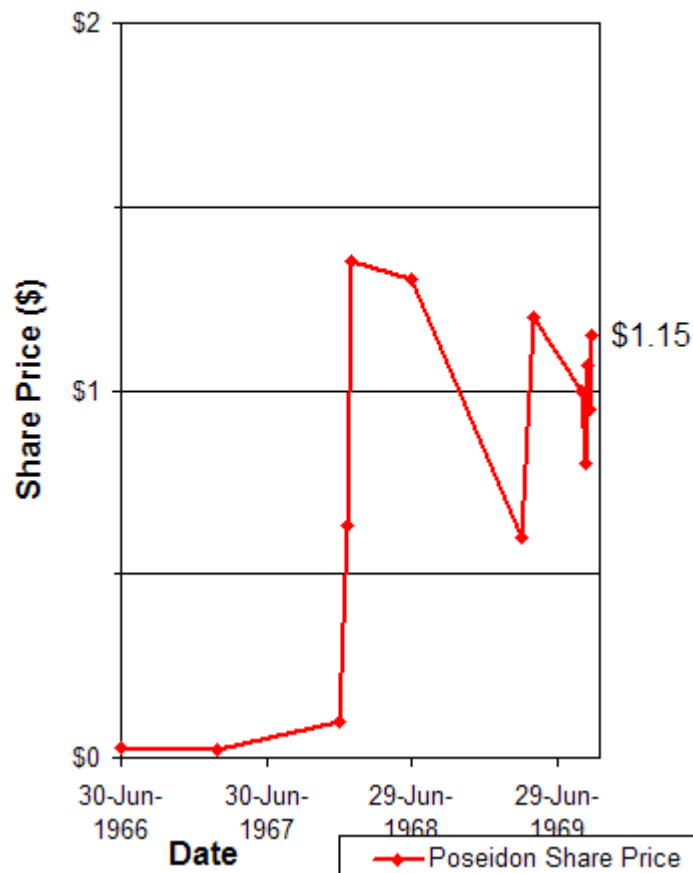
- 1909 - Herbert Hoover's classification system
- 1943 - USBM classification system
- 1953 - AusIMM committee on classification
- 1956 - SEG classification system
- Late 1960's - nickel boom, Australia, with some unacceptable reporting practices "The Poseidon Boom & Bust"



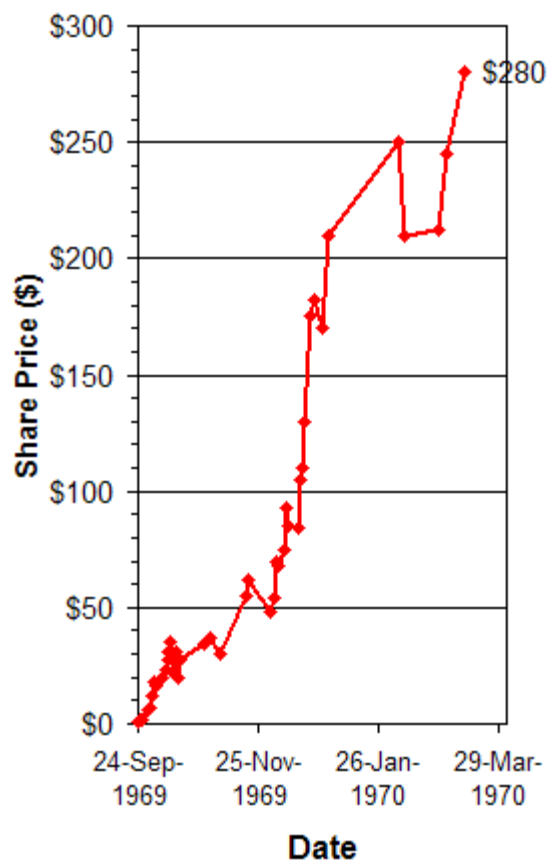


# Poseidon Boom & Bust – Share Price

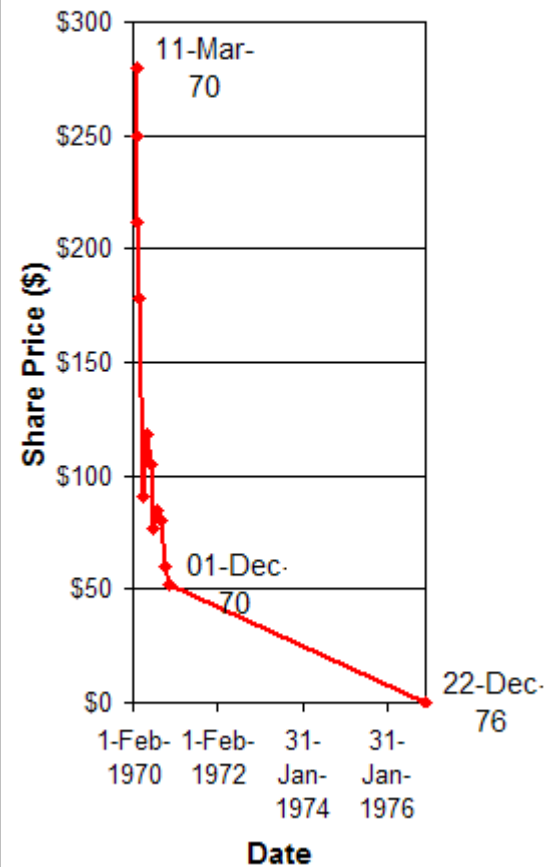
**Poseidon Share Price - June 1966 to 24 Sept 1969**



**Poseidon Share Price - 24 Sept 1969 to 11 March 1970**



**11 March 1970 to 22 Dec 1976**



# Poseidon Bust - Aftermath

Trevor Sykes in *The Money Miners* says:

"One disturbing feature of the boom-time geological statements is their misleading air of precision. Poseidon's statement of 3.56 percent nickel looked like a fine calculation to one-hundredth of one percent. *In fact, Poseidon had no basis on which to make such a calculation at the time and the actual assay of the core turned out to be substantially lower, although still of ore grade.*"



# Following the Poseidon boom and bust .....

- Request from Melbourne Stock Exchange and Australian Government to the Minerals Council of Australia (MCA) to develop a mechanism to resolve the reporting issues
- MCA responded and AusIMM joined promptly to form;
  - The **Joint** Ore Reserves Committee (JORC)
  - AIG joined in 1989





# Ozmine 2011

WHAT IS THE JORC CODE



# The 2004 JORC Code

*READ THE  
CODE!!!!*

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

~ **The JORC Code** ~  
2004 Edition

**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)



JORC Code is about reporting of exploration results, resources & reserves



- About reporting — not how to estimate resources & reserves



- Reporting by the company to the ASX and the media
- Company report must be signed-off by a “competent person”

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

~ **The JORC Code** ~  
2004 Edition

Must be a member of the AusIMM, AIG or a ROPO

# The JORC Code – What it Does

- Sets minimum standards for public reporting (in Australia & New Zealand) of Exploration Results, Mineral Resources and Ore Reserves.
- Provides a mandatory system for classification of tonnage/grade estimates according to geological confidence and technical/economic considerations.
- Requires Public Reports to be based on work undertaken by a Competent Person; describes the qualifications and type of experience required to be a Competent Person.
- Provides extensive guidelines on the criteria to be considered when preparing reports on Exploration Results, Mineral Resources and Ore Reserves.



## The JORC Code Does Not .....

- Regulate the procedures used by Competent Persons to estimate and classify Mineral Resources and Ore Reserves:
  - **It is a Code for reporting.**
- Regulate companies' internal classification or reporting systems
- JORC does not deal with breaches of the Code:
  - By companies (ASX)
  - By individuals. These are dealt with under code of ethics of AIG and AusIMM or the relevant ROPO  
*Recognised Overseas Professional Organisation.*



# Relationship With Regulatory Authorities

- Australasian Code for Reporting of Mineral Resources and Ore Reserves (the JORC Code) is **Appendix 5A** of the ASX Listing Rules
- This makes JORC enforceable **as** Law by the Australian Securities and Investments Commission (ASIC)
- An ASX representative on JORC
- Meetings as required to discuss issues and new updates i.e. JORC 2011 edition
- Financial contribution to internationalisation of the JORC Code
- JORC also meets as required with ASIC.



# JORC Stakeholders



**Resource &  
Reserve  
Estimators**

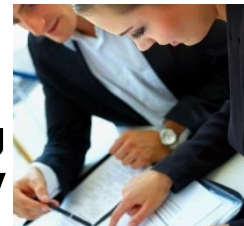


**Mining  
Company  
Management**

**JORC CODE &  
Capital Market Regulations**



**Investment  
Community**



**Financing  
Community**

Mineral Resource / Ore Reserve Estimation  
Meeting JORC Requirements

# Figure 1

## EXPLORATION RESULTS

### *MINERAL RESOURCES*

### *ORE RESERVES*

**Inferred**

**Indicated**

**Probable**

**Measured**

**Proved**

Consideration of mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors  
(the "modifying factors").

Increasing level of geological knowledge and confidence.





# Statistics of estimating contents of a room by drilling

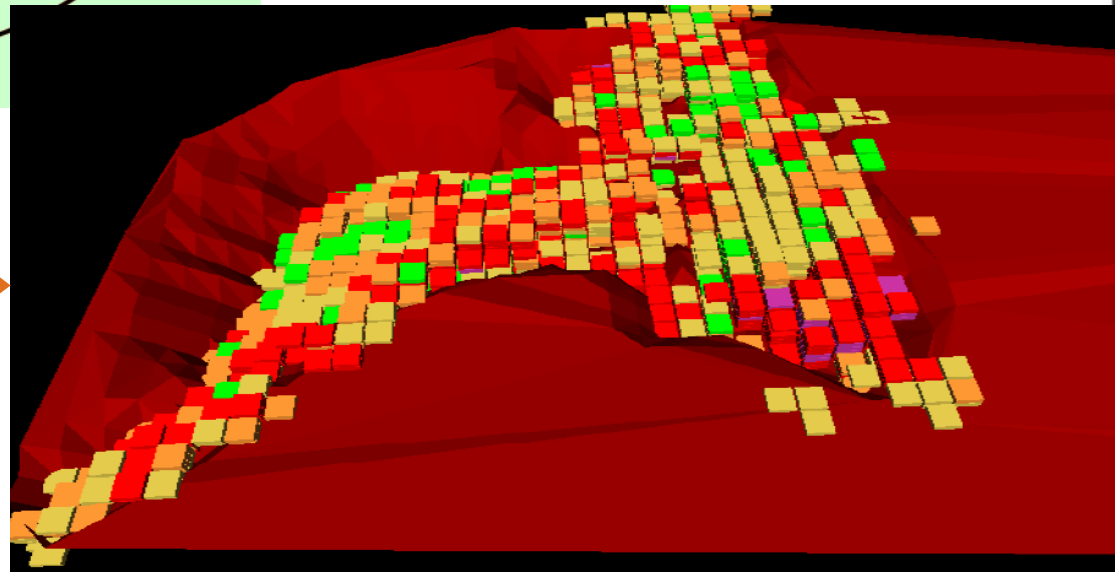
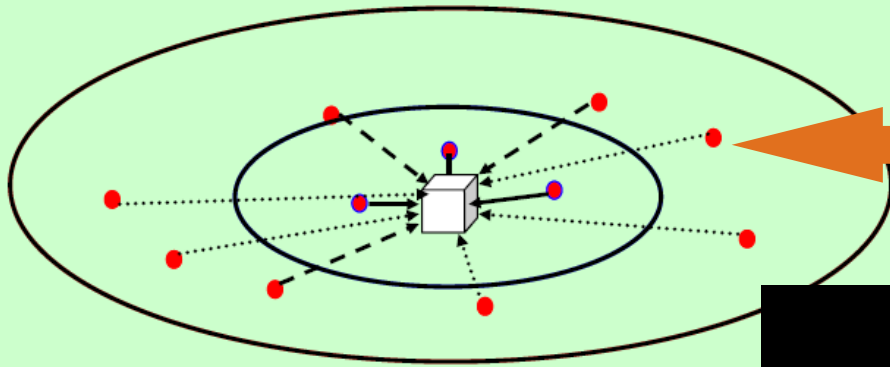




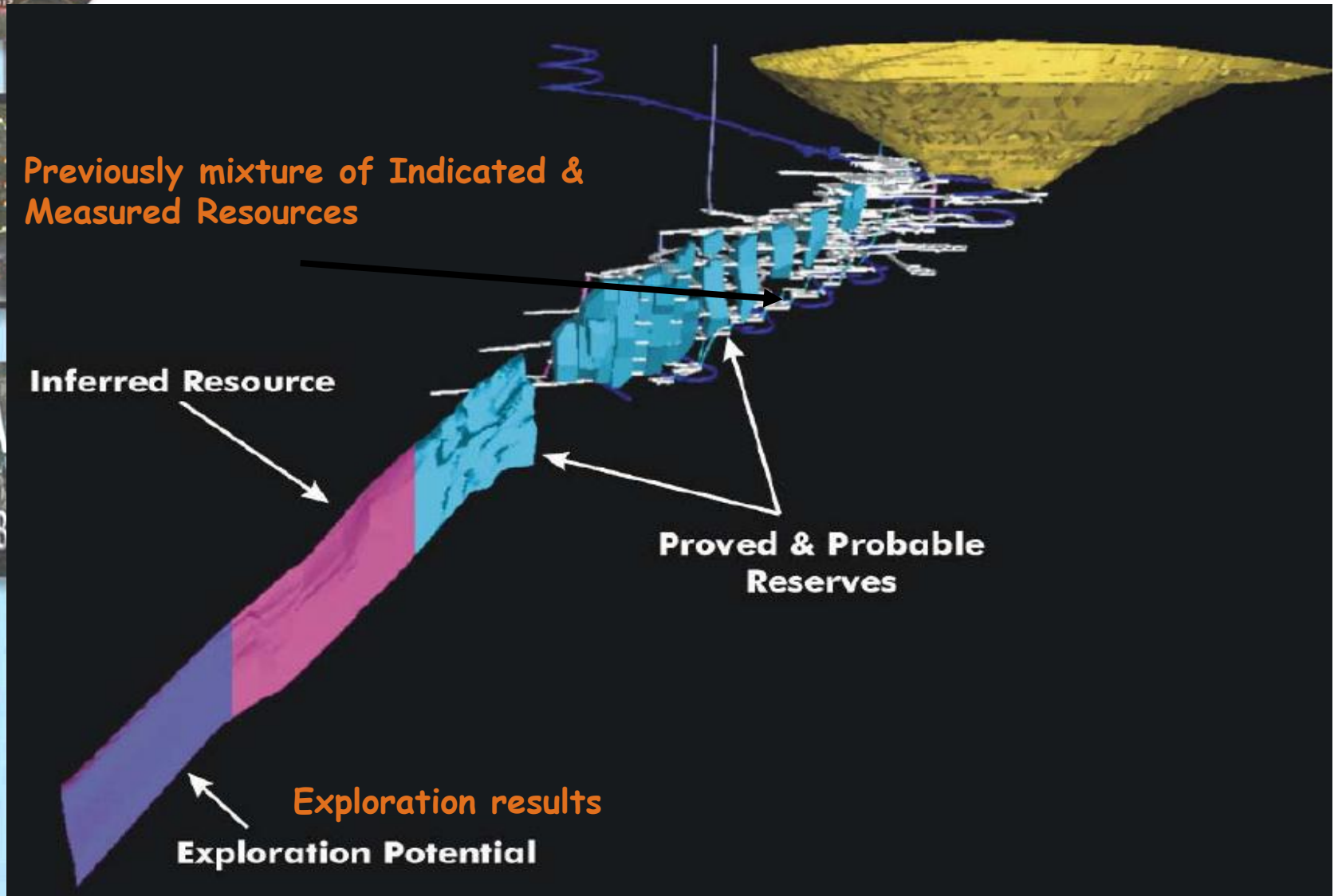
# Geostatistics of resource estimates

Block modelling

(● = drillhole)



# Relationship between Exploration Results, Mineral Resources & Ore Reserves



# Table 1

## Checklist of Assessment and Reporting Criteria

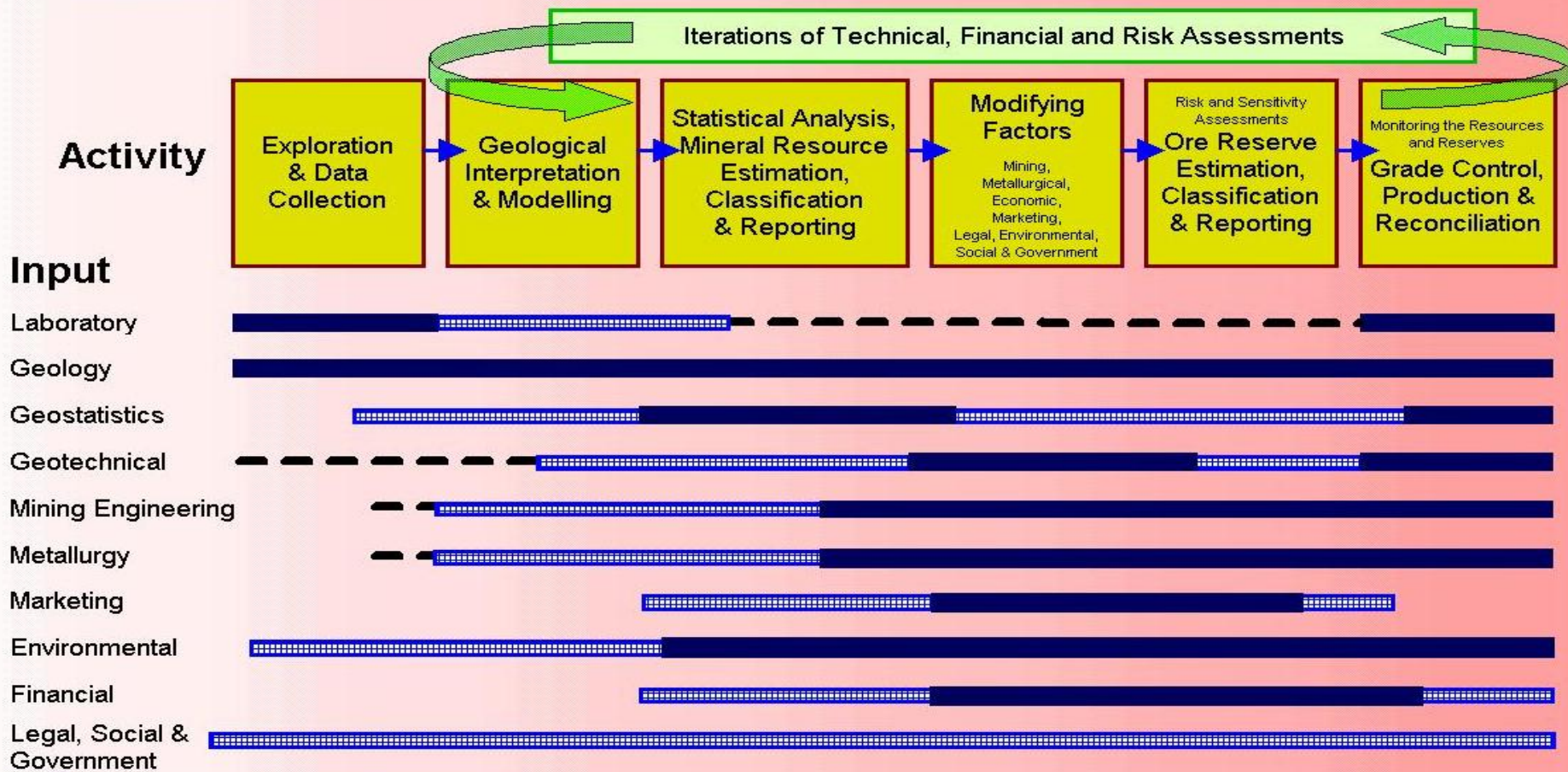
- Drilling techniques
- Logging
- Drill sample recovery
- Sub-sampling techniques and sample preparation
- Quality of assay data and laboratory tests
- Verification of sampling and assaying
- Location of data points
- Data spacing and distribution
- Orientation of data in relation to geological structure
- Audits or reviews.





# Ozmine 2011

## The Ore Reserve Estimation Process





# Public Reporting

- **ASX Listing Rules**
- **Continuous Disclosure**
- **Corporate Regulators**

Mineral Resource / Ore Reserve Estimation Meeting  
JORC Requirements

# Features of JORC style Reporting 1

- **Non Prescriptive**
- **Simplicity**
- **Regulatory Backing**

Mineral Resource / Ore Reserve Estimation Meeting  
JORC Requirements

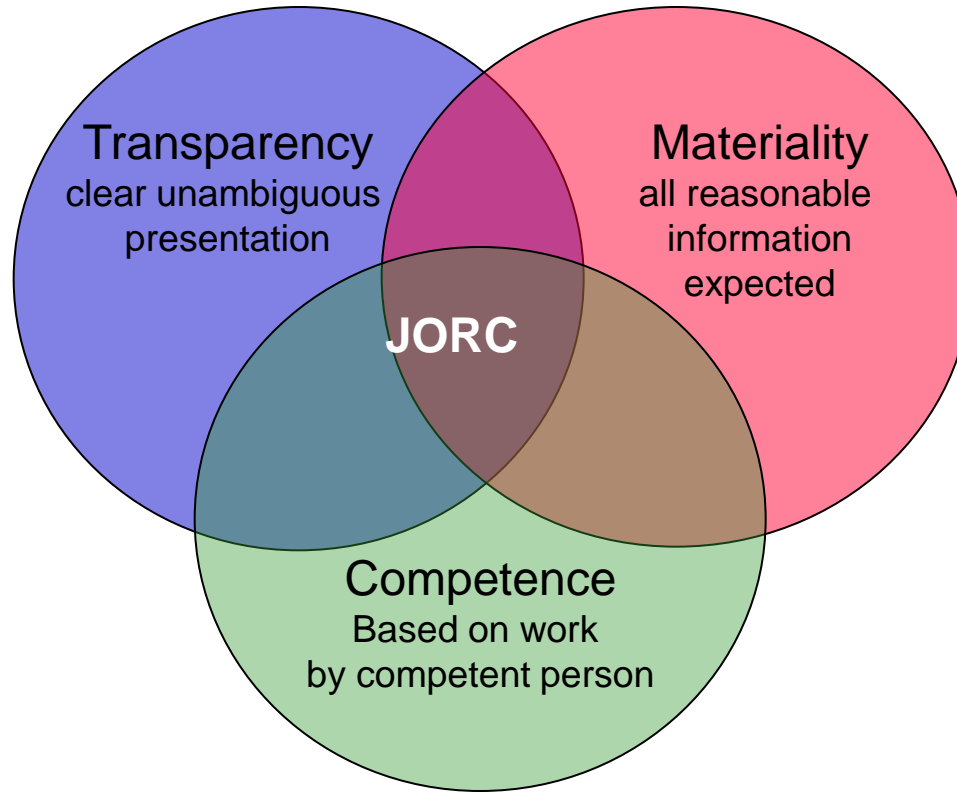
# Features of JORC style Reporting 2

- **Competent Person system**
- **Designed with the investor in mind**
- **Part of a World process**  
**(constantly improving)**

Mineral Resource / Ore Reserve Estimation Meeting  
JORC Requirements



# Principles of JORC Code



Mineral Resource / Ore Reserve Estimation Meeting  
JORC Requirements



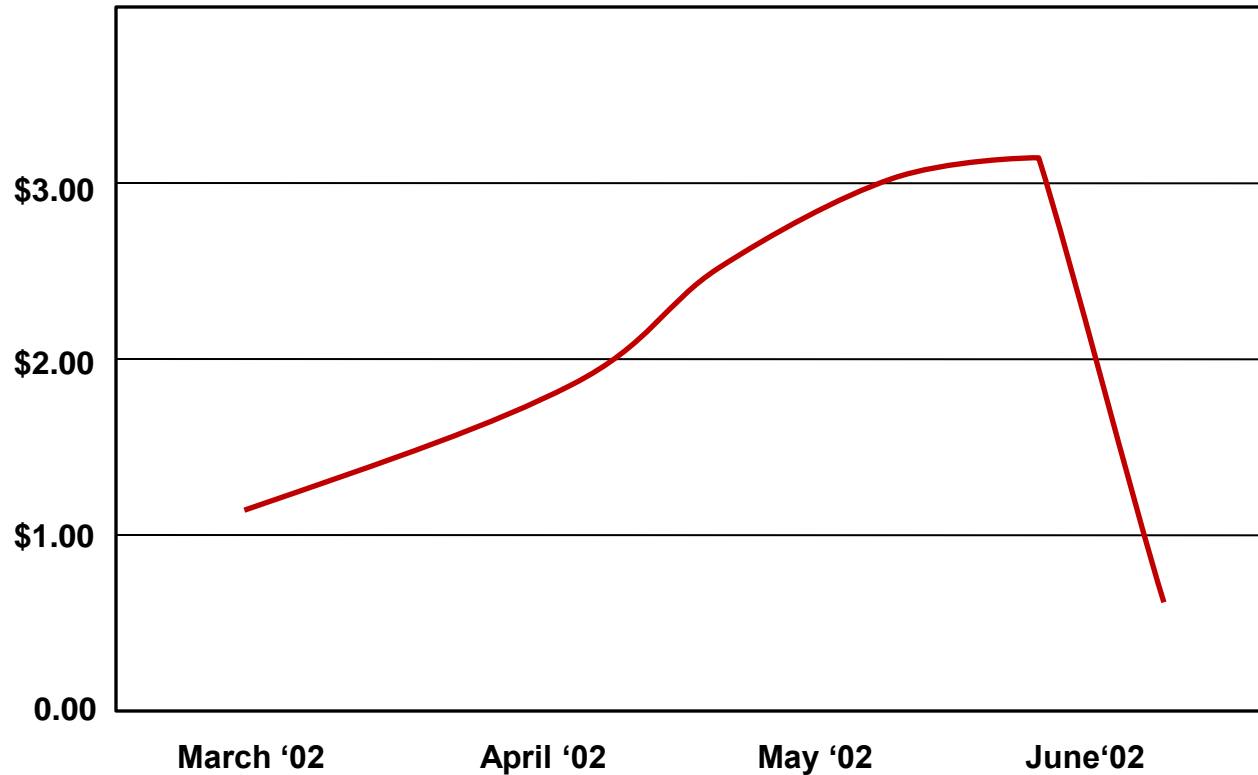
# Transparency

Sufficient Information, clear unambiguous reporting and must not be misleading.



# Transparency Issue

## Case History



# Materiality

Relevant information and scale for balanced reporting



**VS**



# Materiality 2

## 1. Technical

- *e.g. metal recovery*

## 2. Relevance

- *e.g. relevance to investors/advisors*
- *historic estimates*

## 3. Scale

- *junior companies vs. large*



# Competence

1. **Relevant Experience**
2. **Responsibility**
3. **Accountability**



Mineral Resource / Ore Reserve Estimation Meeting  
JORC Requirements



# Competent Persons 1

- Member of a professional society
- Five years of relevant experience
- The professional society must require compliance with specified professional and ethical standards

Mineral Resource / Ore Reserve Estimation Meeting  
JORC Requirements

# Competent Persons 2

- The professional society must have disciplinary powers, including the power to discipline or expel a member
- “Competent Person” is used in Australia, South Africa and Europe. “Qualified Person” is used in Canada
- Currently these terms are identical and equivalent.





# Responsibilities of Company Directors & Competent Persons

- It is company directors who take responsibility for public reports, not Competent Persons.
- The Competent Person is responsible for the documentation that underpins a public report on Exploration Results, Mineral Resources or Ore Reserves.
- The public report must fairly reflect the documentation prepared by the Competent Person and they must agree (prior written consent) to the form and context in which their report is used in the Public Report.



# Relationship of The JORC Code with Regulatory Authorities

- Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (The JORC Code) is **Appendix 5A** of the Australian Securities Exchange (ASX) Listing Rules.
- This makes The JORC Code enforceable **as** Law by Australian Securities and Investments Commission (ASIC).
- There is an ASX representative on JORC.
- JORC is a voluntary committee meets regularly with ASX and ASIC to discuss issues and new initiatives e.g. ROPOs, production targets.



# The Australian Securities Exchange (ASX) Up-dates highlighted concerns

- Reporting of "in situ" values
- Reporting historical or non-JORC compliant estimates
- Competent Person statement omitted
- Reporting exploration targets incorrectly
- Lack of drill hole information
- Combining categories of resource and reserves
- Incorrect use of reserves or resources to describe results

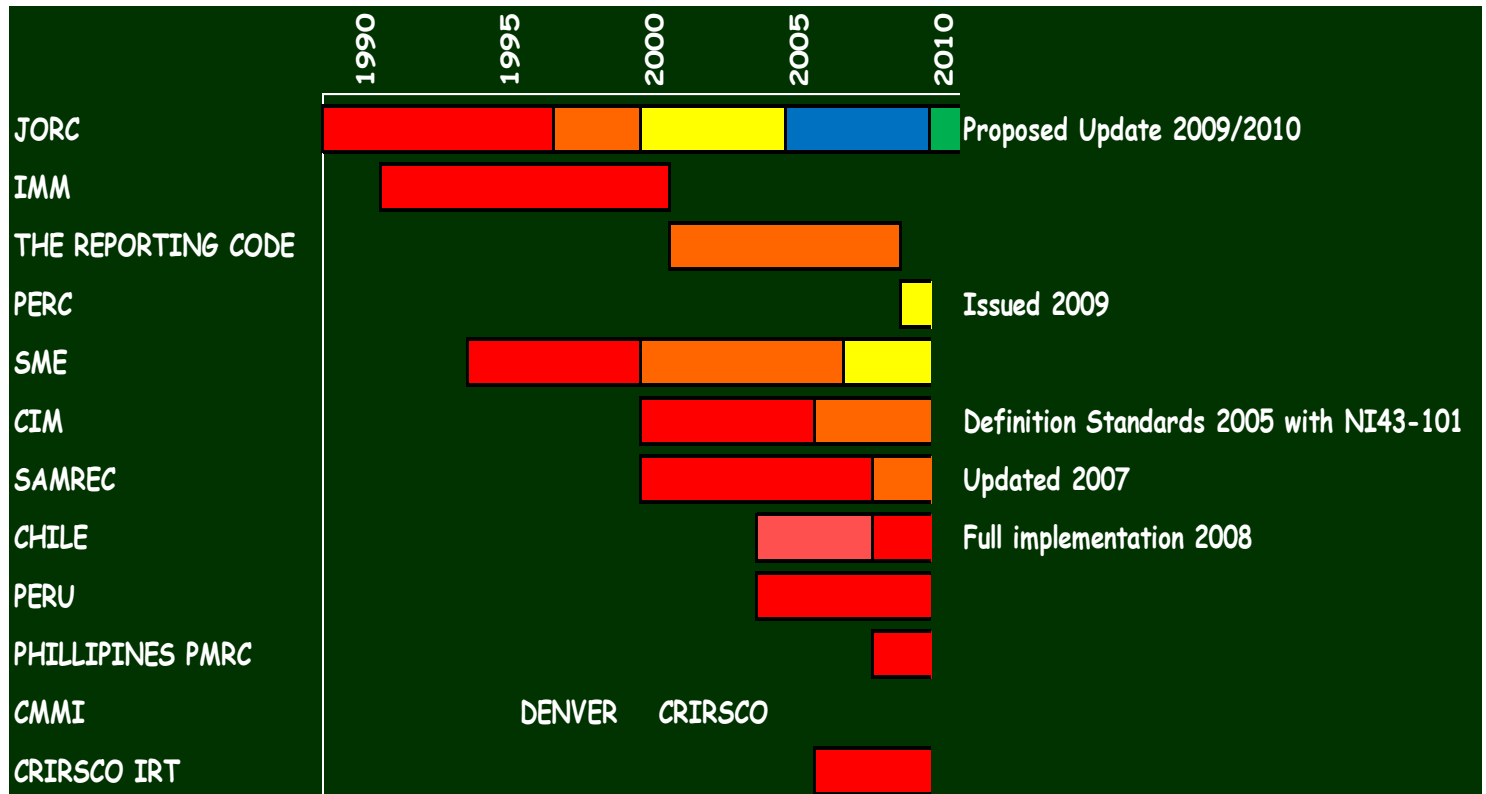
# Essence



# What Codes are out there?



# JORC Family Mineral Resource and Ore Reserve Reporting Codes





## Standard Reporting for Resources and Reserve



- JORC Code (Australasia) - 2004
- SAMREC Code (South Africa) - 2007 Updated Code issued
- The Reporting Code (UK/W Europe) – 2003, Revised PERC Code 2009
- Chilean Code (Chile) - issued 2004, implemented fully 2008.
- Peruvian Code (Peru) - issued 2004
- CIM Definition Standards 2005 (with NI 43 -101 and best practices guide)
- Philippines PMRC - issued December 2007
- JORC Code (Australasia) – 2011 under preparation



# What Codes are out there?

- JORC Code (Australasia) - translations into South American Spanish, Portuguese, Mandarin, Russian, Bahasa Indonesia
- SAMREC Code (South Africa)
- CIM Standards (referenced by Canadian NI 43-101)
- the Reporting Code ('Europe')
- SME Guidelines (USA)
- **USA SEC Guide 7**
- **UNECE Framework Classification**
- Chilean Code – 2003
- Peruvian Code – 2004
- Philippines Mineral Reporting Code – 2007
- CRIRSCO Template incorporating the Denver Accord definitions (see [www.criusco.com](http://www.criusco.com))







## JORC / CRIRSCO continue dialogue with PERHAPI and IAGI

1. Establishment of an Indonesian Competent Person System through professional organisation (PERHAPI or IAGI)
2. CODE OF ETHICS AND CODE OF CONDUCT
3. CODE and REPORTING STANDARD for Exploration Result, Resources and Reserve KCMI (Komite Cadangan Mineral Indonesia)



# Recognised Overseas Professional Organisations (ROPO)

1. Be a self-regulatory organisation
2. Admit members on academic qualifications and experience
3. Require compliance with the professional standards of competence and ethics
4. Have disciplinary powers, including power to suspend and expel a member

# Current list of ROPOs

[http://www.asx.com.au/professionals/pdf/ropo\\_letter\\_september\\_2007\\_standalone.pdf](http://www.asx.com.au/professionals/pdf/ropo_letter_september_2007_standalone.pdf)  
Also available on [www.jorc.org](http://www.jorc.org) under Competent Persons



- Institute of Materials, Minerals and Mining
- Geological Society of London
- Institute of Geologists of Ireland
- European Geologist (EurGeol) members of the European Federation of Geologists
- Mining and Metallurgical Society of America
- American Institute of Professional Geologists
- SME Registered Member of the Society of Mining, Metallurgy and Exploration Inc.
- Engineering Council of South Africa
- South African Council for Natural Scientific Professions
- Geological Society of South Africa
- South African Institute of Mining and Metallurgy
- South African Council for Professional and Technical Surveyors
- Professional Engineers Ontario
- Association of Professional Engineers and Geoscientists of British Columbia
- Association of Professional Engineers and Geoscientists of Manitoba
- Association of Professional Geoscientists of Ontario
- Association of Professional Engineers and Geoscientists of Newfoundland
- Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories
- Association of Professional Geoscientists of Nova Scotia
- Association of Professional Engineers and Geoscientists of New Brunswick
- Association of Professional Engineers, Geologists and Geophysicists of Alberta
- Association of Professional Engineers and Geoscientists of Saskatchewan
- Ordre des Géologues du Québec
- Ordre des Ingénieurs du Québec

**UK and Europe**

**USA**

**South Africa**

**Canada**



# **Update of international developments of significance to the JORC Code and to Companies**



# International Reporting



Committee for Mineral Reserves



International Reporting Standards

**CRIRSCO TEMPLATE**



# The CRIRSCO International Reporting Template

- *Prepared for the assistance of Countries wishing to adopt CRIRSCO style Codes*
- *Used for dialogue with international organisations such as SPE, IASB, UN-ECE, etc.,*
- *Does not deal with specific National issues*
- *If involved: in reporting  
READ THE RELEVANT  
NATIONAL CODE !!!!*



# INTERNATIONAL REPORTING TEMPLATE

for the public reporting of

EXPLORATION RESULTS, MINERAL  
RESOURCES AND MINERAL RESERVES

July 2006



COMMITTEE FOR MINERAL RESERVES INTERNATIONAL REPORTING STANDARDS

**ICMM**  
International Council  
on Mining & Metals

- CRIRSCO (Committee for Mineral Reserves International Reporting Standards) was formed in 1994.
- Now a committee representing national resource/reserve reporting committees in Canada, Australia, South Africa, UK/Ireland/Western Europe, USA (but not the SEC) and Chile. A strategic partner of International Council on Mining and Metals (ICMM).
- Mining companies on these stock exchanges account for more than 80% of the listed capital of the mining industry.
- NI 43-101 (which references CIM Definitions Standards), JORC Code etc, belong to the “CRIRSCO-style” of reporting standards.

# Why so important? CRIRSCO and IASB

- CRIRSCO and the IASB Extractive Activities Project Team (EAPT) have been in close consultation for over many years seeking agreement on the definitions of Resources and Reserves the IASB may adopt in the new International Financial Reporting Standards.
- The IASB is hoping to adopt high level definitions that will encompass both Minerals and Oil and Gas, hence CRIRSCO's engagement with the SPE in mapping the two systems definitions.
- From this engagement with IASB and SPE it appears likely that the IASB will recommend adoption of the mapped CRIRSCO and SPE definitions.

*IASB - International Accounting Standards Board*

*SPE - Society of Petroleum Engineers*

*UNFC - United Nations Framework Classification*





# CRIRSCO AND OTHER CODES

- CIM Standards (Canada)
- JORC Code (Australasia)
- SAMREC Code (South Africa)
- PERC Code (Europe)
- SME Guidelines (USA)
- Certification Code (Chile)
- Peruvian Code
- Philippines Code
- CRIRSCO Template

Other reporting codes not equivalent to the CRIRSCO family of reporting standards

- United Nations Framework Classification,
- USA Securities and Exchange Commission Guide 7
- Two other examples include China and Russia.

# UN-ECE Framework Classification

## I 1- 4:Remaining in place

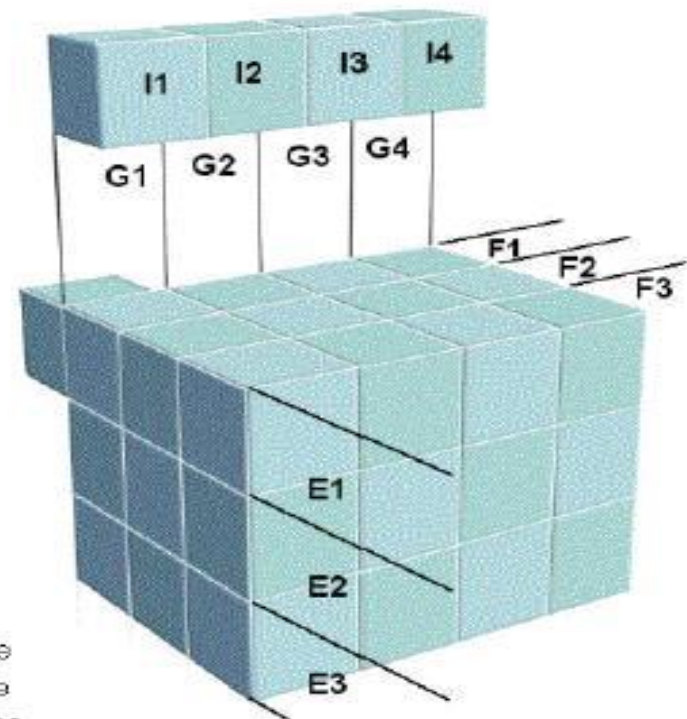
- E1:** Commercial
- E2:** Potentially commercial
- E3:** Undetermined or Non-commercial

## F-1:Produced

- F1:** Committed projects
- F2:** Contingent projects
- F3:** Prospecting projects

- G1:** Reasonably assured geology
- G2:** Identified geologic conditions
- G3:** Estimated geologic conditions
- G4:** Potential geologic conditions

- I1:** Reasonably assured geology in place
- I2:** Identified geologic conditions in place
- I3:** Estimated geologic conditions in place
- I4:** Potential geologic conditions in place



**Figure 1 Principal elements of the UNFC**

# GKZ Russian CRIRSCO Conversion Guideline

## Russian v CRIRSCO 2010



Федерального государственного учреждения  
«Государственная комиссия по запасам полезных ископаемых»  
(ФГУ «ГКЗ»)  
Объединенный Комитет по международным стандартам  
отчетности о запасах  
(CRIRSCO)

Согласовано  
Генеральный директор ФГУ «ГКЗ»  
\_\_\_\_\_ Ю. А. Подтуркин  
25 октября 2009

**Руководство по гармонизации  
стандартов отчетности  
России и CRIRSCO.**

*ПРОЕКТ  
(для обсуждения и комментариев)*

Москва, 2010 г



Russian Federal Government Agency  
State Commission on Mineral Reserves  
(FGU GKZ)  
Committee for Mineral Reserves International Reporting Standards  
(CRIRSCO)

Approved  
Chairman CRIRSCO  
\_\_\_\_\_ Roger Dixon  
25 October 2009

**Guidelines on Alignment of Russian  
minerals reporting standards  
and the CRIRSCO Template**

*CONSULTATION DRAFT*

Moscow 2010



# JORC Compared with Russian System

Measured	Indicated	Inferred	Unclassified
A + B			
C1			
	C2		
			P1
			P2 + P3

Note: A, B, C1 and C2 can also be classified as reserves. (from Henley 2004)



# GKZ Russian CRIRSCO Conversion Guideline

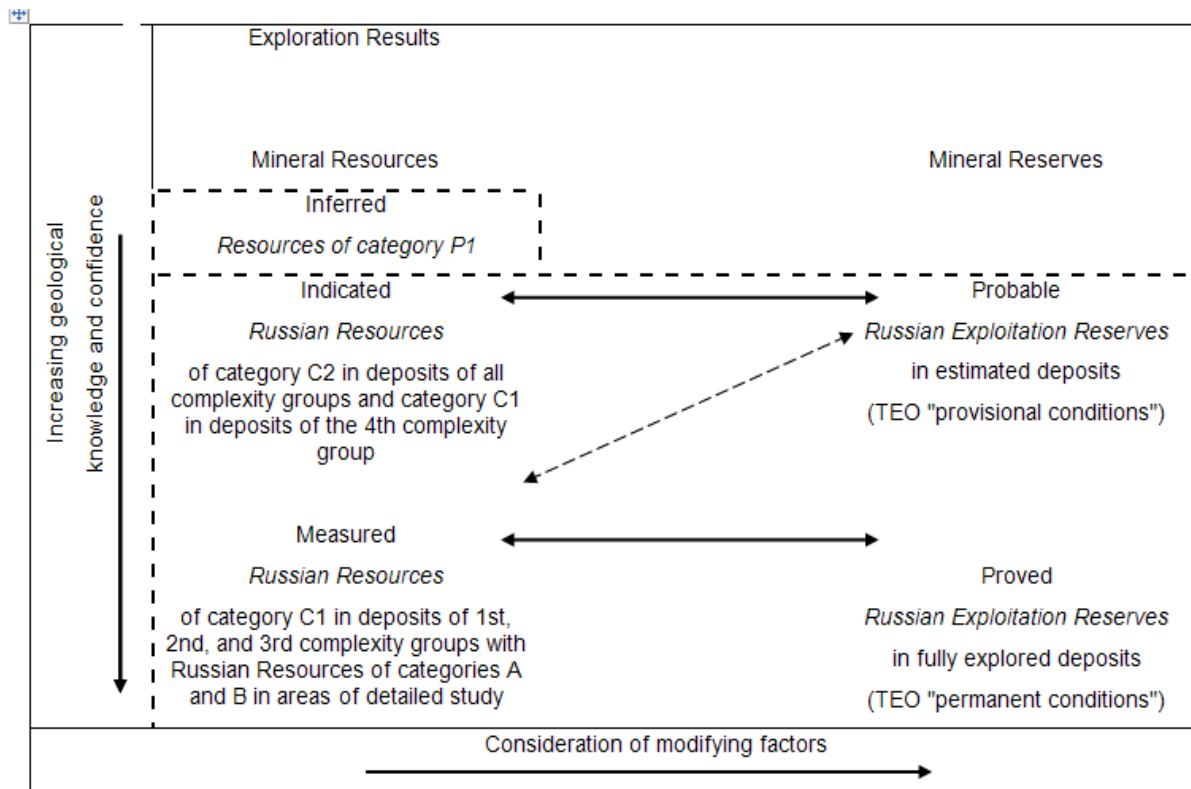








Figure 4 A mapping of the Russian and CRIRSCO classifications. Please note that publication of any conversion, whether it follows these guidelines or differs from them, requires signoff by a Competent Person

- Note the directive that the conversions may only be performed by a Competent Person, but the document, when finalised, is aimed to provide confidence and uniformity of approach.
- Adapted by GKZ and CRIRSCO in March 2010 and is available on the CRIRSCO website.
- GKZ sees this as a first step to a Russian CRIRSCO type Code.

# China – A Mixture of UN and Market Systems

## The Existing Mineral Resource/Reserve Classification System of China

		Discovered			Undiscovered	
		Measured	Indicated	Inferred	Predicted	
Economic	Fea-	111 111b				 Reserve  Basic Reserve  Marginally Basic Reserve  Sub-Economic Resource  Intrinsic Resource  Predicted Resource
	Pre-	121 121b	122 122b			
Marginally Economic		2M11 2M21	2M22			
Sub-Economic		2S11 2S21	2S22			
Intrinsic Economic		331	332	333	334?	

Fea-: feasibility study    Pre-: pre-feasibility study





## Conclusions

- The JORC Code is a well established, principles based Code, it has been in existence for 21 years and formed the basis for internationalisation of mineral industry reporting Codes
- Public reports must be based on and fairly reflect the documentation prepared by a Competent Person. These reports should follow the Principles of Transparency and Materiality
- The CRIRSCO family of reporting standards is being adopted for market related reporting in an increasingly large number of countries.
- While it is for minerals reporting it has been mapped to the SPE, the UNFC, the Chinese system (informally) and the Russian System.

# Acknowledgements

To my JORC colleagues for assistance and support in particular Mr. Peter Stoker JORC Chairman

Preparing this talk and attending Ozmine 2011 was supported by my employer CSA Global



The JORC parents

