



# The JORC Code and Coal

AusIMM Hunter Region Branch  
Maitland  
Wednesday 29 April

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Chairman JORC  
Principal Consultant AMC Consultants Pty Ltd

## Disclaimer and Acknowledgements

Peter Stoker is a Principal Geologist with AMC Consultants with 40 years experience. Peter is Chairman of the Joint Ore Reserves Committee (JORC) and was Secretary from 1999 to 2005. Peter is also a member of CRIRSCO (Committee for Mineral Reserves International Reporting Standards).

While Peter is Chairman of the Australasian Joint Ore Reserves Committee ('JORC'), the views presented are his own and should not be taken as necessarily representing those of the committee.

### Acknowledgements:

To my many JORC, CRIRSCO & AMC colleagues, who prepared originals of some material used in this presentation.

## Outline

- What is the JORC Code?
- How does it work?
- What is the historical relationship of Coal Public Reporting to the JORC Code
- The Australian Coal Guidelines
- Classification

The 2004  
JORC Code

***READ THE  
CODE!!!!***


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

~ **The JORC Code** ~  
2004 Edition



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)

<p>and some additional advice for this audience the 2003 <b>Australian Coal Guidelines</b></p> <p><b><i>READ THE Guidelines!!!</i></b></p>	<p>AUSTRALIAN GUIDELINES FOR <b>Estimating and Reporting of</b> Inventory Coal, Coal Resources and Coal Reserves</p> <p>2003 EDITION</p>  <p><small>PREPARED BY THE COALFIELDS GEOLOGY COUNCIL OF NEW SOUTH WALES AND QUEENSLAND MINING COUNCIL</small></p>
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**Where it all started !**

**“On October 1, 1969, Poseidon directors issued an historic report to the Adelaide Stock Exchange before the start of trading. The statement began: 'Further to the report of the recovery of nickel and copper sulphides on September 29, the directors of Poseidon NL announce that the assays received to date of the first completed drill hole PH2 at Windarra, WA, are as follows ....."**

**Trevor Sykes - *The Money Miners.***

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## Poseidon Boom - 1969 Report

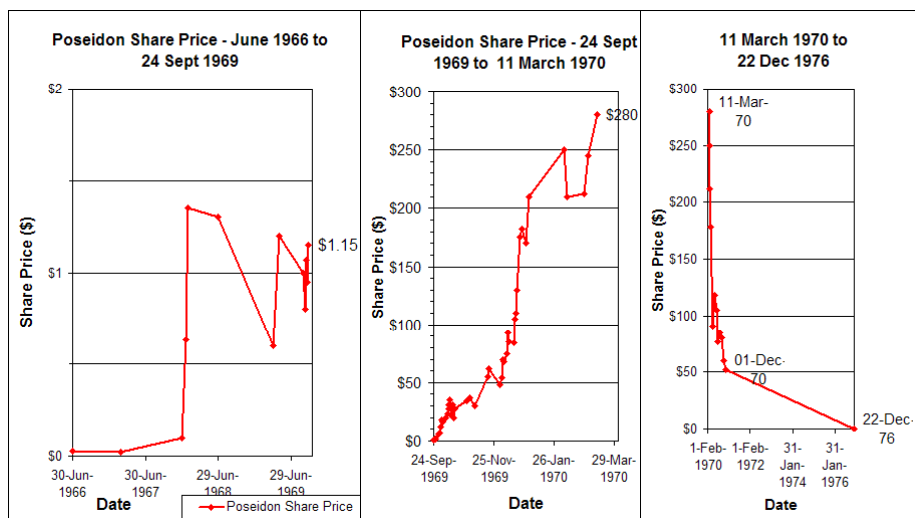
From- to in feet	Length in feet	Ni %	Cu %	Type of Ore
0 - 25	25	0.4	0.1	Leached Ore
25 - 115	90	1.53	0.25	Oxide
115 - 145	30	1.6	0.4	Disseminated Sulphides
145 - 185	40	3.56	0.55	Massive Sulphides

"The Consulting geologists, Burrill and Associates Pty Ltd, quote that the mineralised zone has an indicated length of 1000 ft and a minimum width of 65 ft."

The Share price had moved from a few cents to around a dollar and then rocketed to \$280 before crashing.

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## Poseidon Boom & Bust - Share Price



## 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.***"

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## Leading to .....

- The Melbourne Stock Exchange and Federal Government (Rae Commission) requested AMIC (now the Minerals Council of Australia) to develop a mechanism to resolve the reporting issues
- AMIC responded and AusIMM joined promptly →→ **JORC**
- The **Joint** Ore Reserves Committee (JORC)
- JORC - the Committee
- The JORC Code - the Code developed by JORC (the committee). First Code 1989
- Code updated regularly since then.

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## History of JORC JORC Committee

### History and Background

- 1971 - JORC formed by AMIC; joined by AusIMM
- 1971 to 1985 - JORC guidelines on classification and reporting
- **1989 - first edition of JORC Code, immediately incorporated into the ASX Listing Rules**
- 1990 - release of JORC Code Guidelines
- 1992 - second edition of JORC Code; AIG joined and in 1993 release of the diamond appendix
- 1996 - third edition of JORC Code
- **1999 - fourth edition of JORC Code**
- 2004 - release of the 2004 JORC Code
- 2007 - issue of ASX Companies Update No 03/07 Metal Equivalents, Sampling Required for Resources and Competent Persons Certificate
- 2008 - further companies updates now attached to the Code on the JORC website
- 2009 Proposed revision of the 2004 Code to be called the "2004 JORC Code 2009 Revision", Commencement of a full revision.

## About the JORC CODE

- First released, 1989; latest revision 2004
- Mandatory reporting standard for companies reporting to ASX and NZX
- Mandatory reporting standard for members of AusIMM and AIG; regarded as best practice by MCA, FinSIA
- Highly influential in developing international reporting standards

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## Australasian Joint Ore Reserves Committee (JORC)

JORC is a voluntary committee which has been in existence for over 30 years.

**The "parents" are**

- The Australasian Institute of Mining and Metallurgy
- Minerals Council of Australia
- Australian Institute of Geoscientists (1992)

**Representation from**

- Australian Securities Exchange (1981)
- Financial Services Institute of Australasia

## Current JORC Members

<b>Chairman:</b>	<b>Mr Peter Stoker (AusIMM)</b>
<b>Deputy Chairs:</b>	<b>Mr Mark Adams (AusIMM)</b> <b>Ms Alice Clark (AusIMM)</b>
<b>Mr Rob Behets (AIG)</b>	<b>Mr Chris Cairns (AIG)</b>
<b>Mr Stephen Deady (MCA)</b>	<b>Mr Gerry Fahey (AIG)</b>
<b>Mr Peter Forrestal (MCA)</b>	<b>Mr Steve Hunt (MCA)</b>
<b>Mr Chris Roberts (AIG)</b>	<b>Mr James Rowe (ASX)</b>
<b>Mr Warren Staude (FinSIA)</b>	<b>Mr Gavin Yeates (MCA)</b>
<b>(co-opted)</b>	<b>Mr Tim Goldsmith (AusIMM)</b>
	<b>Mr Ian Goddard (AusIMM)</b>
<b>(ex-officio)</b>	<b>Dr Bill Shaw (AIG)</b>
<b>Secretariat:</b>	<b>Mr Michael Catchpole (AusIMM)</b>
<b>Webmaster:</b>	<b>The AusIMM.</b> <b>Tatiana Feldman The AusIMM.</b>

## The JORC Code

How does it work?



## 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.

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## The JORC Code does not .....

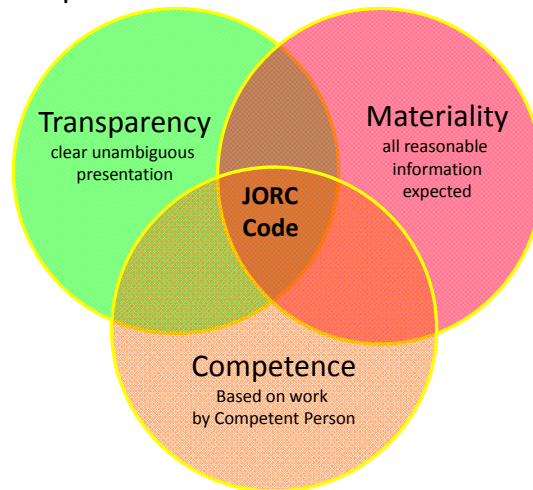
- Regulate the procedures used by Competent Persons to estimate and classify Mineral Resources and Ore Reserves
  - it is a Code for reporting
- Regulate companies' internal classification or reporting systems
- JORC does not deal with breaches of the Code
  - by companies (ASX)
  - By individuals, these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

*ROPO Recognised Overseas Professional Organisation*

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## JORC Code - Principles based

The JORC Code is a principles based not a prescriptive Code. The principles in Clause 4 of the JORC Code are:



## The principles in Clause 4 of the Code are:

### Transparency

- the reader of a Public Report is provided with sufficient clear and unambiguous information, so that a reader is able to understand the report and is not misled

**i.e. Clear and unambiguous**

### Materiality

- a Public Report contains all the relevant information which investors and their professional advisers would reasonably be expected to need in order to make a reasoned and balanced judgement about the matters being reported

**i.e. all the information reasonably required and expected**

### Competence

- the Public Report is based on work which is the responsibility of a suitably qualified and experienced person who is subject to an enforceable professional code of ethics - a Competent Person

**i.e. public reports are based on work undertaken by Competent Persons.**

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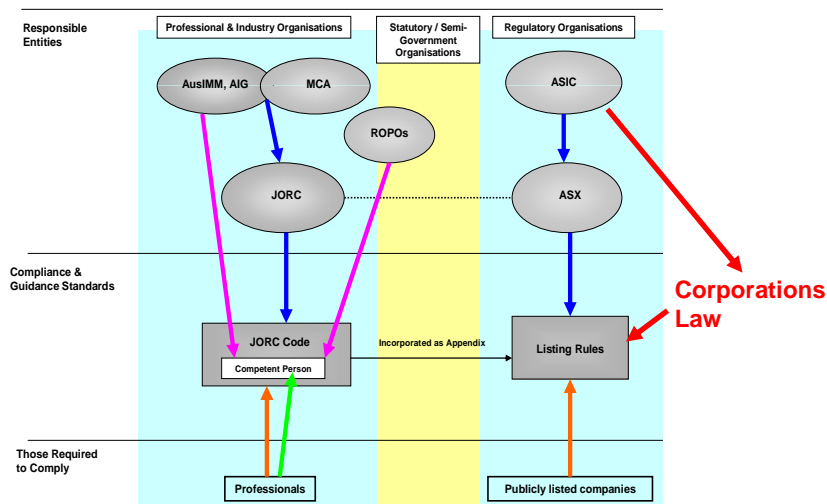
## Relationship with regulatory authorities

- Australasian Code for Reporting of Mineral Resources and Ore Reserves (The JORC Code) is **Appendix 5A** of the ASX Listing Rules
- This makes The JORC Code enforceable **as** Law by ASIC
- An ASX representative on JORC
- Meetings as required to discuss issues and new initiatives e.g. ROPOs
- Financial contribution to internationalisation of The JORC Code
- JORC also meets as required with ASIC.

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## Australian reporting environment

### Australia



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## Coal Public Reporting & the JORC Code

What is the history of Reporting of Coal Resources and Reserves in relation to The JORC Code and its predecessors?

Australian Coal Codes and Guidelines

### Coal Public Reporting & the JORC Code

Guideline or Report (JORC)	Reference to Coal
1972 Report by Joint Ore Reserves Committee	No reference to coal
1981 Reporting of Ore Reserves	10. Ore Reserve Guidelines The committee has not addressed the question of coal reserve terminology, but recommends that when public statements on coal reserves are being made the recommendations outlined in one of the existing State Government Codes be adopted. In this regard attention is drawn to the "Code for Calculating and reporting Coal Reserves" prepared by the Standing Committee on Coalfield Geology of New South Wales.
1985 Reporting of Ore Reserves	<i>Same entry as 1981 above</i>

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## Coal Public Reporting & the JORC Code (2)

JORC Code & Guidelines	Reference to Coal
1989 Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves 1989 Edition	<b>REPORTING OF COAL RESOURCES AND RESERVES</b> 39. The committee has not given detailed consideration to the question of coal reserve reporting and recommends that when public statements on coal resources and coal reserves are being made, the recommendations outlined in the <b>“Australian Code for Reporting Identified Coal Resources and Reserves (February 1986)”</b> published in Appendix 1 be adopted.
1990 Guidelines to the Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves May 1990	No reference to coal

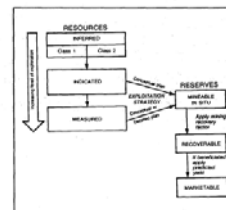
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## Australian Code for Reporting Identified Coal Resources and Reserves (February 1986)

### APPENDIX 1 AUSTRALIAN CODE FOR REPORTING IDENTIFIED COAL RESOURCES AND RESERVES (FEBRUARY 1986)

Following a request from the Australian Minerals and Energy Council (AMEC) for the development of a national approach to the reporting of coal resources and reserves, the Government Geologists' Conference in 1984 established a subcommittee to examine the issues and report back to the Conference on its findings. The subcommittee consisted of A.D. Gidigan, (Chief Geologist, New South Wales Department of Mineral Resources), and G.C. Marget, (Director, Field Force, Geological Survey of Queensland).

The Subcommittee used the "Code for Calculating Coal Resources and Reserves" (1981 Edition, June 1986) of the Standing Committee on Coalfield Geology of New South Wales as the base document, and modified this code to meet the requirements of both industry and government in other states, and the Bureau of Mineral Resources. The new code was ratified by the Government Geologists' Conference in April 1986 and has been adopted by the Standing Committee on Coalfield Geology of New South Wales. The Code is published in full on the following pages.



#### INTRODUCTION

This code outlines general concepts for reporting identified Coal Resources and Reserves. It is broad in nature to accommodate the wide range of coal deposits, in terms of rank, quality, and geological environment, that are present in Australia.

In this Code, the term Resources is used to refer to all of the coal in situ which may have potential for use, and the various categories indicate the level of confidence of the

assessment. Reserves are those resources which are planned to be mined and for which such planning has been undertaken. The Code sets out minimum guidelines for evaluating Resources and Reserves and the estimator is required to state clearly the criteria used in any assessment. Additional guidelines and parameters may be required for reporting coal Resources and Reserves from specific basins or regions.

### Coal Public Reporting & the JORC Code (3)

JORC Code	Reference to Coal
1992 Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves, September 1992	<b>Reporting of Coal Resources and Reserves</b> 32. When public statements on coal Resources and Reserves are made, the recommendations outlined in the <b>Australian Code for Reporting Identified Coal Resources and Reserves (February 1986)</b> published in Appendix 1 should be adopted.
1996 Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves, July 1996	<b>Reporting of Coal Resources and Reserves</b> 32. When public statements on coal Resources and Reserves are made, the recommendations outlined in the <b>Australian Code for Reporting Identified Coal Resources and Reserves (February 1986)</b> published in Appendix 1 should be adopted.

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### Coal Public Reporting & the JORC Code (4)

JORC Code	Reference to Coal
1999 Australasian Code for Reporting of Mineral Resources and Ore Reserves (The JORC Code) September 1999	<b>Reporting of Coal Resources and Reserves</b> 37. Clauses 38 to 40 of the Code address matters which relate specifically to the Public Reporting of Coal Resources and Reserves. Unless otherwise stated, clauses 1 to 36 of this Code (including Figure 1) apply. Table 1, as part of the guidelines, should also be considered persuasive when reporting on Coal Resources and Reserves.  <i>For guidance on the estimation of black Coal Resources and Reserves and on statutory reporting not primarily intended for providing information to the investing public, readers are referred to the 1999 edition of the 'Guidelines for the Estimation and Reporting of Australian Black Coal Resources and Reserves', a document drawn up by a committee of coal industry and government representatives and consultants from New South Wales and Queensland.</i>

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## Coal Public Reporting & the JORC Code (5)

JORC Code	Reference to Coal
1999 Australasian Code for Reporting of Mineral Resources and Ore Reserves (The JORC Code) September 1999	<p><i>Coal is of particular interest to State and Federal Governments because of its impact on government planning and land use implications. Reports to governments may require estimates of coal resources which are not constrained by short to medium term economic considerations. Such reports and estimates of strategic resources are not covered by the JORC Code. Refer also to the guidelines to Clauses 5 and 20.</i></p> <p>38. The terms 'Mineral Resource(s)' and 'Ore Reserve(s)', and the subdivisions of these as defined above, apply also to coal reporting, but if preferred by the reporting company, the terms 'Coal Resource(s)' and 'Coal Reserve(s)' and appropriate subdivisions may be substituted.</p> <p>39. For coal reporting only, Probable and Proved Ore (Coal) Reserves may be combined and reported as Recoverable Reserves.</p> <p>40. Reports of 'Marketable Coal Reserves', representing beneficiated or otherwise enhanced coal product, may be used in Public Reports in conjunction with, but not instead of, reports of Ore (Coal) Reserves. The basis of the predicted yield to achieve Marketable Coal Reserves should be stated.</p>

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### Guidelines for the Estimation and Reporting of Australian Black Coal Resources and Reserves, 1999 Edition

#### Guidelines for the Estimation and Reporting of Australian Black Coal Resources and Reserves

(as referred to in the Joint Ore Reserves Committee Code ('The JORC Code') 1999 edition)

2001 Edition



Prepared by The Coalfields Geology Council of New South Wales and the Queensland Mining Council

## Coal Public Reporting & the JORC Code (6)

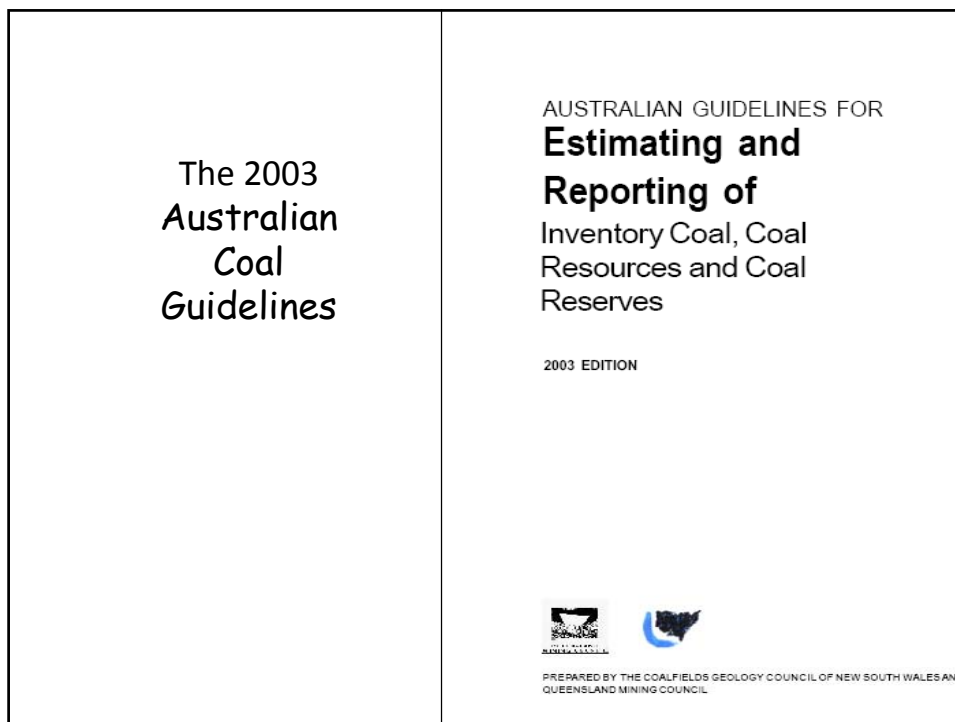
JORC Code	Reference to Coal
2004 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, The JORC Code, 2004 Edition	<p><b>Reporting of Coal Resources and Reserves</b></p> <p>37. Clauses 37 to 39 of the Code address matters that relate specifically to the Public Reporting of Coal Resources and Reserves. Unless otherwise stated, Clauses 1 to 36 of this Code (including Figure 1) apply. Table 1, as part of the guidelines, should be considered persuasive when reporting on Coal Resources and Reserves.</p> <p><i>For purposes of Public Reporting, the requirements for coal are generally similar to those for other commodities with the replacement of terms such as 'mineral' by 'coal' and 'grade' by 'quality'.</i></p> <p><i>For guidance on the estimation of Coal Resources and Reserves and on statutory reporting not primarily intended for providing information to the investing public, readers are referred to the 2003 edition of the 'Australian Guidelines for Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves'. These guidelines do not override the provisions and intentions of the JORC Code for Public Reporting.</i></p>

## Coal Public Reporting & the JORC Code (6)

JORC Code	Reference to Coal
2004 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, The JORC Code, 2004 Edition	<p><b>Reporting of Coal Resources and Reserves</b></p> <p><i>Because of its impact on planning and land use, governments may require estimates of inventory coal that are not constrained by short to medium term economic considerations. The JORC Code does not cover such estimates. Refer also to the guidelines to Clauses 5 and 19.</i></p> <p>38. The terms 'Mineral Resource(s)' and 'Ore Reserve(s)', and the subdivisions of these as defined above, apply also to coal reporting, but if preferred by the reporting company, the terms 'Coal Resource(s)' and 'Coal Reserve(s)' and the appropriate subdivisions may be substituted.</p> <p>39. 'Marketable Coal Reserves', representing beneficiated or otherwise enhanced coal product where modifications due to mining, dilution and processing have been considered, may be publicly reported in conjunction with, but not instead of, reports of Ore (Coal) Reserves. The basis of the predicted yield to achieve Marketable Coal Reserves should be stated.</p>

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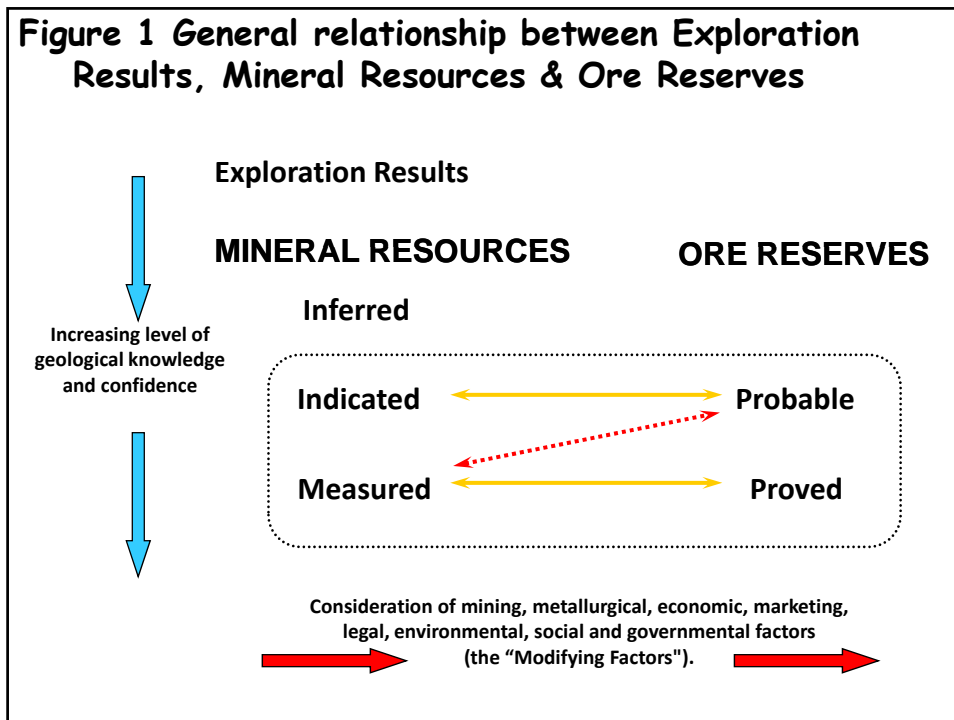
## Classification

- one of the key aspects of reporting under the JORC Code

The JORC Code provides a mandatory system for classification of tonnage/grade estimates according to geological confidence and technical/economic considerations.

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This block contains a title 'Classification', a bullet point '- one of the key aspects of reporting under the JORC Code', and a paragraph 'The JORC Code provides a mandatory system for classification of tonnage/grade estimates according to geological confidence and technical/economic considerations.' The number '34' is in the bottom right corner.

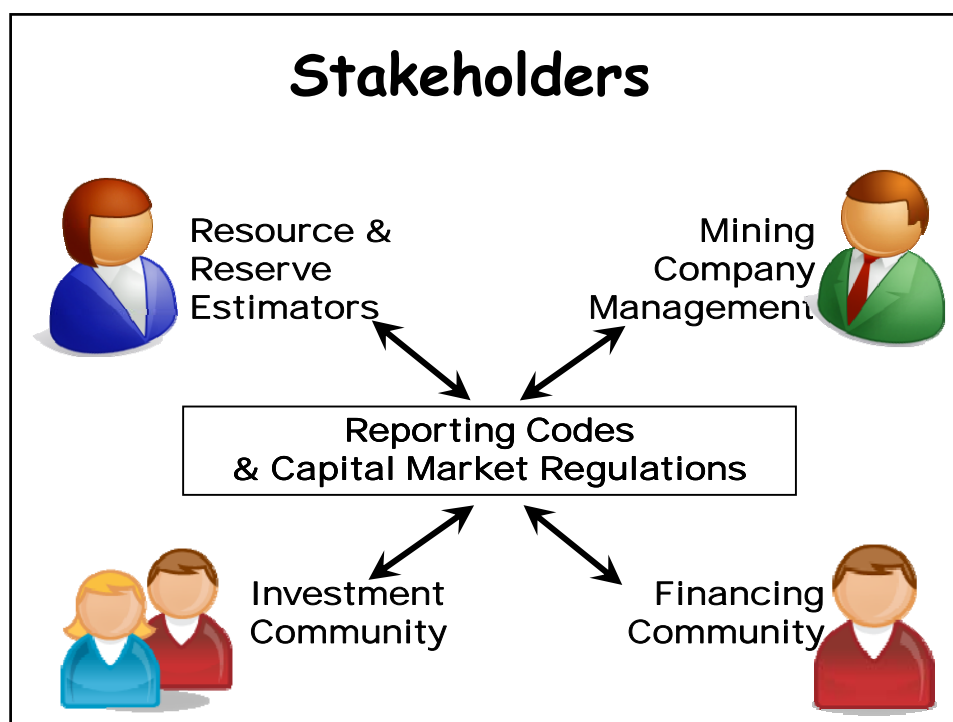


### Why are Resources and Reserves Classified?

To enable users of the estimates to make informed decisions regarding relative risk

From: Classification of Mineral Resources and Ore Reserves, P R Stephenson & P T Stoker APCOM '99

Using this classification system is one of the key aspects of the Code as it allows the Competent Person to communicate his confidence in the estimate to the multiple users of the information.



## What is a Coal Resource?

- A Coal Resource is an estimate of tonnage and quality for a body, **based on sampling of that body**
- The estimate represents a realistic inventory that, under assumed and justifiable technical and economic conditions, might, in whole or in part, become economically extractable
- Portions of a deposit that do not have reasonable prospects for eventual economic extraction are **NOT** Coal Resources (see Australia Coal Guidelines Inventory Coal)
- Sub-divided, in order of increasing geological confidence, into:
  - Inferred Coal Resources (low level of confidence)
  - Indicated Coal Resources (reasonable level of confidence)
  - Measured Coal Resources (high level of confidence)

## Coal Resource Estimation

Requirements for estimating Coal Resources:

- Representative samples and quality information (analytical and/or test results)
- Geological interpretation
- Application of appropriate estimation technique

This comes from:

- Mapping and sampling the deposit
- Ensuring the highest standards of sampling and assaying (testing) integrity
- Employing experienced, qualified professionals ("Competent Persons")

## Criteria for Classifying Coal Resources Measured, Indicated or Inferred

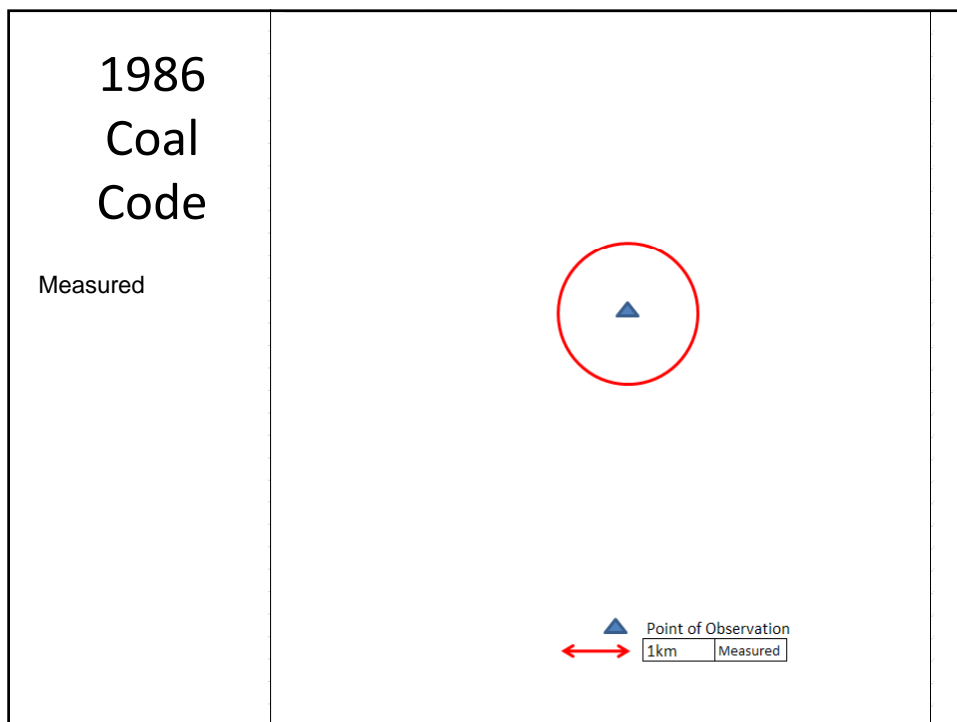
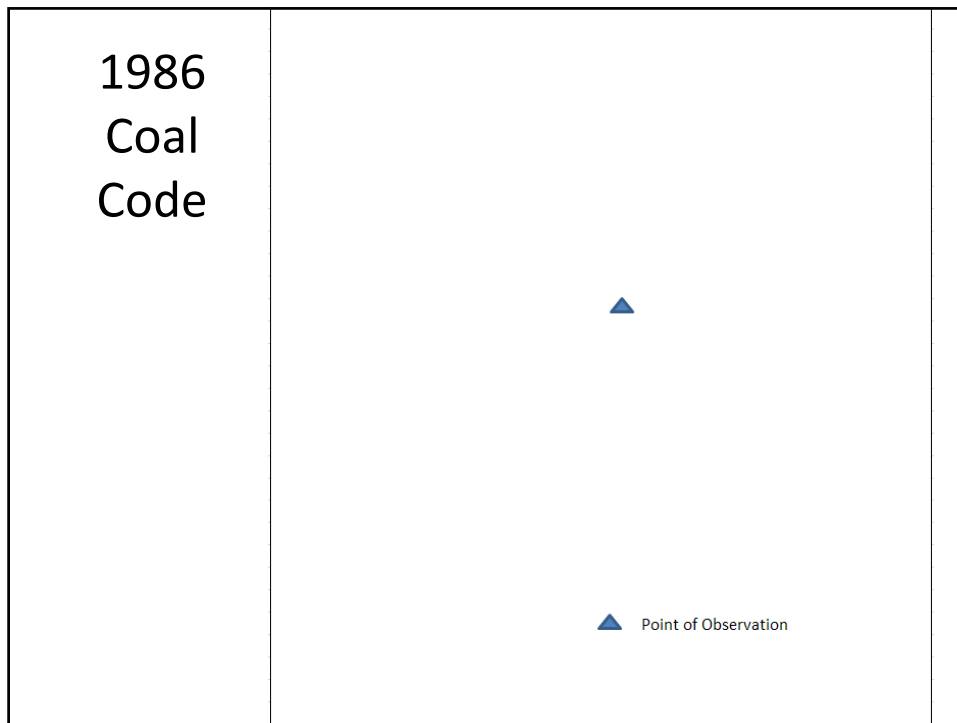
- Confidence in both the geological and quality continuity
- Quantity and distribution of sampling data
- Quality of sampling data
- Sensitivity of the Resource estimate to additional data or changes in the geological interpretation
- Judgement of the Competent Person

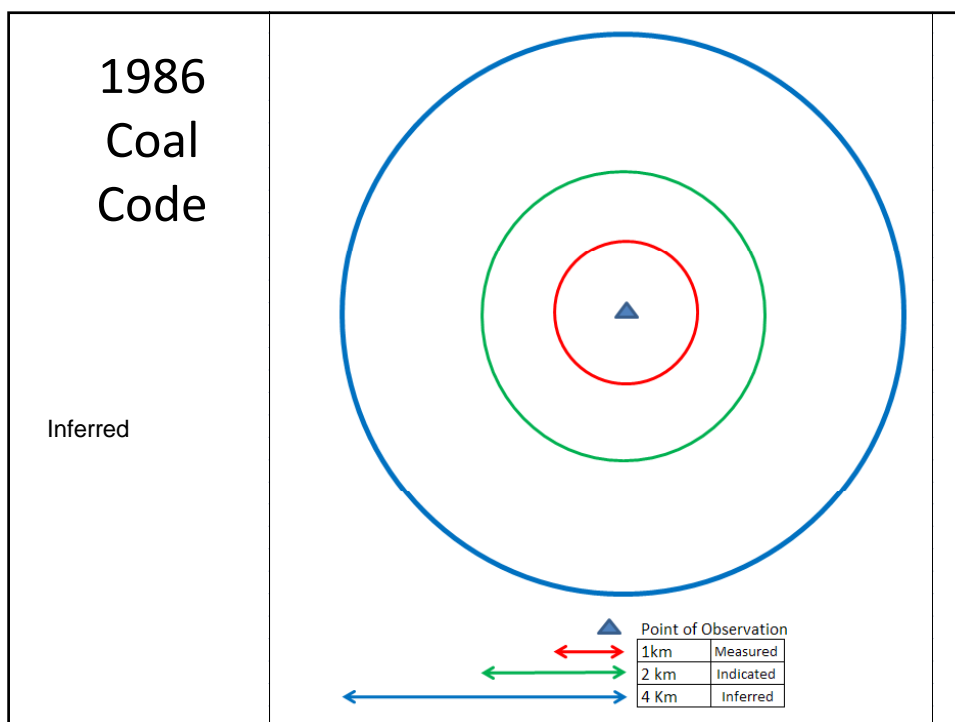
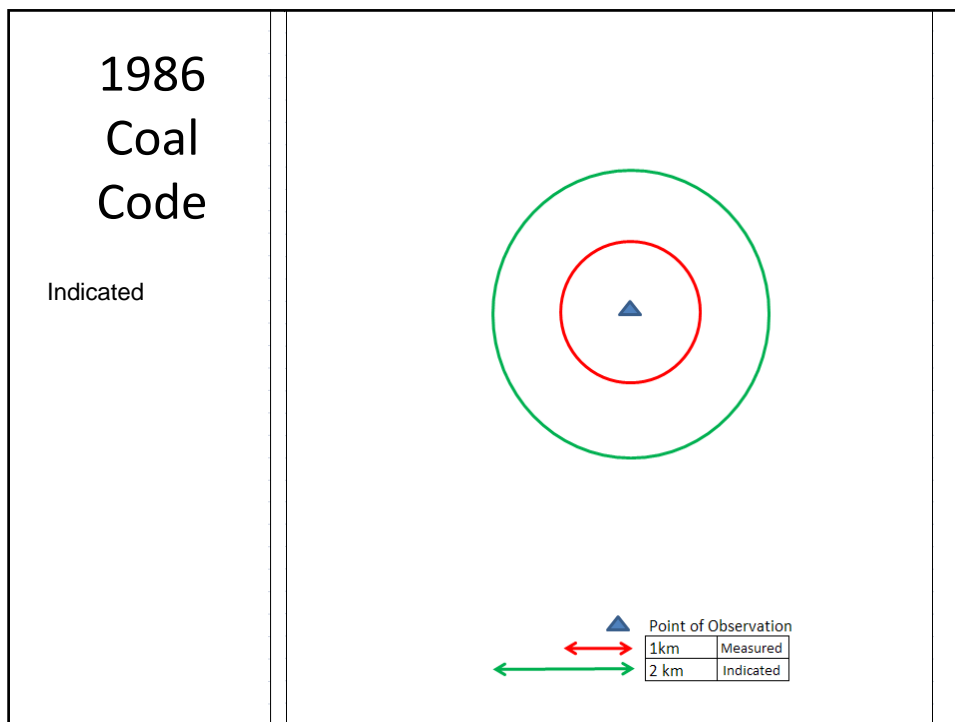
### Coal Resource Classification (for mineral read coal)

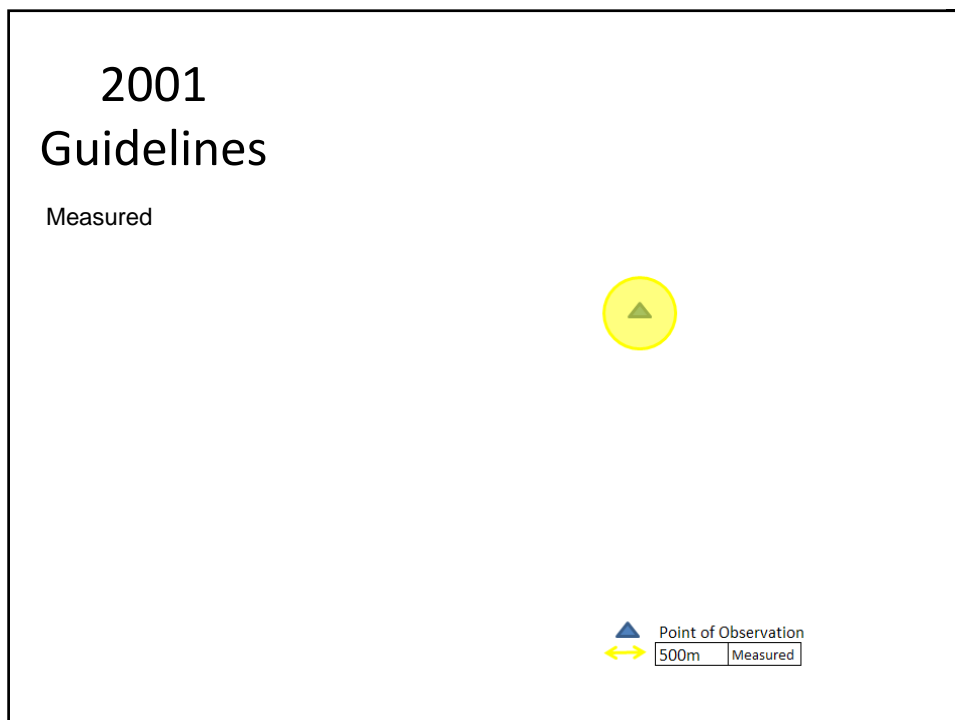
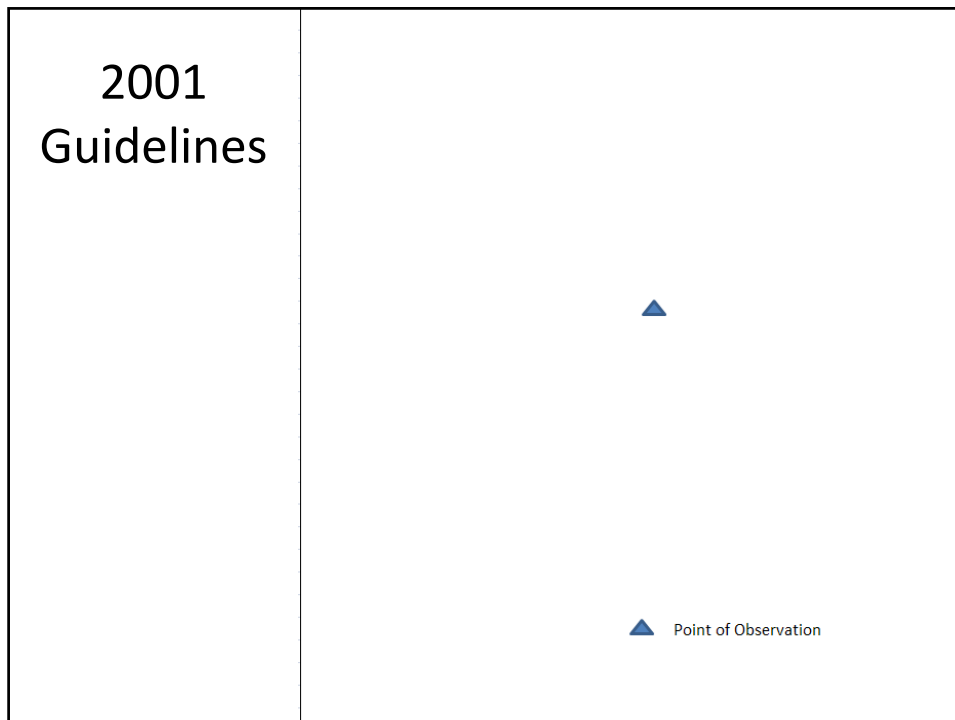
Classification	that part of a Mineral Resource for which:
Inferred	tonnage, grade and mineral content can be estimated with a <b>low level of confidence</b> . It is inferred from geological evidence and <i>assumed but not verified geological and/or grade continuity</i> .
Indicated	tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a <b>reasonable level of confidence</b> . The sampling locations are too widely or <i>inappropriately spaced to confirm geological and/or grade continuity but are spaced closely enough for continuity to be assumed</i> .
Continuity is important Continuity is between not around	
Measured	tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a <b>high level of confidence</b> . The sampling locations are spaced <i>closely enough to confirm geological and grade continuity</i> .

### Historical comparison of guidance on spacing of Points of Observation

Item Classification	1986 Code	2001 Guide (1999 JORC Code reference)	2003 Guide (2004 JORC Code Reference)
Points of Observation (PO)	Defined	Defined	Defined
Interpretive Data	Mentioned	Defined	Defined
Measured	< 1km between PO, extrapolate <500m	<500m to maybe 1km between PO, extrapolate <500m	<500m between PO, should not be extrapolated more than half the distance between PO.
Indicated	< 2km between PO, extrapolate <1km from PO	< 1km to maybe 2km between PO, extrapolate <1km from PO	< 1km between PO, should not be extrapolated more than half the distance between PO.
Inferred	Presence of coal unambiguously determined	< 4km between PO, extrapolate <2km from PO	< 4km between PO, should not be unreasonably extrapolated beyond the last line of PO.
Inferred Class 1	< 4km between PO, extrapolate <2km from PO		
Inferred Class 2	limited information		
Note		Distances maybe extended up to the maximum specified with appropriate justification	The distance may be extended if there is sufficient technical justification to do so; for example, if supported by geostatistical analysis.





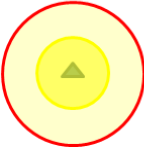




## 2001 Guidelines

Or is this Measured?

No Indicated



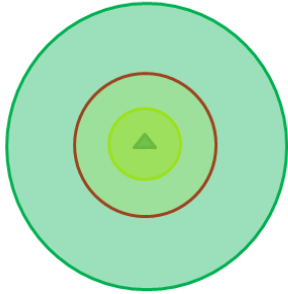
▲	Point of Observation		
↔	500m	Measured	
↔	1km	Indicated	Measured ?

## 2001 Guidelines

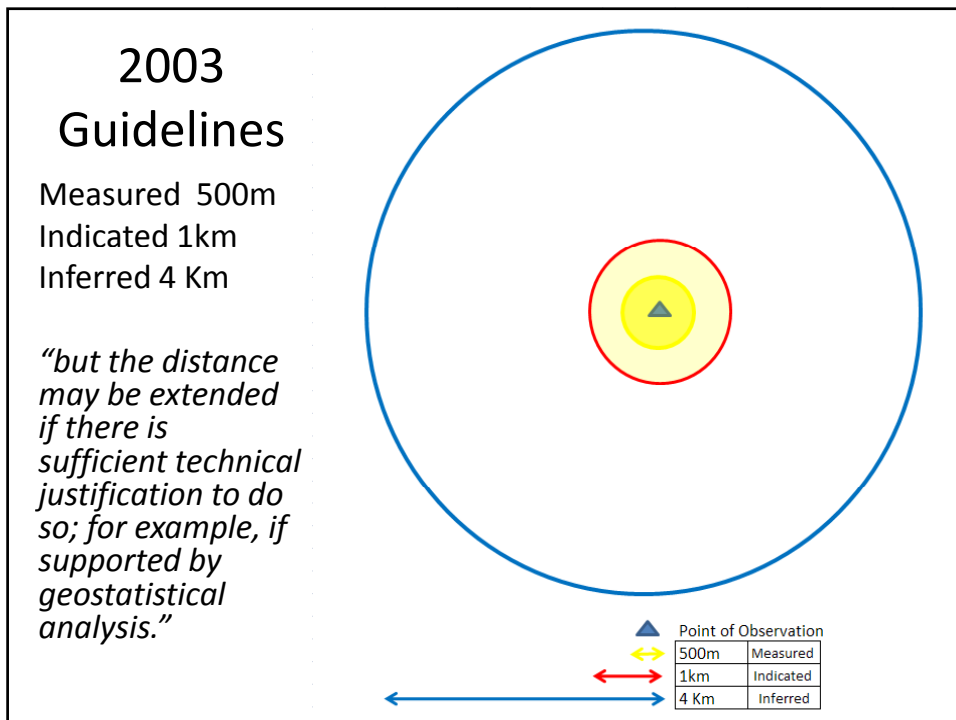
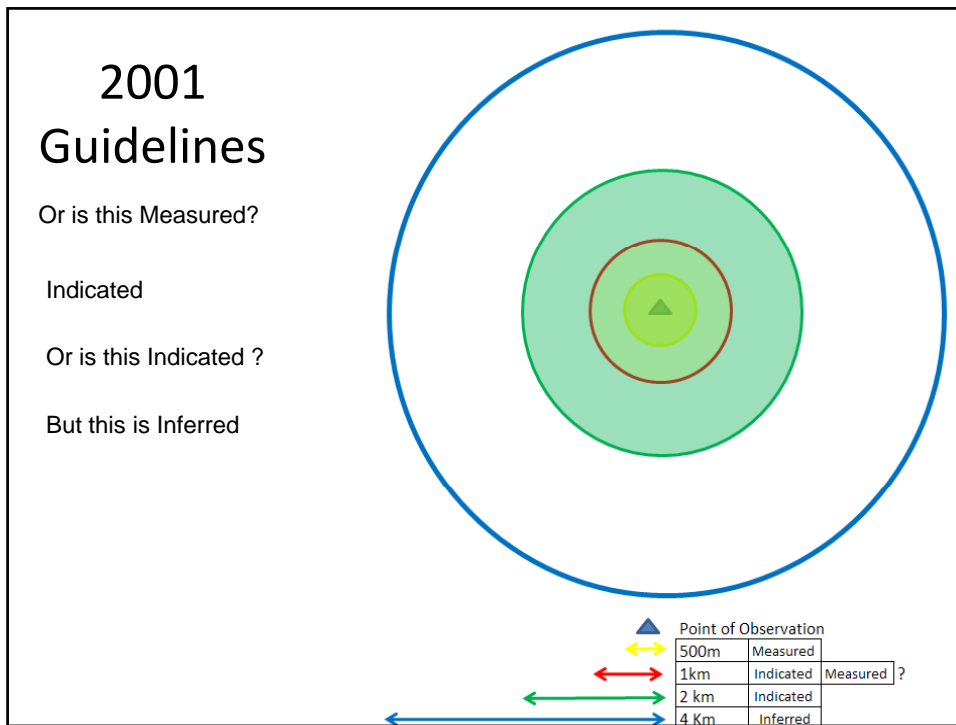
Or is this Measured?

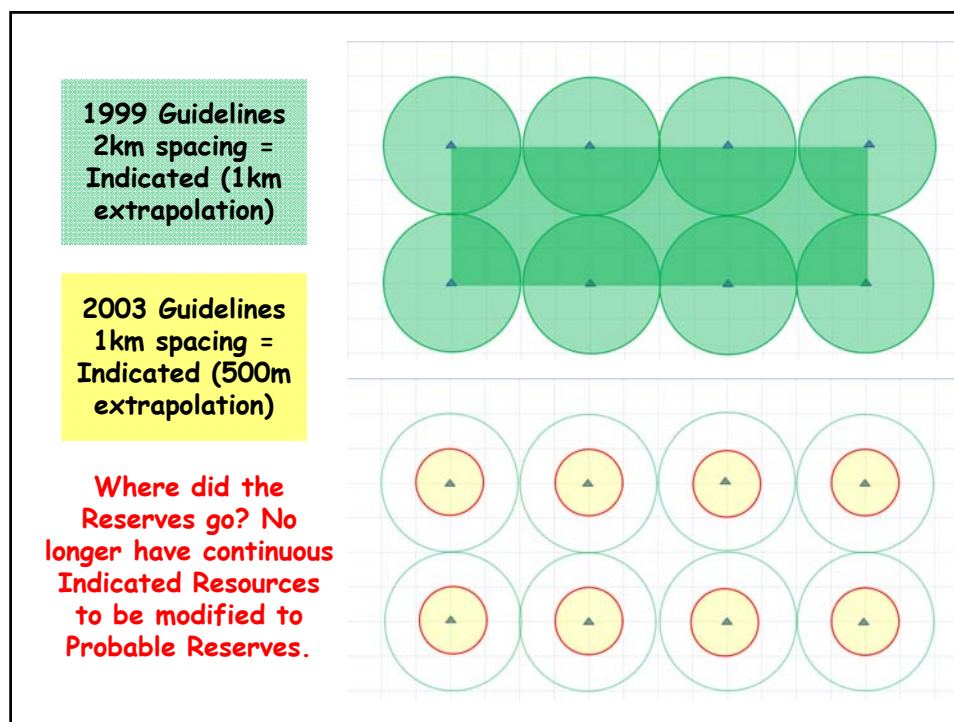
Indicated

Or is this Indicated ?



▲	Point of Observation		
↔	500m	Measured	
↔	1km	Indicated	Measured ?
↔	2 km	Indicated	





Australian Guidelines for Estimating and Reporting of  
Inventory Coal, Coal Resources and Coal Reserves - Some Extracts

Guidance of spacing of Points of Observation for Coal  
Resource Estimation:

Inferred 4 kilometres

Indicated Normally less than 1 kilometre

Measured Normally less than 500 metres

**For both Indicated and Measured Coal Resources  
the guidelines state: "but the distance may be  
extended if there is sufficient technical  
justification to do so; for example, if supported by  
geostatistical analysis."**

Australian Guidelines for Estimating and Reporting of  
Inventory Coal, Coal Resources and Coal Reserves

1. Preface
2. Scope
3. Definitions
4. Estimation and Documentation of **Inventory Coal**  
and **Coal Resources**
5. Estimation and Documentation of **Coal Reserves**
6. Future Reviews
7. Diagram 1 : Relationship Between Inventory Coal,  
Coal Resources and Coal Reserves

Australian Guidelines for Estimating and Reporting of  
Inventory Coal, Coal Resources and Coal Reserves - Some Extracts

**3.2 Points of Observation** are intersections of coalbearing strata, at known locations, which provide information, to varying degrees of confidence, about the coal by observation, measurement and/or testing of the following: surface or underground exposures, bore cores, downhole geophysical logs and/or drill cuttings in non-cored boreholes. **Points of Observation** shall allow the presence of coal to be unambiguously determined. **Points of Observation** for coal quantity estimation may not necessarily be used for coal quality evaluation. A **Point of Observation** for coal quality evaluation is normally obtained by testing samples obtained from surface or underground exposures, or from bore core samples having an acceptable level of recovery (normally >95 per cent linear recovery).

Australian Guidelines for Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves - Some Extracts

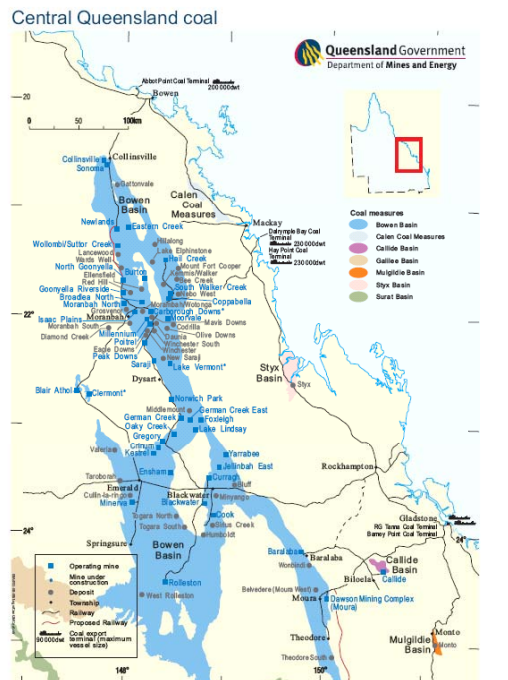
**3.3 Interpretive Data** are observations supporting the existence of coal, gathered by interpretive or indirect methods. **Interpretive Data** may include results from mapping, seismic, magnetic, gravity and other geophysical and geological surveys, but should not be used to estimate coal quantity or quality. A company, when reporting Interpretive Data, shall state the technical basis of the interpretation. **Interpretive Data** may be used in conjunction with **Points of Observation** to improve confidence levels.

Australian Guidelines for Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves - Some Extracts

4.5 The following are broad guidelines to assist the Estimator when determining the relevant confidence categories for estimates of Inventory Coal and Coal Resources. In areas where seams are faulted, intruded, split, lenticular, or subject to significant variations in thickness or quality, more closely spaced Points of Observation, which may be supported by Interpretive Data, will be required.

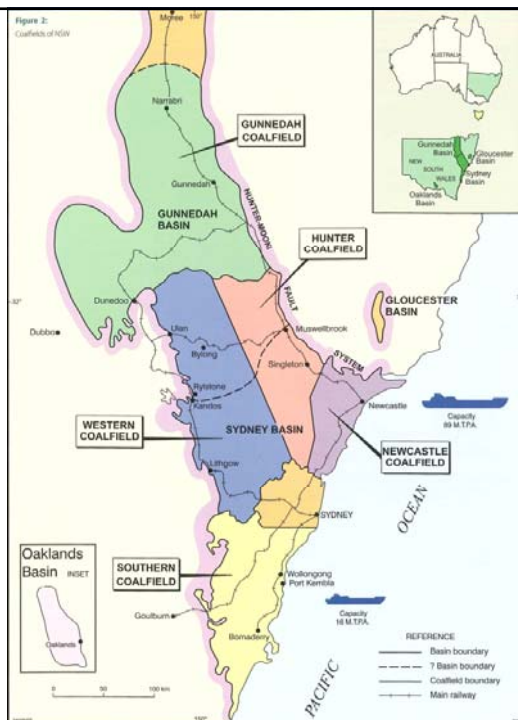
Major Coal Fields in Queensland are extensive and generally not structurally disrupted, except around the margins

So continuity is generally good



New South Wales  
Continuity is generally good in NSW coal fields.

This allows the Coal Guidelines to be specific regarding drill spacing





## Australian Coal Guidelines

As noted these distances were halved between 1996 and 2003 in an attempt to encourage the application of site specific criteria, a measure which appears to have been only partially successful.

But this is guidance and the guidelines include advice to the Competent Person that the distance may be extended (or reduced!) if there is sufficient technical justification to do so; for example, if supported by geostatistical analysis.

So the Competent Person's experience is vital.

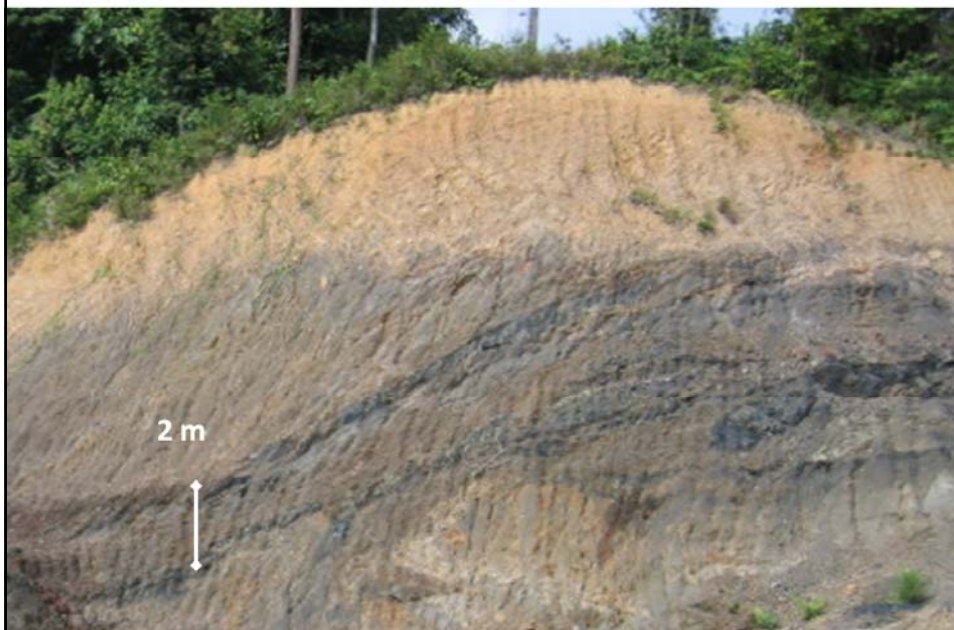


### Guidance on spacing in coal.

These distances are generally regarded as appropriate for coal which is part of one of the major coal basins in Australia. But they are not necessarily suitable for coal which is structurally disrupted.

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### narrow sheared coal seams





### Sheared Coal Outcrop



### Core recovery



Australian Guidelines for Estimating and Reporting of  
Inventory Coal, Coal Resources and Coal Reserves - Discussion

In both the 1999 and 2004 versions of the JORC Code, the Clause 37 reference to the Coal Guidelines is contained in an indented and italicised paragraph, signifying that the reference is only for guidance, and is not part of the JORC Code (although should be considered persuasive when interpreting the Code).

Despite this, it appears some Coal Resource Estimators apply the Coal Guidelines, without exercising the discretion allowed to the Competent Person, as though they are a necessary standard in order to achieve JORC compliance.

Australian Guidelines for Estimating and Reporting of  
Inventory Coal, Coal Resources and Coal Reserves - Discussion

Remember the Coal Guidelines are *guidelines*

They are referenced by the JORC Code in the guidelines to Clause 37 and thus may be considered as guidelines and thus under the JORC Code are not considered mandatory for reporting or for estimating, but need to be considered and discussed if material to the understanding of the public report in relation to classification .

## What is an Coal Reserve?

- An Coal Reserve is the economically mineable part of Measured and Indicated Coal Resources.
- It includes diluting materials and allowances for losses which may occur when the material is mined.
- Appropriate assessments and studies have been carried out, and include consideration of and modification by the application of realistically assumed 'Modifying Factors'.
- These assessments demonstrate at the time of reporting that extraction could reasonably be justified.
- Sub-divided, in order of increasing confidence, into:
  - Probable Coal Reserves
  - Proved Coal Reserves

### Coal Reserve Classification (for mineral & ore read coal)

Classification	that part of an Ore Reserve which are:
Probable Reserve	Derived from Indicated, or in circumstances when not all the Modifying Factors may be known with confidence a Measured, Mineral Resource.
Proved Reserve	Derived from a Measured Mineral Resource, and for which the modifying factors are known with appropriate confidence .

Coal Reserves (for public reporting) may not be derived from Inferred Mineral Resources

## Modifying Factors

The term 'Modifying Factors' is defined to include:

mining,  
metallurgical,  
economic,  
marketing,  
legal,  
environmental,  
social and  
governmental considerations.

What effect do all these Modifying Factors have on the conversion of Measured and Indicated Coal Resources to Coal Reserves? Must be determined by an appropriate study.

## Level of Study Required

- There is no format for studies specified in the JORC Code, which so far has deliberately set out not to define the contents of studies, rather relying on the Competent Person to determine that. Clause 28 says in part:  
**"Appropriate assessments and studies have been carried out, and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction could reasonably be justified."**
- *"In order to achieve the required level of confidence in the Modifying Factors, appropriate studies will have been carried out prior to determination of the Ore Reserves. The studies will have determined a mine plan that is technically achievable and economically viable and from which the Ore Reserves can be derived. It may not be necessary for these studies to be at the level of a final feasibility study."*

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## Studies (continued)

- However there is much guidance in the way these studies are organised. There are papers, see examples in AusIMM Monograph 23 Table of Contents, White and Shillabear for instance regarding the manner in which feasibility studies are organised and their contents.

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## Important Points about Coal Resource and Coal Reserve Estimates

- Resource estimates are **ESTIMATES**, not calculations. New information or a different geological interpretation can materially change estimates
- There is no single correct resource or reserve estimate for a given deposit, in fact...
- the only thing that is certain is that the estimate is not absolutely correct!

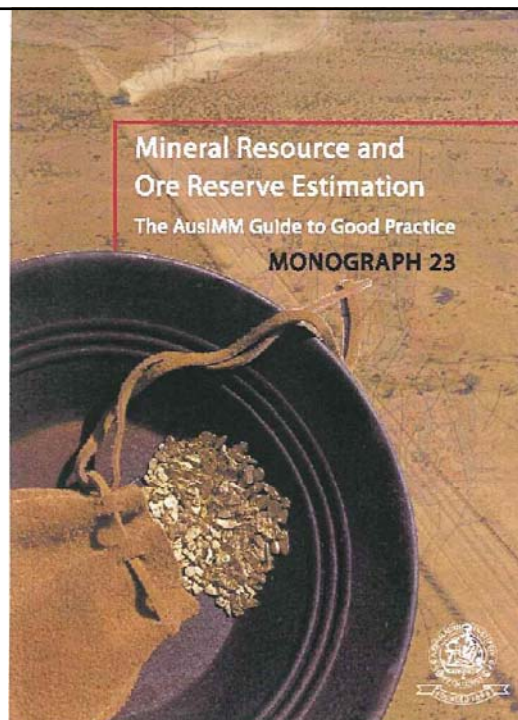
**Classification is the responsibility of the  
Competent Person**

- What guidance is available?

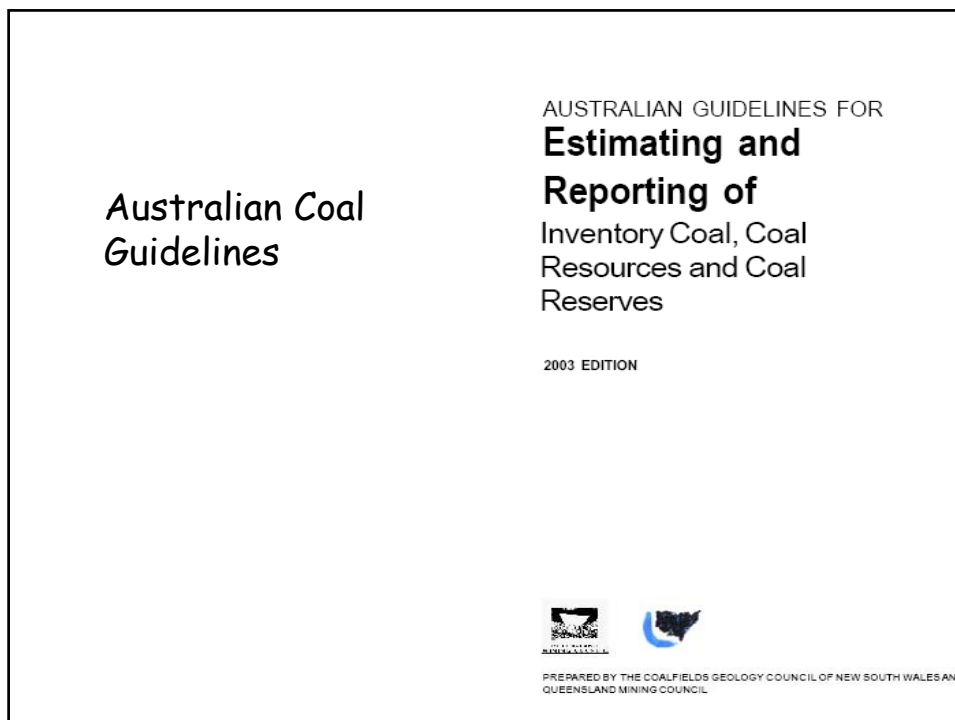
AusIMM Monographs

CIM Best Practice  
guidelines

Etc.,







### Continuity is critical

- Confidence in both geological and quality continuity
- If this continuity is not apparent in the model (e.g. where is the continuity in the Measured - in yellow - here?)
- then have to ask whether the classification is appropriate.

## Conclusions

- The JORC Code is a principles based Code
- It is a Code for Public Reporting not a Code for estimation
- The Code (and hence the market) relies on the skill and diligence of the Competent Person
- The Code contains significant guidance and for coal there is further guidance in the *Australian Coal Guidelines*, which are referenced in The JORC Code
- The Competent Person's confidence in both geological and quality continuity is critical for classification.

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attend the branch meeting.

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## Supplementary Slides

### JORC compliant!

- The JORC Code is a Code for reporting not estimating
- Reports which say "these are JORC compliant resource estimates" or "we intend to produce JORC compliant resources next quarter" are in the view of JORC potentially misleading.
- However JORC believes that the words are now rather common and so JORC should define what we understand them to mean, which is:  
**"Reported in accordance with the JORC Code and estimated (or based on documentation prepared) by a Competent Person".**

## Public Reports

- There are examples of reports that may not appear to be in accordance with the JORC Code
- '*They should do something*' is the cry
- But who is "*they*" and how do we know if they are doing something?
- The most important *they* is *you*.
- What should you do? Look on the JORC website for advice. But don't expect someone else to do it for you. It is our industry and we all must ensure the standards are kept high.

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