

**AMC**

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# **Public Reporting of Handheld XRF Data in line with ... ... The JORC Code**

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# The JORC Code – 1

- Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves
- Prepared by the Joint Ore Reserves Committee (JORC) comprising:
  - AusIMM
  - AIG
  - MCA

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)

# The JORC Code – 2

- Sets out minimum standards for public reporting of Exploration Results, Mineral Resources and Ore Reserves in Australia & New Zealand
- Provides extensive guidelines on the criteria to be considered when preparing public reports
- First edition published in 1989, with updates in 1992, 1996, 1999 and 2004
- Applicable to all solid minerals including coal, diamonds, other gemstones and industrial minerals
- Incorporated into the listing rules of both the Australian and New Zealand stock exchanges

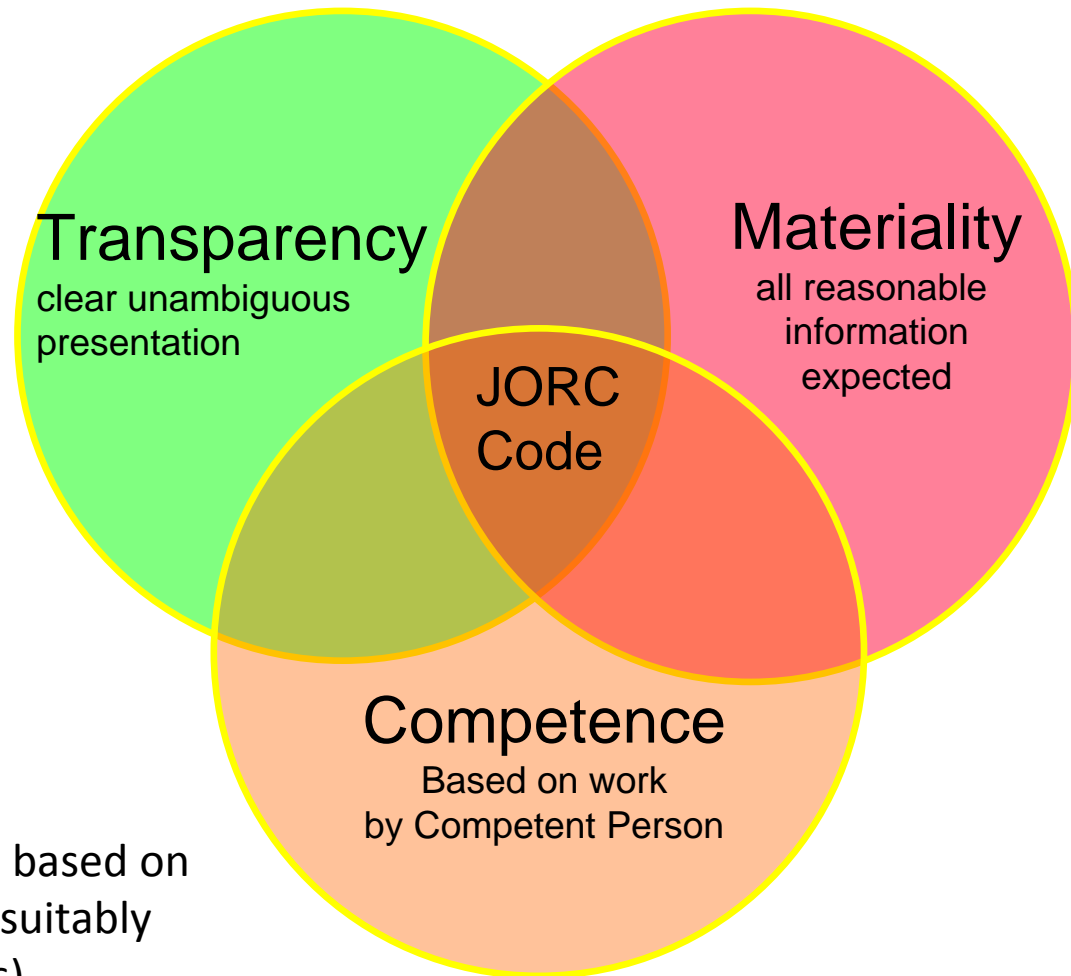
# The JORC Code

## A Principles based code

**Transparency** i.e. the reader of a public report is provided with sufficient information that is clear, unambiguous, understandable

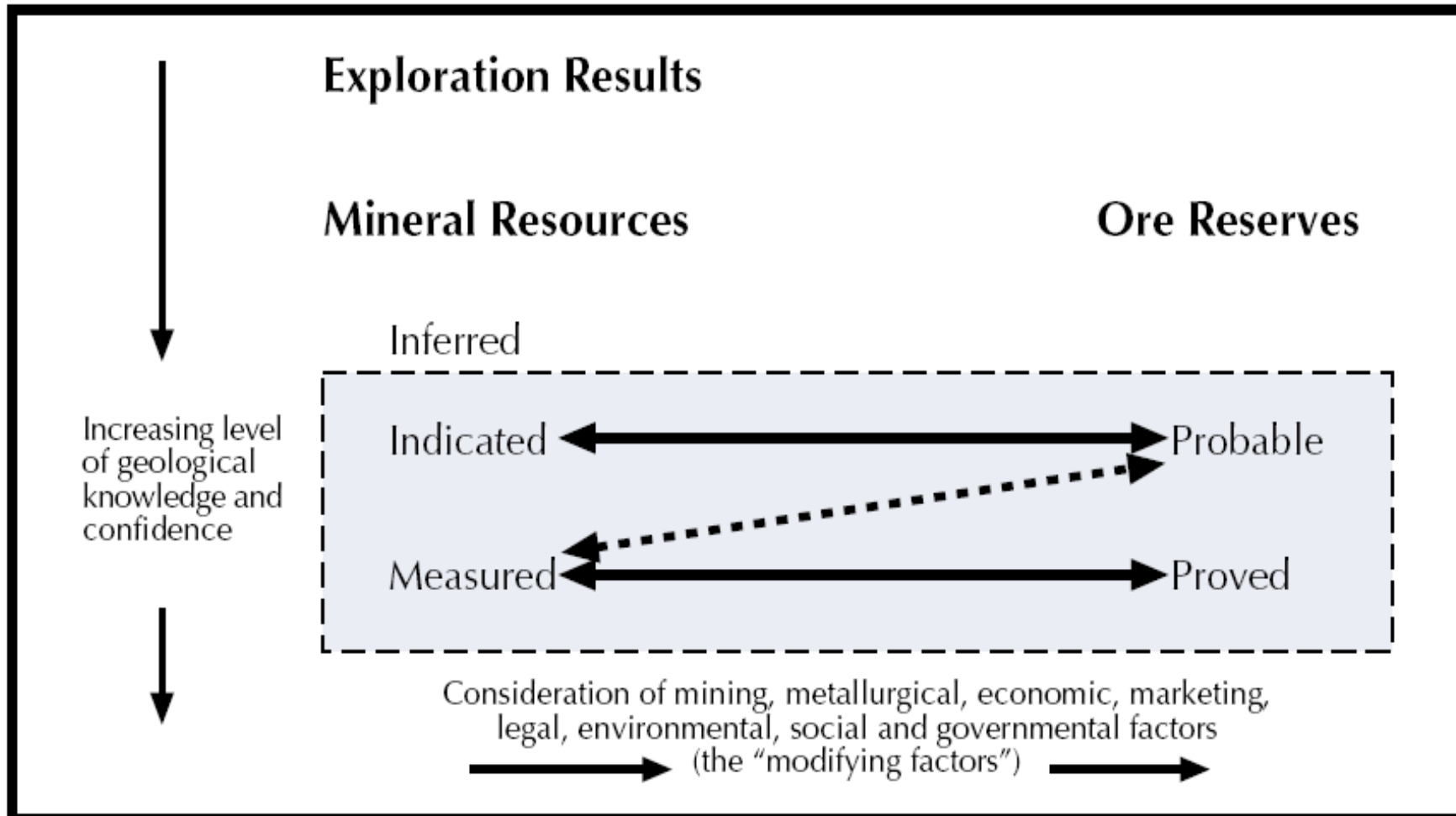
**Materiality** i.e. public reports contain all relevant information reasonably required and expected by investors and professional advisors to make balanced judgements

**Competence** i.e. public reports are based on work which is the responsibility of suitably qualified and experienced person(s)



# The JORC Code – Figure 1

## Relationship between Exploration Results, Mineral Resources and Ore Reserves



# XRF Data and The JORC Code

- Public companies may wish to report data collected using handheld XRF instruments relevant to:
  - Exploration Results
  - Mineral Resources
- This data may relate directly to economic minerals being explored for e.g. Cu, Pb, Zn, Ni, W, U etc or elements associated with the economic minerals being explored for

# Information relevant to Handheld XRF data from JORC Code Table 1

- SAMPLING RELATED ISSUES:
  - Nature and quality of sampling and measures taken to ensure sample representivity
  - Nature, quality and appropriateness of the sample preparation technique
  - Measures taken to ensure that the sampling is representative
  - Whether sample sizes are appropriate to the grainsize of the material being sampled

# Information relevant to Handheld XRF data from JORC Code Table 1

- ANALYSIS RELATED ISSUES:
  - Nature, quality and appropriateness of the assaying and laboratory procedures used
  - Whether the technique is considered a partial or total analysis
  - Nature of quality control procedures adopted e.g. standards, blanks, duplicates, etc
  - Whether acceptable levels of accuracy and precision have been established



# Additional Relevant Info from ASX Companies Update (3 May 2007)

- SUGGESTED ENHANCEMENT TO JORC CODE TABLE 1 DESCRIPTION OF “SAMPLING TECHNIQUES”:
  - Nature and quality of sampling (e.g. cut channels, random chips, specific specialised industry standard measurement tools appropriate to minerals under investigation such as downhole gamma sondes and prompt fission neutron bore hole probes etc). Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used

# MATERIALITY – The key Issue to consider when publicly reporting handheld XRF Data

- How important or prominent is the XRF data in the public report? E.g.:
  - If the XRF data is the core of what is presented in the announcement, it is essential to provide the reader with details of sampling, analysis and interpretation
  - If the XRF data is an ancillary part of the announcement, it is prudent to provide the reader with some level of supporting information – the degree of which should be commensurate with the importance of the XRF data to the report

“Rock chip sampling at Halleys from an ironstone outcrop returned a peak assay of 0.54% Cu, 0.24% Ni, 249ppb PGE+Au and 0.05% Co. Recent follow-up sampling, using a handheld XRF machine, has yielded even higher rock-chip values of 0.73% Cu and 0.43% Ni from the main exposure, which is a low hill with at least four separate ironstone bands (assay results from the laboratory are pending).”

“On site assays, using a handheld XRF, define a 1.4km long Cu anomaly up to 800m wide at >200ppm Cu with numerous values greater than 500ppm Cu.”

“Peak rock-chip values from the anomaly (analysed on-site with a hand held XRF) are 670ppm Cu, 62ppm Mo, 0.13% Pb and 65 ppm As, but assays from the laboratory are still pending.”

“The Company continued with regional exploration during the Quarter, with the assessment of the results from the geological mapping, conventional -80 mesh multi-element soil geochemistry, handheld Niton® XRF multi-element soil analysis, and high density regional stream sediment Bulk Leach Extractable Gold (BLEG) sampling programmes.”

“The handheld Niton® XRF soil program covered an area of 12.5km centred over the Cerro del Gallo gold-silver-copper deposit. A total of 3,107 samples were analysed during the program. A total of 10 geochemical anomalies were identified based on individual or coincident values greater than either 100ppm Cu, 120ppm Pb or 230ppm Zn; except for the Southern anomaly, which is based on coincident values greater than 60ppm Cu, 5ppm Mo and 22ppb Au.”



**COPPERMOLY**

Limited and wholly owned subsidiary - Copper Quest (PNG) Limited

“A soil sampling programme was completed in 2008 along the geophysical survey lines. Samples were taken beneath the surface tephra cover and measured with the \*Niton XRF. A 500m by 300m zone of anomalous copper (> 100 ppm) occurs over the topographic hill. Anomalous zinc and molybdenum samples surround the copper anomaly, indicating a broader mineralising event that is yet to be tested by drilling.”

“ \*Niton XRF - The Niton XRF unit is a Company owned portable analyser of various elements/metals, which utilises an x-ray fluorescence tube to take rapid measurements over a pin-point area. It is used by Coppermoly Limited employees to take readings on drill core, rock outcrop and soil samples to evaluate the tenor but not absolute value of the contained mineralisation. The readings are not verified by an independent laboratory.”



**MARENGO**  
MINING LIMITED

“The prospect has been subject to geological mapping and outcrop chip sampling over past weeks. To date, a total of 122 rock chip samples have been collected and tested with a Niton XRF Analyser (refer to Notes). Of these, 32 samples have returned copper readings between **0.1% and 36.9% Cu**. In addition, two samples were submitted for fire assay gold with results of 0.55 and 0.08 g/t Au.”

***“Notes: Niton XRF Analyser***

*The estimates of Cu for rock chip samples referred to in this release are based on an average of multiple readings on pulped rock samples using a Niton XLt3 portable XRF analyser. Whilst Marengo believes that these readings are indicative of grade, the Company wishes to make clear that the Niton results are not formal assays and are an estimate of Cu grades only.”*



“Early field sampling with a portable XRF machine indicated excellent U<sub>3</sub>O<sub>8</sub> concentrations of up to 4,120 ppm (ASX announcement 16th July 2009) and this was confirmed by laboratory XRF analyses on rock chip samples (ASX announcement 27th August 2009).”

“Although a direct correlation cannot be made between the reported uranium values made by the portable Niton XL3t XRF unit and the laboratory XRF values which are determined from much larger rock samples, they both provide a strong confirmation of the presence of uranium in outcrop and also indicate that thorium values are low (Table 1).”



**Table 1. Laboratory XRF and Niton XRF uranium and thorium values from Anomaly B - at Crystal Creek.**

Sample location	Easting	Northing	XRF U Niton (ppm)	Lab XRF U (ppm)	XRF Th Niton (ppm)	Lab XRF Th (ppm)
83001	743801	7541681	311 ( $\pm$ 61)	80	b.d	15
83002	744018	7541726	30 ( $\pm$ 18)	75	b.d	15
83003	743244	7541397	b.d	60	b.d	25
83004	743801	7541681	311 ( $\pm$ 61)	50	b.d	15
83005	743340	7541697	202 ( $\pm$ 57)	90	64 ( $\pm$ 33)	20
83006	743558	7541753	3500 ( $\pm$ 209)	4000	b.d	20
83007	743441	7541716	374 ( $\pm$ 71)	215	b.d	15
83008	743368	7541692	350 ( $\pm$ 57)	55	b.d	15
83009	743558	7541753	2644 ( $\pm$ 174)	3600	61 ( $\pm$ 40)	15
83010	743356	7541685	262 ( $\pm$ 80)	145	b.d	15
83011	741864	7541191	1438 ( $\pm$ 140)	700	b.d	15
83012	743441	7541716	374 ( $\pm$ 71)	115	b.d	25
83016	743356	7541685	262 ( $\pm$ 80)	130	b.d	20
83017	742814	7541575	b.d	45	b.d	15
83018	740827	7540888	b.d	25	b.d	20
83019	743340	7541697	130 ( $\pm$ 42)	110	39 ( $\pm$ 23)	20



# Conclusions

- Reporting of Handheld XRF results as a relevant part of a report on Exploration Results or Mineral Resources is no different to the reporting of any other results
- The Competent Person must exercise his or her professional judgement and to be able to demonstrate the reliability of the information to peers, and not mislead the investor
- The guiding principles of Materiality and Transparency of the JORC Code must be applied, and the checklist in Table 1 is a useful and helpful reference

Thank you ...  
... Questions???

