International Reporting Codes: Mineral Resources and Ore Reserves
How the JORC Code, NI43-101 & other codes work

Presenter: Gerry Fahey
Principal Mining Geologist

Camborne School of Mines Delegation
Visit to Australia

Date: 10/07/2018
Welcome to Camborne School of Mines Delegation on your visit to CSA Global
Your Presenter

Gerry Fahey

- Former WA Chairman of the Australian Institute of Geoscientists (AIG)
- Formerly on the Executive of JORC (14 years)
- Principal Mining Geologist CSA Global
- Onsite grade enhancement strategies
- Feasibility studies, company advice on JORC and NI43-101 and Independent Geologist’s Reports.
- Currently Director of Focus Minerals and Prospect Resources (ASX listed companies)
Outline

• Why have the JORC Code – a brief history

• What is the JORC Code and Principles of the Code

• Other Reporting Codes

• Mineral Resource Reporting

• Wrap up Summary
History and Background

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 Before 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 unacceptable reporting practices ➔ “The Poseidon Boom & Bust”
HISTORY OF THE JORC CODE
The History of the JORC Code

The JORC Code
Joint Ore Reserves Committee Code

- 1971 - JORC formed by AMIC; joined by AusIMM
- 1971 to 1985 - JORC guidelines on classification/reporting
- 1989 – first edition of JORC Code into ASX Listing Rules
- 2012 – sixth edition of JORC Code
## JORC Family Mineral Resource and Ore Reserve Reporting Codes

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What is the JORC Code?

The JORC Code is about the **reporting** of Exploration Results, Resources & Reserves

- About reporting — **not how** to estimate resources & reserves
- Company report must be signed-off by a **“Competent Person”**

Must be a member of the AusIMM, AIG or a Recognised Professional Organisation (RPO)
Who is JORC?

Mineral industry professionals associations

- AusIMM
- AIG

Mineral industry lobby group

- MCA

Funding Bodies

Others

- SIA
- ASX

MCA: Mineral Council of Australia
SIA: Securities Institute of Australia
ASX: Australian Stock Exchange
How JORC Code Works

Responsible Entities

Professional & Industry Organisations
- AusIMM
- AIG
- MCA
- RPOs

Statutory / Semi-Government Organisations
- ASIC
- ASX

Regulatory Organisations

Compliance & Guidance Standards

Those Required to Comply

Competent Person

Incorporated as Appendix

Professionals

Publicly listed companies

Corporations

Law

after P Stephenson AMC
How JORC Code Works

• AIG and AusIMM
  - Complaints management systems
  - Ensure procedural fairness for alleged breach of codes
• Each organisation deals with +5 complaints per year
• If complaint is upheld, penalties can include:
  - Cautions, or reprimands and counselling
  - Publication of name
  - Suspensions from membership
  - Expulsion from membership
AIG Complaints Process

1. **Complaint made by member or non-member**
   - **Ethics & Standards Committee initially reviews allegation**
     - **Involves more serious complaint**
     - **Documents evidence to support complaint or dismissal of complaint**
     - **Ethics & Standards Committee decides whether allegation is upheld or not, and appropriate penalty**
       - **Appeal to Council**
         - **Council upholds or varies Ethics & Standards Committee decision**
         - **Penalty applied. For expulsion, requires vote of at least two thirds of eligible Council members**
     - **No breach of Code of Ethics found**
       - **Appeal upheld - member appeals**
         - **Council advises Ethics & Standards Committee**
       - **Allegation upheld - member accepts Ethics & Standards Committee decision**
   - **Member sent warning letter**
   - **Complaint dismissed**

2. **Very minor breach only**
   - **Insufficient grounds to support complaint or frivolous**
Figure 1: Results, Resources & Reserves 2012

Exploration Results

Mineral Resources

- Inferred
- Indicated
- Measured

Ore Reserves

- Probable
- Proved

Increasing level of geological knowledge and confidence

Consideration of mining, processing, metallurgical, infrastructure, economic, marketing, legal, environment, social and government factors (the “Modifying Factors”).
JORC Stakeholders

Resource & Reserve Estimators

Mining Company Management

Investment Community

Financing Community

&

Capital Market Regulations
PRINCIPLES OF THE JORC CODE
Principles of JORC Code

Clause 4 describes the **foundations** of the JORC Code

- **Transparency**
- **Materiality**
- **Competence**

**JORC Compliant Reports**
Transparency Issue

Sufficient information, clear unambiguous reporting and must not be misleading
Materiality

Relevant information and scale for balanced reporting

Small Company vs Large Company
Competence

1. Relevant experience
2. Responsibility
3. Accountability

Mineral Resource / Ore Reserve Estimation Meeting
JORC Requirements
Features of the JORC Code

✓ Non prescriptive and is flexible

✓ Simplicity

✓ Regulatory Backing
Features of the JORC Code

- Concept of the Competent Person
- Investor in mind
- World process (continuous improvement)
Public reports made via the ASX or other stock exchange need to consider the rules of the exchange as well as the JORC Code.

- Listing Rules (ASX Listing Rules & Guidance note 31)

= Public Reporting that meets all requirements
Essence is Trust
❖ JORC is a committee
❖ The JORC Code is concerned with public reporting of exploration results, mineral resources and ore reserves
❖ The aim of such reporting is to keep financial investment markets continuously and adequately informed
❖ It does not tell you how to estimate resources and reserves
❖ Careful use of nomenclature is required by the Code
❖ Mineral resources and ore reserves estimates are not fixed or “correct” — they vary in response to economic, technical and government factors
OTHER REPORTING CODES
What Codes Are Out There?
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
NI 43-101 REPORTING
CRIRSCO and Other Codes

CRIRSCO Members (currently 11)
- JORC (Australasia)
- CBRR (Brazil)
- CIM (Canada)
- Comision Minera (Chile)
- PERC (Europe)
- MPIGM (Mongolia)
- NAEN (Russia)
- SAMCODES (South Africa)
- SME (United States of America)
- PONEN Code Kazakhstan Reporting Code (KAZRC)
- KCMI (Indonesia)

Other reporting codes not equivalent to the CRIRSCO family of reporting standards:
- United Nations Framework Classification,
- Other example includes China and Russian GKZ
## CRIRSCO and Other Codes

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<tr>
<th>Country</th>
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Eligibility for Membership of CRIRSCO

• Produce and be responsible for maintaining a reporting standard compatible with the Template

• Agree to international consulting with CRIRSCO National Reporting Organisations (NROs) prior to amending its reporting standard

• Include self regulating professional bodies with disciplinary power and codes of ethics

• Engage with CRIRSCO activities
Potential New Members of CRIRSCO

- China
- Turkey
- Colombia
- Peru
- Mexico
Current List of RPOs

Professional Organisation
- Institute of Materials, Minerals and Mining
- Geological Society of London
- Institute of Geologists of Ireland
- European Federation of Geologists
- Mining and Metallurgical Society of America
- American Institute of Professional Geologists
- Society for Mining, Metallurgy & Exploration
- Engineering Council of South Africa
- South African Council for Natural Scientific Professions
- Geological Society of South Africa
- The Southern African Institute of Mining and Metallurgy
- South African Council for Professional and Technical Surveyors

Minimum Membership Class Required
- Member (MIMMM) or Fellow (FIMMM)
- Chartered Geologist (CGeol), Chartered Scientist (CSci) or European Geologist (EurGeol)
- Professional Geologist (PGeo)
- European Geologist (EurGeol)
- Qualified Professional (QP)
- Certified Professional Geologist (CPG)
- SME Registered Member
- Professional Engineer (Pr Eng)
- Professional Natural Scientist (Pr.Sci.Nat.)
- Member or Fellow
- Member or Fellow
- Mine Surveyors and Professional Mine Surveyors

UK and Europe

USA

South Africa
Reporting to NI 43-101 Canada

• Canadian Institute of Mining, Metallurgy and Petroleum (CIM)

• Latest CIM Guidelines adopted Nov 2010

• Canadian Securities Administrators (CSA)

• National Instrument NI 43-101 came into force 2001

• Latest NI 43-101 effective from June 30th 2011
Technical Report Items

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UNFC Three-Dimensional Classification and Codification System

UNECE = 3 D Classification
CRIRSCO = 2 D classification
GKZ Russian CRIRSCO Conversion Guidance

Russian Code v CRIRSCO 2011
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MINERAL RESOURCES AND ORE RESERVES
Statistics of estimating contents of a room by drilling
Geostatistics of Resource Estimates

Block modelling

(● = drillhole)
Geology Mapping and Stratigraphy

Fig 4 - Kanowna Belle open pit geology projected to 10 280 m RL, showing major rock units, structures and orebodies.
## Comparison of International Codes

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<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3**</td>
</tr>
<tr>
<td>Commodity price process specified by regulator</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>ROPO-type reciprocal system</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Level of study:**
- 1 = appropriate assessments and studies as determined by Competent Person
- 2 = pre-feasibility study - expected (UK/W Europe) or required (Canada, Chile)
- 3 = feasibility study for new projects
- 3** = feasibility study for Proved Reserves, pre-feasibility study for Probable Reserves

**RPO** = Recognised Overseas Professional Organisation

**X*** = Allowed in certain restricted circumstances
About CSA Global

CSA Global is a leading mining, geological, technology and management consulting company which provides high quality solutions to our clients in the global minerals industry.

Our team include mining engineers, geologists project managers, data and information technology management professionals and various support personnel.
Our Points Of Difference

**HISTORY**
More than 30 years of acquired geological and commodity expertise.

**COMMUNITY**
We always seek to bring together the right skills and knowledge to support the communities in which we work.

**TECHNICAL EXPERTISE**
Substantial in-house capabilities across geophysical, geotechnical, engineering, mining and technology.

**GLOBAL PRESENCE**
11 offices in 8 countries; Australia, Russia, UK, UAE, Canada, South Africa, Singapore and Indonesia.

**COMMODITY**
Our specialists have worked across all commodities and minerals and have a wealth of experience across geographies.

**FULL PROJECT CAPABILITY**
Provision of expert advice across all stages of the project; from generation to exploration, evaluation, operations and corporate.
Services Across Divisions

**MINING**
- Mining and engineering studies
- Reserve assessment reviews
- Mine optimisation
- Ore reserve estimation & reporting
- Grade control & reconciliation

**CORPORATE**
- Project reviews
- Due diligence
- Expert valuations
- Independent reports
- Geo-corporate advice
- Secure information hosting

**RESOURCES**
- QAAC
- Geological interpretation
- 3D modelling
- Geostatistical analysis
- Mineral Resource & Ore Reserve estimation
- JORC, SAMREC, NI 43-101
- Risk analysis

**EXPLORATION**
- Mineral systems targeting & project generation
- Remote sensing & geophysics
- Geochemistry
- Mapping & field investigations
- Drill program planning & supervision

**TECHNOLOGY**
- Data management
- Visualisation & analytics
- Data systems
- IT management
- Project design & management
- Technology advice
- Cyber security
THANK YOU VERY MUCH
ENJOY YOUR STAY IN AUSTRALIA