The SAMREC Code – manual or guide

Ken Lomberg (Coffey Mining) and Steven Rupprecht (University of Johannesburg)
### Outline

- Background
- The Importance of the Reporting Codes
- Role of the SAMREC Code
- Role of the Competent Person
- Changes to The SAMREC Code

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### Chairman of SAMREC

**Ken Lomberg**

BSc(Hons) Geology, BCom, MEng
FGSSA, Pr.Sci.Nat.
Senior Principal Consultant
Coffey Mining
30 years experience in SA
Deputy Chairman of SAMREC

Steven Rupprecht

BSc, PhD, Pr.Eng.
Senior Lecturer
University of Johannesburg

UNIVERSITY OF JOHANNESBURG

30 years experience in SA

Background and History of the SAMREC Code

1971 JORC Committee
1980 USGS Circular 831
1989 JORC Code Published
1992 SAMREC WG Formed
1994 CMMI initiative (CRIRSCO)
1995 Denver Accord
1996 SAMREC Code
2002 CRIRSCO formed
2004 SAMREC Code
2016 SAMREC Code

Adopted by JSE
Adopted by SAIMM, GSSA, SACNASP, ECSA, PLATO

The SAMREC Code – manual or guide
CRIRSCO Template – Figure 1

Denver Accord 1997

The SAMREC Code – manual or guide
The mining industry is a vital contributor to national and global economies; never more so than at present with soaring demand for the commodities that it produces. It is a truly international business that depends on the trust and confidence of investors and other stakeholders for its financial and operational well-being. Unlike many other industries, it is based on depleting mineral assets, the knowledge of which is imperfect prior to the commencement of extraction. It is therefore essential that the industry communicates the risks associated with investment effectively and transparently in order to earn the level of trust necessary to underpin its activities.

(CRIRSCO Website)
The Importance of the Reporting Codes

- Provides minimum standards for reporting of Exploration Results, Mineral Resources and Mineral Reserves;
- Adds credibility to declarations by project promoters and assists in comparisons due to the uniform basis of declaration;
- Assists professionals by providing guidance; and
- Assists the Competent Person to demonstrate the legitimacy of the declaration and provides credibility to the Public Report.

Promoting High Standards of Reporting
- Maintaining the trust of investors and other interested parties

Role of the Competent Person

- Fully Understand the meaning and the responsibilities
- What it is not just:-
  - about the professional training received
  - Suitable experience
  - having a supervisory role
  - Being designated
- Takes responsibility for that part of the Public Report
- Key professions supported by other professionals
  - geologists
  - Surveyors
  - Mining engineers
  - economists
  - metallurgists
  - Engineers (geotechnical, ventilation, civil, mechanical, electrical)
  - environmentalists
  - social scientists/practitioners, and
  - lawyers etc.
Contributing professionals to justify and document their technical inputs

This approach relies on the professional to be prepared to face their peers and being willing to take responsibility for the result.

The guidelines
- support these declarations,
- the sustainability of the industry and
- the efficient exploration of minerals.

South African Geomatics Council (SAGC) and Institute of Mine Surveyors of South Africa (IMSSA) replace PLATO
Analogy of a Competent Person

Commercial Pilots Licence

- Private Pilots Licence
- Night qualification
- Multi-Engine Rating
- Instrument Rating
- Type rating of a specific aircraft
- Regular checks and updates

Competent Person

- Basic qualification
- 5 Years experience
- Registration – Pr.Sci.Nat.
- (Specific) Relevant experience
- Regular training

Motivation to review and upgrade the Code

- The mineral industry has advanced and changed focus as the prevailing economic and political circumstances have changed;
- The manner in which projects and mines are funded, developed, and operated, is continually changing;
- There are shifting requirements by the investment community, government and society (social licence to operate);
- There is a need to promote greater efficiency in the capital raising and fund utilisation for exploration, mining, and production companies; and
- SAMREC must keep abreast of the advances made by other international reporting codes and eliminate possible contradictory reporting practices.
### CRIRSCO Definitions adopted

- Measured Resources
- Mineral Reserve
- Probable Reserve
- Proved Reserve
- Scoping Study
- Pre-Feasibility Study
- Feasibility Study
- Public Reports
- Competent Person
- Modifying Factors
- Exploration Target
- Exploration Results
- Mineral Resource
- Indicated Resource
- Inferred Resource

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### Exploration Results

- Been used (and occasionally abused)
- Represents the entry level to declarations
- “presented in a way that unreasonably implies the discovery of potentially economic mineralisation”
- Referring to the deposit as Mineralisation is used so as not to communicate any degree of technical or economic reliance
- Exploration Targets unchanged in that ranges of tonnes and grade
It is hoped that this will clearly indicate the low level of confidence in the information and ensure that a reported Exploration Target cannot be misconstrued or misrepresented as a Mineral Resource or Mineral Reserve.

Risks and Table 1

Do You know what You COULD do? SHOULD do? MUST do?
Expansion of aspects of Table 1

- New format
- Tried to follow table of contents
- Looked widely at other codes and requirements
- Specific Coal requirements
- Specific Gemstones and Diamonds
- Specific Industrial Minerals
- Specific Metal Equivalents
- Emphasis on economics & transparency/materiality
- Issue of what investors require – noted in Readers Panel
- Information about the assessment of RPEEE

Updated Table 1

<table>
<thead>
<tr>
<th>Exploration Results</th>
<th>Mineral Resources</th>
<th>Mineral Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 1: Project Outline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 2: Geological Setting, Deposit, Mineralisation</td>
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<td></td>
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<tr>
<td>Section 3: Exploration and Drilling, Sampling Techniques and Data</td>
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<td></td>
</tr>
<tr>
<td>Section 4: Estimation and Reporting of Exploration Results and Mineral Resources</td>
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<td></td>
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<tr>
<td>Section 5: Technical Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 6: Estimation and Reporting of Mineral Reserves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 7: Audits and Reviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 8: Other Relevant Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 9: Qualification of Competent Person(s) and other key technical staff. Date and Signature Page</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 10: Reporting of for Coal Resources and Reserves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 11: Reporting of Diamonds and Gemstones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 12: Reporting of Industrial Minerals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 13: Reporting using Metal Equivalents</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 4.1 Geological Model and Interpretation

- **(i)** Describe the geological model, construction technique and assumptions that forms the basis for the Exploration Results or Mineral Resource estimate.
- **(ii)** Discuss the sufficiency of data density to assure continuity of mineralisation and geology and provide an adequate basis for the estimation and classification procedures applied.
- **(iii)** Describe the nature, detail and reliability of geological information with which, lithological, structural, mineralogical, alteration or other geological, geometallurgical, environmental, social, infrastructural, legal and economic factors that could have a significant effect on the prospects of any possible exploration target or deposit.
- **(iv)** Discuss all known geological data that could materially influence the estimated quantity and quality of the Mineral Resource.
- **(v)** Discuss whether consideration was given to alternative interpretations or models and their possible effect (or potential risk), if any, on the Mineral Resource estimate.
- **(vi)** Discuss geological disclosures (e.g. magnitudes, per neck, domain, etc.) applied in the model, whether applied to mineralised and/or unmineralised material (e.g. potholes, faults, dykes, etc.).

### 4.2 Estimation and Modelling Techniques

- **(i)** Describe in detail the estimation techniques and assumptions used to determine the grade and tonnage ranges.
- **(ii)** Discuss the nature and appropriateness of the estimation technique(s) applied and any assumptions, including treatment of extreme grade values (cutting or capping), compositing (including by length and/or density), downgraining, sample spacing, estimation unit size (block size), selective mining units, interpolation parameters and maximum distance of extrapolation from data points.
- **(iii)** Describe assumptions and justification of correlations made between variables.
- **(iv)** Provide details of any relevant software used, together with the estimation parameters used.
- **(v)** State the processes of checking and validation, the comparison of model information to sample data and use of reconciliation data, and whether the Mineral Resource estimate takes account of such information.
- **(vi)** Describe the assumptions made regarding the estimation of any co-products, by-products or deleterious elements.

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- **Agreed to the principle**
- **Used of a verb i.e. ask a question**
- **Not an additional reporting requirement**
- **Triggers:**
  - Maiden announcement
  - Significant change of a Material Project
Technical Studies

- More definition and guidelines included for:
  - Scoping Study
  - Pre-feasibility Study
  - Feasibility Study
  - Guideline Table added
  - Additional table in line with SME

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**A Scoping Study** is an order of magnitude technical and economic study of the potential viability of Mineral Resources that includes appropriate assessments of realistically assumed Modifying Factors together with any other relevant operational factors that are necessary to demonstrate at the time of reporting that progress to a Pre-Feasibility Study can be reasonably justified.

A **Pre-Feasibility Study** is a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on the Modifying Factors and the evaluation of any other relevant factors which are sufficient for a Competent Person, acting reasonably, to determine if all or part of the Mineral Resource may be converted to a Mineral Reserve at the time of reporting. A Pre-Feasibility Study is at a lower confidence level than a Feasibility Study.

A **Feasibility Study** is a comprehensive technical and economic study of the selected development option for a mineral project that includes appropriately detailed assessments of applicable Modifying Factors together with any other relevant operational factors and detailed financial analysis that are necessary to demonstrate at the time of reporting that extraction is reasonably justified (economically mineable). The results of the study may reasonably serve as the basis for a final decision by a proponent or financial institution to proceed with, or finance, the development of the project. The confidence level of the study will be higher than that of a Pre-Feasibility Study.

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### Table 2 – Capital Costs

<table>
<thead>
<tr>
<th>Capital Cost Category</th>
<th>Scoping Study</th>
<th>Prefeasibility Study</th>
<th>Feasibility Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basis of Estimate to include the following areas:</td>
<td>Order-of-magnitude, based on historic data or factoring. Engineering &lt; 5% complete.</td>
<td>Estimated from historic factors or percentages and vendor quotes based on material volumes. Engineering at 5-20% complete.</td>
<td>Detailed from engineering at 20% to 50% complete, estimated material take-off quantities, and multiple vendor quotations.</td>
</tr>
<tr>
<td>Civil/structural, architectural, piping/HVAC, electrical, instrumentation, construction labour, construction labour productivity, material volumes/amounts, material/equipment, pricing, infrastructure</td>
<td>Percentage of direct cost by area for contractors, historic for subcontractors</td>
<td>Written quotes from contractor and subcontractors</td>
<td></td>
</tr>
<tr>
<td>Contractors</td>
<td>Included in unit cost or as a percentage of total cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering, procurement, and construction management (EPCM)</td>
<td>Percentage of estimated construction cost</td>
<td>Percentage of detailed construction cost</td>
<td>Calculated estimate from EPCM</td>
</tr>
<tr>
<td>Pricing</td>
<td>FOB mine site, including taxes and duties</td>
<td>FOB mine site, including taxes and duties</td>
<td>FOB mine site, including taxes and duties</td>
</tr>
<tr>
<td>Owner’s costs</td>
<td>Historic estimate</td>
<td>Estimate from experience, factored from similar project</td>
<td>Estimate prepared from detailed zero-based budget</td>
</tr>
<tr>
<td>Environmental compliance</td>
<td>Factored from historic estimate</td>
<td>Estimate from experience, factored from similar project</td>
<td>Estimate prepared from detailed zero-based budget for design engineering and specific permit requirements</td>
</tr>
<tr>
<td>Escalation</td>
<td>Not considered</td>
<td>Based on entity’s current budget percentage</td>
<td>Based on cost area with risk</td>
</tr>
<tr>
<td>Accuracy Range (Order of magnitude)</td>
<td>±50%</td>
<td>±15-25%</td>
<td>±10-15%</td>
</tr>
<tr>
<td>Contingency Range (Allowance for items not specified in scope that will be needed)</td>
<td>+25%</td>
<td>+15%</td>
<td>+10% (actual to be determined based on risk analysis)</td>
</tr>
</tbody>
</table>

### Table 2 – Operating Costs

<table>
<thead>
<tr>
<th>Operating Cost Category</th>
<th>Scoping Study</th>
<th>Prefeasibility Study</th>
<th>Feasibility Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basis</td>
<td>Order-of-magnitude, based on historic data or factoring.</td>
<td>Estimated from historic factors or percentages and vendor quotes based on material volumes.</td>
<td>Detailed estimate</td>
</tr>
<tr>
<td>Operating quantities</td>
<td>General</td>
<td>Specific estimates with some factoring</td>
<td>Detailed estimates</td>
</tr>
<tr>
<td>Unit costs</td>
<td>Based on historic data for factoring</td>
<td>Letter quotes from vendors; minimal factoring</td>
<td></td>
</tr>
<tr>
<td>Accuracy Range</td>
<td>±25-50%</td>
<td>15% - 25%</td>
<td>10% - 15%</td>
</tr>
<tr>
<td>Contingency Range (Allowance for items not specified in scope that will be needed)</td>
<td>+25%</td>
<td>+15%</td>
<td>+10% (actual to be determined based on risk analysis)</td>
</tr>
</tbody>
</table>
**Point of Reference**

- Introduction of the principle
- Point of sale applicable to bulk commodities and industrials minerals
- Shaft head for precious and base metals
- The reference point at which Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.

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**Site Visit**

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Revision of aspects relating to Coal

The Systematic evaluation of Coal Deposits, Coal Resources and Coal Reserves (SANS 10320) provides the methodologies and definitions of the relevant terms that should be considered when preparing reports on Coal Resources and Coal Reserves.

Table 1 still applies

The confidence levels in the modifying factors must be disclosed for all ROM and Saleable Reserves.

Diamond and Gemstone section

- More comprehensive definition and general discussion
- Concern with alluvial diamonds addressed
Introduction of a section on Industrial Minerals

- Adoption of JORC approach
- Guidance provided on deleterious minerals and product specifications

Introduction of a section on Metal Equivalence

- Adoption of JORC approach
- Guidance provided on use of price, grade and metallurgical recovery
# Table of Contents

Along the lines of NI 43-101

<table>
<thead>
<tr>
<th>Recommended Table of Contents for Competent Persons Report (CPR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>This table of contents is given only as a guide to the compilation of CPR. It is designed to summarise all major requirements of Table 1 of the Code.</td>
</tr>
<tr>
<td>Title Page</td>
</tr>
<tr>
<td>Include a title page setting out the title of the CPR, the name and professional designation of each of the Competent Persons, their firms, and the preparation date.</td>
</tr>
<tr>
<td>Executive Summary</td>
</tr>
<tr>
<td>Briefly summarise the objectives of the CPR, including project description and location, general description of mineral resource or reserve, and requirements for disclosure.</td>
</tr>
<tr>
<td>Tables of Contents</td>
</tr>
<tr>
<td>Provide a list of contents listing the contents of the CPR, including figures and tables.</td>
</tr>
</tbody>
</table>

## 1. Introduction

- Name of author(s) and title
- Purpose and objectives of the CPR
- Methodology used in the CPR
- Scope and limitations of the CPR
- Acknowledgements (if any)

## 2. Project Outline

- Description of the Project
- Description of the Mineral Resource or Reserve
- Description of the Methodology
- Description of the Results
- Description of the Conclusions

## 3. Accessibility, Geology, Climate, Local Resources and Infrastructure

- Accessibility
- Geology
- Climate
- Local Resources
- Infrastructure

## 4. Project History

- Previous Exploration
- Previous Mining Activities
- Previous Environmental Studies
- Previous Mineral Resource Estimates

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**Certificate of Competent Person**

Certificate of Competent Person

<table>
<thead>
<tr>
<th>Certificate of Competent Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>By virtue of the provisions of NI 43-101, I hereby certify that:</td>
</tr>
<tr>
<td>1. I have reviewed the Project in detail and have reasonable knowledge of the subject matter.</td>
</tr>
<tr>
<td>2. I have access to all information relevant to the Project.</td>
</tr>
<tr>
<td>3. I have reviewed all relevant data and information relevant to the Project.</td>
</tr>
<tr>
<td>4. I have reviewed all relevant reports and studies related to the Project.</td>
</tr>
<tr>
<td>5. I have reviewed all relevant licences and agreements related to the Project.</td>
</tr>
<tr>
<td>6. I have reviewed all relevant environmental assessments related to the Project.</td>
</tr>
<tr>
<td>7. I have reviewed all relevant social and economic assessments related to the Project.</td>
</tr>
<tr>
<td>8. I have reviewed all relevant financial assessments related to the Project.</td>
</tr>
<tr>
<td>9. I have reviewed all relevant geological and geotechnical assessments related to the Project.</td>
</tr>
<tr>
<td>10. I have reviewed all relevant engineering and technical assessments related to the Project.</td>
</tr>
<tr>
<td>11. I have reviewed all relevant regulatory assessments related to the Project.</td>
</tr>
<tr>
<td>12. I have reviewed all relevant operating assessments related to the Project.</td>
</tr>
<tr>
<td>13. I have reviewed all relevant security assessments related to the Project.</td>
</tr>
<tr>
<td>14. I have reviewed all relevant health and safety assessments related to the Project.</td>
</tr>
<tr>
<td>15. I have reviewed all relevant social and economic assessments related to the Project.</td>
</tr>
<tr>
<td>16. I have reviewed all relevant environmental assessments related to the Project.</td>
</tr>
<tr>
<td>17. I have reviewed all relevant legal and regulatory assessments related to the Project.</td>
</tr>
</tbody>
</table>

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Modifying Factors are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors.
A ‘Mineable Tonnes In Situ Coal Resource’ is the tonnage and coal quality, at a specified moisture content, contained in the coal seams or sections of the seams at the theoretical mining height, adjusted by the geological loss factors.
Guideline or Manual?

- Does not specify the technical details
- The interpretation of the raw data requires the input of specialists
- Provides these guidelines
- Mechanism to assist in the progression of mining projects
- Holding various registered professionals accountable for their work
www.samcodes.co.za