SAMCODES

THE SOUTH AFRICAN MINERAL REPORTING CODES

SAMREC
THE SOUTH AFRICAN CODE FOR THE REPORTING OF EXPLORATION RESULTS, MINERAL RESOURCES AND MINERAL RESERVES

SAMVAL
THE SOUTH AFRICAN CODE FOR THE REPORTING OF MINERAL ASSET VALUATIONS

SAMOG
THE SOUTH AFRICAN CODE FOR THE REPORTING OF OIL AND GAS RESOURCES

- An Introduction to the SAMCODES – the role of SAMESG
- Dr Tania R Marshall

Background
Poseidon Nickel

- In Australia in 1969, Poseidon NL made a major Ni discovery in Windarra (WA)
  - Shares at $0.80
  - Shares climbed steadily, based on corporate promotion
  - By February 1970, shares were at $280 when production started
- Production challenges
  - Extraction costs higher than expected
  - Grade much lower than originally thought (original grade estimations based on very limited sampling)
  - Ni price had fallen significantly after the end of the Vietnam war (1955-1975)
- In 1976, Poseidon de-listed due to insufficient profits
- Joint Ore Reserves Committee was formed and JORC Code published in 1989
  - Enforced by the ASX

Figure 9: Poseidon Share Price

Source: *Australian Financial Review*

BRE-X MINERALS

Log Format

Feb 16, 1997 : Agreement to develop Busang. Bre-X gets 45 per cent; Freeport McMoRan gets 15 per cent; the Indonesian get 40 per cent.

July 1996 : estimate 47 million ounces.

June 1996 : Busang contains 39 million ounces of gold.

May 10, 1996 : Bre-X stock price hits $286.5 on TSX. Stock splits 10-for-1. Company market value over $6 billion.

April 1996 : Begins trading on the TSX; stock hits $180.

October 1995 : 10 million ounces reserves could contain 30 million ounces.

Feb 17, 1997 : estimate 71 million ounces.

Feb 19, 1997 : may contain 200 million ounces.

March 12, 1997 : Freeport says minor amounts of gold.

March 19, 1997 : De Guzman falls to his death.

March 27, 1997 : Bre-X shares plunge to $2.50.

May 5, 1997 : Report confirms there's no gold in Busang, samples tampered with.

Report calls the Bre-X debacle as being "without precedent in the history of mining anywhere in the world." The following day, Bre-X shares fall to 80 cents and continue to plunge. The stock is soon delisted.

David Walsh

October 1993 : initial test holes encouraging.

1994-95 : ramps up drilling program.

1992-93 : Bre-X starts gold exploration in Busang, Indonesia, recommended by new geologist John Felderhof. Geologist Michael de Guzman is hired as exploration manager. Both have extensive experience in Indonesia.

John Felderhof & Michael de Guzman

Volume 1000's

- *In 2001 the CIM Code was published*
- ***Enforced by the TSX***

100 50 20 10 5 2 1 0.5 0.2 0.1 0.05 0.02 0.01 0.005 0.002 0.001

80000 60000 40000 20000 0

1990 1991 1992 1993 1994 1995 1996 1997

BACKGROUND BRE-X

SAMCODES
SAMCODES STANDARDS COMMITTEE
THE SOUTH AFRICAN MINERAL REPORTING CODES

Background
Code Development

Poseidon Nickel bubble

Pre-1970 Various classification systems

1971 JORC Committee

1989 JORC Code Published

1991 IMM Code Published

1992 SAMREC WG Formed

1992 SME Guide Published

1994 CMMI initiative (CRIRSCO)

1995 VALMIN Code published

1997 Denver Accord *(Australia, Canada, South Africa, UK, USA)*

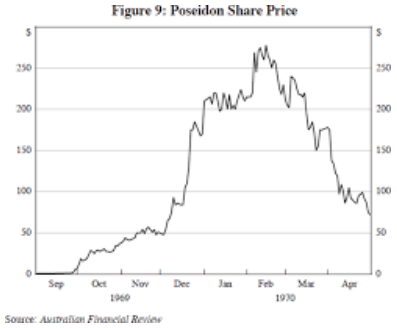
1999 CRIRSCO/UNECE Agreement (UNFC)

2000 SPE, WPC, AAPG classification system

2000 SAMREC Code

Adopted by JSE, GSSA, SAIMM, SACNASP, ECSA, PLATO (SAGC/IMSSA)

Bre-X Scandal



SAMCODES
SAMCODES STANDARDS COMMITTEE
THE SOUTH AFRICAN MINERAL REPORTING CODES

Background
Code Development

2001 CIM Code published

2002 SAMVAL WG Formed

2002 CRIRSCO formed

2003 CIMVal Code published

2007 PRMS Document

2008 SAMVAL Code Published

2008 PERC Code Published

2008 SSC Established

2011 Guidelines for application of PRMS

2012 IMVAL formed

2014 SAMOG WG Formed

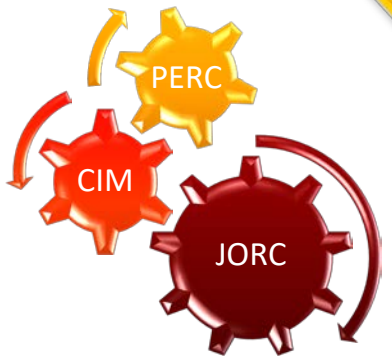
2015 SAMOG Code Published

2015 SAMESG WG Formed

2016 SAMESG Guideline Published

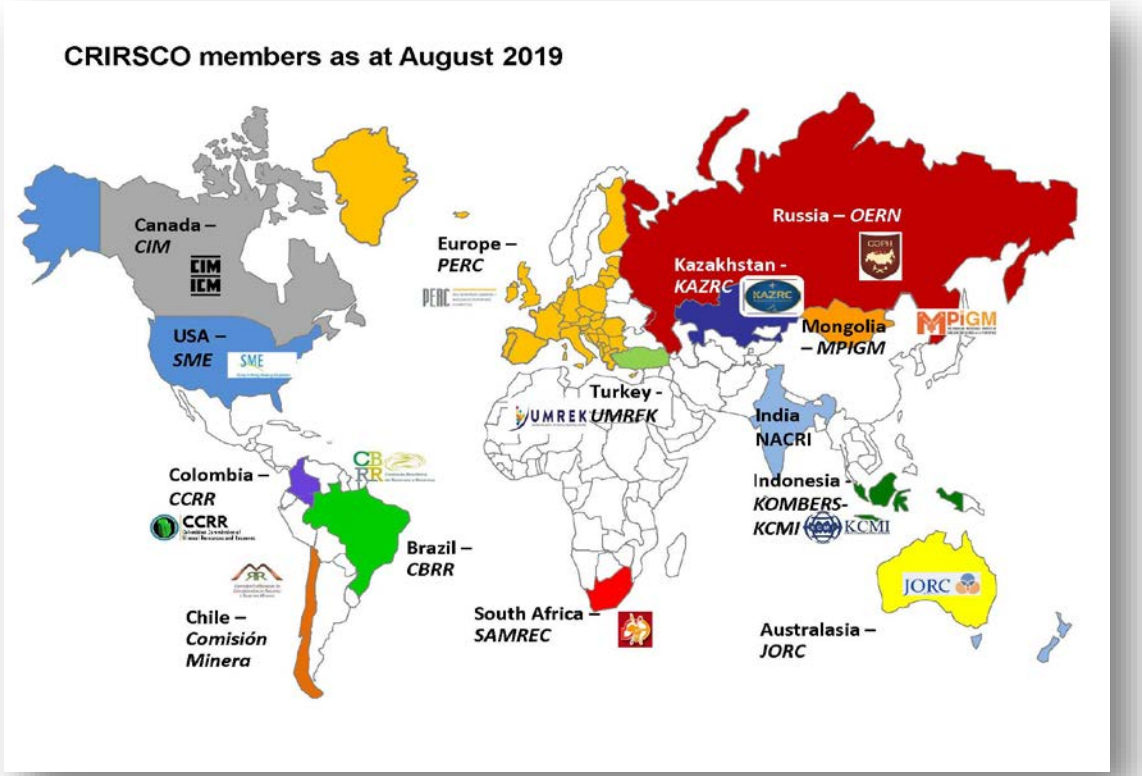
2016 SAMCODES Update & Consolidation

2018 SK 33 (SEC Amendments)



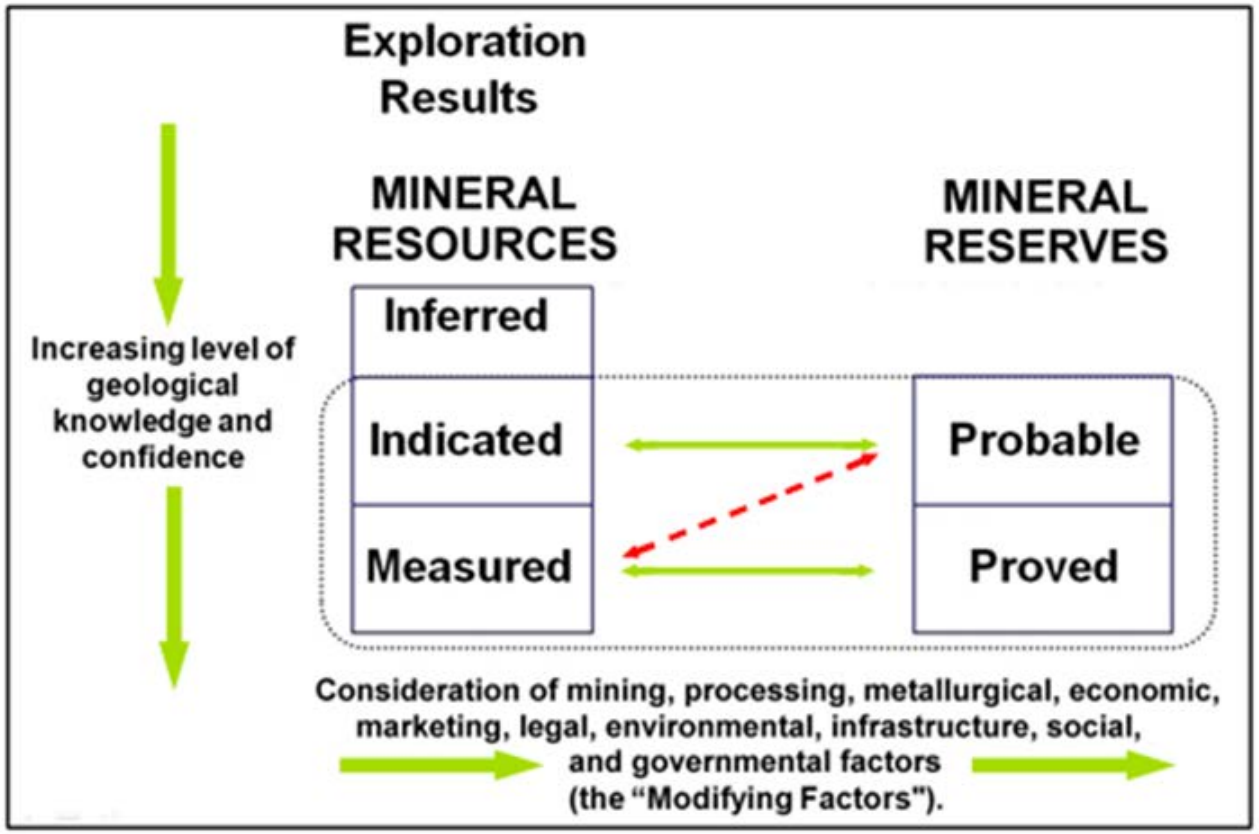
BACKGROUND CRIRSCO

- CRIRSCO is a (NGO) grouping of representatives of organisations that are responsible for developing (solid) mineral reporting codes and guidelines (for Public Reporting purposes)
  - Currently has 14 member nations each with their own national reporting code based on a common template
    - China, Mocambique, Argentina, Bolivia, Philippines, Azerbaijan in the pipeline for 2020/2021
  - +80% of listed companies worldwide report according to a CRIRSCO compliant code



BACKGROUND CRIRSCO

- Objective is to standardise terminology and definitions internationally
- Provide a reporting "template" with 15 standard definitions
  - Public Reports
  - Competent Person
  - Modifying Factors
  - Exploration Target
  - Exploration Results
  - Mineral Resource
  - Inferred Resource
  - Indicated Resource
  - Measured Resource
  - Mineral Reserve
  - Probable Reserve
  - Proved Reserve
  - Scoping Study
  - Pre-Feasibility Study
  - Feasibility study



Background Enforcement

- Supported/driven by Stock Exchange requirements and Listing Rules in any particular jurisdiction
- Professional Bodies
  - Compliance with terminologies and principles written into Code of Ethics

- Private Investors
  - Recognise the benefit of standardised terminology and principles of transparency, materiality and competence
  - Many demand Code-based documents for investment and as basis for legal contracts
- State Permitting bodies
  - Serve as an objective basis for granting of Mining Rights
  - Serve as a basis for Annual Reporting requirements
  - Serve as an objective basis for company valuation in terms of royalties and taxes

- Council for Geoscience (COG)
- Department of Mineral Resources & Energy (DMRE)
- Engineering Council of South Africa (ECSA)
- Financial Sector Conduct Authority (FSCA)
- Geological Society of South Africa (GSSA)
- Geostatistical Society of South Africa (GASA)
- General Council of the Bar (GCB)
- Investment Analysts Society of South Africa (IASSA)
- Institute of Mine Surveyors of South Africa (IMSSA)
- JSE Limited (including the Chairs of the Readers Panels)
- Law Society of South Africa (LSSA)
- Mineral Council of South Africa (MINCOSA)
- South African Geomatics Council (SAGC)
- South African Council for Natural Scientific Professions (SACNASP)
- South African Institute of Chartered Accountants (SAICA)
- Southern African Institute of Mining and Metallurgy (SAIMM)
- South African Oil & Gas Agency (SAOGA)
- Chairpersons of all Committees

BACKGROUND SSC

- Responsible for administration, promotion, update and management of the SAMCODES
  - Responsible for training
  - Deals with complaints
  - Administer issues of reciprocity
- Through relevant international bodies
  - Represented on CRIRSCO and IMVAL committee to ensure continued international alignment
- Operate under auspices of /financing from GSSA and SAIMM

SAIMM THE SOUTHERN AFRICAN INSTITUTE OF MINING AND METALLURGY

GSSA Geological Society of South Africa

BACKGROUND
SAMCODES FAMILY

CODES

- SAMREC – Public Reporting of Exploration Results, Mineral Resources/Reserves
- SAMVAL – Public Reporting of Valuation of Mineral Assets
- SAMOG – Public Reporting of Oil & Gas Resources/Reserves and Valuation

GUIDELINES

- SAMESG – Environmental, Social & Governance issues
- Diamond/Gemstone specific requirements

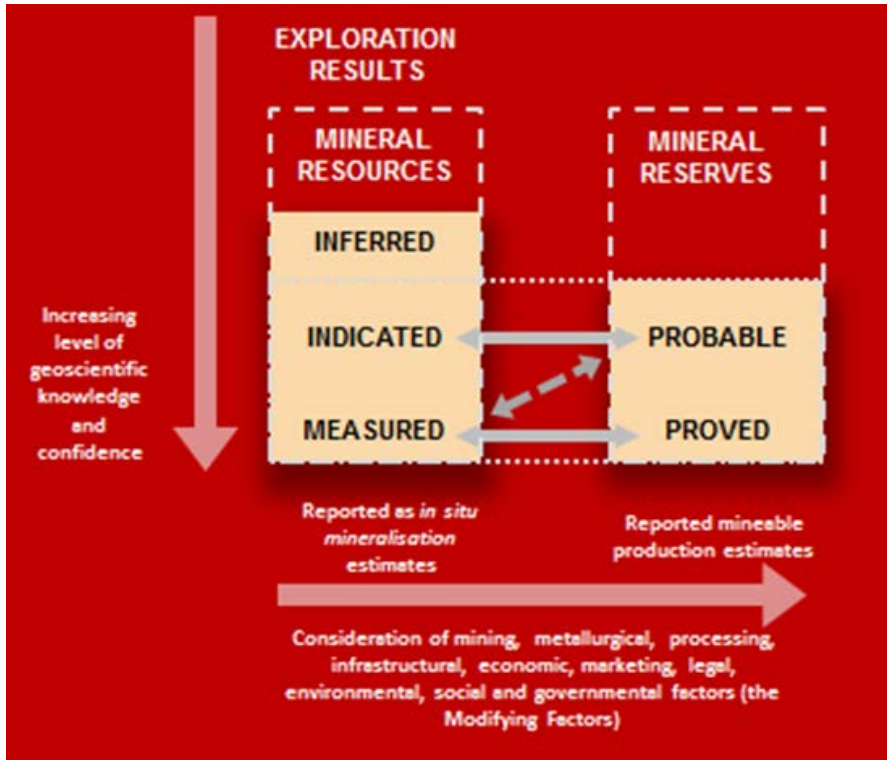
AFFILIATED NATIONAL STANDARD

- SANS 10320 – SABS standard for evaluating Coal deposits

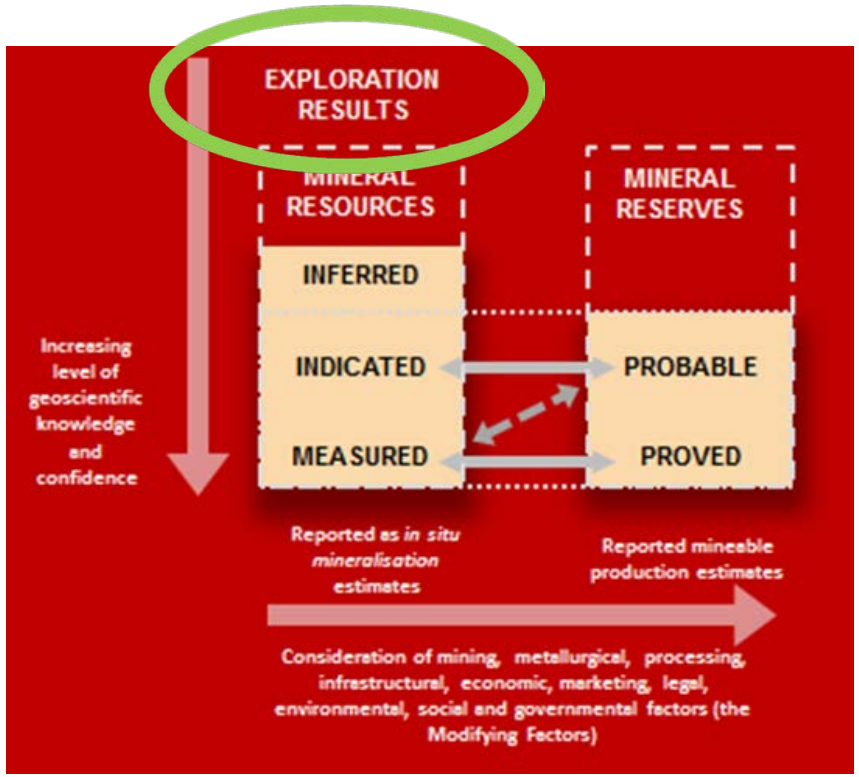
SAMCODES
SAMREC Code

SAMREC
THE SOUTH AFRICAN CODE FOR THE REPORTING OF
EXPLORATION RESULTS, MINERAL RESOURCES AND MINERAL RESERVES

- Reporting of (Solid Minerals only)
  - Exploration results (*what are we looking for*)
  - Mineral Resources (*what is in the ground*)
  - Mineral Reserves (*what can we mine profitably*)
- First SAMREC Code in 2000
  - Major re-write in 2016
    - Includes commodity-specific reporting of coal, diamonds/ other gemstones, industrial minerals and metal equivalents
    - Greater applicability to smaller and/or non-listed companies
    - Greater applicability to alluvial diamond/gemstone deposits



SAMCODES EXPLORATION



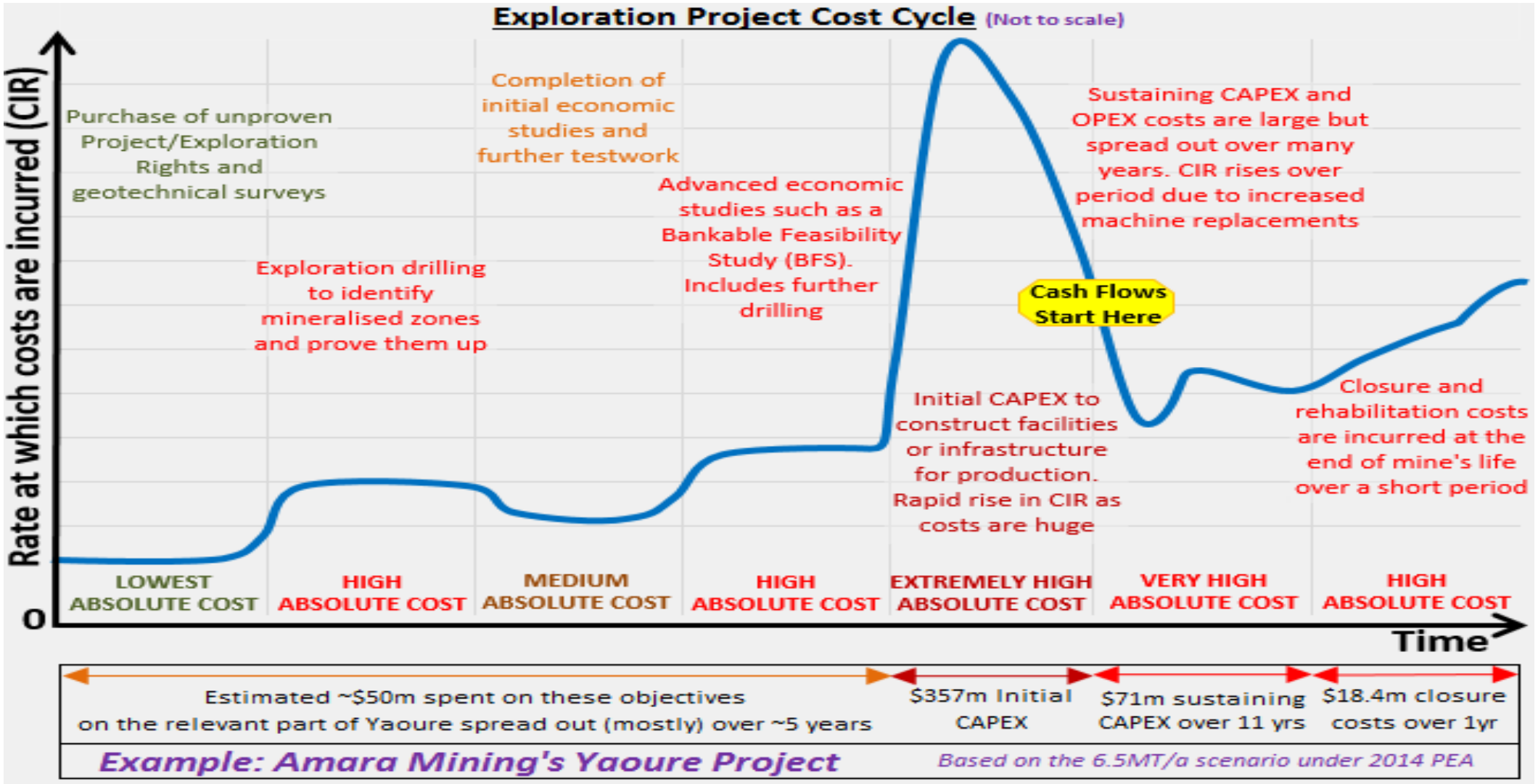
- Exploration Results - data and information generated by exploration programmes
  - Exploration data and information may include survey, geological, geophysical, geochemical, sampling, drilling, trenching, analytical testing, assaying, mineralogical, metallurgical and other information, where available.
    - Mining, metallurgical, processing, environmental, social, legal, infrastructural, legal, geopolitical, governance, etc
- An Exploration Target is a concept of mineralisation with respect to type, quantity and quality, which would be of interest to an exploration or mining company.
  - There must be a likelihood that this exploration target occurs in an area of geological prospectivity for that commodity and mineralisation type.
  - An Exploration Target need not represent any discovered Mineralisation, nor does it imply reasonable prospects for possible economic extraction.

1,000 Desktop Studies

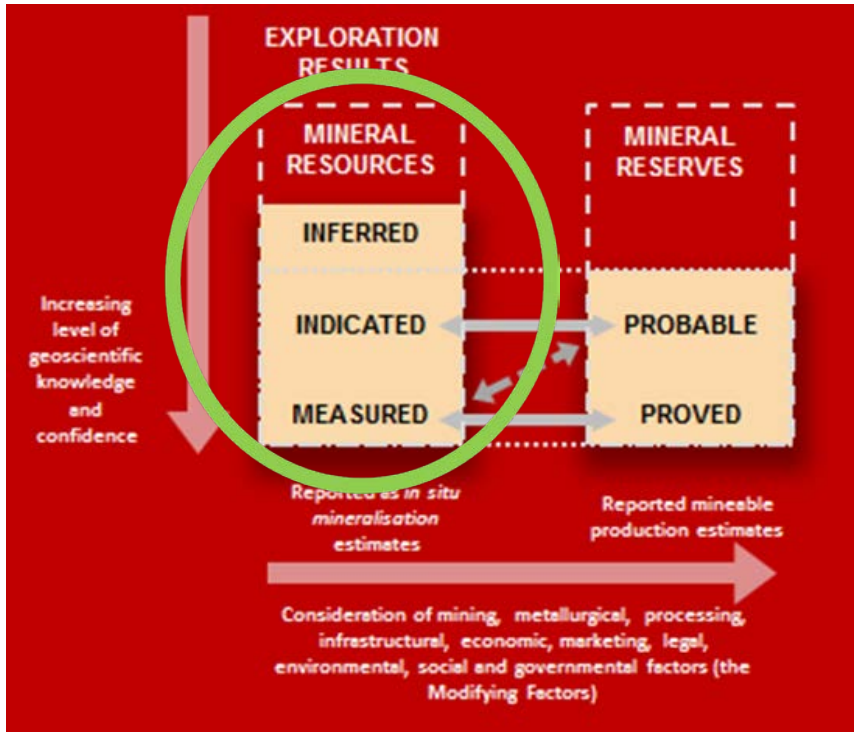
100 Initial Exploration Programmes

10 may make it to PFS/FS Stage

1 might get to Production Mining Phase


Exploration Project Cost Cycle (Not to scale)
Rate at which costs are incurred (CIR)
0
Time
Purchase of unproven Project/Exploration Rights and geotechnical surveys
Exploration drilling to identify mineralised zones and prove them up
Completion of initial economic studies and further testwork
Advanced economic studies such as a Bankable Feasibility Study (BFS). Includes further drilling
Initial CAPEX to construct facilities or infrastructure for production. Rapid rise in CIR as costs are huge
Cash Flows Start Here
Sustaining CAPEX and OPEX costs are large but spread out over many years. CIR rises over period due to increased machine replacements
Closure and rehabilitation costs are incurred at the end of mine's life over a short period
LOWEST ABSOLUTE COST
HIGH ABSOLUTE COST
MEDIUM ABSOLUTE COST
HIGH ABSOLUTE COST
EXTREMELY HIGH ABSOLUTE COST
VERY HIGH ABSOLUTE COST
HIGH ABSOLUTE COST
Estimated ~$50m spent on these objectives on the relevant part of Yaoure spread out (mostly) over ~5 years
$357m Initial CAPEX
$71m sustaining CAPEX over 11 yrs
$18.4m closure costs over 1yr
Example: Amara Mining's Yaoure Project
Based on the 6.5MT/a scenario under 2014 PEA

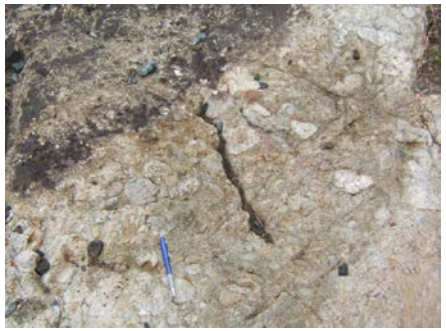
SAMCODES
RESOURCE ESTIMATION



- A Mineral Resource requires a demonstration of reasonable prospects for eventual economic extraction (RPEEE)
  - Such a consideration should include a reasoned assessment of …….. assumptions which, in the opinion of the Competent Person, are likely to influence the prospect of economic extraction.
  - Different categories of Resources is defined in terms of an increase in geoscientific knowledge and confidence in what is in the ground (geological parameters)

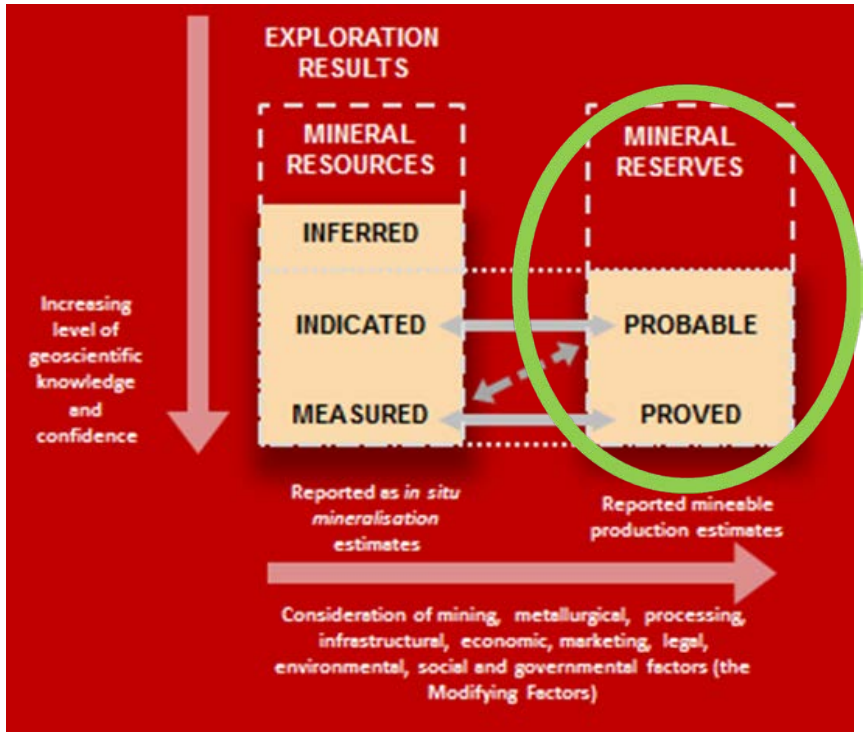
SAMCODES
RESOURCE ESTIMATION

- Reasonable Prospects for Eventual Economic Extraction (RPEEE)
  - High-level, reasoned assessment and justification of realistic assumptions
  - Definition of Eventual
- Geological (volume, grade, value/price)
- Engineering (mining, geo-technical, processing, metallurgical)
- Other – legal, infrastructural, marketing, socio-political, environmental, and economic assumptions



SAMCODES
RESERVE ESTIMATION



- A Mineral Reserve must be 'economically mineable'
  - That portion which has been demonstrated as viable and justifiable under a defined set of realistically assumed (10) Modifying Factors and application of the requirements of a Pre-feasibility or Feasibility Study [Technical Studies]
    - Mining
    - Metallurgical
    - Processing
    - Infrastructural
    - Economic
    - Marketing
    - Legal
    - Environmental
    - Social
    - Governmental (governance/political)

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THE SOUTH AFRICAN MINERAL REPORTING CODES

SAMCODES

SAMCODES
SAMESG APPLICABILITY

- SAMESG has application to:
  - SAMCODES
    - CPR
    - JSE Listed companies – CPRs and IARs (Major/Junior companies)
  - Other documents
    - Private investment in mineral projects – CPRs, PFS/FS reports (typically small companies)
    - Sustainability reports
    - EIAs and other documents required by State Permitting Bodies
    - Any document in the Public Domain
  - UNFC inventory management systems

SAMCODES
SAMESG APPLICABILITY

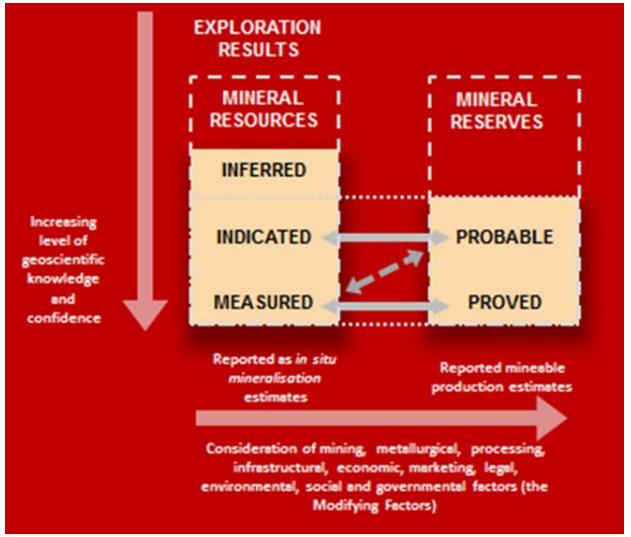
- SAMESG provides guidance for what information must be provided to support the estimation of:
  - Resources
    - High level discussion of RPEEE
    - As sections/paragraphs within chapter of the CPR
    - Same level of detail required for all levels of Resource classification
  - Reserves
    - Application of Modifying Factors in Technical Studies
    - As individual chapters in the CPR
    - Level of detail required of MFs increases from PFS to FS

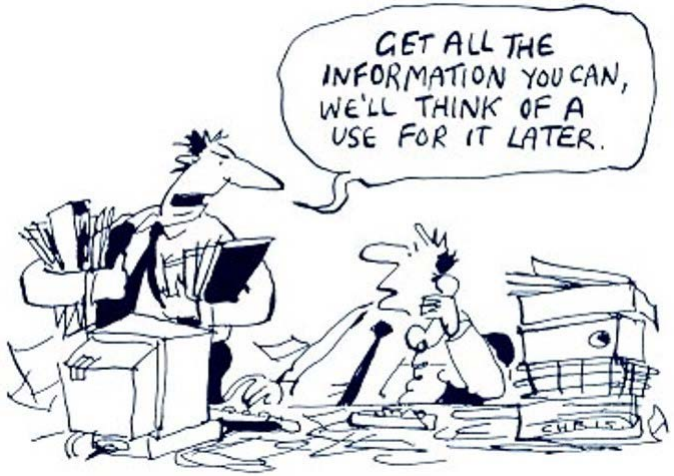
SAMCODES
SAMESG APPLICABILITY

- Public reporting requirements must be applicable to all scales of mining operations

SAMCODES SAMESG APPLICABILITY

- Speaking to geologists/engineers (primarily)
  - Use terminology that is consistent with SAMCODES definitions
  - Limit the ESG specific jargon – explain unfamiliar terms
  - Remember that time/money is in short supply
  - A CPR is not a Sustainability Report / EIA





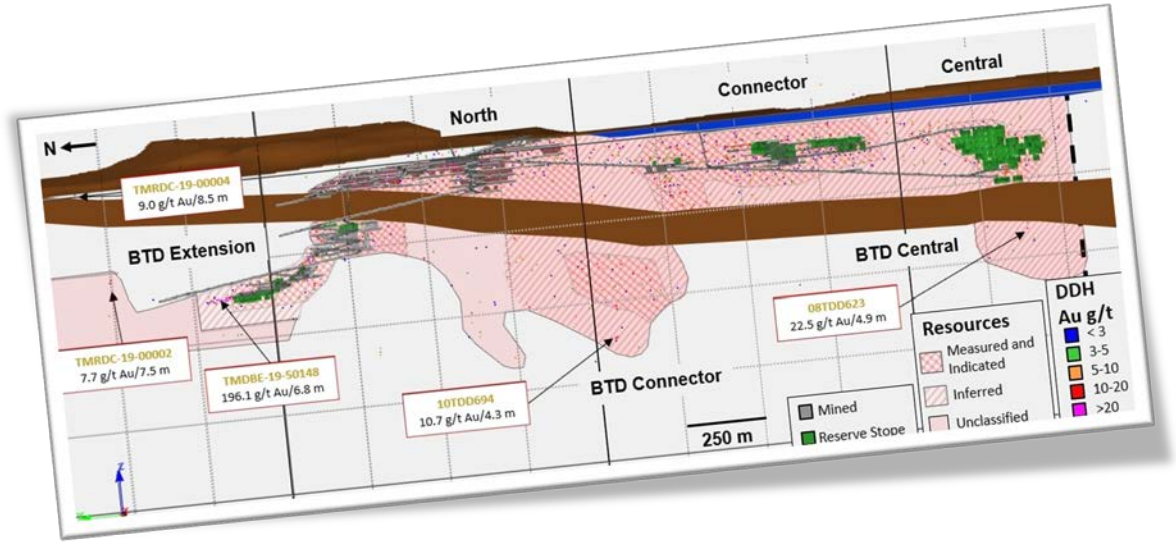
SAMCODES
SAMESG APPLICABILITY

Technical Studies

- Economic and technical assessments (of the Modifying Factors) with increasing levels of confidence for the project design, scheduling, costs and risks; to justify progression of the project to the next investment level.
- Scoping Study, Prefeasibility Study, Feasibility Study – in terms of Table 2
- Can only be done on a project with defined Mineral Resources.

Does not refer to any study or information obtained during exploration

- Early-stage economic studies done for internal company decision-making purposes are not for public disclosure



SAMCODES
SAMREC Table 1

- Section 1 (Project Outline)
  - Section 1.5 Legal aspects and Permitting
  - Section 1.7 Liabilities
- Section 7 (Audits and reviews)
  - Section 7.1 (i) State type of review/audit and names/qualifications of reviewers
  - Section 7.1 (ii) Disclose conclusions of audits/reviews. Note deficiencies and proposed remedial action.
- Section 8 (Other Relevant Information)
- Section 9 (Qualifications of key technical staff)

SAMCODES
SAMREC Table 1

- Section 4 (Reporting of Exploration Results and Mineral Resources)
  - Section 4.1 (Geological Model and interpretation)
    - (iii) Discuss any obvious geological, mining, metallurgical, environmental, social, infrastructural, legal and economic factors …… that may affect the geological model
  - Section 4.3 (RPEEE),
    - (v) Disclose/discuss the environmental and social parameters
    - (vii) Disclose/discuss the economic assumptions and parameters
    - (viii) Disclose and discuss any material risks.

SAMCODES
SAMREC Table 1

- Section 5 (Modifying Factors in Technical Studies)
  - Section 5.5 Environmental and Social
  - Section 5.7 Risk Analysis
  - Section 5.8 Economic Analysis

- Table 2 – Requirements for Technical Studies
  - Permitting
  - Social Licence to operate
  - Environmental compliance and closure issues
  - Rehabilitation liabilities
  - Capital & Operating Costs

SAMCODES
PUBLIC REPORTING REQUIREMENTS

JSE

❑ Section 12 (JSE Listing Rules)

- CPR must comply with SAMREC and SAMVAL
  - Executive summary must include a brief description of key Modifying Factors (includes ESG)
  - Must include section on Risks (which includes ESG issues)
  - Table 1 compliance – variable acceptability
- Annual Reports must be compliant with SAMREC (including Table 1)
  - Currently includes minimal ESG content and variable compliance levels

SAMCODES
JSE READERS PANEL

JSE

- Panels for Solid Minerals and Oil & Gas
- Readers selected on "permanent" or *ad hoc* basis
  - Basic requirements of experience, specialty (mineral commodity and CP/CV), knowledge of Codes, registration, etc.
  - 18 geologists/mining engineers
  - No ESG specialists (nor specialists for any of the Modifying Factors)
- Stringent requirements in terms of turnaround time (14 days), conflicts of interest, confidentiality, costs, etc.
- SAMESG review

SAMVAL
SAMVAL Code

- Affiliated to IMVAL
- Based on a SAMREC-compliant CPR
- Value as at a specific date under a specific set of technical/economic circumstances
- Basis of valuation
  - Intrinsic value, fair value, market value, synergistic value, special value etc.
- Reason for valuation
  - Buying, selling, merger, financing, legal dispute, etc.

SAMVAL
THE SOUTH AFRICAN CODE FOR THE REPORTING OF MINERAL ASSET VALUATIONS

SAMVAL
METHODS AND APPROACHES

COST

Reasonably appraise the value of all assets and liabilities on the balance sheet to determine the value of the asset

MARKET

Use the value of similar enterprises as comparable case to valuate the fair value of the asset

INCOME

Valuate the projected net income of the asset and discount it to determine the value of the asset

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SAMVAL
METHODS AND APPROACHES

Valuation Methodologies	Market Approach	Cost Approach	Income Approach
	Sale Comparison	Depreciated Replacement cost	Discounted Cash Flow
	Option Agreement Terms	Multiple Exploration Expenditure	Real Options Pricing
	Value per unit of metal	Modified Appraised Value	DCF + Monte Carlo
	Market Capitalisation/Comparable companies	Reproduction Cost Method	DCF + Probabilistic Factors
	*Gross in-situ value**	Geoscience Factor (Kilburn Geoscience Factor)	
		Rural Cost Appraisal Method	

***The use of Gross in situ value method is expressly excluded as a valuation method in the SAMVAL Code**

- Metal content multiplied by metal price is NOT an acceptable method of project valuation

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SAMVAL
METHODS AND APPROACHES

Valuation approach	Early stage exploration	Advanced stage exploration	Development properties	Production properties	Dormant properties		Defunct properties
					Economically viable	Economically not viable	
Income Approach	Not generally used	Less widely used	Widely used	Widely used	Widely used	Not generally used	Not generally used
Market Approach	Widely used	Widely used	Less widely used	Quite widely used	Quite widely used	Widely used	Widely used
Cost Approach	Widely used	Widely used	Not generally used	Not generally used	Not generally used	Less widely used	Quite widely used

SAMVAL
SAMESG APPLICATION

- Where the (SAMREC compliant) CPR is appended to, or supports, the Valuation Report, the technical information can be incorporated by reference to the CPR.
  - Typically the situation with JSE documents
- If the Valuation is compiled as a stand-alone document, all the points of SAMVAL Table 1 must be addressed in the Valuation Report

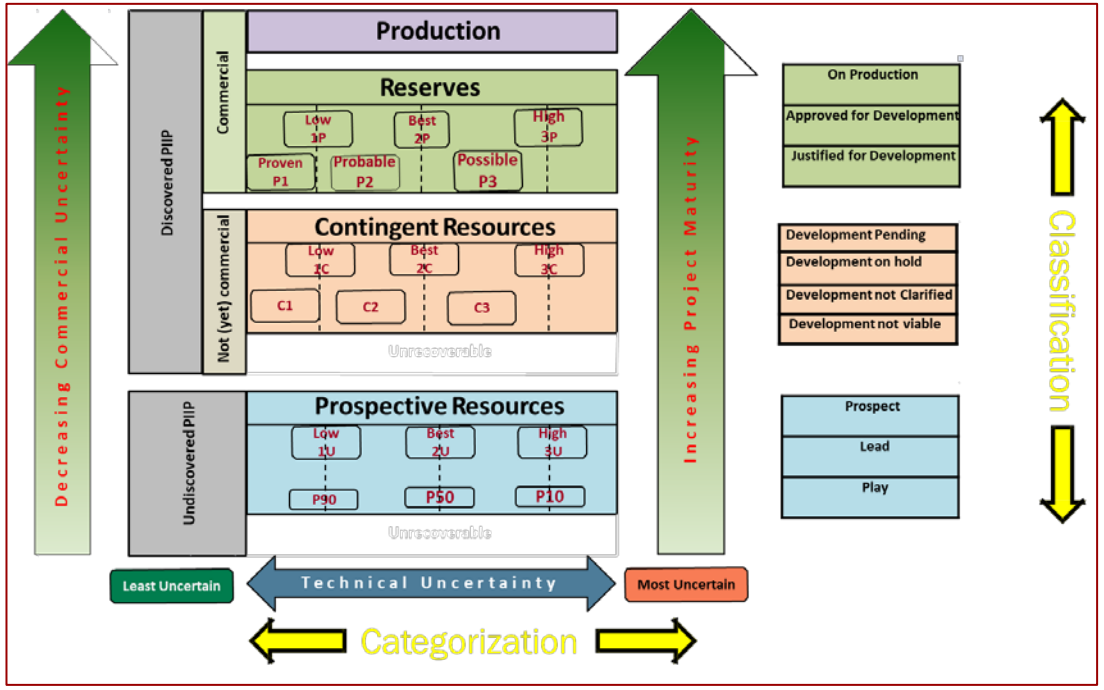
T1.10 Modifying Factors and Key Assumptions	A statement of Modifying Factors shall be included, separately summarizing material issues relating to each applicable Modifying Factor. The CV shall set out the manner in which he has satisfied himself that he can rely upon the technical information provided. (**NOTE:** All the Modifying Factors shall be listed, or references provided to relevant definitions). This shall include an explanation of all material assumptions and limiting factors. *When reporting on environmental, social and governance modifying factors, reference should be made to the ESG reporting parameters as required by the Southern African Minerals Environmental, Social and Governance Guideline (SAMESG) or other recognised code, e.g. Equator Principles.*

SAMCODES
SAMOG CODE

SAMOG

THE SOUTH AFRICAN CODE FOR THE REPORTING OF OIL AND GAS RESOURCES

- Based primarily on PRMS classification
  - Addresses Resource/Reserve classification
  - Address valuation of O&G deposits
- Applicable to all scales of O&G companies
- Addresses “unconventional” as well as conventional deposits



SAMCODES Summary

Exploration Results

- Generate Data
- Identify RPEEE

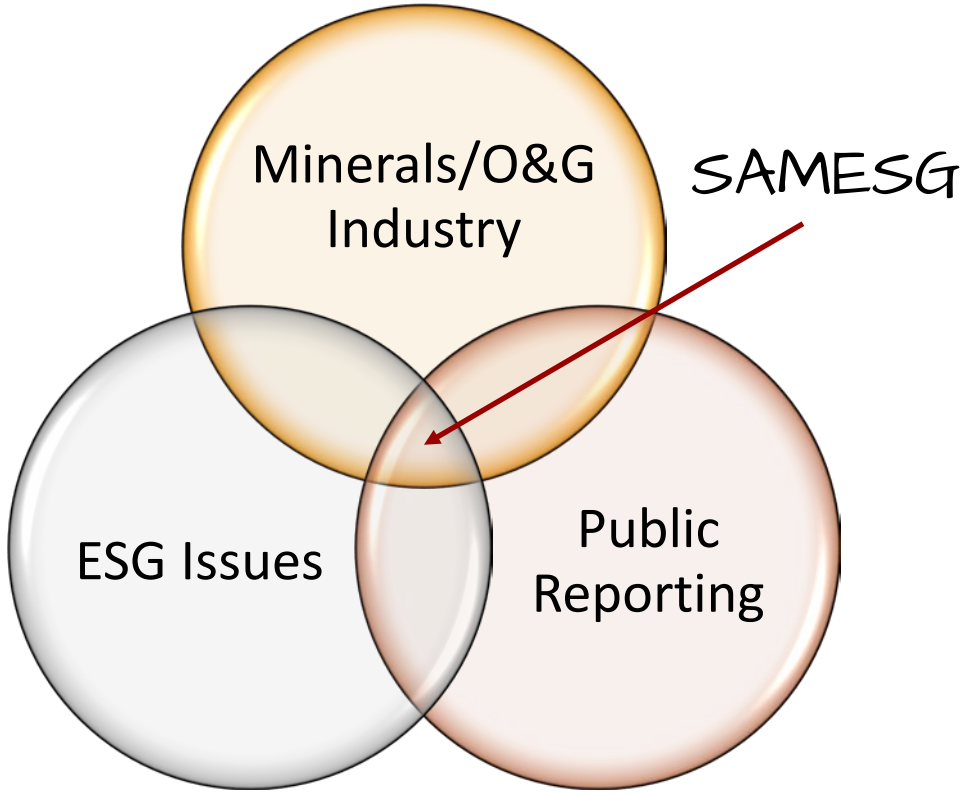
Mineral Resource

- Apply Modifying Factors

Mineral Reserve

- Life of Mine compliance
- Mine Closure

SAMCODES Summary

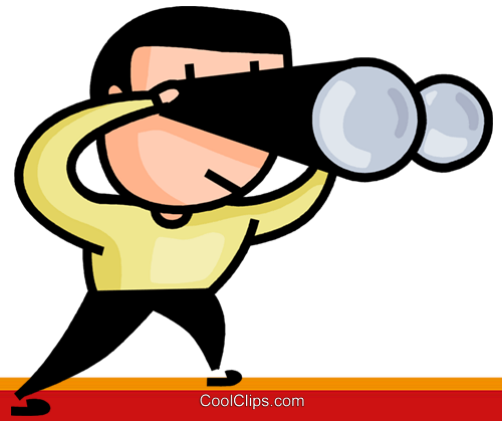


- Provides the detail of how ESG issues pertinent to Mineral Reporting should be done
  - SAMESG provides guidance for what information must be provided to support the estimation of
    - Resources (through RPEEE)
    - Reserves (through application of Modifying Factors in technical studies)
  - Easily applicable to large and small operators
  - Increase in requirements/details from Exploration, through Mineral Resource estimation to Mineral Reserve estimation.
    - Mineral Reserve estimations (including mine closure proposals) and Life-of-Mine reporting.

SAMCODES FUTURE

LONG TERM

- Include applicable ESG-specific clauses into SAMREC/SAMOG Codes as an Amendment
  - Applicability to all scales of mining
  - Applicable to stage of project
  - Simple language, minimum jargon
- Include ESG issues into CRIRSCO template
  - Currently looking at all standard definitions, so now is a good time



SHORT TERM

- Change the mindset of the mining community
  - Continued socialization of SAMESG
  - Demonstrate usefulness/benefits of ESG
  - Update ESG issues on the website
- SSC/IASSA Squirrel award for voluntary ESG input in IAR
- SAMESG has reviewed sample CPR documents (from Readers Panel)
  - Compiled a list of issues
  - Do write-up for website
  - Do presentation to Readers Panel
  - Motivate for *"ad hoc"* or *"advisory"* ESG Readers

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