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ENERGY AND CLIMATE CHANGE  
ENVIRONMENT AND SUSTAINABILITY  
INFRASTRUCTURE AND UTILITIES  
LAND AND PROPERTY  
MINING, QUARRYING AND MINERAL ESTATES  
WASTE RESOURCE MANAGEMENT



## **IRAN - Building Blocks to the Future**

### **A ROADMAP FOR MINING INVESTMENT**



*your earth our world*

## The Presenters

**Dr. Phil Newall , CEng, FIMMM**

Managing Director - Wardell Armstrong Ltd

**Mark Mounde B.Eng. C.Eng. MIMMM, SAIMM**

Technical Director - Wardell Armstrong Ltd

**Navid Ahmadi Msc, MBA**

Managing Director, Tunnel Falat Pars Ltd

WAI Exclusive Agent in Iran



## Wardell Armstrong Group - Highlights



Wardell Armstrong International is part of the Wardell Armstrong Group:

- An independent partnership established in 1837
- Annual turnover of £30m
- 12 offices in the UK
- International offices in Almaty and Moscow
- Experience in over 90 countries
- Approximately 500 professional and technical staff
- Multidisciplinary practice



# Wardell Armstrong Group - Disciplines



The Group's main service areas are:

- Mining & Quarrying
- Environment and Sustainability
- Infrastructure and Utilities
- Energy and Climate Change
- Mineral Estates
- Waste Resource Management
- Land and Property
- Archaeology





# Wardell Armstrong International - Services



An integrated minerals consultancy company specialising in:

- Exploration Management
- Resource Modelling
- Mine Planning & Design
- Reserve Optimisation
- Process Testwork
- Metallurgical Audits
- Project Valuation & Financial Analysis
- Environmental Audit & Management
- Corporate Social Responsibility
- Mine Closure



# Wardell Armstrong International



## Client deliverables:

- Scoping Studies
- Technical Due Diligence
- Competent Person's Report/NI 43-101
- Financial Valuations
- Pre & Feasibility Studies
- Expert Witness
- Environmental Studies
- Metallurgical Testwork
- Flowsheet Design
- Assaying
- Troubleshooting



# Commodities

- Gold
- Copper
- Molybdenum
- Iron Ore
- Lead/Zinc
- Uranium
- Silver
- Nickel
- Phosphate
- Borates
- Coal
- Rare Earth

In addition, WAI is involved in a large variety of industrial minerals globally





# Marketplace



- Central Asia
- Middle East
- Africa
- Central and Eastern Europe
- Russia and the CIS
- North America
- Central America
- South America
- Western Europe
- **and Iran**

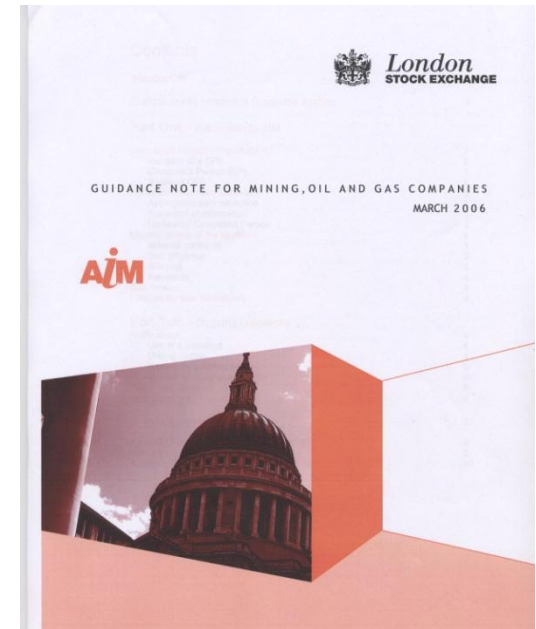




## A Selection of Stock Exchange Listings



- First Quantum Minerals - AIM
- Oxus Mining - AIM
- Petropavlovsk – London
- KazakhGold – London
- European Nickel - AIM
- London Mining - AIM
- Glencore – London/Hong Kong
- Persian Gold - AIM



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## A ROADMAP FOR MINING INVESTMENT

### An Overview



*your earth our world*

## Market Headlines

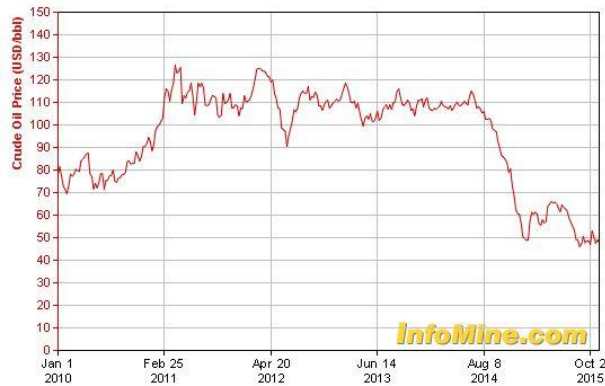
### Global Slow Down:

- World economy has slowed
- Metal prices lower
- Uncertainty in Europe
- Fiscal austerity
- Outlook - **SLOW GROWTH AT BEST!**

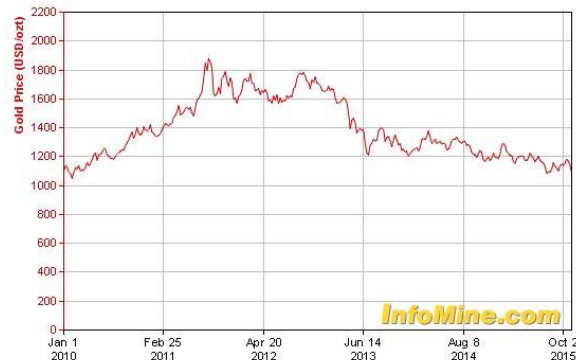




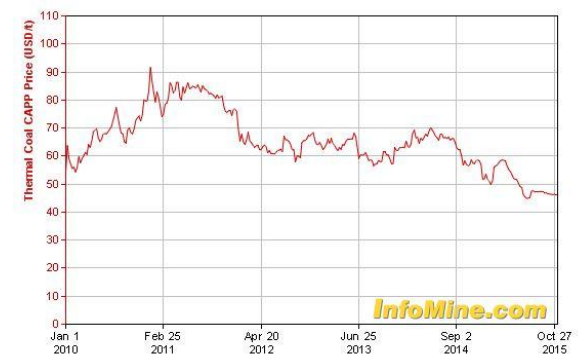
# Commodity Pricing (5 Year Historic Prices)



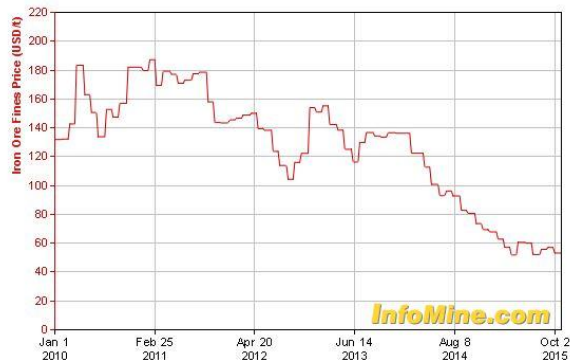
Crude Oil



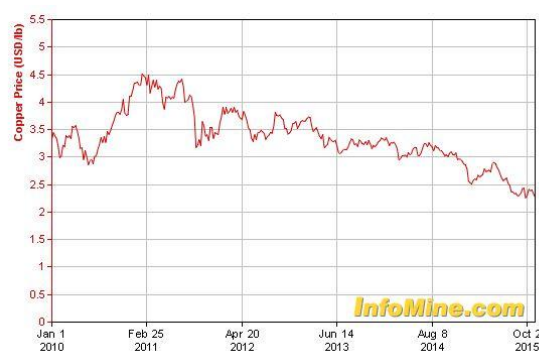
Gold



Coal



Iron Ore



Copper

# Metal Price Forecasts (2013)



Metal Price Forecasts															
		March Spot	SP Angel		Intierra RMG	Bank of America	Goldman Sachs	HSBC		Macquarie		Economist Intelligence Unit		World Bank	
			2014	2015	2014	2014	2014	2014	2015	2014	2015	2014	2015	2014	2015
Au	US\$/oz	1,589	1,500	1,500		1,838	1,550	1,775	1,675			1,644	1,556		
Ag	US\$/oz	29	28	25								31	29		
Pt	US\$/oz	1,585	2,000	2,000								1,500	1,600		
Pd	US\$/oz	763	800	800								655	675		
Cu	\$/t	7,762	8,500	8,000	6,539					7,675	7,150	9,185	8,910		
Al	\$/t	1,938	2,200	2,250	2,150					2,100	2,200	2,206	2,250		
Ni	\$/t	16,983	19,000	20,000	18,385					18,500	22,500	17,160	19,800		
Zn	\$/t	1,954	2,200	2,200	2,265					2,250	2,475	2,200	2,288		
Pb	\$/t	2,234	2,300	2,300						2,350	2,400	2,515	2,640		
Sn	\$/t	23,988	25,000	25,000						22,125	22,125	22,220	21,560		
Oil	\$/bbl	94	80	80								90.3	96.5	81.4	79.8

# SNL Metals & Mining's 26th Corporate Exploration Strategies (23 Nov 2015)



## **Non-ferrous exploration budget**

2014 – \$11.4 billion

2015 – \$9.20 Billion (a 19% decrease)

## **Junior Exploration budget**

2015 – 26% drop from 2014

2014 – 29% drop from 2013

## **Split of Exploration Budget**

34% - exploration at or near mines

37% - late stage exploration

29% - grassroots



# What are investors looking for?

A place to do business which may or may not have:

- Good prospects
- Track record of mining
- Countries with low risk
- Safe commodities with well defined markets
- Transparency in legislation
- Minimise capital costs
- Maximise returns



# Investors into Iran

(Source imidro.gov.ir)



24 Nov - VEB Bank announced that is ready to support Russian firms to implement mining projects in Iran

21 Nov - A Georgian delegation unveiled plans to invest \$15 million in four mineral exploration projects

14 Nov - Iran and South Africa to broaden joint cooperation in mine and mining industries sector

04 Nov - Iran, Italy Cooperation in Steel and Aluminium Projects

18 Oct - Iran, Poland Cooperation in Exploitation Mineral Reservoirs



According to the predictions domestic and European firms are ready to participate in.....

# An introduction to *The Strategy of Iranian Government* to promote investment in Mining and Metal Sector

## Foreign Investor Opportunities

**Final Version**

**Dr. Mehdi Karbasian**  
**Deputy Minister and Chairman of IMIDRO**

**IMIDRO**  
سازمان توسعه و نوسازی  
معادن و صنایع معدنی ایران  
Iranian Mines and Mining  
Industries Development &  
Renovation Organization



## Mineral Resources of Iran

- Iran world ranking increased as part of IMIDRO activities in the past 15 years...
- International ranking of Iran:
  - Steel: 14
  - Cement: 4
  - Copper: 20
  - Aluminum: 19
  - Iron Ore: 9

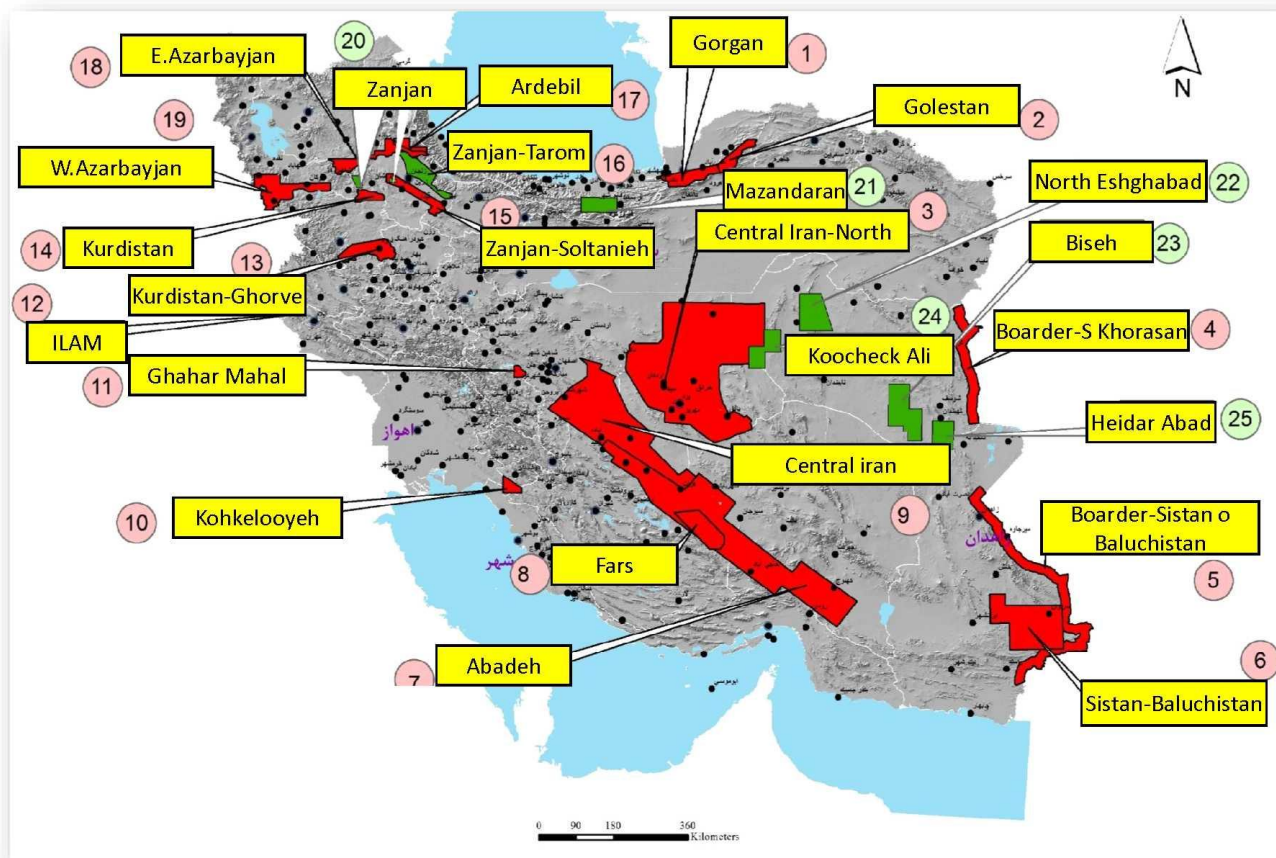
Mineral Resource	Iran reserve	Unit	Iran as % world
Iron	2.7	Billion Ton	1%
Copper	2.6	Billion Ton	4%
Zinc	11	Million Ton	4%
Gold	250	MT	0.5%
Barite	10	Million Ton	5%

# IMIDRO Current and Future Projects



# Exploration Projects (240,000 Km2) and Opportunities for Partnership

Province	Area
Khorasan-Sangan	11500
Sistan –Baluchistan-Border	15000
Sistan –Baluchistan-Caravan	14300
South Khorasan-Border line	6116
Fars-Bahram Goor	5000
Ardebil-Ghezeloan-Khalkhal	1351
Kerman-Hormozgan-Sirjan	30000
Ardebil-Sabalan	1696
Ardebil-Baghrdagh	874
Yazd-Bafgh-Robat	10558
West Azarbaijan-Khoi-Maako	1218
West AzarbaijanTakab-Piranshahr	5135
Kohkelooyeh-Boyerahmad	1006
Other Area	136000
<b>Total Area (Km2)</b>	<b>240.000</b>





# IMIDRO's Macro Strategies



1. Development of mine and mining industries activities with competitive edge in less developed areas
2. Increasing investment in building mine and mining industries chain units with high risk and modern technologies
3. Development of overseas mining activities and mining industries with the aim of completing value chain
4. Expanding modern methods of financing in implementing of development projects
5. Boosting productivity, synergy and competitiveness in mine and mining industries sector
6. Promotion of knowledge, applied researches and technologies needed for mine and mining industries sector
7. Expansion of private sector's investment in mine and mining industries activities and related infrastructure
8. Strategic marketing and boosting export of products and technical-engineering services
9. Development of human resources in mine and mining industries sector

# Iran's Place in the World



- The World has **196** countries
- The challenge is how does Iran attract investment **that is attractive to Iran.**

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## A ROADMAP FOR MINING INVESTMENT

### Mineral Resource and Ore Reserve

# Mining Technical Disclosure Standards



Companies wishing to raise finance to develop mining projects must recognise that there are guidelines to follow and how they are applied.

- JORC – Joint Ore Reserves Committee
- CIM – Canadian Institute of Mining
- SAMREC – The South African Mineral Resource Committee
- SME – Society of Mining, Metallurgy and Exploration

Other members include, Comision Minera, PERC, MPIGM, NAEN



# Mining Technical Disclosure Standards



Physical Map of the World, June 2012

AUSTRALIA  
Bermuda  
Italy / ADMES  
★  
Capital

Independence state  
Dependency or area of special sovereignty  
Island / island group  
Capital

NI 43-101 and TSX and  
TSX-Venture Exchange  
policies; CIM, JORC,  
PERC, IG-7, SAMREC

LSE and AIM Rules for Companies; PERC,  
CIM, SAMREC, JORC, SME, Russian code

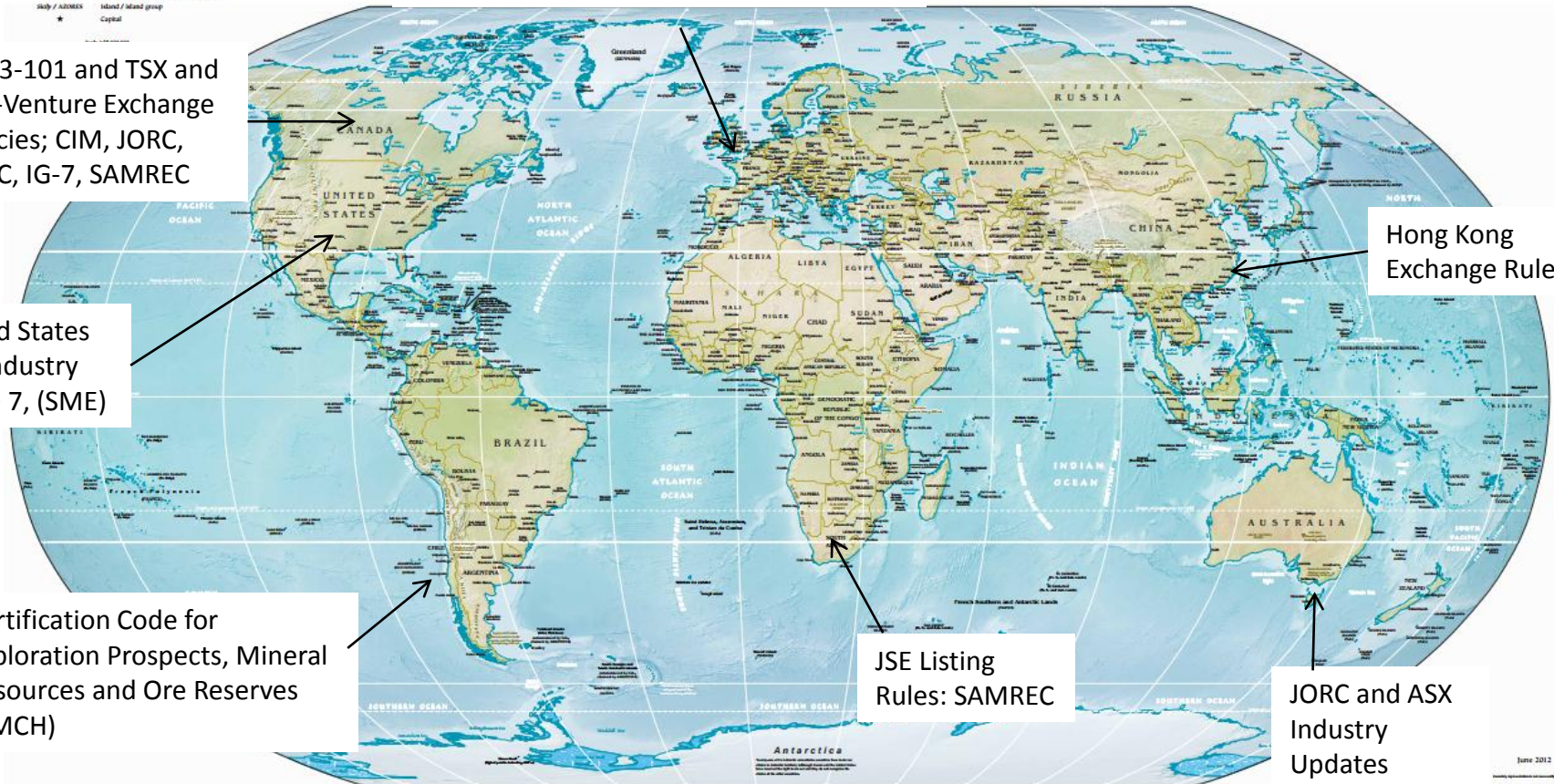
Hong Kong  
Exchange Rules

United States  
SEC Industry  
Guide 7, (SME)

Certification Code for  
Exploration Prospects, Mineral  
Resources and Ore Reserves  
(IIMCH)

JSE Listing  
Rules: SAMREC

JORC and ASX  
Industry  
Updates



# International Reporting Codes



# Mining Technical Disclosure Standards





## NI 43-101 and JORC (2012): Similarities



- Both require the involvement of a QP or CP (in Chile, Qualified Competent Person) and recognise foreign professional associations
- Definition of mineral resources and ore reserves are the same
- Preliminary Economic Assessment analogous to Scoping Study
- Definitions of Pre-Feasibility and Feasibility Study are the same
- Pre-Feasibility minimum standard for Ore Reserves





# Mining Technical Disclosure Standards



- Investor confidence is critical
- Investor must be able to rely on information provided by the Company
- Mining is a risky business – technical, commodity price, political, social risks
- Uncertainty in project viability may lead to high cost of capital **or** no capital at all

# Mineral Resource and Ore Reserves



## List of Examples

- Anglo American JORC or SAMREC
- BHP Billiton JORC
- Glencore JORC or SAMREC
- Barrick Gold JORC or CIM
- Rio Tinto JORC
- Vale SME

# Mineral Resource and Ore Reserves



## The JORC Code (2012) – A Mineral Resource

A 'Mineral Resource' is a concentration or occurrence of solid material of economic interest in or on the earth's crust in such a form, grade (or quality) that there are reasonable prospects for eventual economic extraction.

Mineral Resources are signed off by a Competent Person as defined by the relevant reporting codes.

# Mineral Resource Estimate Classification



Step 4: Classify each block according to the level of geological confidence

Exploration results	Inferred	Indicated	Measured
Pre-cursors to Mineral Resources	Low level of geological confidence	Reasonable level of geological confidence	High level of geological confidence
Insufficient data to indicate continuity of geology and grade	Inferred continuity of geology and grade	Interpreted continuity of geology and grade	Verifiable continuity of geology and grade
E.g. Sparse drilling	E.g. Wide drill hole spacing	E.g. Close drill hole spacing	E.g. Drilling to support production planning
Geochemical data	Insufficient QA/QC	Good QA/QC data	
Geophysical data	No downhole surveys		



# Mineral Resource and Ore Reserves



## The JORC Code (2012) – An Ore Reserve

An “Ore Reserve” is an economically mineable part of a Measured and/or Indicated Mineral Resource.

Defined by studies at a **Pre-Feasibility** or **Feasibility Study** as appropriate that include application of modifying factors.

Such studies demonstrate that, at the time of reporting, extraction could be reasonably justified

Ore Reserves are signed off by a Competent Person as defined by the relevant reporting codes.

# Mineral Resource and Ore Reserves



## The JORC Code (2012) – An Ore Reserve

**Proven** – A Economically mineable part of a Measured Mineral Resource.

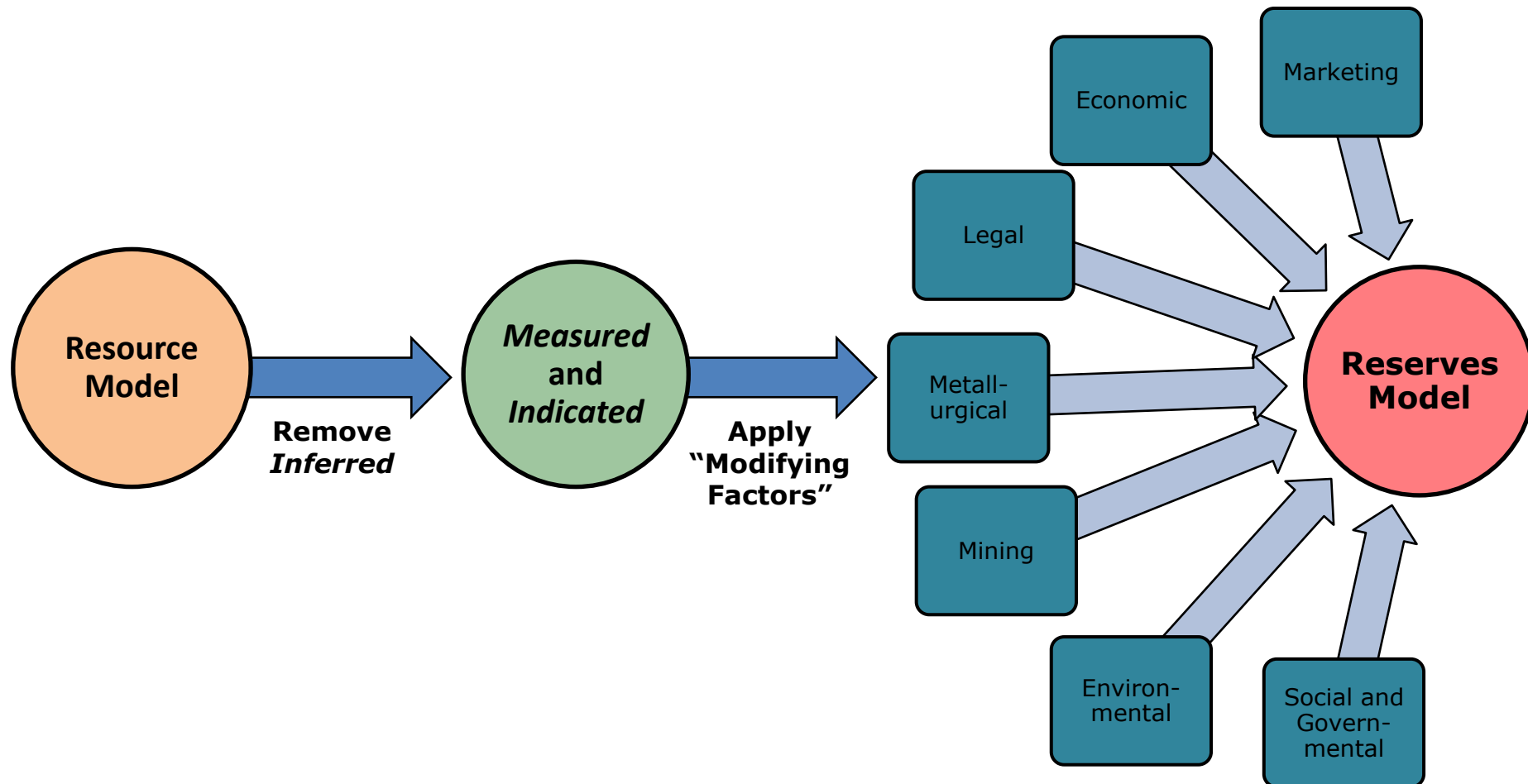
**Probable** - A Economically mineable part of an Indicated, and sometimes a Measured, Mineral Resource.

The Probable Ore Reserve has a **lower level of technical confidence** than the Proved Ore Reserve

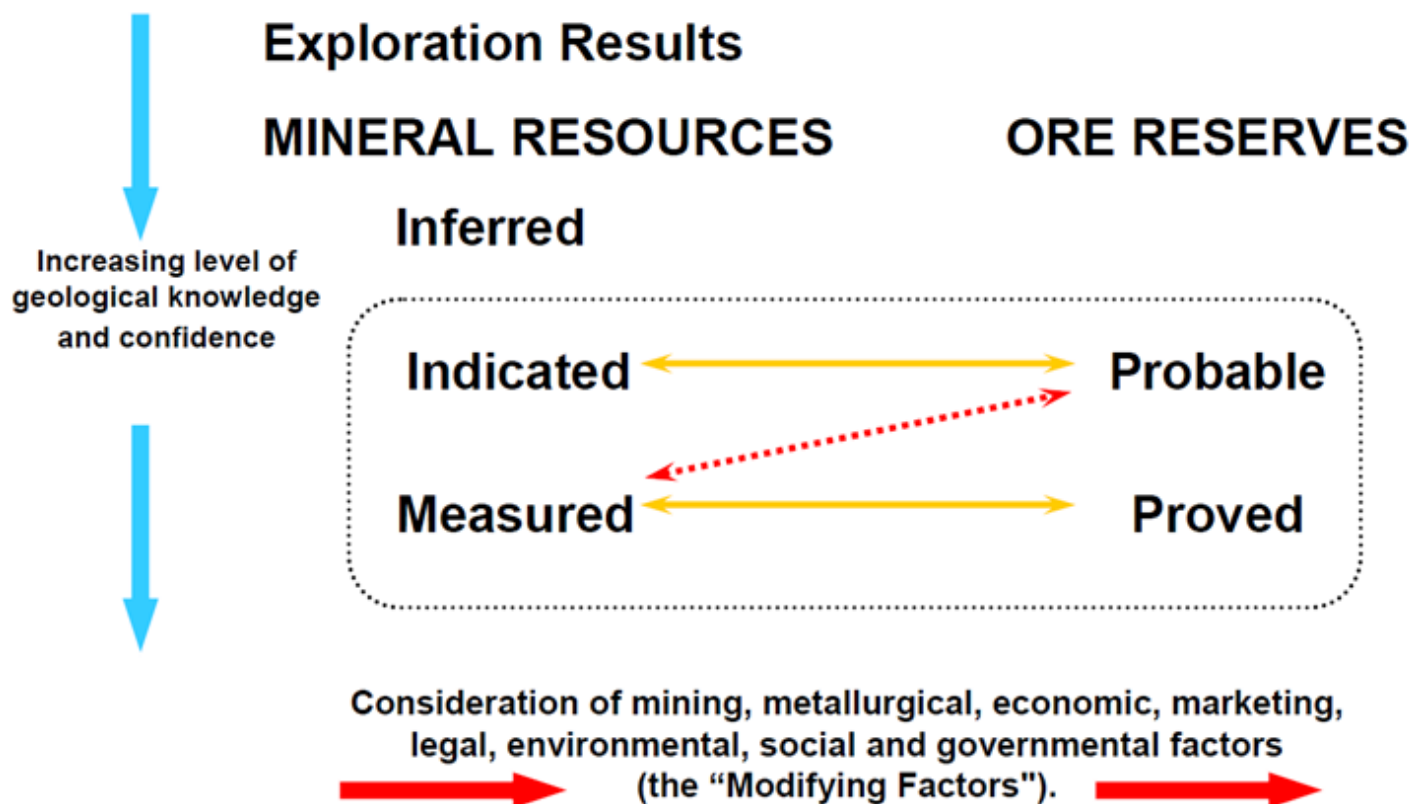
# Reserve Estimation



## “Modifying Factors” applied to Resource Estimate:



# Mineral Resource and Ore Reserves

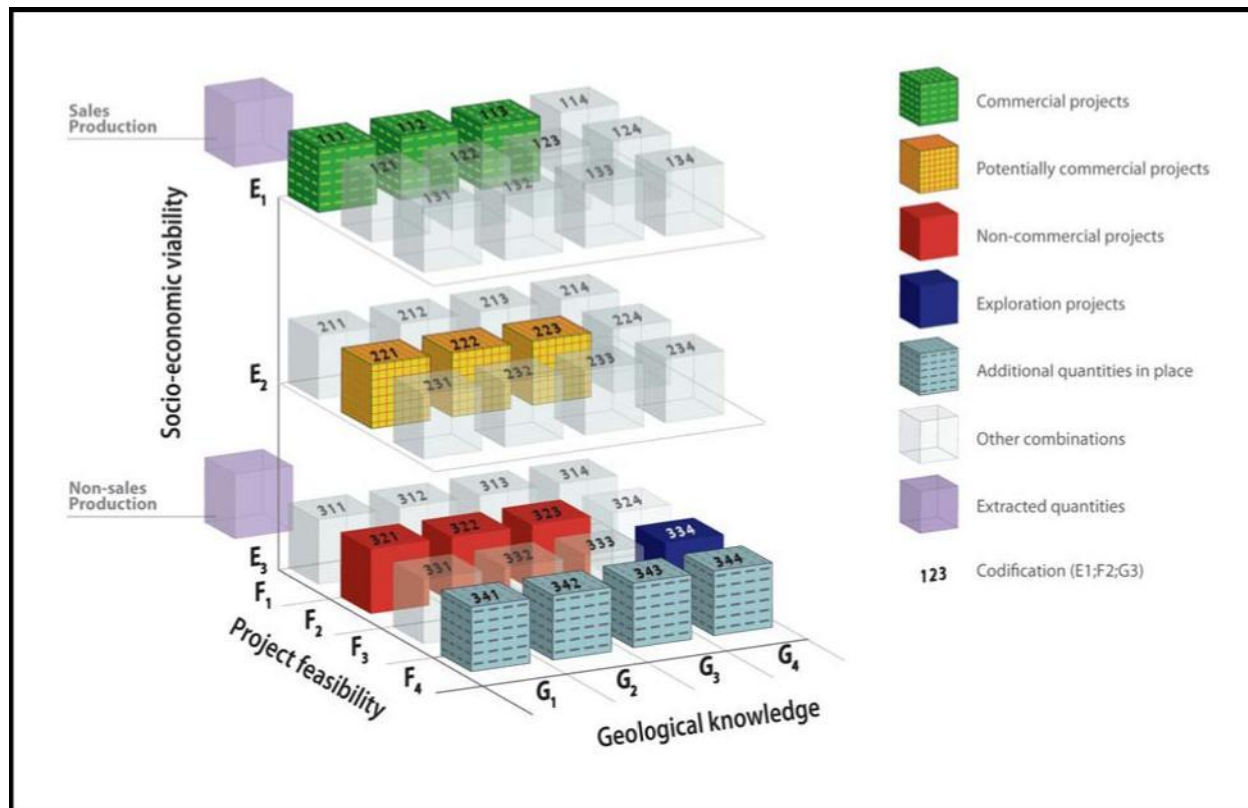




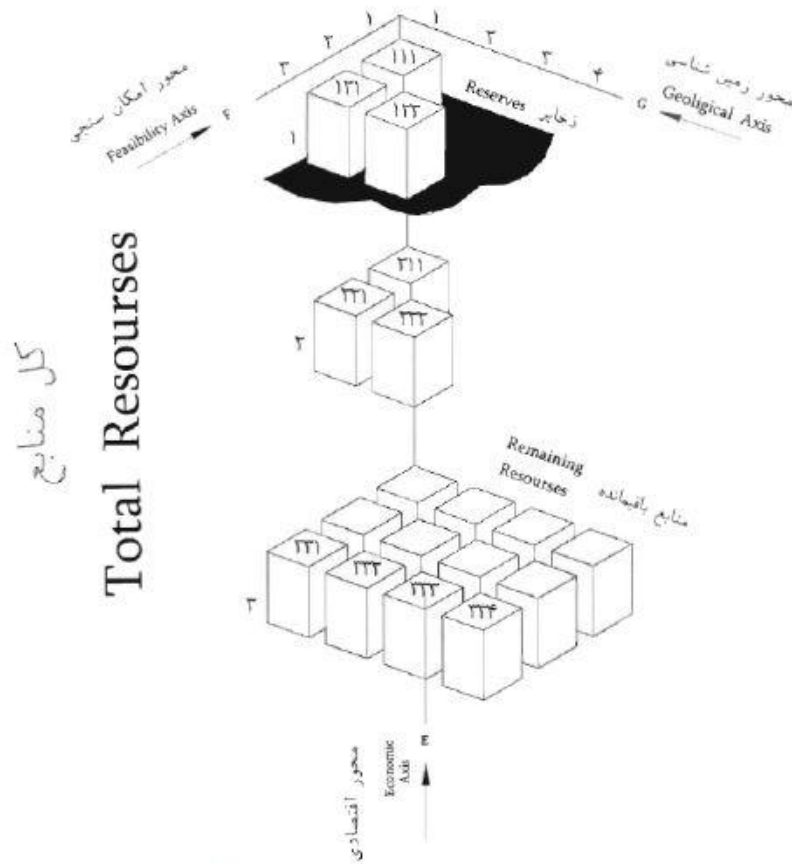
# Comparison of “international” Studies and Iranian Studies



United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009



# Comparison of “international” Studies and Iranian Studies



شکل ۱-۴-۱- فرم باز شده روش کدگذاری سیستم سازمان ملل متحد [۴]

Iranian Standard of Resource and Reserve classification

# Comparison of “international” Studies and Iranian Studies



Fundamental Characterization	Solid Mineral Classes	UNFC E axis	UNFC F axis	UNFC G axis		
				Proved	Probable	NA
DISCOVERED AND MINEABLE	MINERAL RESERVES	1	1	1	2	
				Measured	Indicated	Inferred
DISCOVERED AND NOT COMMERCIALY RECOVERABLE	MINERAL RESOURCES	2.1	2	1	2	3
	Discovered Not Economic	2.2	2	1	2	3
	Unrecoverable	3	4	1	2	3
				Zone of Mineralization		
UNDISCOVERED	Exploration Results	3	3	4		
	Unrecoverable	3	4			

“Conversion” between UNFC to CRIRSCO

# Comparison of “international” Studies and Iranian Studies



United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009

- “purpose is to was to define a neutral framework by which minerals, oil and gas, and other energy sources could be reported using the same classification.”
- A few boxes match CRIRSCO categories and most boxes are rarely, if ever, used”
- It provides means of reporting estimates of undiscovered, uneconomic and unrecoverable material which most mineral companies would have no interest in reporting.
- No advantage to using UNFC as the international financial community understands CRIRSCO



# Mineral Resource Software

Resource estimation is a complex subject which in recent years has moved towards a fully computer-based format in the international world. Examples of such software include:

- **Datamine**
- **Vulcan**
- **Micromine**
- **Surpac**



# Mineral Resource and Ore Reserves



Inferred Mineral Resource	Indicated Mineral Resource	Measured Mineral Resource
is that part of a Mineral Resource for which quantity and grade or quality,		
can be estimated on the basis of geological evidence and limited sampling; and reasonably assumed, but not verified by geological and grade control	densities, shape and physical characteristics	
	can be estimated with a level of confidence	are so well established that they can be estimated with confidence
	sufficient to allow the appropriate application of technical and economic parameters, to support	
	mine planning and evaluation of the economic viability of the deposit.	
	The estimate is	
information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.		sampling
	and testing locations spaced close enough to allow appropriate techniques from	locations, pits, workings and drill holes that are
	for geological and grade continuity to be reasonably assumed.	to confirm both geological and grade continuity.
The chance is 10 % or greater that mineralization is there	The chance is 50 % or greater that mineralization is there	The chance is 90 % or greater that mineralization is there

**INFERRED RESOURCE  
NO VALUE**

**FOR M&A - MEASURED AND INDICATED  
RESOURCES ARE VALUED AT AN 83%  
DISCOUNT**

# Mineral Resource and Ore Reserves



Probable Mineral Reserve	Proved Mineral Reserve
is the economic	
an indicated circumstances resource	a measured mineral resource
demonstrated by at least a preliminary feasibility study. This study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate that economic extraction can be justified.	

**FOR M&A, PROVEN AND PROBABLE  
RESERVES ARE VALUED AT 44% DISCOUNT**

# Mineral Resource and Ore Reserves



## Case Study : FTSE 100 Mining Company

- Operating mine was extracting from the Inferred Mineral Resource
- The mine was making money by mining in that area
- The “Competent Person” (Mark Mounde) was unable to sign off an Ore Reserve
- Zero value was attributed to their project valuation and total Ore Reserve Estimate
- Recommendation was to drill more holes in the future mining areas



# Hydrogeology



## Case Study : CIS exploration company

- Scoping Study progressed straight to Feasibility Study
- Hydrogeology issues not identified at Scoping Study level
- Adjacent mine has historic issues with water control
- WAI hydrogeology programme estimated three years to dewater the mining area
- The financial implications of this technical risk too great for the client
- Project has stalled

# Geotechnical constraints



## Case Study : CIS mining company

- JORC Ore Reserve Estimate required
- Geotechnical drill holes vertical - impossible to calculate dip direction of structure
- Geotechnical design limited by lack of data
- Report signed off but with 'Unresolved issues'. Further work required
- Wasted opportunity. Second drilling campaign required
- Further work required, increasing cost and delaying next phase of project

# Geology / Mineral Resources



## Case Study : African Gold Deposit

- Previous drilling campaigns based on widely spaced drilling grids - insufficient to define the main structural controls of mineralisation
- Low level of confidence in structural interpretation meant that the deposit was classified as an Inferred Mineral Resource under guidelines of JORC Code (2012) and unable to progress to Feasibility Study resulting in delay to project
- Additional drilling campaigns using tightly spaced (20m to 40m) spaced drill holes allowed for re-interpretation of deposit geology and structure
- Increased confidence allowed for classification of Indicated Mineral Resources with subsequent Feasibility Study leading to classifying Probable Ore Reserves

# Geology / Mineral Resources



## Case Study : CIS mining company

- Wished to raise finance for expansion through the international markets
- JORC Mineral Resource Estimate stated Inferred and Indicated categories
- However the Indicated Mineral Resource covered two years of a 20 years mine plan
- Under JORC the Ore Reserve was insufficient to justify the payback of the capital required
- Under the guidance of WAI the Company undertook additional drilling to upgrade the Inferred Mineral Resource to Indicated Mineral Resource categories
- Funding was made available



# Mineral Processing



## Case Study : CIS exploration company

- Mineral processing testwork had been undertaken but no variability testing
- The client's geologist had identified core in line with variability testing criteria, however, were then packaged into one test sample
- Variability testing required repeating

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## A ROADMAP FOR MINING INVESTMENT

### Life Cycles of a Mining Project

# Mine Life Cycle Stages



- Wild Enthusiasm
  - Confusion
  - Slow Dawn of Realization
  - Disillusionment
  - Panic
  - Search for someone to blame
- 
- Iran has 37 billion tonnes of **proven reserves** and more than 57 billion tonnes of **potential reserves** worth \$770 billion in 2014. (Source: Wikipedia)
  - How do we prove this?!

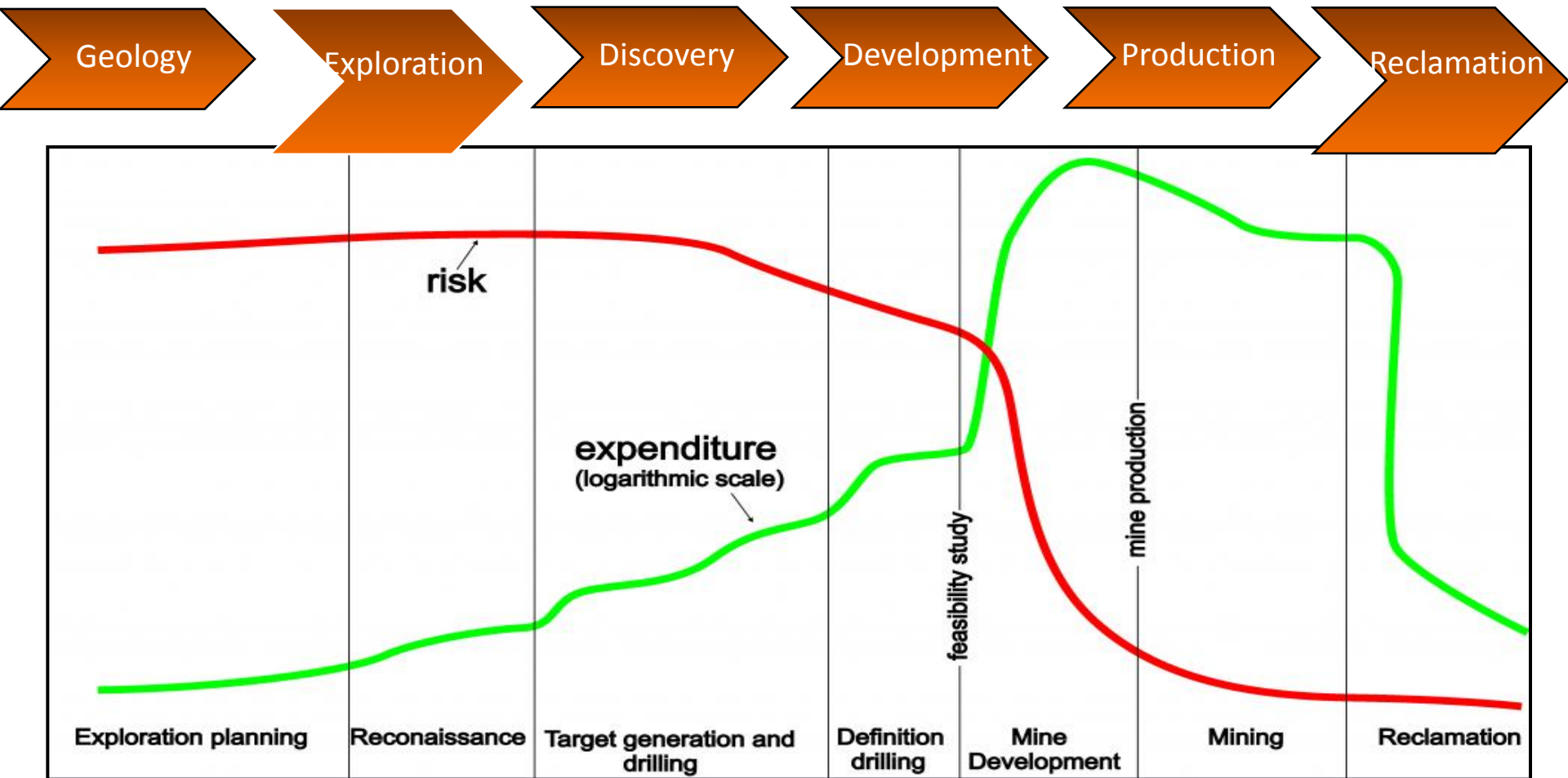
# Mine Life Cycle Stages

- Exploration
- Advanced Exploration
- Scoping Study
- Pre-Feasibility
- Feasibility
- Project Financing
- Construction
- Startup
- Operation
- Closure/Reclamation

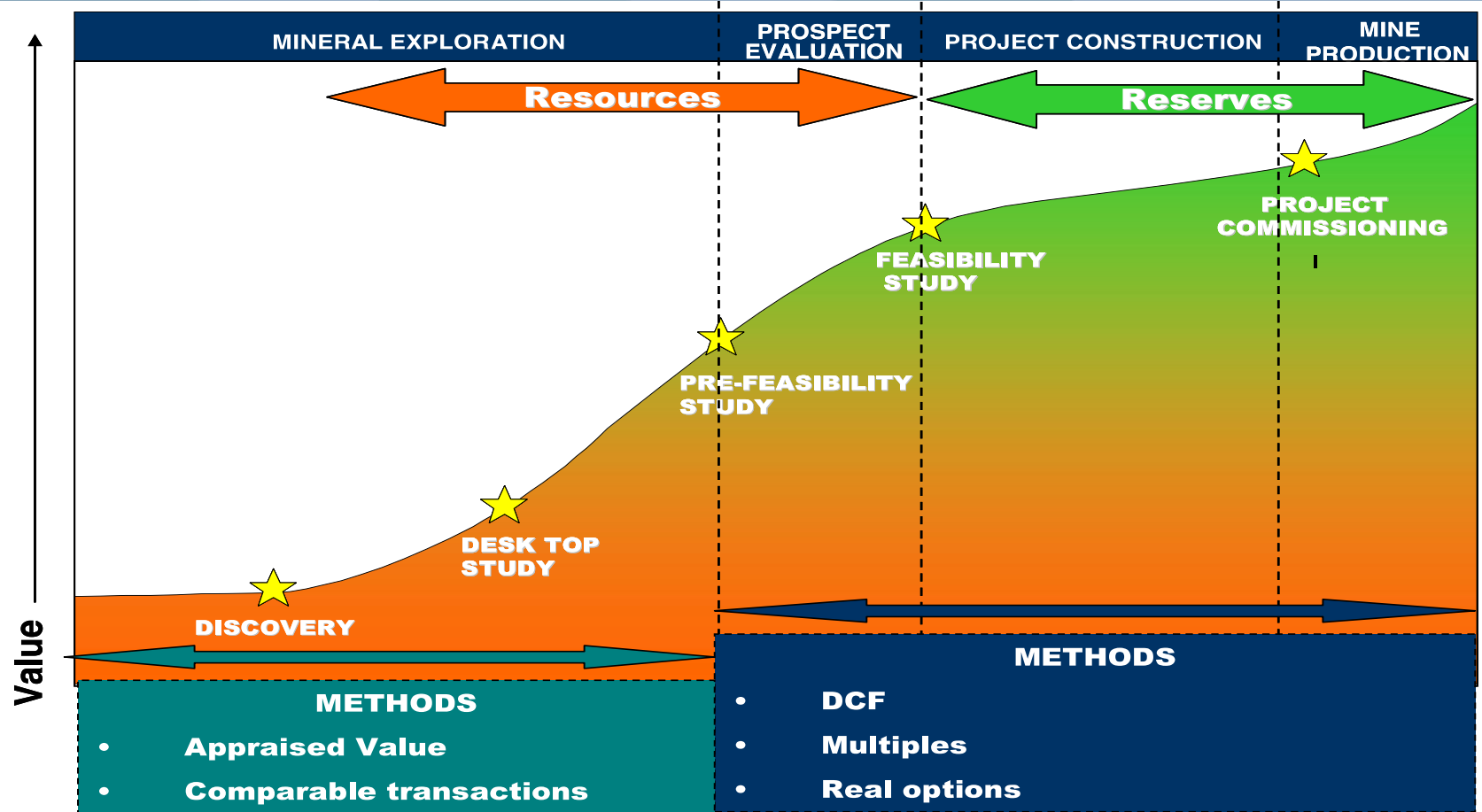




# Mine Life Cycle Stages



# Mine Life Cycle Stages



**Confidence**

A function of the amount of knowledge on a mineral resource/property and the degree of probability of it being brought to account.

# Mine Life Cycle Stages



At all stages of a mine's life.....

- **Stage 1: Scoping Study** (Determine what the project could be). Develop concepts, does it make sense
- **Stage 2: Pre-feasibility** (Determine what the project should be). Assess and rank options. What is the best.
- **Stage 3: Feasibility Study** (Determine what the project will be). Investor review. Is it viable?
- **Stage 4: Implementation and Setup** (Deliver the project). Construct and commission. (EPC)
- **Stage 5: Operation** (Extract the value £/\$).
- **Stage 6: Closure, demolition and rehabilitation** (Return to the community).

# Mineral Exploration: Desk Study

- Data collation
- Data review
- Site visit
- Assessment of geology, hydrogeology, geotechnical, mining potential, environmental, and social aspects of mining operations
- **Timeframes: 3-4 weeks**
- **Costs: £10,000-£20,000**





# Mineral Exploration: Scoping Study

- Carried out at early stages of project
- To determine if project is economically viable and technically feasible
- May be used as basis for acquiring exploration funding
- A 'mining scenario' may be considered at this stage
- Risk assessment and fatal flaw analysis conducted
- Typically an estimated accuracy of  $\pm 40\text{-}50\%$
- Determine whether the expense of a full prefeasibility study is warranted
- **Time frames: 6-8 weeks**
- **Cost £30,000 - £60,000**



## Pre Feasibility Study (PFS)

**“A comprehensive study of a range of options”, involving:**

- Geological Model
- Mineral Resource estimate to a recognised reporting Code
- Geotechnical and Hydrogeology
- Mine design
- Mineral processing flowsheet and plant design
- Civil engineering and infrastructure
- Environmental and Social assessments (EIA)
- Estimation of cost base
- Typical estimated cost accuracy of  $\pm 20\text{-}25\%$
- Time frames: 24 - 36 weeks
- **Basis of Funding for technical definition of the project**



## Feasibility Study (FS)

**“A comprehensive study of the selected development option” involving:**

- Detailed and removes all significant uncertainties
- Relevant information with backed up evidence
- Demonstrate with reasonable confidence the project can be constructed and operated in a technically sound and economically viable manner
- Provide basis for permitting and regulation
- Detailed cost analysis
- Typical estimated cost accuracy of  $\pm 10\text{-}15\%$
- Time frames & costs: project dependent
- **Basis of an investment decision or to support project financing**





# Feasibility Study

- JORC Clause 40 (Definition of a Feasibility Study) states “Terms such as Bankable Feasibility Study and Definitive Feasibility Study are noted as being equivalent as defined in this Clause.”
  - Feasibility Study
  - Bankable Feasibility Study
  - Definitive Feasibility Study
- Each bank will have a criteria under which they are willing to invest - **know your bank's requirements**





# Comparison of “international” Studies and Iranian Studies



Timeline of Studies	Iranian Study			“International” Standard?
1	Pre- exploration	اکتشافات مقدماتی	Gozareh Tojihi	Scoping Study
2	Basic exploration	اکتشافات نیمه تفصیلی	Ekteshafat Moghadamati	Pre-Feasibility Study
3	Feasibility study	گزارش توجیهی	Ekteshafat Nime Tafsili	Feasibility Study
4	Detail Design	اکتشافات تفصیلی	Ekteshafat Tafsili	Detailed Design

## Operating Mines

**Do companies with an operating mine need to undertake a Pre-feasibility study in order to continue reporting Ore Reserves?**

*The Life of Mine Plan would generally be expected to contain information at better than Pre-Feasibility or Feasibility level for the whole range of inputs normally required for a Pre-Feasibility or Feasibility study and this would meet the requirement in Clause 29 for the Ore Reserve to continue that classification.*



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## A ROADMAP FOR MINING INVESTMENT

**Technical Reports for the Financial Community**



# Technical Reports



- Competent Person's Report
- Technical Due Diligence
- Environmental and Social Impact Assessment
  
- Previously covered
  - Scoping Study
  - Pre-Feasibility Study
  - Feasibility Study



# The JORC Code (2012) – A Competent Person



- **Competent Person (CP) should**
  - Be a mineral industry professional and a Member or Fellow of a “Recognised Professional Organisation”
  - Have a minimum of five years relevant experience in the style of mineralisation or type of deposit under consideration and in the activity which that person is undertaking

One CP may sign off the whole report (i.e. taking full responsibility), or individual CP’s will be responsible for their sections.

## LSE - Note for Mining, Oil and Gas Companies – June 2009

- Be independent of the **applicant**, its **directors**, senior management and advisers
- Not be remunerated by way of a fee that is linked to the **admission** or value of the **applicant**

# Competent Person's Report



LSE - Note for Mining, Oil and Gas Companies – June 2009

- Scope of a CPR
  - Should be prepared no more than 6 months prior to the date of the admission document
  - Summary Table of assets
  - Overview of Region, Location and Assets
  - Mineral Resources and Ore Reserves
  - Other Assets
  - Qualifications of Competent Person and statement of Competent Person's independence

# Competent Person's Report



## Statement

I/We,

---

*(Insert full name(s))*

confirm that I am the Competent Person for the Report and:

- I have read and understood the requirements of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition).
- I am a Competent Person as defined by the JORC Code, 2012 Edition, having five years experience that is relevant to the style of mineralisation and type of deposit described in the Report, and to the activity for which I am accepting responsibility.
- I am a Member or Fellow of *The Australasian Institute of Mining and Metallurgy* or the *Australian Institute of Geoscientists* or a 'Recognised Professional Organisation' (RPO) included in a list promulgated by ASX from time to time.
- I have reviewed the Report to which this Consent Statement applies.

I am a full time employee of

---

*(Insert company name)*

Or

I/We am a consultant working for

---

*(Insert company name)*



*your earth our world*

## Competent Person's Report



I

I have disclosed to the reporting company the full nature of the relationship between myself and the company, including any issue that could be perceived by investors as a conflict of interest.

I verify that the Report is based on and fairly and accurately reflects in the form and context in which it appears, the information in my supporting documentation relating to Exploration Targets, Exploration Results, Mineral Resources and/or Ore Reserves *(select as appropriate)*.





TO: EURASIAN MINERALS INC

British Columbia Securities Commission  
Alberta Securities Commission

Dear Sirs:

CONSENT OF AUTHOR

I, *Phil Newall BSc (ARSM), PhD (ACSM), CEng, FIMMM* do hereby consent to the public filing on SEDAR ([www.sedar.com](http://www.sedar.com)) and with the securities regulatory authorities referred to above of the Technical Report prepared by Wardell Armstrong International for EURASIAN MINERALS INC ("EMX") and IG COPPER LLC with an effective date of May 1, 2015 and dated July 10, 2015, and titled:

NI 43-101 Technical Report on the Initial Mineral Resource Estimate for the Malmyzh Copper-Gold Project, Khabarovsk Krai, Russian Federation

I confirm that I have read the written disclosure by EMX in its news release titled "Eurasian Minerals Reports Initial Resource Estimate and Project Approvals for the Malmyzh Copper-Gold Porphyry Project, Far East, Russia" dated May 26, 2015, and it fairly and accurately represents the information in the Technical Report, for which I am responsible, that supports the disclosure.

Dated this 10<sup>th</sup> day of July, 2015.



Signature of Qualified Person

## Technical Reports



- Supports significant stages such as:
  - The company listing on a stock exchange
  - Due diligence of a project on behalf of a third party
  - Supporting major capital investment
  - First time disclosure of a Mineral Resource or an Ore Reserve estimate
- Summary of material scientific and technical information on a property
- Involvement of a Competent Person

# Technical Reports



## Summary of Contents

- Property Information, Land and Permits
- Geology and Mineral Resources
- Mining and Ore Reserves
- Metallurgy and Process
- Transportation and Infrastructure
- Management and Labour
- Products, Markets and Sales
- Environment, Social and Permitting
- Development Schedule and Cost
- Life of Mine Plan
- Economic Analysis

# NI43-101 vs Competent Person's Report



## NI43-101

- Form of technical report is law
- All items in Table of Contents must be completed
- Filed on SEDAR so readily available for public
- Certificate and consent of QP is required

## CPR

- Requires specific technical disclosure
- Covering letter specifying “consent”
- Filed with regulators, not readily available to public



# Investors – National and International



- London Stock Exchange Nominated Advisors
  - Simmons and Simmons
  - RFC Ambrian
  - Strand Hanson
  - Canaccord Genuity Limited
  - Grant Thornton
  - **And many more**

# Technical Reports



Already discussed:

- Competent Person's Report
- Technical Due Diligence
- Scoping Study
- Pre-Feasibility Study
- Feasibility Study
- **Environmental and Social Impact Assessment**

# Environmental and Social Impact Assessments



What makes a good Environmental and Social Impact Assessments (ESIA)

- Fully addresses the sector/type of project
- Technical robustness of baseline, predictions, assessments, impact criteria
- Properly dealt with interactions between topics; cumulative impacts
- Presentation and coverage of the ESIA Report

# Environmental and Social Impact Assessments



## Propose of the Study

- A tool for project design
- An analytical and assessment process
- A tool to inform the public and assist decision makers
- The first stage of an environmental & social management process for the life of project



# Environmental and Social Impact Assessments



## World Bank Environmental Screening Categories

- A** - EIA is normally required, as the project may have diverse and significant environmental impacts
- B** - More limited EIA is appropriate, as the project may have specific environmental impacts (focused EIA)
- C** - EIA is not normally necessary, as the project is unlikely to have significant environmental impacts
- F1** - Investment of bank funds through a financial intermediary that may result in adverse environmental impacts

# Environmental and Social Impact Assessments



## International Financial Corporation (IFC) Performance Standards

- **Performance Standard 1:** Assessment and Management of Environmental and Social Risks and Impacts
- **Performance Standard 2:** Labour and Working Conditions
- **Performance Standard 3:** Resource Efficiency and Pollution Prevention
- **Performance Standard 4:** Community Health, Safety, and Security
- **Performance Standard 5:** Land Acquisition and Involuntary Resettlement
- **Performance Standard 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources
- **Performance Standard 7:** Indigenous Peoples
- **Performance Standard 8:** Cultural Heritage

# Environmental and Social Impact Assessments



## Why bother with the social element

### Corporate

- Reduced financial and reputation risk
- Increased ability to secure finance and insurance

### Community

- Reduced social costs
- Increased social benefits and opportunities

# Environmental and Social Impact Assessments



In different parts of the world, Environmental, Social and H&S performance varies from excellent to poor.

However, invariably, they do not fully comply with IFC Guidelines and Equator Principles, and compliance with these is required for international financing.

For gold mining, Cyanide Management Code is becoming important.





# Environmental



## Case Study : CIS exploration company

- WAI was asked to undertake due diligence on an iron ore project as part of signing off the Feasibility Study
- Due diligence showed
  - A lack of environmental baseline data
  - No Social Baseline
  - Limited impact analysis
  - No reclamation and closure planning
- WAI designed the baseline studies and fast tracked the impact analysis programme, which requires a minimum of 12 months data to complete

# Environmental



## **Case Study : African Junior Mining company**

### **Issue:**

Local compliance was reached for environmental studies, but social aspects had been missed.

These are now an essential requirement for both IFC Performance standards and Equator Principles.

### **Delay: 3 month delay**

### **WAI Approach:**

WAI undertook social baseline studies to IFC performance standards with stakeholder mapping and engagement. A stakeholder engagement plan was required for the project

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LAND AND PROPERTY  
MINING, QUARRYING AND MINERAL ESTATES  
WASTE RESOURCE MANAGEMENT



## **IRAN - Building Blocks to the Future**

### **Mineral Deposit Evaluation in the FSU – A Case Study**



## Mineral Deposit Evaluation in the FSU – A Case Study



For the last 15-20 years, WAI has been providing services to clients in Central Asia and Russia, predominantly with regard to raising Project Finance from the international markets, whether they be UK, USA or Canada.

This has meant that projects need to be evaluated following recognised international procedures, but understanding that mining projects in these regions are run and managed according to State protocols.



## The Assets

- The FSU is a treasure-trove of all types of mineral deposits from oil and gas through to base and precious metals and industrial minerals.
- The rigorous Soviet system ensured that all projects were evaluated on the same basis dependent on commodity and level of complexity.
- This usually provides a large repository of high quality, useful data which provides valuable input to modern studies. The major advantage of this is that we know what data should be available before we start a job.



## Benefits of the Data

Much of the data can be relied on directly, particularly:

- Geological mapping
- General interpretation
- Sampling methodology
- Assaying and QA/QC
- Hydrogeological
- Geotechnical



## Problems with the Data



- Missing data
- Overall quality of the databases
- Reliability of the drilling (traditionally relied on conventional core drilling, lack of survey data and poor core recovery)
- Translating the Soviet resource system into JORC equivalent resources – issues with  $C_2$  and  $P_1$
- Inflexibility or absence of mine design
- Depending on the status of the project, little or no environmental data may be available, or relevant current baseline studies
- Absence of useful economic assessment
- No market data

## Evaluation Methodology



- Analyse and interpret Soviet geologic data
- Examine the raw data for manual errors
- Audit the Soviet “reserve” statement and/or prepare a geostatistical model in accordance with JORC
- Examine technical data including hydrological, geotechnical, metallurgical and make decision as to whether corroborative works are required
- Prepare mine design and process flowsheet
- Market study
- Prepare project valuation



## Drivers



### Financing:

Many Clients in Central Asia and Russia were looking to the international markets (directly or indirectly), for Project Finance.

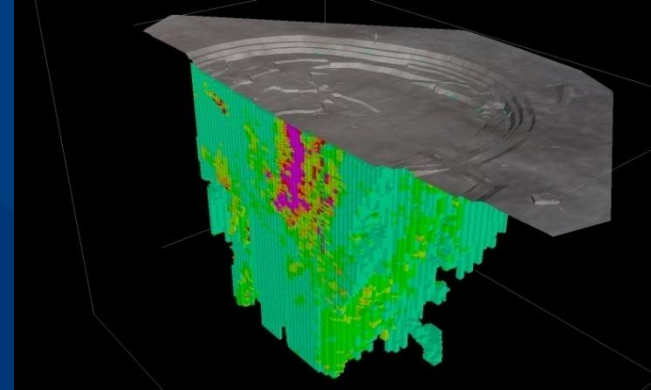
This means that projects needed to be evaluated following recognised international procedures, but understanding that mining projects in these regions are run and managed according to strict State protocols.

Of particular importance is the role of resource reporting and environmental compliance.





## Compliance



In terms of international compliance, there were two main areas of concern:

### Resources & Reserves

- Calculated and classified under GKZ Protocols into A, B, C<sub>1</sub> and C<sub>2</sub>
- C<sub>2</sub> tends to be problematic in that does not naturally transfer to Indicated or Inferred under JORC (2004)
- Most international markets want to see JORC numbers.

### Environmental & Social Legislation

- Although the Kazakhstan regulations are thorough, they do not fully comply with IFC Guidelines and Equator Principles, and compliance with these is required for international financing.



## Fund Raising

### Pre-IPO:

- Many CIS projects started through private investment, usually from within the region, often from individuals
- Many private investors not familiar with mining sector or ideas of international compliance.

### IPO:

- Most common route still via London either on AIM or Full Board
- Hong Kong Exchange becoming increasingly popular
- New York, Toronto and Oslo also alternatives



## Success Stories



Over the years, WAI has helped a number of CIS-based companies realise the true value of their assets either through IPO's or raising Project Finance:

- Kazzinc (Glencore) – transfer of gold asset resources into JORC and successful IPO;
- Polyus - transfer of gold asset resources into JORC;
- Nordgold - transfer of gold asset resources into JORC and annual reporting;
- Petropavlovsk - transfer of gold asset resources into JORC and annual reporting;
- IRC - transfer of gold asset resources into JORC and successful Hong Kong IPO;
- Kazakhgold – successful London IPO.



## Is Iran Open For Business?



In WAI's opinion, Iran's mineral sector is very definitely "open for business":

- Strong market perception
- Vast mineral base with track record of mining
- Talented, entrepreneurial workforce
- Well established local banking facility
- Stable currency
- Expected future growth
- Access to private finance
- Security of tenure
- Stable government
- Access to major markets



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WASTE RESOURCE MANAGEMENT



## IRAN - Building Blocks to the Future

### STRATEGY TO PREPARE FOR INVESTORS





# A ROADMAP FOR MINING INVESTMENT



Where is Iran's immediate value presented:

- Operating Mines
  - a. Proven production records
  - b. Proven infrastructure
  - c. Proven Mine plans
  - d. Physical Net Present Value
- Exploration Projects
  - a. Drilling undertaken
  - b. Engineering studies
  - c. Upside financial potential

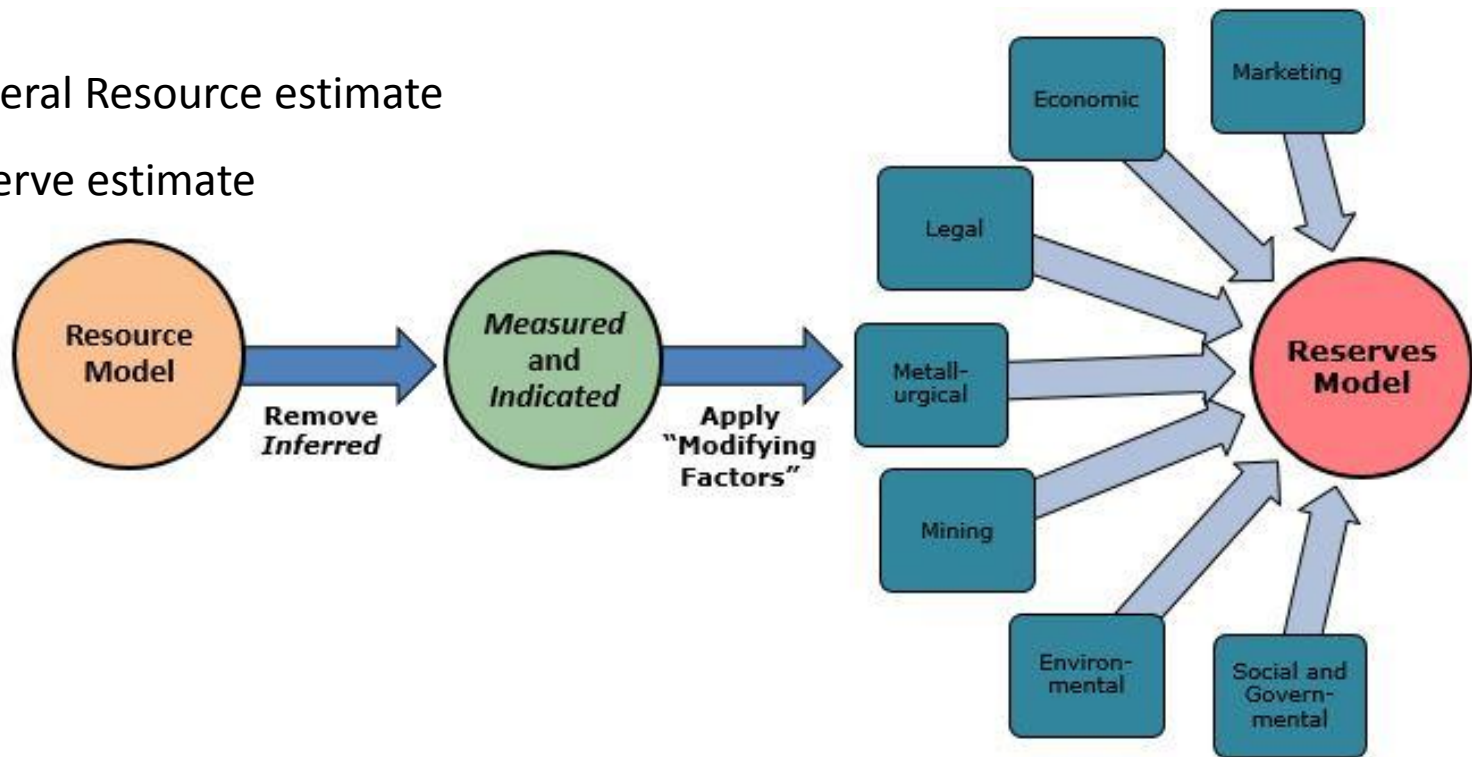


# A ROADMAP FOR MINING INVESTMENT



## Develop

1. The Mineral Resource estimate
2. Ore Reserve estimate



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متشكرم



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