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The Application of UNFC to Mineral Resources

Workshop – UNFC and UNRMS: Tools for Managing Resources for Sustainable Development, Geneva, 29.04.2019

Resource Management Week 2019

RESOURCES FOR SUSTAINABLE DEVELOPMENT

10th Session of the Expert Group on Resource Management

29 April – 3 May 2019, Palais des Nations, Geneva

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UNFC was originally designed for the application in the minerals and oil/gas sectors. Over the years it was extended to a much larger variety of Natural Resources.

The application of UNFC (and UNRMS) to mineral resources has to be understood within a framework of national and supranational management of the minerals resources together with the use of the SDGs as a move to make the mining industry fit for a sustainable and acceptable future.

Use of UNFC

UNFC provides a method for the industrial and financial sectors, governments and NGOs to incorporate published data into databases, mineral inventories, i.e. the management of resources.

Use of CRIRSCO

CRIRSCO is recognised by ESMA for use on European Union stock exchanges (ESMA = European Securities and Markets Authority)

Accepted on a number of other stock exchanges around the world (Canada, Singapore, ...)

(Public) Reporting Standard

Promoting best practise in reporting of resources and reserves incl. classification following world-wide standards. Strict rule of ethics and competency. Reliable and transparent information for investors.

Classification Tool

Global and governmental communication tool. Just classification, no reporting, security recognition and competency rules. Comparable between different resource types. Reliable information on mineral inventory for further usage.

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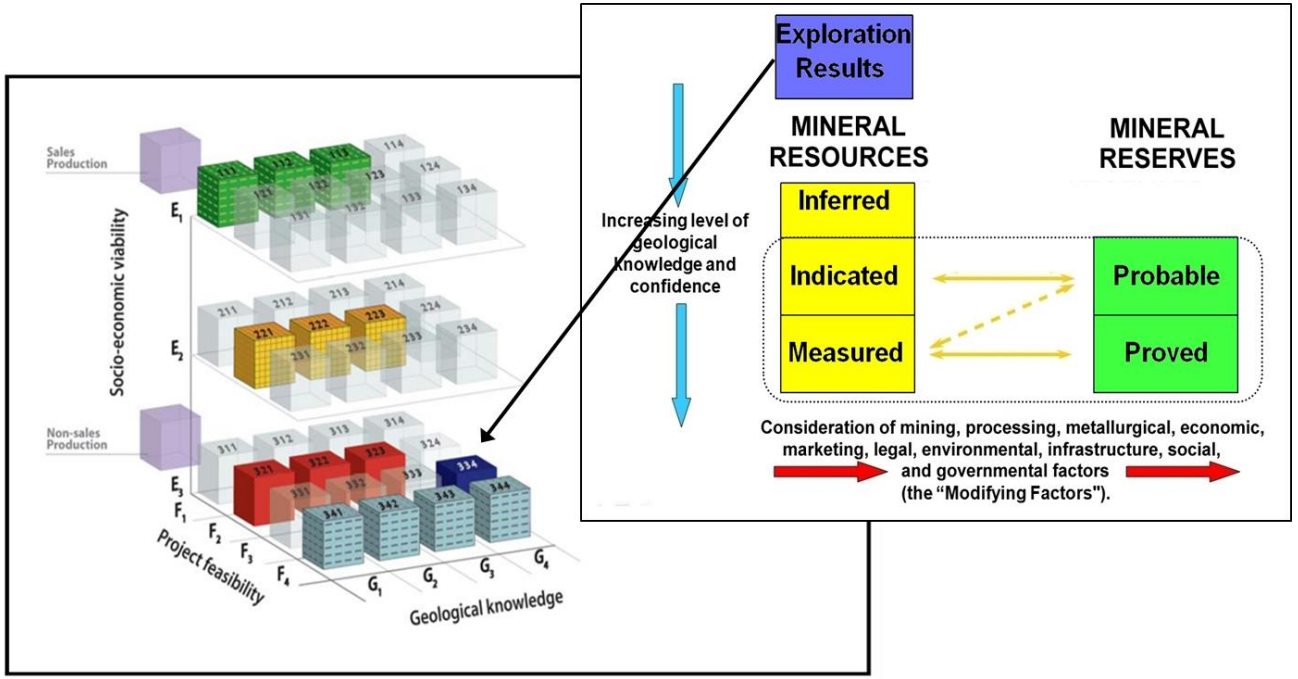

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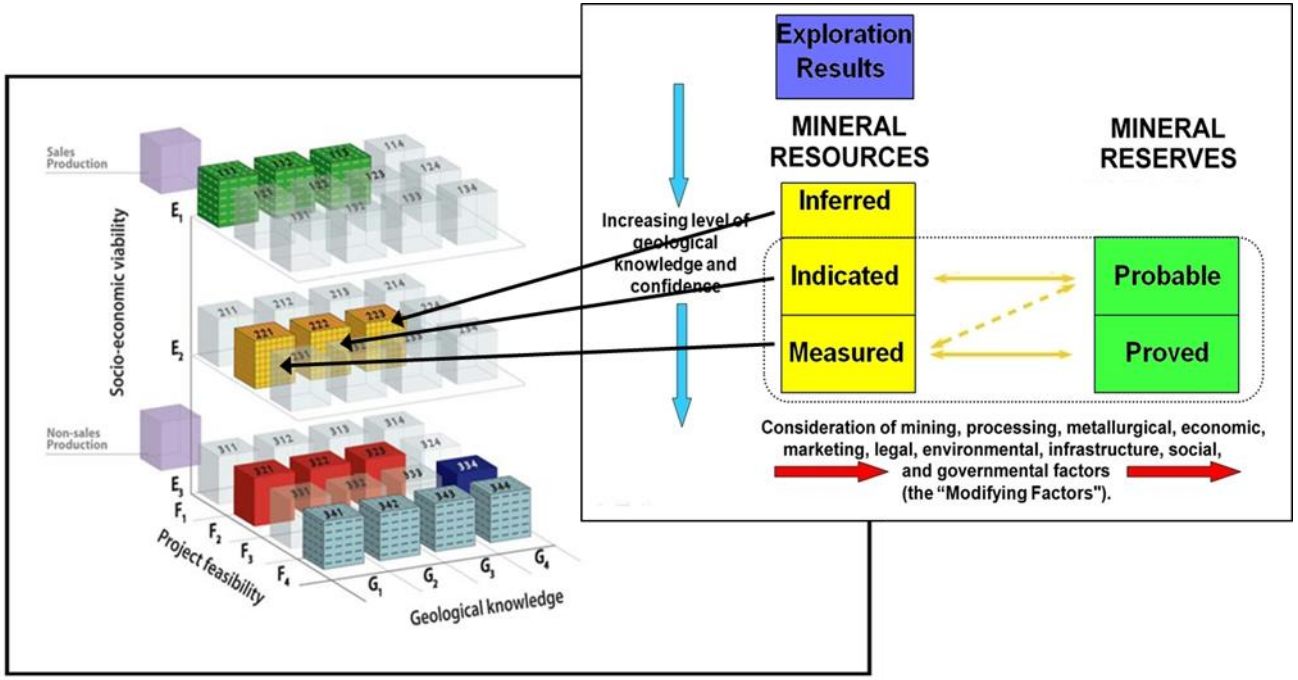

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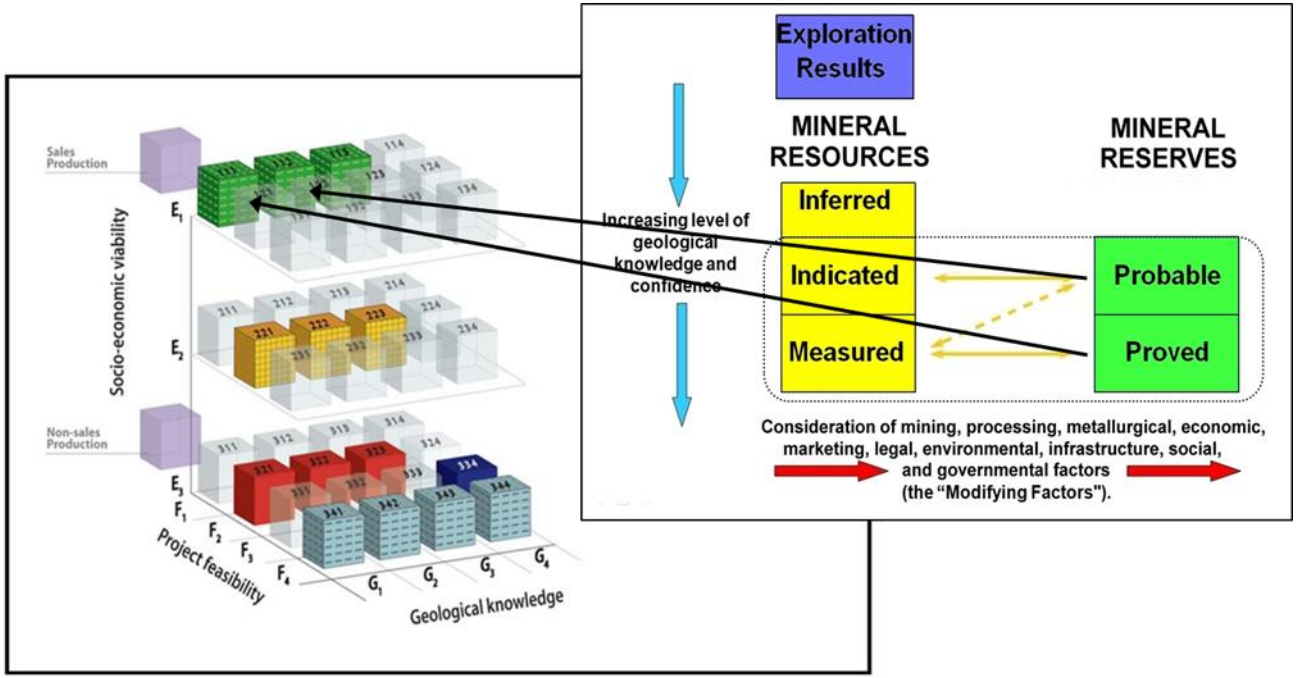

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Rio Tinto 2012: gold reserves

GOLD	Type of mine (a)	Proved ore reserves at end 2012 Tonnage millions of tonnes	Proved ore reserves at end 2012 Grade grammes per tonne	Probable orereserves at end 2012 Tonnage millions of tonnes	Probable orereserves at end 2012 Grade grammes per tonne	Average mill recovery %	Rio Tinto share Interest %		Recoverable metal millions of ounces
Reserves at operating mines									
Bingham Canyon (US)									
– open pit (l)	O/P	417	0.21	287	0.18		64	100	2.875
– stockpiles		40	0.14	41	0.14		64	100	0.232
Grasberg (Indonesia)	OP+UG	800	1.03	1624	0.74		68	(q)	12.227
Northparkes (Australia)									
– open pit and stockpiles		8.2	0.24				67	80	0.035
– underground	U/G			66	0.28		68	80	0.328
Oyu Tolgoi (Mongolia)									
– South Oyu open pit (r) (y)	O/P	426	0.42	614	0.24		74	33.5	2.581
– South Oyu stockpiles (s) (r)		9	0.33				74	33.5	0.024
Reserves at development projects									
Eagle (US) (u)	U/G			5.2	0.25		55	100	0.023
Oyu Tolgoi (Mongolia)									
– Hugo Dummett N (v)	U/G			460	0.37		83	33.5	1.544
– Hugo Dummett N Ext(w)	U/G			31	0.62		83	30.5	0.159

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Rio Tinto 2012: gold reserves

E1-F1-G1 E1-F1-G2

GOLD	Type of mine (a)	Proved ore reserves at end 2012 Tonnage millions of tonnes	Proved ore reserves at end 2012 Grade grammes per tonne	Probable orereserves at end 2012 Tonnage millions of tonnes	Probable orereserves at end 2012 Grade grammes per tonne	Average mill recovery %	Rio Tinto share Interest %		Recoverable metal millions of ounces
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Rio Tinto 2012: gold reserves

E1-F1-G1 E1-F1-G2

GOLD	Type of mine (a)	Proved ore reserves at end 2012 Tonnage millions of tonnes	Proved ore reserves at end 2012 Grade grammes per tonne	Probable orereserves at end 2012 Tonnage millions of tonnes	Probable orereserves at end 2012 Grade grammes per tonne	Average mill recovery %	Rio Tinto share Interest %		Recoverable metal millions of ounces
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Grasberg (Indonesia)	OP+UG	800	1.03	1624	0.74	68	(q)		12.227
Northparkes (Australia)									
– open pit and stockpiles		8.2	0.24			67	80		0.035
– underground	U/G								
Oyu Tolgoi (Mongolia)									
– South Oyu open pit (r) (y)	O/P								
– South Oyu stockpiles (s) (r)									
Reserves at development projects									
Eagle (US) (u)	U/G								
Oyu Tolgoi (Mongolia)									
– Hugo Dummett N (v)	U/G			460	0.37	83	33.5		1.544
– Hugo Dummett N Ext(w)	U/G			31	0.62	83	30.5		0.159

Reserves at Operating Mines
= "On Production"
higher sub-classes **E1.1-F1.1-G1** and **E1.1-F1.1-G2**

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Rio Tinto 2012: gold reserves

GOLD	Type of mine (a)	Proved ore reserves at end 2012 (E1-F1-G1) Tonnage millions of tonnes	Proved ore reserves at end 2012 (E1-F1-G1) Grade grammes per tonne	Probable orereserves at end 2012 (E1-F1-G2) Tonnage millions of tonnes	Probable orereserves at end 2012 (E1-F1-G2) Grade grammes per tonne	Average mill recovery %	Rio Tinto share Interest %	Recoverable metal millions of ounces
Reserves at operating mines								
Bingham Canyon (US)								
– open pit (l)	O/P							
– stockpiles								
Grasberg (Indonesia)	OP+U							
Northparkes (Australia)								
– open pit and stockpiles								
– underground	U/G			66	0.28	68	80	0.328
Oyu Tolgoi (Mongolia)								
– South Oyu open pit (r) (y)	O/P	426	0.42	614	0.24	74	33.5	2.581
– South Oyu stockpiles (s) (r)		9	0.33			74	33.5	0.024
Reserves at development projects								
Eagle (US) (u)	U/G			5.2	0.25	55	100	0.023
Oyu Tolgoi (Mongolia)								
– Hugo Dummett N (v)	U/G			460	0.37	83	33.5	1.544
– Hugo Dummett N Ext(w)	U/G			31	0.62	83	30.5	0.159

Reserves at development projects
= "Justified for Development"
Sub-classes **E1.1-F1.2-G1** and **E1.1-F1.2-G2**

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Rio Tinto 2012: gold reserves

		E2-F2-G1		E2-F2-G2		E2-F2-G3		
	Likely mining method (a)	Measured resources at end 2012		Indicated resources at end 2012		Inferred resources at end 2012		Rio Tinto Interest %
		Tonnage	Grade	Tonnage	Grade	Tonnage	Grade	
GOLD		millions of tonnes	grammes per tonne	millions of tonnes	grammes per tonne	millions of tonnes	grammes per tonne	
Bingham Canyon (US)								
– Open Pit (l)	O/P					2.7	0.13	100
– North Rim Skarn	U/G	1	2.1	9	1.7	10	1.5	100
Eagle (US) (m)	U/G			0.4	0.18	0.1	0.12	100
Grasberg (Indonesia)	OP+UG	490	0.63	1851	0.53	94	0.46	(r)
Northparkes (Australia)	U/G	14	0.3	3.7	0.13	271	0.26	80
Oyu Tolgoi (Mongolia)								
– Heruga ETG (s)	U/G					910	0.49	30.5
– Heruga IVN (t)	U/G					60	0.37	33.5
– Hugo Dummett North (u)	U/G			292	0.31	574	0.31	33.5
– Hugo Dummett North Extension (v)	U/G			90	0.57	100	0.3	30.5
– Hugo Dummett South (w)	U/G					490	0.09	33.5
– South Oyu (x)	O/P	22	0.65	150	0.5	453	0.23	33.5
Wabu (Indonesia)	O/P					44	2.47	(r)

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The Challenges for mineral industry

- Ensure sufficient, reliable, affordable and environmentally responsible supplies of energy and raw materials
- Demonstrate alignment to SDGs
- Decarbonize the economy
- **Social acceptance**

"If mining companies truly hope to repair their image, they must do more than change their messaging. They must also fundamentally change their behaviors around the way they mine how they engage with communities, attract talent, and deliver on their promises."

James Ferguson
Global Mining Tax Leader
Deloitte UK

The UNFC Mineral Management System

- Promote the consistent and coherent classification of all mineral resources and “values”
- Provide specifications and guidelines that will allow the mineral industry to align to good outcomes
  - Resource classification (UNFC Framework)
  - Resource management
  - Socio-economic and commercial assessment
  - Innovation planning and management
  - Definition of life-cycle and certification of recovery chains
  - Collaboration with CRIRSCO, PERC and other National Reporting Organizations for improvement of the UNFC and its links to historical accounts.

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COMPETENCY

The use of the UNFC will require persons with competence in the fields of minerals, oil & gas, CO_2-injection, renewable energy (geothermal, bio, hydro, solar, wind), nuclear energy and anthropogenic resources.
Future projects will cover water as a resource.

Background

Competent / Qualified Persons (CP / QP) are presently required for:
Reporting mineral exploration and mining (CRIRSCO; PERC, JORC, SAMREC, NI43-101, etc.).
Reporting for oil and gas (PRMS, NI51-101, AIM, etc.).
First standards for geothermal energy have been initiated in Australia and Canada.
CPs are commonly geoscientists, petroleum, mining or metallurgical engineers.

NOTE 1: Being registered with, for example EFG, does not imply competence in each and every task or activity. It merely implies that the registrant has satisfied the basic entry condition for registration i.e. the individual has satisfied the minimum registration requirements as specified in EFG regulations.

What is Competence?

Qualification +
Experience +
Continuous Training

= Competence

Who is a Competent Person?

Somebody who has competence, is registered in a professional organisation, follows a Code of Ethics and who is willing to discuss his/her results with his/her peers.

NOTE 2: Complaints made in respect of the professional work of a Competent Person will be dealt with under the disciplinary procedures of the professional organisation to which the Competent Person belongs. Such procedures may vary from country to country, but international agreements between Recognised Professional Organisations (RPOs) are in place to standardise practices.

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Conclusion:

UNFC is an ideal system to manage resources on a industrial, regional, national and supranational level, esp considering longterm views and international comparability.

The industrial codes are well established reporting standards for industry ad finance, esp. for short and medium terms.

A clear definition of competency and Competent Persons / Evaluators is absolutely necessary for the protection of the projects and the public interests.

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Thank you

Michael U.C. Neumann

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