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Issues in Transition from UNFC 1997 to 2009 - INDIA

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Indian Mining Sector: An Overview



- Endowed with rich mineral resources
- Contributed 2.31% to GDP in 2012-13
- Produces 87 minerals: 4 fuels, 10 metallic, 47 non-metallic, 3 atomic & 24 minor minerals



Mineral Resource Data Base



- National Mineral Inventory of 70 metallic & non-metallic minerals maintained by Federal Government
- Updation: Every 5 years



Journey of Mineral Resource Classification



- Till 1980, classification of mineral resources had an one-dimensional approach on basis of **geologic assurance**.
- 1980 to 2000 the classification **had two dimensional approach** (geological & techno-economic) with emphasis on geological axis.
- From 2000 onwards on the basis of the **three dimensional UNFC 1997**.



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Major Mineral Resources as per UNFC 1997



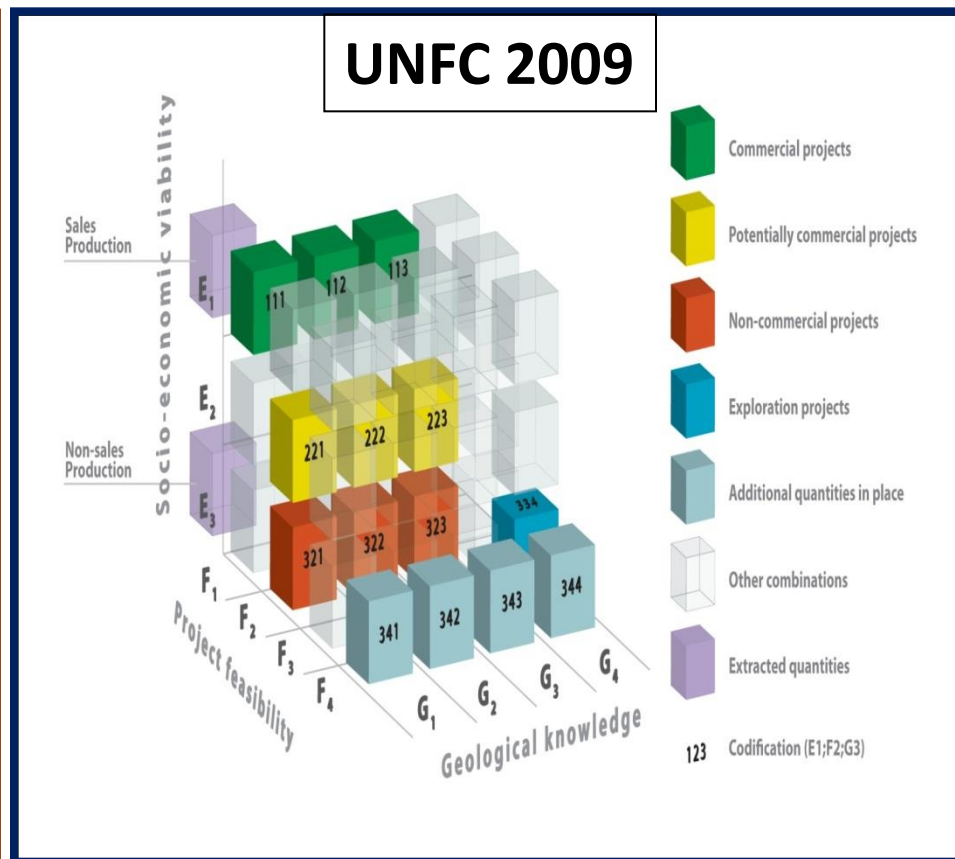
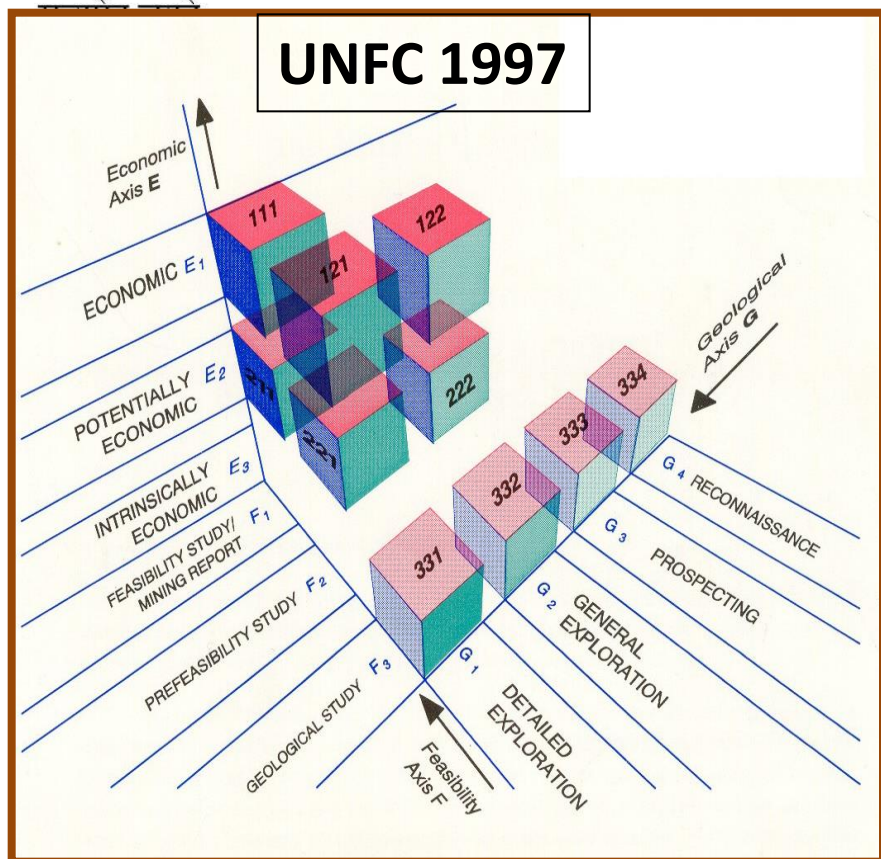
(as on 1.4.2010)

(in million metric tonne)

Mineral Commodity	Reserves (111 + 121 + 122)	Resources (211 + 221 + 222 + 331 + 332 + 333 + 334)	Total Resources
Bauxite	593	2886	3479
Copper	394	1164	1558
Iron Ore	8311	20410	28526
Lead & Zinc Ore	109	576	685
Manganese	142	288	430
Limestone	14926	170008	184934
Chromite	54	149	203



UNFC 1997 Vs 2009



- Code (331), (332), (333) & (211) of UNFC-1997 are not available in UNFC 2009
- Code 221 and 222 are available with new definitions
- Codes (113), (223), (321,322,323)& (341,342,343, 344) of UNFC 2009 are not available in UNFC 1997



Mapping of UNFC 1997 to 2009



UNFC 1997		UNFC 2009			
Class	Category	Category			Class
	EFG	E	F	G	
Proved	111	1	1	1,2,3	Commercial projects
Probable	121, 122				
Feasibility	211	3	2	1,2,3	Non-commercial projects
Pre-feasibility	221, 222				
Measured	331	2	2	1,2,3	Potentially commercial projects
Indicated	332				
Inferred	333				
Reconnaissance	334	3	3	4	Exploration project
No codes available		3	4	1,2,3	Additional quantities associated with known deposits
		3	4	4	Additional quantities associated with potential deposits



Mapping between CRIRSCO, UNFC 1997 & 2009



CRIRSCO TEMPLATE		UNFC 1997	UNFC 2009 "Minimum" Categories'			UNFC 2009 CLASS
Mineral Reserve	Proved	111	E1	F1	G1	Commercial Projects
	Probable	121,122			G2	
Mineral Resource	Measured	331	E2	F2	G1	Potentially Commercial Projects
	Indicated	332			G2	
	Inferred	333			G3	
Exploration Results		334	E3	F3	G4	Exploration Projects

- Feasibility(211) & Prefeasibility (221+222) Mineral Resources class of UNFC 1997 are not mapable to CRIRSCO Template
- CRIRSCO has less granularity than UNFC 2009 for which all projects can not be mapped through CRIRSCO to UNFC. The non commercial project & additional quantities in place classes of UNFC does not find a place in CRIRSCO Template



Case study - Application of UNFC 2009 to a Limestone Deposit



(all figures in million metric tonnes)

UNFC 1997		UNFC2009		
Class	Quantity	Class	Quantity	Sub Class
Proved Mineral Reserve (111)	110.00	Commercial Project (111)	110.00	
Feasibility Mineral Resource (211)	390.00	Non Commercial Project (321)	274.00	Development Unclarified * 3.2,2.2,1
			116.00	Development not viable ** 3.3,2.3,1
Indicated Mineral Resource (332)	59.00	Potentially Commercial Project (222)	59.00	
Inferred Mineral Resource (333)	83.00	Potentially Commercial Project (223)	83.00	
	642.00		642.00	



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Mapping of Iron Ore (Hematite) resources of India with UNFC 2009



(all figures in million metric tonnes)

UNFC-1997	Quantity	UNFC-2009
Proved (111)	5982	Commercial Project (111)
Probable (121+122)	1173 + 938	Commercial Project (112)
Feasibility (211)	515	Non Commercial Project (321)
Prefeasibility (221+222)	756+495	Non Commercial Project (321)
Measured (331)	540	Potentially Commercial Project (221)
Indicated (332)	1198	Potentially Commercial Project (222)
Inferred (333)	3943	Potentially Commercial Project (223)
Reconnaissance (334)	2342	Exploration Projects (334)



Issues in Brief



Issues	Possible solutions
Measured (331), Indicated (332), Inferred (333) classes of UNFC-1997 are not available in UNFC 2009	Resources classified under these codes may have to be moved to 221, 222 and 223 codes of UNFC through CRIRSCO template
Feasibility Mineral Resource (211) code of UNFC 1997 is not available in the new codes	The resources earlier classified under these codes may have to be moved to non commercial class 321 of new code
Code 121 and 122 of UNFC 1997 exists in UNFC 2009 with new definitions	Resources earlier classified under these codes may be moved to 321 and 322 codes of new classifications
All projects are not mappable through CRIRSCO to UNFC due to less granularity in CRIRSCO	Direct mapping to UNFC through suitable bridging documents should be allowed



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Conclusion



- UNFC-1997 and UNFC-2009 are not fully aligned.
- Mapping of UNFC 1997 to UNFC 2009 at deposit level as well as at aggregate level is possible.
- The CRIRSCO template needs more granularity to address the issues of exploration taken up by government agencies without taking up any feasibility studies & resources identified by companies having no immediate economic viability.



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The Road map



- Setting up a committee in India to evolve a bridging document for transiting to UNFC 2009, CRIRSCO and TAG may be associated, so that a bridging document may be approved by TAG/Bureau.
- Take up pilot projects and case studies.
- For Global need training modules for UNFC 2009 may be designed by India in collaboration with CRIRSCO and TAG.
- Introduction of UNFC in the curriculum at Under Graduate level including Standard syllabus.
- Promotion of UNFC 2009 through workshops, conferences, meetings & articles etc.



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THANK YOU FOR YOUR KIND ATTENTION

