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Item 5 (a) of the provisional agenda

**REPORT OF THE TASK FORCE ON
PRACTICAL IMPLEMENTATION OF THE UNITED NATIONS
FRAMEWORK CLASSIFICATION FOR RESERVED/RESOURCES
(Geneva, 7-9 November 1999)**

and

**Joint Meeting of the UN/ECE Task Force and
CMMI International Mineral Reserves Committee**

PARTICIPATION

1. The Task Force on the Implementation of the United Nations Framework Classification for Reserves/Resources: Solid Fuels and Mineral Commodities (UNFC) was held in Geneva from 7 to 9 November 1999. A separate meeting between the Task Force and CMMI International Mineral Reserves Committee was organised to elaborate and adopt jointly accepted Definitions for the benefit of the Classification (UNFC). Their conclusions are presented in Annex II, to this report. The member countries of the Council of Mining and Metallurgical Institutions (CMMI) are Australia, Canada, South Africa, United Kingdom of Great Britain and Northern Ireland, and United States of America.
2. A total of 33 experts from the following 19 countries attended the Task Force meeting: Armenia, Australia, Finland, Germany, India, Indonesia, Iran (Islamic Republic of), Hungary, Lithuania, Philippines, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, South Africa, United Kingdom and United States of America. The International Atomic Energy Agency (IAEA) was also represented.

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Presentation and discussion of the latest results (1998-1999) of the practical implementation of the UN Framework Classification (agenda item 2).

3. The meeting began with a summary of the results of worldwide application of the UNFC as received as of November 1999 (Annex I gives the main results of the ongoing practical application). Some 50 countries are applying the UNFC to around 60 deposits worldwide. The main findings are that UNFC is easy to apply, national terms can be maintained while using UNFC and the results obtained are clear and unambiguous. A growing number of countries are introducing UNFC as a national system and elaborating their national updated system on the basis of UNFC.
4. A summary statement of the present status of the practical application of UNFC was followed by country presentations. Successful examples were demonstrated by each participating country and comments were made regarding specific aspects of UNFC implementation in practice.
5. Bulgaria has already introduced UNFC as a national system by law. In Kazakhstan, a frequent change of experts in charge is experienced which makes a consequent follow-up of UNFC application difficult. Romania introduced in 1998 a new mining law and instructions which comply with UNFC and its codification. The Russian Federation introduced in 1997 a new classification, which is fully in line with UNFC. The codification of UNFC solves the previously existing semantic problems. Recommendations were made by the Russian Federation to improve the Guidelines to UNFC .
6. India was represented by delegates from the government, university and from the mining industry having different points of view. The Indian Bureau of Mines has a huge reserve/ resource data base developed on the Indian classification system with specific reserve/resource classes. These will be transferred to UNFC in future when communicating with other countries. The Indian delegates recommended a regional seminar for Indian Ocean Rim countries to facilitate UNFC application to this region. The Government of Iran has already applied the UNFC to its mineral sector. A proposal was made to establish a working group to set up standards for specific mineral commodity investigation stages. Hungary has already translated UNFC into its language. Poland presented an update of the results obtained of practical application of UNFC which demonstrated that it is easily comparable to the national system.
7. The representative of Indonesia informed the meeting that UNFC was in a certain contradiction to the mining law in force in his country, and that relevant modification would be made in order to make UNFC usable as a national system. The representative of Slovakia reported that UNFC is in trial application on three deposits in his country and experience had shown that the system was acceptable to the country. Philippines had made one initial application test with positive results. Indonesia informed on behalf of ESCAP that UNFC would be introduced by ESCAP as a subregional reporting standard and that funds would be available for the introduction process in the coming two years.
8. The representative of IAEA informed the meeting about the status of the World Energy Assessment Study (WEA), Chapter 5: Energy Resources. According to the Study, carried out by an expert group sponsored by UN-DESA, UNDP and WEC, resources are considered to be

plentiful giving no constraint to sustainable development, despite the fact that the current use of resources is not sustainable. It was noted that chapter 5 of the WEA study relies on the two dimensional reserve/resource classification: economy versus geology. This classification is rather outdated and does not take into account the recent developments of UNFC. Furthermore, the definitions used by the World Energy Council for worldwide resource assessment need to be updated to reflect recent improvements. The Task Force recommended that the framework aspect of UNFC should be proposed for updating worldwide energy resource assessment.

Conclusions and recommendations of the joint ECE-ESCAP Seminar on UNFC implementation in the ESCAP region (Bangkok, October, 1998); and national seminar in Indonesia (Jakarta, December, 1998) (agenda item 3)

9. The ECE secretariat and the representative of Indonesia reported on the conclusions and recommendations of both Seminars. The importance was stressed of organising regional seminars that help national experts from Geological Surveys and industry to put the UNFC into practice more easily. The seminars help national experts, in particular, to develop their national systems based on the UNFC principles. The secretariat announced other regional seminars, to be held in Brazil, Bulgaria, India, CIS.

Guidelines related to the practical application of UNFC (agenda item 4)

10. The draft guidelines to UNFC were discussed in detail and a number of recommendations were made for improvement; for example, how to qualify the liability of stages of Geological Study or how to characterise the complexity of deposits and to give more weight to ecological issues. The task was allocated to a working group comprising Mr. O. Zaborin (Russian Federation); Mr.G.Roonwal (India), Mr.B. Fodor (Hungary); Mr. F.Bandelow and Mr. D. Kelter (Germany). The English version will be reviewed by Mr. N. Miskelly (Australia) and Mr.G. Riddler (United Kingdom). The Guidelines will be completed by the next session of the Committee on Sustainable Energy (October, 2000).

ECE Task Force / CMMI Committee Agreement on terms of UNFC Definitions (agenda item 5)

11. At their first meeting in October 1998, agreement was reached to adopt the CMMI standard reporting definitions for mineral reserves/resources into UNFC for the categories common to both systems. Furthermore, it was agreed to reduce the provisional CMMI definitions to shorter sentences. At the present meeting, both groups agreed on the specific joint wording for those reserve/resource definitions they shared in common (see Annex II).

12. Implementation of this agreement by both groups is of significant benefit to the mining industry as a whole, to facilitate the universal application of a set of international standard reporting definitions for mineral reserves and resources.

13. The CMMI International Reserves Committee was represented by Mr. Norman Miskelly (Australia), Chairman; Mr. Gordon Riddler (United Kingdom); Mr. Niall Weatherstone (United Kingdom Institutions of Mining and Metallurgy, IMM); Mr. Ferdi Camisani (South Africa) and Mr. Jean-Michel Rendu (USA).

ANNEX I

**Current status of UN International Framework Classification for
Reserves/Resources implementation process (Summary)**

As of November, 1999

Country	Organization	State	Result
ALBANIA	Mining & Processing Technology Institute (ITNPM)	ITNPM has started to classify all Albanian mineral reserves in the framework of UNFC.	Introduction of UNFC on national basis.
ARMENIA	State Commission of Mineral Resources	UNFC applied to two deposits.	Amendments to UNFC recommended.
ARGENTINA	CNEA	Cerro Solo Uranium deposit proposed for a trial. Other Gov. Institutions asked for participation in the trial.	In progress
AUSTRALIA	Bureau of Resource Sciences	No trial is envisaged.	No follow-up
	JORC/CMMI	Revised code to take effect September 1999.	Integration of CMMI definitions into UNFC in progress – see under CMMI.
AUSTRIA	Graz-Köflacher Eisenbahn- und Bergbau-Gesellschaft M.B.H.	UNFC applied to Köflach coal deposits.	UNFC considered to be excellent instrument for appraisal and assessment of the companies coal deposits.
AZERBAIJAN	Committee on Geol. & Mineral Resources	Filitschai-Polymetal deposit selected for application.	UNFC will be used for evaluation of reserves/resources according to market economy criteria. Application once UN/ECE methodological instructions received.
BRAZIL	Rio Grande do Sul State Government and the Federal University of Rio Grande do Sul.	Preparation of joint ECLAC/ECE Seminar on implementation of UNFC in Latin America and Caribbean region.	See ECLAC.

Country	Organization	State	Result
BULGARIA	Ministry of Environmental Protection and Water	UNFC fully adapted to Bulgarian conditions and adopted as legal regulatory document.	UNFC adopted on national basis.
	Committee on Geology & Mineral Resources	UNFC translated into Bulgarian and published. Trial test to be applied to copper-porphyry, lignite and lead-zinc deposit.	Application in progress.
CAMBODIA	Department of Geology and Mines	UNFC is being used as standard to classify all resources of solid fuels and mineral commodities	UNFC introduced on national basis as standard
CANADA	Uranerz Company	Practical application of UNFC on uranium deposit accepted.	Reserves and Resources demonstrated by means of incorporating into UNFC.
	Natural Resources Canada	UNFC considered to be complex and difficult to follow.	Recommended that UN should work with CMMI.
CHILE	Sociedad Contractual Mineral El Abra.	The El Abra declared ore reserves are in the UNFC matrix position: 111	UNFC terminology applicable to define the El Abra ore reserves.
	Corporacion Nacional de Cobre de Chile	Description of Codelco classification provided.	No comment regarding UNFC.
CHINA	Department of Mineral Resources and Reserves	A new classification for Reserves/Resources of solid fuels and mineral commodities has been finalized on the basis of UNFC, to enter into force on 1 December 1999.	New national system formulated on the basis of UNFC.
COLOMBIA	Ecocarbon	UNFC under consideration by state institutions and companies	Follow-up possible.
CZECH REPUBLIC	Mr. I. Sitenky	Existing Czech mineral reserve classification is being incorporated into UNFC by means of codification.	National system comparable with UNFC.
ESTONIA	Geological Survey of Estonia – Ministry of the Environment	UNFC has been applied in Estonia. Its main idea and terms are acceptable.	Transfer of Estonian classification to UNFC possible if needed.

Country	Organization	State	Result
FINLAND	Geological Survey of Finland	UNFC has been adopted by Geological Survey of Finland as official classification. Three examples of application to be presented.	Geological Survey of Finland uses UNFC in all reporting.
FRANCE	Centre Géopolitique de l'Energie & des Matières Premières	Interested, but not in a position to apply UNFC. Question to be addressed to Ministry of Industry.	Follow-up to be taken by UN/ECE.
GERMANY	Mr. Leifeld, BGR, Hannover	Practical application initiated on a Gold Deposit Project (Peru).	Reserve/Resources data can be easily and clearly assigned to UNFC.
	Mr. Lorenz, & Mr. G. Gwosdz BGR, Hannover	Special application for industrial minerals (Publ.).	UNFC applicable to industrial minerals of medium to high developing investment. For low or no investment projects specific sub-categories are proposed.
	Montan Consulting	Publ. BANDELOW. Two examples for coal deposits in the Philippines and Iran provided.	Application of UNFC clearly demonstrated. Recommendations provided
	Geological Survey Lower Saxony	Publ. LANGER & STEIN. Permitting status to be added to UNFC.	Expansion of UNFC recommended.
	P. Diehl	Publication of use of Geostatistics in UNFC.	Recommendation regarding role of geostatistics.
	Deutsche Steinindustrie AG	Application to Brazilian Dimension Stone Deposit Project.	UNFC can be directly applied to assess dimensional stone reserves/resources.
	Rheinbraun	UNFC applied to the Rhenish lignite mining area (Publ.).	UNFC applicable in general. Recommendations provided.
	Ad hoc AG Rohstoffe	Various meetings regarding application of UNFC.	UNFC applicable for industrial minerals in Germany. Specific modifications recommended.
	GDMB	Publication of dictionary of terms used in Economic Geology: Lagerstättenkundliches Wörterbuch.	Part reserve and resource elaborating on UNFC and joint CMMI/UN definitions.

Country	Organization	State	Result
GERMANY (cont.)	GDMB	Publication of "Klassifikation von Lagerstättenvorräten" – Classification of reserves/ resources.	Ten contributions regarding reserve/ resource classification with emphasis on UNFC.
GREECE	Centre for Solid Fuels Technology and Applications (CSFTA)	Classification of the Greek lignite deposits according to UNFC.	UNFC suitable for adaptation to the domestic conditions of Greece. Specific suggestions are provided.
HUNGARY	Hungarian Geological Survey	Application to: – Two coal deposits – One Bauxite deposit	Hungarian classification easy to incorporate into UNFC. Little difference between both. Hungarian accepts the UNFC. Use of UNFC in national regulation is under examination.
ICELAND	ORKUSTOFNUN	UNFC is not applicable to geothermal energy sources being a renewable energy source.	No follow up for geothermal energy source.
INDIA	Indian Bureau of Mines	Comparison of UN codes and Indian classification: indicating corresponding classes and highlighting missing links (additional Indian classes).	A complete switch to UNFC only possible if a solution can be found for the additional Indian classes.
	Federation of Indian Mineral Industries	Presentation of detailed paper: Compatibility of Indian resource classification with those of UNFC.	Integration of Indian Classification to UNFC viewed in light of India becoming part of the global economy. Workshop for Indian Ocean rim countries jointly with UN held in November.
INDONESIA	Department of Mine & Energy; Directorate General of Geology & Mineral Resources	Meeting of Dept. of Mines, Indonesian Mining Association and ECE in Jakarta, December 1998.	Revision of Indonesian Classification System on the basis of UNFC initiated.
IRAN, ISLAMIC REPUBLIC OF	Geological Survey of Iran	Procedure of practical application of UNFC has been confirmed by experts of GSI.	GSI has appointed an expert group to coordinate all exploration activities to be carried out in accordance to UNFC procedure.

Country	Organization	State	Result
IRELAND	Department of Marine & Natural Resources, Exploration & Mining Division	A few mining companies requested a trial.	Follow-up intended 1998.
JAPAN	Geological Survey of Japan	The limited number of mines makes domestic application of UNFC currently not so important.	GSJ interested in UNFC mainly for comparative economic reasons of its international resource study activities.
KAZAKHSTAN	State Commission of Reserves/Resources	Three deposits to be reassessed – Karapi coal deposit – Obuhov titan-cirkon deposit – Artein copper-lead-zinc deposit	New national classification in preparation on the basis of UNFC principles.
LITHUANIA	Geological Survey of Lithuania	A new national classification was elaborated and will come into force on 1 Jan. 2000. The UNFC codes have been adopted, traditional terms will be maintained.	Integration of UNFC codes into new national classification should ensure international compatibility.
MALAYSIA	Geological Survey Department	UNFC was tested for three different types of mineral commodities i.e. coal, metallic mineral and industrial mineral: – Merit Pila Coal Deposit – Bukit Mantri Gold Deposit – Penjom Gold Deposit	New classification of Geological Survey has been prepared on the basis of UNFC. No problems so far encountered in applying the UNFC by the Geological Survey and most mining companies. Extension of UNFC recommended to cater for certain non-metallic mineral deposits.
MYANMAR	Department of Mines	Information about UNFC was received only in October 1999.	Documentation of UNFC requested in order to take necessary steps.
NETHERLANDS	Netherlands Institute of Applied Geosciences TNO	A few activities regarding prospecting in future progress.	No application follow-up

Country	Organization	State	Result
NEW ZEALAND	Institute of Geological & Nuclear Sciences	Received information about UNFC in October 1999 and has forwarded it to Crown Minerals	Communication gap. Answer expected at a later stage.
PERU	See application of Mr. Leifeld, BGR, Germany		
PHILIPPINES	Department of Energy	Reclassification of the Philippine coal deposits according to UNFC is intended.	Preparation in progress.
	Mines and Geo-science Bureau	Adoption of UNFC for the non-energy mineral resource/reserves presently being studied.	Adoption of UNFC pending result of study.
POLAND	Ministry of Environmental Protection, Natural Resources and Forestry	Selection of 4 deposits for implementation: – Jas-Mos Hard Coal Deposit – Belchatow Lignite Deposit – Pomorzany Zinc-lead Deposit – Bairein-Pichein Limestone Deposit	In progress.
	State Geological Institute	Publication of UNFC in Polish with examples on how to adapt it to local conditions.	Adaptation of national terms and definitions to UNFC.
PORTUGAL	National Geological Survey; Department of Geology (University of Porto)	Two deposits selected for application: – Panasqueira Mine (Wofti) – Neves Corvo Mine (Copper & Tin)	In progress.
ROMANIA	Institutul Geologic al Romaniei Agentia Nationala pentru Resurse Minerale	Presentation of paper analysing the integration of UNFC	UNFC allows reclassification and comparison of reserves/resources according to their economic significance.

Country	Organization	State	Result
RUSSIAN FEDERATION	Ministry of Natural Resources and State Committee for Mineral Reserves/Resource	Newly-established Russian classification will fully comply with UNFC. 13 deposits been selected for comparing UNFC with new Russian system.	In progress.
	VNIGRIUgol	Study on correlation of UNFC with national classification system.	In progress.
SLOVENIA	Velenje Lignite Mine, Geological Survey and Dept. of Mining Engineering & Geotechnology	Practical application of UNFC in preparation.	New mining law adopted July 1999. Full enforcement is pending adoption of special regulations including a classification system for which UNFC should be taken into account.
SLOVAKIA	Ministry of Environment	Full support to UNCF. Three deposits (magnesite, iron ore and lignite) are designated to apply UNFC.	In progress.
SOUTH AFRICA	Working Group on the compilation of the Main South African Code for Reporting of Mineral Resources and Mineral Reserves.	A new code (SAMREC) was prepared to take effect November 1999.	Reference is made in SAMREC to the October 1998 agreement between the CMMI International Definitions Group and UN/ECE Task Force to incorporate the CMMI standard reporting definitions into the UNFC
SPAIN	Instituto Tecn. Geo. Minero de España	Three deposits selected for application: – Migollas Sulphide Deposit – Vicalvara Sepiolite Deposit – West Balestra Coal Mine	In progress.
THAILAND	Department of Mineral Resources	UNFC is currently being studied.	UNFC found appropriate and acceptable for large stratiform deposits. It may need modification for application to complex ore deposit at the national level

Country	Organization	State	Result
UKRAINE	State Com. Geol. & Utilization of Mineral Resources	New mineral reserves and resources National Classification of Ukraine approved by the Ukraine Council Enactment n° 432 of May 5, 1997. It is in harmony with the UNFC and will be applied also to uranium ore deposits, oil and gas fields.	New national classification is fully adapted to UNFC.
UNITED KINGDOM	Institution of Mining and Metallurgy	A number of UK mineral companies will be approached with regard to the trial application.	In progress (1998).
	Aggregate Industries	Interested in participating in a trial application.	UNFC can be applied to the construction materials industry. Permit status to be included as fourth dimension.
USA	USGS	UNFC and US national system of classifying resources/ reserves are completely compatible and the same, in their concept.	USGS is in the process of completing a "National Coal Resource Assessment", the purpose of which is to identify the coals that will be mined during the first half of the 21 st century. The resources identified in that study can all be neatly classified using the UNFC.
VIETNAM	Department of Geology and Minerals	Introduction and Promotion of UNFC to subordinate units and related agencies.	Application in all geological and mineral activities in progress
ZIMBABWE	Geological Survey Department	Trial application initiated in the frame of a country-wide resource inventory.	In progress (1998).
ECOSOC	Substantive Session June/July 1997	Decision: to invite UN Member States, international organizations and regional commission to consider possibility of taking appropriate measures for ensuring worldwide application of UNFC	In progress. See country contributions, ESCAP, ECLAC, EUROGEOSURVEY etc.

Country	Organization	State	Result
UN/ESCAP		ESCAP/ECE Seminar on implementation of the UNFC in the Asia-Pacific organized in October 1998 in Bangkok. 30 representatives participated from: Cambodia, China, Indonesia, Japan, Malaysia, Philippines, Thailand, Vietnam.	The seminar concluded that the UNFC provides a unique opportunity to incorporate all existing national and sub-regional classification systems into it. The general agreement recently reached with the CMMI Group enhanced that awareness.
UN/ECLAC		ECLAC/ECE Seminar jointly with the Brazilian Rio Grande do Sul State government and the Federal University of Rio Grande do Sul scheduled for 24-25 November 1999	In preparation.
EUROGEO SURVEY (BRUSSELS)		UNFC distributed to 16 Member organisations, some of which are making arrangements for testing.	Follow-up. A meeting with EU members was organized in May 1998.
UN/ECE	Working Party on Gas	Possibility of applying UNFC for hydrocarbon to be examined at the forthcoming meeting.	Follow-up to be examined.
NEA/IAEA	Red Book Classification of Uranium Reserves / Resources, August 1998	The Red Book Uranium resource classification has been reviewed and is also judged to be consistent with the recently developed UNFC.	UNFC to be further discussed.
CMMI		A meeting with members of CMMI International Definitions Committee and UN/ ECE Task Force took place on 4 October 1998.	Agreement was reached to incorporate the CMMI standard reporting definitions into the UNFC for those classes common to both systems.
WEC		Proposal to WEC regarding the terms and definitions for global reserve/resource survey in preparation	Follow-up to be decided upon during Geneva meeting on 9 November 1999

ANNEX II

JOINT CMMI/UNFC DEFINITIONS FOR MINERAL RESOURCES AND RESERVES – SOLID FUELS AND MINERAL COMMODITIES

Agreed, Geneva, 9 November 1999

MINERAL RESOURCE

¹ A ‘Mineral Resource’ is a concentration [or occurrence] of material of intrinsic economic interest in or on the Earth’s crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge.

² The resource figures are quoted as being of intrinsic economic interest, depending on the results of a Prefeasibility Study and Feasibility Study. Generally, only in-situ resource figures are reported at this stage of geological assessment.

Mineral Resources are subdivided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories.

Portions of a deposit that do not have reasonable prospects for eventual economic extraction must not be included in a Mineral Resource.

INFERRED MINERAL RESOURCE

¹ An ‘Inferred Mineral Resource’ is that part of a Mineral Resource for which tonnage, grade and mineral content can be estimated with a low level of confidence. It is inferred from geological evidence and assumed but not verified geological and/or grade continuity. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes which is limited, or of uncertain quality and reliability.

² This level of confidence is usually not sufficient to allow a Prefeasibility Study to be carried out. UNFC Code: 333.

An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource.

INDICATED MINERAL RESOURCE

¹ An ‘Indicated Mineral Resource’ is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a reasonable level of confidence. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits,

workings and drill holes. The locations are too widely or inappropriately spaced to confirm geological and/or grade continuity but are spaced closely enough for continuity to be assumed.

² The level of confidence should be sufficient for deciding whether a Prefeasibility Study and Detailed Exploration are warranted. UNFC Code: 332.

An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource, but has a higher level of confidence than that applying to an Inferred Mineral Resource.

¹ Definition identical for CMMI and UNFC

² Additional UNFC definition

MEASURED MINERAL RESOURCE

¹ A ‘Measured Mineral Resource’ is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a high level of confidence. It is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are spaced closely enough to confirm geological and/or grade continuity.

² A decision to conduct a Feasibility Study can be made from the information provided by Detailed Exploration. UNFC Code: 331.

MINERAL RESERVE

¹ A ‘Mineral Reserve’ is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses which may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, and include consideration of, and modification by, realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is justified.

² The mineability (Economic Viability) is demonstrated in consecutive Feasibility Assessment stages which may be, in order of increasing detail, Prefeasibility Study and Feasibility Study/Mining Report. A Probable Mineral Reserve may derive from a Prefeasibility Study and a Proved Mineral Reserve from a Feasibility Study or mining activity documentation.

Mineral Reserves are sub-divided in order of increasing confidence into Probable Mineral Reserves and Proved Mineral Reserves.

PROBABLE MINERAL RESERVE

¹ A 'Probable Mineral Reserve' is the economically mineable part of an Indicated and, in some circumstances, a Measured Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, and include consideration of, and modification by, realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is justified.

² A Probable Mineral Reserve may be demonstrated to be economically mineable by a Prefeasibility Study usually carried out at the Detailed Exploration and General Exploration stages. UNFC Code : 121 +122.

A Probable Mineral Reserve has a lower level of confidence than a Proved Mineral Reserve.

PROVED MINERAL RESERVE

¹ A 'Proved Mineral Reserve' is the economically mineable part of a Measured Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out, and include consideration of, and modification by, realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate, with a high level of confidence at the time of reporting, that extraction is justified.

² A Proved Mineral Reserve may be demonstrated to be economically mineable by a Feasibility Study or actual mining activity usually undertaken at the Detailed Exploration stage. UNFC Code: 111.

¹ Definition identical for CMMI and UNFC

² Additional UNFC definition

ADDITIONAL UNFC CATEGORIES

The additional three categories given below are of particular interest for government planning purposes which would include future land use or strategic mineral inventories. These categories refer to material that is either poorly defined or which has been shown by appropriate technical and economic studies to be currently not economic, but possibly could become economically viable in future. It is not intended that these categories be used for non-governmental investment and financing decisions.

RECONNAISSANCE MINERAL RESOURCE

A 'Reconnaissance Mineral Resource' is based on regional geological studies and mapping, airborne and indirect methods, preliminary field inspection, as well as geological inference and extrapolation. The aim is to identify areas of enhanced mineral potential worthy of further investigation towards deposit identification. The level of confidence is lower than

that applying to an Inferred Mineral Resource and is usually not sufficient to quote tonnage and grade figures. UNFC Code 334.

Estimates of quantity based on limited information and analogies with known deposits of similar geological character may be possible but are inadequate for classification as Inferred Mineral Resources.

PREFEASIBILITY MINERAL RESOURCE

A ‘Prefeasibility Mineral Resource’ is that part of an Indicated, and in some circumstances Measured, Mineral Resource, that has been shown, after a Prefeasibility Study has been carried out, to be not economically mineable. The Prefeasibility Study will have included consideration of realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors, but will have demonstrated at the time of reporting that extraction is presently not justified. This material is identified as being possibly economically viable subject to changes in technological, economic, environmental and/or other relevant conditions. UNFC Code: 221 + 222.

A Prefeasibility Mineral Resource has a lower level of confidence than a Feasibility Mineral Resource.

FEASIBILITY MINERAL RESOURCE

A ‘Feasibility Mineral Resource’ is that part of a Measured Mineral Resource, that has been shown, after a Feasibility Study has been carried out, to be not economically mineable. The Feasibility Study will have included consideration of realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors, but will have demonstrated at the time of reporting that extraction is presently not justified. This material is identified as being possibly economically viable subject to changes in technological, economic, environmental and/or other relevant conditions. UNFC Code: 211.

The UNFC Codification is explained in the Appendix .

¹ Definition identical for CMMI and UNFC

² Additional UNFC definition

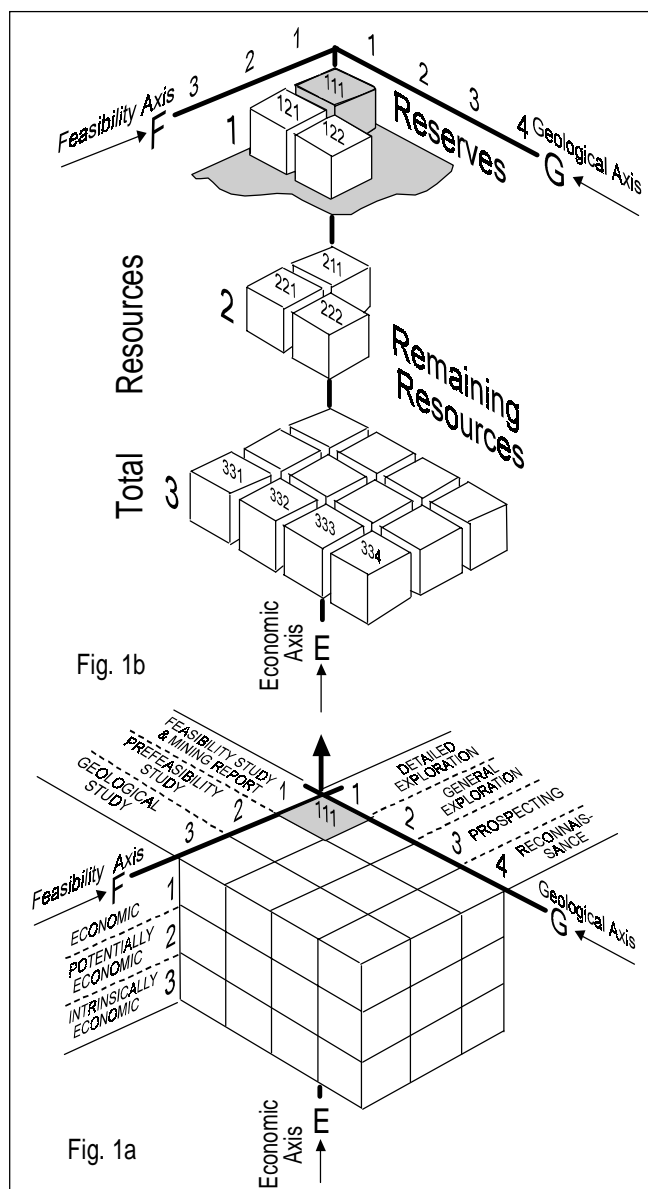
APPENDIX: CODIFICATION

The incorporation of existing classification systems into the UN Framework Classification and their comparison will be further simplified by means of codification acting as interface. Codification has the further advantage of providing a short, unambiguous identification of the reserve/resource categories which facilitates computer processing of data and exchange of information. The codification will make the UNFC a comprehensive, truly transparent international classification system.

Figure 1a shows the principle behind the proposed codification of the UN Framework Classification, the three dimensions of categorization represented by the edges of a cube, the E (Economic) axis for Economic Viability, the F (Feasibility) axis for Feasibility Assessment, and the G (Geology) axis for Geological Study. The digits are quoted in the order EFG firstly because alphabetical order is easy to memorise, and secondly because the first digit refers to the Economic Viability, which is of decisive interest to both mining company and investor.

Numbers are used to designate the different classes; the lowest number, in accordance with the usual perception that the 1st is the best, referring to the highest degree of Economic Viability on the E axis, and the highest degree of assurance on the F axis and G axis. Figure 1b represents an "exploded" three dimensional layout of Figure 1a showing the codified classes which are applicable in practice.

The class coded 111, which is shaded in Figure 1a and 1b, is of prime interest to an investor: it refers to quantities that are economically mineable (number 1 as the first digit), have been proved by means of a Feasibility study or actual mining (number 1 as the second digit), and are based on Detailed Exploration (number 1 as the third digit).



Theoretically 36 (4x3x3) classes are available but only eight of them are generally applicable in practice. For clarity, only these are shown in Figure 1b. However, if necessary, other classes may also be used (311 for mines that have been closed down but are still included in the national inventory, for example).

Each codified class has a specific set of assessment stages and Economic Viability degree which are arranged in a table (Fig. 2). According to this table it is possible to codify any kind of reserve and resource and to transfer any class from one system to another.

Fig. 2.: Codification of Classes

ECONOMIC AXIS	FEASIBILITY AXIS	GEOLOGICAL AXIS	CODE
Economic	Feasib.St. & Min. Rep.	Detailed Exploration	111
Economic	Prefeasibility Study	Detailed Exploration	121
Economic	Prefeasibility Study	General Exploration	122
Potentially Economic	Feasib.St. & Min. Rep.	Detailed Exploration	211
Potentially Economic	Prefeasibility Study	Detailed Exploration	221
Potentially Economic	Prefeasibility Study	General Exploration	222
Intrinsically Economic ¹	Geological Study	Detailed Exploration	331
Intrinsically Economic ¹	Geological Study	General Exploration	332
Intrinsically Economic ¹	Geological Study	Prospecting	333
Undetermined Economic	Geological Study	Reconnaissance	334

¹ Economic to potentially economic

Figure 3 shows as an example the translation from the UN Reserve and Resource terms to those of CMMI by means of the numerical codes. This example also gives the 8 reserve and resource classes, in practical use.

Fig. 3: Example of translation from UN to CMMI system using codes

CODE	CMMI CATEGORY	UN CATEGORY
111	Proved Mineral Reserve	Proved Mineral Reserve
121 and 122	Probable Mineral Reserve	Probable Mineral Reserve
211	Measured Mineral Resource	Feasibility Mineral Resource
221 and 222	Indicated Mineral Resource	Prefeasibility Mineral Resource
331	Measured Mineral Resource	Measured Mineral Resource
332	Indicated Mineral Resource	Indicated Mineral Resource
333	Inferred Mineral Resource	Inferred Mineral Resource
334	not available	Reconnaissance Mineral Resource

On a national level, letters can be used to reflect subclasses if this is required, for example **n** for normal economic, **e** for exceptional, **m** for marginal economic and **s** for submarginal.

Resource figures are generally reported as “in situ” quantities while Reserve figures are generally quoted as “extractable”, and also as “in situ” if necessary. In all cases it should be clearly stated whether the reported reserve/resource figures refer to “in situ” or “extractable” quantities by using for example the symbol **in** or **ex**, respectively.