



**Economic and Social
Council**

Distr.
GENERAL

ENERGY/2001/10
14 August 2001

Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

COMMITTEE ON SUSTAINABLE ENERGY

Key for the Classification of Reserves/Resources

– United Nations International Framework Classification for Reserves/Resources (UNFC) –

Submitted by the Government of Germany ^{*)}

Abstract

Since the introduction of the United Nations International Framework Classification for Reserves/Resources (UNFC) – Solid Fuels and Mineral Commodities in 1997 by UNECE, recommended for application worldwide in 1998 by the UN Economic and Social Council (ECOSOC), some of those using the system who do not deal daily with the classification of reserves/resources are not certain how they should apply this reserves/resources classification system. The Classification Key described here provides the user with an easy to use tool for classifying reserves/resources according to the UN Framework Classification.

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I. Application of the UN Framework Classification

In order to use the UN Framework Classification (UNFC) to classify the reserves and resources of a mineral deposit or part of it, the following questions must be answered:

- **What kind of geological investigations were carried out?**
 1. detailed exploration
 2. general exploration
 3. prospecting
 4. reconnaissance survey

- **What kind of studies were conducted to assess the economic viability of the deposit?**
 5. a feasibility study or a mining report
 6. a prefeasibility study
 7. a geological study (under certain circumstances, only a comparison with a neighbouring deposits)

- **What was the result of the economic viability study(ies)? Was the deposit classified as**
 8. economic?
 9. potentially economic?
 10. intrinsically economic, because it could not be clearly classified as economic or potentially economic?

When these questions have been answered, the amount of reserves/resources of the deposit (or part of the deposit) can be entered directly in the corresponding field of the UNFC matrix (Figs. 1 and 2). This Classification Key has been designed for users that are not acquainted with the UNFC that leads the user to the correct entry in the UNFC classification matrix.

To enable a uniform usage of terms, some of the terms used in the Key are marked with an asterisk (*) and explained in the Glossary (Chapter III).

The Classification Key can only be used for deposits or parts of deposits that can be economically mined at the present time or in the foreseeable future.

The UN Framework Classification Applied to Medium to High-Risk Projects

The UNFC was originally designed to classify coal deposits. It was then extended to other mineral commodities, e.g., chromium, iron, copper, and diamonds. Although not all of these mineral resources are metallic, they are all high-value resources.

Owing to the high expense and risk involved, particularly when they are to be mined on a large scale, these kinds of mineral deposits, referred to as medium to high-risk projects, require a thorough geological, mining and economic assessment before reliable reserve/resource figures can be obtained. On the international level, reserves can be designated as "economic" (category 1) only when a feasibility study, or at least a prefeasibility study, has shown that they can be profitably mined under the present economic, technological, ecological and political conditions.

If a feasibility or prefeasibility study has found that the deposit or part of it cannot be mined profitably at present, but could be in the future, the resources are classified as "potentially

economic" (category 2). If neither a feasibility study nor a prefeasibility study has been made, and only the results of a geological study are available, then the resources are designated as "intrinsically economic" (= economic to potentially economic) (category 3).

Table 2 is used for all of the medium to high risk projects. This table is designed so that the user easily arrives at the correct result.

The UN Framework Classification Applied to Low to No Risk Projects

Many mineral deposits, especially construction raw materials, are relatively inexpensive bulk materials, e.g., sand and gravel, brick clay, limestone, and dimension stone. These materials are normally quarried on the basis of a minimum of geological information. Usually, not even geological studies are available, mainly because there is little or no financial risk involved. Hence, a prefeasibility or feasibility study is usually not necessary, excavation is simply started.

This is often the case, especially in the developing countries. It is also the case for other mineral deposits that involve little or no financial risk because they are produced with very simple tools on a small scale, although high-value minerals are involved, e.g., gold, diamonds and other precious stones, tin, and copper.

In the reserves/resources classification system of the United Nations, reserves/resources in such low to no risk projects, particularly for construction raw materials but also for high-value materials produced on a small scale, would have to be assigned to the bottom row ("geological study") of the UNFC diagram in Figure 1, and would be classified as "intrinsically economic" (category 3). Depending on the extent and exactness of the geological studies, they would be assigned the code 331 (detailed exploration), 332 (general exploration), 333 (prospecting), or 334 (reconnaissance).

This would not reflect the fact that the deposits are being profitably mined/quarried on a regular basis over a relatively long period of time and, realistically, should be classified as "economic" (category 1). If production occurs only sporadically, such deposits should be realistically classified as "potentially economic", category 2. Assignment to category 3 also does not reflect the fact that under certain geological conditions a deposit can be concluded to be "economic" on the basis of comparison with other deposits in the region or on the basis of the experience of a specialist in economic geology.

Owing to the national significance of such low to no risk mining projects, a UNFC diagram is presented here that permits a more realistic classification at the national level. This is made possible by the addition of two further subcategories to category 3 ("intrinsically economic"): "economic" and "potentially economic" (Figure 2). Thus, in the bottom row ("geological study") of the UNFC diagram, we have the following three categories for low to no risk mining projects:

Category 1 ("economic"): for all reserves in deposits exploited by low to no risk operations that have been described in a geological study and have been profitably mined/quarried on a regular basis for a relatively long time. In this case the existence of an operation is viewed as proof of economic viability, and thus a prefeasibility or feasibility study is not necessary.

This category can also be assigned to reserves of a future operation whose economic viability has been concluded by an experienced specialist in economic geology on the basis of comparison with active operations in the region. In decreasing order of degree of exploration, such reserves would be assigned UNFC codes 131, 132, 133, or 134 and called "131 reserve", "132 reserve", "133 reserve", or "134 reserve".

Category 2 ("potentially economic"): for all resources in a deposit that have been described in a geological study and in analogy to other deposits in the region have been classified as not economically viable at the present time. They could, however, become economically viable in the foreseeable future if certain economic, technological, ecological, legal, and other conditions change in a positive way. In analogy to category 1, in decreasing order of degree of exploration, such resources would be assigned UNFC codes 231, 232, 233, or 234 and called "231 resource", "232 resource", "233 resource", or "234 resource".

Category 3 ("intrinsically economic"): for all resources of low to no risk operations that cannot be classified as "economic" or "potentially economic" because information on the economic viability is lacking. In decreasing order of degree of exploration, they would be assigned UNFC codes 331, 332, 333, or 334 and called "331 resource", "332 resource", "333 resource", or "334 resource".

Table 3 is used for all of the low to no risk projects. This table is designed so that the user easily arrives at the correct result.

II. Classification Key

Mineral reserves/resources can be easily classified according to the UNFC and assigned one of the codes of the UNFC diagrams (Fig. 1 and 2) with the aid of the classification key described in this chapter.

UN Framework Classification
- for medium to high-risk mining projects -

UN Framework Classification		Detailed Exploration	General Exploration	Prospecting	Reconnaissance
	National System				
Feasibility Study and/or Mining Report		1 (111)	<i>usually</i>		
		2 (211)	<i>not</i>		
Pre-feasibility Study		1 (121) [+] (122)	<i>realized</i>	
		2 (221) [+] (222)		
Geological Study		3 (331)	3 (332)	3 (333)	3 (334)

categories of economic viability: 1 = economic 2 = potentially economic 3 = intrinsically economic (economic to potentially economic)
 (111) = code deposit:
 date:

Figure 1: UN Framework Classification for *medium to high-risk projects**.

UN Framework Classification
- extended for low to no risk mining projects -

UN Framework Classification	National System	Detailed Exploration	General Exploration	Prospecting	Reconnaissance
Feasibility Study and/or Mining Report		1 (111) 2 (211)	usually		
Pre-feasibility Study		1 (121) [..... (122) 2 (221) [..... (222)	not realized		
Geological Study		1 (131)	1 (132)	1 (133)	1 (134)
		2 (231)	2 (232)	2 (233)	2 (234)
		3 (331)	3 (332)	3 (333)	3 (334)

categories of economic viability: 1 = economic 2 = potentially economic 3 = intrinsically economic (economic to potentially economic)
 (111) = code deposit:..... Date:
 Additional classes to accommodate economic reserves and potentially economic resources of low to no risk projects

Figure 2: Expanded UNFC diagram for low to no risk projects* (small-scale mining*)

The Classification Key consists of three tables:

Table 1 serves to initiate the classification and helps to determine which of the other two tables (Table 2 or Table 3) should be used.

Table 2 is particularly suitable for "normal" mining projects that produce ore, minerals, or rocks, that normally require a relatively high investment and thus involve a relatively high financial risk, and for which engineering planning is usually required by mining law. It is based on the UN International Framework Classification for Reserves/Resources (UNITED NATIONS – ECE 1997) (Fig. 1). Typical examples are the mining of metallic ores and high-value industrial minerals, e.g., diamonds, salts, fluorite, barite, phosphate, lithium and boron minerals, heavy minerals, and asbestos.

Table 3 is particularly suitable for *small-scale mining projects** that mainly produce low-value industrial minerals and rocks, that normally require little or no or, at the most, moderate investment and thus involve a low financial risk, and for which little or no engineering planning is required by mining law. Typical examples are the mining of bulk materials, e.g., sand, gravel, common clay, limestone and dimension stone. Sometimes, however, even high-value minerals are involved, e.g., gold, diamonds and other precious stones, and tin, if they are excavated on a small-scale or in artisanal operations.

Table 3 is based on the extended UN International Framework Classification for Reserves/Resources, which takes special consideration of national conditions (LORENZ, GWOSDZ & TOMS 2000) (Fig. 2). It contains all of the classes of Table 1, but has been extended to include additional classes which, on a national basis, are of importance in low to no risk, or small-scale mining. In each table the numbered questions are answered with "yes" or "no"; to the right of the respective answer is the number of the next question to be answered. *The reserves/resources of each deposit or part of it are to be entered in separate diagrams.* Blank forms are contained in the Appendix. The definitions of terms marked with an asterisk (*) as used for the UNFC are explained in the Glossary (Chapter III). This is done to attain a uniform usage of terms and a uniform use of this classification key. Therefore, *it is highly recommended to refer to the Glossary whenever the meaning of a term seems uncertain.*

Table 1: Start-up of classification.

no.	Question	answer	result	no.
1	Does the project involve <i>reserves*/resources*</i> that are or will be extracted with a moderate to high investment, which requires <i>geological data*</i> and <i>economic and mining engineering data*</i> (<i>medium to high-risk project*</i>) for the <i>deposit*</i> to be well studied?	yes	<i>Geological data*</i> and <i>mining engineering data*</i> have to be well studied and the project is usually regulated by mining law. Continue with Point 2 in Table 2.	2
		no	The project involves <i>reserves/resource*</i> without significant investment and little study of the <i>geological data*</i> and <i>economic and mining engineering data*</i> (so-called <i>low to no risk project*</i>). Usually, mining law provides simplified procedures or does not apply at all. Continue with Point 22 in Table 3.	22
		uncertain	Attempt first to obtain a satisfactory result with Table 2, starting at Point 2. If you find that the questions in Table 2 do not correspond to the deposit conditions, continue with the questions of Table 3 at Point 22.	2

Table 2: Classification key for medium to high-risk mining projects.

no.	question	answer	result	no.
2	Are <i>geological data*</i> and <i>economic and mining engineering data*</i> available for the <i>deposit*</i> ?	yes	go to	3
		no	<i>Reserves*/resources*</i> cannot be classified owing to a lack of data. No entry is made in the UNFC classification diagram.	
Feasibility Study (nos. 3 – 7)				
3	Are a <i>feasibility study*</i> and/or <i>mining report*</i> available?	yes	go to	4
		no	go to	8
4	Are the conclusions of the <i>feasibility study*</i> and/or <i>mining report*</i> positive?	yes	go to	5
		no	<p>Mining of the <i>reserves*/resources*</i> is not viable at the time of reporting. Therefore, no entry is made in the UNFC diagram.</p> <p>Any <i>reserve*/resource*</i> amounts already entered in the UNFC diagram have to be reclassified.</p> <p><i>Please examine whether the mineral occurrence* really is economically uninteresting and/or technologically not mineable. If this is not the case, begin again at Point 1, carefully checking again the answers.</i></p>	
Detailed Exploration				
5	Were the <i>geological data*</i> obtained during <i>detailed exploration*</i> ?	yes	go to	6
		no	A <i>feasibility study*</i> should include the results of a <i>detailed exploration*</i> survey. Please check if you are really dealing with a <i>feasibility study*</i> (see Glossary) or another type of study and start again at Point 2.	2
6	Were the <i>reserves*</i> identified by the study as economic at the time of reporting?	yes	The <i>reserves*</i> are assigned the code 111 ("proved mineral reserve").	
		no	go to	7
7	Were the <i>resources*</i> identified by the study as potentially economic at the time of reporting?	yes	The <i>resources*</i> are assigned the code 211 ("feasibility mineral resource").	
		no	<p>Please begin again at Point 2.</p> <p><i>If this does not yield results corresponding to the current conditions, please begin at Point 1. Also examine whether Table 3 is more applicable.</i></p>	2
Prefeasibility Study (nos. 8 – 15)				
8	Is a <i>prefeasibility study*</i> available?	yes	go to	9
		no	go to	16
9	Are the results of the <i>prefeasibility</i>	yes	go to	10

no.	question	answer	result	no.
	<i>study*</i> on the whole positive?	no	The results are on the whole negative. Mining of the <i>reserves*/resources*</i> is not mineable at the time of reporting. Therefore, no entry is made in the UNFC diagram. Any <i>reserve*/resource*</i> amounts already entered in the classification diagram have to be reclassified. <i>Please examine whether the mineral occurrence* really is economically uninteresting and/or technologically not mineable. If this is not the case, begin again at Point 1, carefully checking again the answers.</i>	
General Exploration				
10	Were the <i>geological data*</i> obtained during a <i>general exploration*</i> survey?	yes	go to	11
		no	go to	13
11	Were the <i>reserves*</i> identified by the study as economic at the time of reporting?	yes	The <i>reserves*</i> are assigned the code 122 ("probable mineral reserve").	
		no	go to	12
12	Were the <i>resources*</i> identified by the study as potentially economic at the time of reporting?	yes	The <i>resources*</i> are assigned the code 222 ("prefeasibility mineral resource").	
		no	Please begin again at Point 8.	8
Detailed Exploration				
13	Were the <i>geological data*</i> obtained during <i>detailed exploration*</i> ?	yes	go to	14
		no	Please begin again at Point 10.	10
14	Were the <i>reserves*</i> identified by the study as economic at the time of reporting?	yes	The <i>reserves*</i> are assigned the code 121 ("probable mineral reserve").	
		no	go to	15
15	Were the <i>resources*</i> identified by the study as potentially economic?	yes	The <i>resources*</i> are assigned the code 221 ("prefeasibility mineral resource").	
		no	Please begin again at Point 2.	2
Geological Study (nos. 16 – 21)				
16	Is a <i>geological study*</i> available?	yes	go to	17
		no	If no studies are available, then the <i>deposit*</i> , for which medium to high risk investment is involved, cannot be classified owing to a lack of economic and/or technological data. <i>For projects involving little or no investment, however, frequently no studies are made. In these special cases continue at Point 58 (Table 3).</i> <i>If you are uncertain, start again at Point 1, carefully checking again the answers.</i>	

No.	question	answer	result	no.
17	Do the <i>geological data*</i> , including an <u>initial</u> evaluation of economic viability (e.g., the <i>cut-off values*</i>), indicate a positive result?	yes	The <i>deposit*</i> is classified with reservation as intrinsically economic (= economic to potentially economic). Continue at Point 18.	18
		no	Mining of the <i>reserves*/resources*</i> is not viable at the time of reporting. Therefore, no entry is made in the UNFC classification diagram. Any <i>reserve*/resource*</i> amounts already entered in the classification diagram have to be reclassified. <i>If you are uncertain, begin again at Point 1, carefully checking again the answers.</i>	
Reconnaissance				
18	Were the <i>geological data*</i> obtained during a <i>reconnaissance*</i> survey?	yes	The <i>resources*</i> are assigned the code 334 ("reconnaissance mineral resource"). <i>The resources* can be entered in code field 334 only if sufficient data is available and a positive assessment can be made by comparison with other, known deposits* in the region.</i>	19
		no	go to	
Prospecting				
19	Were the <i>geological data*</i> obtained during a <i>prospecting*</i> survey?	yes	The <i>resources*</i> are assigned the code 333 ("inferred mineral resource").	20
		no	go to	
General Exploration				
20	Were the <i>geological data*</i> obtained during a <i>general exploration*</i> survey?	yes	The <i>resources*</i> are assigned the code 332 ("indicated mineral resource").	21
		no	go to	
Detailed Exploration				
21	Were the <i>geological data*</i> obtained during <i>detailed exploration*</i> ?	yes	The <i>resources*</i> are assigned the code 331 ("measured mineral resource").	1
		no	Return to Point 1 and choose the best applicable answer. <i>Examine whether Table 3 leads to a better result.</i>	

Table 3: Classification key for low to no risk mining projects.

no.	question	answer	Result	no.
22	Are <i>geological data*</i> and economic and <i>mining engineering data*</i> of the <i>deposit*</i> available?	yes	go to	23
		no	The <i>reserves*/resources*</i> cannot be classified owing to a lack of data. Therefore, no entry is made in the UNFC diagram.	
Feasibility Study (nos. 23 – 27)				
23	Are a <i>feasibility study*</i> and/or <i>mining report*</i> available?	yes	For projects involving little or no investment risk, a <i>feasibility study*</i> or <i>mining report*</i> is not normally prepared. If that has been done in your special case, continue with Point 24. <i>Please examine whether the project involves medium to high risk* investment (for which Table2 should be used).</i>	24
		no	go to	28
24	Are the conclusions of the <i>feasibility study*</i> or <i>mining report*</i> positive?	yes	go to	25
		no	Mining of the <i>reserves*/resources*</i> is not viable at the time of reporting. Therefore, no entry is made in the UNFC diagram. <i>Any reserve*/resource* amounts already entered in the UNFC diagram have to be reclassified. Please examine whether the mineral occurrence* really is economically uninteresting and/or technologically not mineable. If this is not the case, begin again at Point 1, carefully checking again the answers.</i>	
Detailed Exploration				
25	Were the <i>geological data*</i> obtained during <i>detailed exploration*?</i>	yes	go to	26
		no	A <i>feasibility study*</i> should include the results of <i>detailed exploration*</i> . Please check whether you are really dealing with a <i>feasibility study*</i> (see Glossary) or another type of study and start again at Point 22.	22
26	Were the <i>reserves*</i> identified by the <i>feasibility study*</i> or <i>mining report*</i> as economic at the time of reporting?	yes	The <i>reserves*</i> are assigned the code 111 ("proved mineral reserve").	
		no	go to	27
27	Were the <i>resources*</i> identified by the <i>feasibility study*</i> or <i>mining report*</i> as potentially economic at the time of reporting?	yes	The <i>resources*</i> are assigned the code 211 ("feasibility mineral resource").	
		no	Please begin again at Point 22.	22

no.	question	answer	Result	no.
Prefeasibility Study (nos. 28 – 35)				
28	Is a <i>prefeasibility study</i> * available?	yes	For projects involving little or no investment risk, a <i>prefeasibility study</i> * is not normally prepared. If such a study has been prepared in your case, continue with Point 30. <i>Please examine whether the project involves medium to high-risk* investment, in which case Table 2 should be used.</i>	30
		no	go to	36
29	Are the economic and technological conclusions of the <i>prefeasibility study</i> * positive?	yes	go to	30
		no	Mining of the <i>reserves*/resources*</i> is not viable at the time of reporting. Therefore, no entry is made in the UNFC diagram. Any <i>reserve*/resource*</i> amounts already entered in the classification diagram have to be reclassified. <i>Please examine whether the mineral occurrence* really is economically uninteresting and/or technologically not mineable. If this is not the case, begin again at Point 1, carefully checking again the answers.</i>	
Detailed Exploration				
30	Were the <i>geological data*</i> obtained during <i>detailed exploration*</i> ?	yes	go to	31
		no	go to	33
31	Were the <i>reserves*</i> identified by the <i>prefeasibility study</i> * as economic at the time of reporting?	yes	The <i>reserves*</i> are assigned the code 121 ("probable mineral reserve").	
		no	go to	32
32	Were the <i>resources*</i> identified by the <i>prefeasibility study</i> * as potentially economic at the time of reporting?	yes	The <i>resources*</i> are assigned the code 221 ("prefeasibility mineral resource").	
		no	Please begin again at Point 28.	28
General Exploration				
33	Were the <i>geological data*</i> obtained during a <i>general exploration*</i> survey?	yes	go to	34
		no	A <i>prefeasibility study</i> * should include the results of a <i>detailed exploration*</i> survey or a <i>general exploration*</i> survey. If this is not the case, please check if you are really dealing with a <i>prefeasibility study</i> * (see Glossary) or another type of study and start again at Point 22.	22
34	Were the <i>reserves*</i> identified by the <i>prefeasibility study</i> * as economic at the time of reporting?	yes	The <i>reserves*</i> are assigned the code 122 ("probable mineral reserve").	
		no	go to	35

no.	question	answer	Result	no.
35	Were the <i>resources*</i> identified by the <i>prefeasibility study*</i> as potentially economic at the time of reporting?	yes	The <i>resources*</i> are assigned the code 222 ("prefeasibility mineral resource").	
		no	Please begin again at Point 28. <i>If this does not produce satisfactory results, begin again at Point 22.</i> <i>If only a geological study* was conducted, and no pre-investment study*, then continue with Point 36.</i>	28
Geological Study (nos. 36 – 57)				
36	Is a <i>geological study*</i> available?	yes	go to	37
		no	go to	58
37	Are the <i>geological data*</i> , as well as an <u>initial</u> evaluation of economic viability (e.g., the <i>cut-off values*</i>), positive?	yes	go to	38
		no	Mining of the <i>reserves*/resources*</i> is not viable at the time of reporting. Therefore, no entry is made in the UNFC classification diagram. Any <i>reserve*/resource*</i> amounts already entered in the UNFC diagram have to be reclassified. <i>Please examine whether the mineral occurrence* really is economically uninteresting and/or technologically not mineable. If this is not the case, begin again at Point 1, carefully checking again the answers.</i>	
Reconnaissance				
38	Were the <i>geological data*</i> obtained during a <i>reconnaissance*</i> survey?	yes	go to	39
		no	go to	43
39	Is the <i>deposit*</i> being worked or has it been in the past?	yes	go to	40
		no	The <i>deposit*</i> is intrinsically economic (= economic to potentially economic), the mineral <i>resources*</i> are assigned the code 334 ("reconnaissance mineral resource").	
40	Is the working of the <i>deposit*</i> profitable on a long-term, <i>regular*</i> basis?	yes	The <i>deposit*</i> is economic, the <i>reserves*</i> are assigned the code 134 ("134 reserve").	
		no	go to	41
41	Is the <i>deposit*</i> worked profitably on an <i>irregular*</i> basis?	yes	The <i>deposit*</i> is most probably potentially economic, the <i>resources*</i> are assigned the code 234 ("234 resource").	
		no	go to	42
42	Is the <i>deposit*</i> exhausted?	yes	Mining is no longer possible. No entry is made in the UNFC diagram. Any <i>reserve*/resource*</i> amounts already entered in the UNFC diagram have to be removed.	
		no	The <i>deposit*</i> is intrinsically economic (= economic to potentially economic), the mineral <i>resources*</i> are assigned the code 334 ("reconnaissance mineral resource"). <i>If you are uncertain, please begin again at Point 36.</i>	

no.	question	answer	Result	no.
Prospecting				
43	Were the <i>geological data*</i> obtained during a <i>prospecting*</i> survey?	yes	go to	44
		no	go to	48
44	Is the <i>deposit*</i> being worked or has it been in the past?	yes	go to	45
		no	The <i>deposit*</i> is intrinsically economic (= economic to potentially economic), the mineral <i>resources*</i> are assigned the code 333 ("inferred mineral resource").	
45	Is the working of the <i>deposit*</i> profitable on a long-term, <i>regular*</i> basis?	yes	The <i>deposit*</i> is economic, the <i>reserves*</i> are assigned the code 133 ("133 reserve").	
		no	go to	46
46	Is the <i>deposit*</i> being worked on an <i>irregular*</i> basis and at least sometimes profitable?	yes	The <i>deposit*</i> is most probably potentially economic, the <i>resources*</i> are assigned the code 233 ("233 resource").	
		no	go to	47
47	Is the <i>deposit*</i> exhausted?	yes	Mining is no longer possible. No entry is made in the UNFC diagram. Any <i>reserve*/resource*</i> amounts already entered in the UNFC diagram have to be removed.	
		no	The <i>deposit*</i> is intrinsically economic (= economic to potentially economic), the mineral <i>resources*</i> are assigned the code 333 ("reconnaissance mineral resource"). <i>If you are uncertain, please begin again at Point 36.</i>	
General Exploration				
48	Were the <i>geological data*</i> obtained during a <i>general exploration*</i> survey?	yes	go to	49
		no	go to	53
49	Is the <i>deposit*</i> being worked or has it been in the past?	yes	go to	50
		no	The <i>deposit*</i> is intrinsically economic (= economic to potentially economic), the mineral <i>resources*</i> are assigned the code 332 ("indicated mineral resource").	
50	Is the working of the <i>deposit*</i> profitable on a long-term, <i>regular*</i> basis?	yes	The <i>deposit*</i> is economic, the <i>reserves*</i> are assigned the code 132 ("132 reserve").	
		no	go to	51
51	Is the <i>deposit*</i> being worked on an <i>irregular*</i> basis and at least sometimes profitable?	yes	The <i>deposit*</i> is probably <i>potentially economic*</i> , the <i>resources*</i> are assigned the code 232 ("232 resource").	
		no	go to	52
52	Is the <i>deposit*</i> exhausted?	yes	Mining is no longer possible. No entry is made in the UNFC diagram. Any <i>reserve*/resource*</i> amounts already entered in the classification diagram have to be removed.	52

no.	question	answer	result	no.
		no	The <i>deposit*</i> is intrinsically economic (= economic to potentially economic), the mineral <i>resources*</i> are assigned the code 332 ("indicated mineral resources"). <i>If you are uncertain, please begin again at Point 36.</i>	
Detailed Exploration				
53	Were the <i>geological data*</i> obtained during <i>detailed exploration*</i> ?	yes	go to	54
		no	Please begin again at Point 36. <i>If that does not produce satisfactory results, begin again at Point 23.</i>	36
54	Is the <i>deposit*</i> being worked or has it been in the past?	yes	go to	55
		no	The <i>deposit*</i> is intrinsically economic (= economic to potentially economic), the mineral <i>resources*</i> are assigned the code 331 ("measured mineral resource").	
55	Is the working of the <i>deposit*</i> profitable on a long-term, <i>regular*</i> basis?	yes	The <i>deposit*</i> is economic, the <i>reserves*</i> are assigned the code 131 ("131 reserve").	
		no	go to	56
56	Is the <i>deposit*</i> worked on an <i>irregular*</i> basis being profitable from time to time?	yes	The <i>deposit*</i> is probably <i>potentially economic*</i> , the <i>resources*</i> are assigned the code 231 ("231 resource").	
		no	go to	57
57	Is the <i>deposit*</i> exhausted?	yes	Mining is no longer possible. No entry is made in the UNFC diagram. Any <i>reserve*/resource*</i> amounts already entered in the UNFC diagram have to be removed.	
		no	The <i>deposit*</i> is intrinsically economic (= economic to potentially economic), the mineral <i>resources*</i> are assigned the code 332 ("measured mineral resource"). <i>If no studies at all have been prepared, please continue at Point 58. If you are uncertain, please begin again at Point 36.</i>	
No Feasibility and/or Mining Report, no Prefeasibility, no Geological Study (nos. 58–77)				
58	There is no <i>geological study*</i> as defined in the Glossary that can provide <i>geological data*</i> and basic <i>economic and mining engineering data*</i> . Can a plausible estimate of the <i>economic viability*</i> of the <i>deposit*</i> be made (with or without the advice of a mining geologist) on the basis of	yes	go to	59
		no	The <i>reserves*/resources*</i> cannot be classified owing to a lack of data. No entry is made in the UNFC diagram. <i>If this does not correspond to the current conditions, please begin again at Point 22. Possibly examine whether Table 1 is more appropriate.</i>	

no.	question	answer	result	no.
	a) current or past operations, or b) <i>exploration*</i> notes or reports, or c) a comparison of the <i>deposit*</i> with similar <i>deposits*</i> that are being mined/quarried (e.g., with respect to the kind, quality, workability, and profitability)?			
59	Can a decision be made whether the mineral <i>reserve*/resource*</i> can be profitably mined at the time of reporting or only in the foreseeable future?	yes	go to	60
		no	The <i>deposit*</i> is <i>intrinsically economic*</i> , go to	73
60	Is the <i>deposit*</i> being worked or has it been in the past?	yes	go to	63
		no	go to	61
61	Can it be concluded on the basis of comparison to similar <i>deposits*</i> and operations in the region that the mineral <i>reserve*/resource*</i> can be profitably extracted at the time of reporting?	yes	go to	64
		no	go to	62
62	Can it be concluded on the basis of comparison to similar <i>deposits*</i> and operations in the region that the mineral <i>reserve*/resource*</i> can be profitably extracted in the foreseeable future , assuming changes in the economic, technological, legal, ecological, and other conditions?	yes	go to	69
		no	The <i>occurrence*</i> cannot be considered economic. Therefore, no entry is made in the UNFC diagram. <i>If you are uncertain, please begin again at point 58. If that does not produce satisfactory results, begin again at point 36.</i>	
63	Is the working of the <i>deposit*</i> profitable on a long-term, <i>regular*</i> basis?	yes	go to	64
		no	go to	68
64	Are there plentiful exposures in addition to opencast or underground workings which give a clear picture of the geological setting of the <i>deposit*</i> and allows <i>reserve*</i> figures to be calculated with certainty? (The state of geological knowledge of the <i>deposit*</i> being comparable to that obtained during <i>detailed exploration*</i> .) <i>This case may be expected to occur extremely seldom, because the results of such work are usually documented in a geological study* or a more detailed study, such as a prefeasibility* or feasibility study*.</i>	yes	The <i>deposit*</i> is economic, the <i>reserves*</i> are assigned the code 131 ("131 reserve").	
		no	go to	65
65	Are there numerous exposures in addition to opencast or underground workings and is the general geological setting of the <i>deposit*</i> clear enough for the <i>reserve*</i> figures to be calculated with reasonable certainty? (The state of geological knowledge of the <i>deposit*</i> being	yes	The <i>deposit*</i> is economic, the <i>reserves*</i> are assigned the code 132 ("132 reserve").	
		no	go to	66

no.	question	answer	Result	no.
66	Are there few exposures besides opencast or underground workings, but the general geological setting nevertheless allows <i>reserve</i> * figures to be estimated? (The state of geological knowledge being comparable to that obtained during a <i>prospecting</i> * campaign.)	yes	The <i>deposit</i> * is economic, the <i>reserves</i> * are assigned the code 133 ("133 reserve").	
		no	go to	67
67	Are there only opencast or underground workings, but the general geological setting nevertheless allows <i>reserve</i> * figures to be extrapolated? (The present geological knowledge of the <i>deposit</i> * being comparable to that obtained during a <i>reconnaissance</i> * campaign.)	yes	The <i>deposit</i> * is economic, the <i>reserves</i> * are assigned the code 134 ("134 reserve").	
		no	Please begin again at Point 61. <i>If that does not produce satisfactory results, begin again at Point 37.</i>	61
68	Is the <i>deposit</i> * being worked on an <i>irregular</i> * basis and at least sometimes profitable?	yes	go to	69
		no	The <i>reserves</i> */ <i>resources</i> * cannot be classified owing to a lack of data. No entry is made in the UNFC diagram. <i>If you are uncertain, please begin again at Point 58. If that does not produce satisfactory results, begin again at Point 36.</i>	
69	Are there plentiful exposures in addition to opencast or underground workings which give a clear picture of the geological setting of the <i>deposit</i> * and allow <i>resource</i> * figures to be calculated with certainty? (The state of geological knowledge of the <i>deposit</i> * being comparable to that obtained during <i>detailed exploration</i> *.) <i>This case may be expected to occur extremely seldom, because the results of such work are usually documented in a geological study* or a more detailed study, such as a prefeasibility* or feasibility study*.</i>	yes	The <i>deposit</i> * is potentially economic, the <i>resources</i> * are assigned the code 231 ("231 resource").	
		no	go to	70
70	Are there numerous other exposures in addition to opencast or underground workings and is the general geological setting of the <i>deposit</i> * clear enough for <i>resource</i> * figures to be calculated with reasonable certainty? (The state of geological knowledge of the <i>deposit</i> * being comparable to that obtained during <i>general exploration</i> *.) <i>This case may be expected to occur seldom, because the results of such work are usually documented in a geological study* or a more detailed study, e.g., a prefeasibility study*.</i>	yes	The <i>deposit</i> * is potentially economic, the <i>resources</i> * are assigned the code 232 ("232 resource").	
		no	go to	71

no.	question	answer	result	no.
71	Are there few exposures besides opencast or underground workings, but the general geological setting nevertheless allows <i>resource*</i> figures to be estimated? (The state of geological knowledge being comparable to that obtained during a <i>prospecting*</i> campaign.)	yes	The <i>deposit*</i> is potentially economic, the <i>resources*</i> are assigned the code 233 ("233 resource").	
		no	go to	72
72	Are there only opencast or underground workings, but the general geological setting nevertheless allows <i>resource*</i> figures to be extrapolated? (The present geological knowledge of the <i>deposit*</i> being comparable to that obtained during a <i>reconnaissance*</i> campaign.)	yes	The <i>deposit*</i> is potentially economic, the <i>resources*</i> are assigned the code 234 ("234 resource").	
		no	Please begin again at Point 58. <i>If that does not produce satisfactory results, begin again at Point 36.</i>	58
73	Does the <i>deposit*</i> seem to be extractable, considering the geological, economical and technological conditions?	yes	go to	74
		no	The <i>deposit*</i> is of no economic interest. No entry is made in the UNFC diagram. <i>Resource*</i> figures already entered have to be removed.	
74	Are there plentiful other exposures besides opencast or underground workings which give a clear picture of the geological setting of the <i>deposit*</i> and allow <i>resource*</i> figures to be calculated with certainty? (The state of geological knowledge of the <i>deposit*</i> being comparable to that obtained during <i>detailed exploration*</i> .) <i>This case may be expected to occur extremely seldom, because the results of such work are usually documented in a geological study* or a more detailed study, such as a prefeasibility* or feasibility study*.</i>	yes	The deposit is <i>intrinsically economic*</i> , the resources are assigned the code 331 ("331 resource").	
		no		75
75	Are there numerous other exposures in addition to opencast or underground workings and is the general geological setting of the <i>deposit*</i> clear enough for <i>resource*</i> figures to be calculated with reasonable certainty? (The state of geological knowledge of the <i>deposit*</i> being comparable to that obtained during <i>general exploration*</i> .) <i>This case may be expected to occur seldom, because the results of such work are usually documented in a geological study* or a more detailed study, e.g., a prefeasibility study*.</i>	yes	The <i>deposit*</i> is potentially economic, the <i>resources*</i> are assigned the code 332 ("332 resource").	
		no	go to	76
76	Are there few other exposures besides opencast or underground workings, but the general geological setting nevertheless allows <i>resource*</i> figures to be estimated? (The state of geological knowledge being comparable to that obtained during a <i>prospecting*</i> campaign.)	yes	The <i>deposit*</i> is potentially economic, the <i>resources*</i> are assigned the code 333 ("333 resource").	
		no	go to	77

no.	question	answer	Result	no.
77	Are there only opencast or underground workings, but the general geological setting nevertheless allows <i>resource*</i> figures to be extrapolated? (The present geological knowledge of the <i>deposit*</i> being comparable to that obtained during a <i>reconnaissance*</i> campaign.)	yes	The <i>deposit*</i> is potentially economic, the <i>resources*</i> are assigned the code 334 ("334 resource").	
		no	Please begin again at Point 58. <i>If that does not produce satisfactory results, begin again at Point 36.</i>	58

III. Glossary

Several terms are defined and explained here that must be known in order to use the Key for reserves/resources classification correctly. These terms are written in *italics* and are marked with an asterisk (*). This Glossary has been included to enable a uniform usage of terms and a uniform use of the Classification Key. The definitions given here are very close to those given in UNECE, document ENERGY/WP.1/R.70 (1997).

competent person	The studies conducted in connection with the UN Framework Classification must be carried out by persons who have the qualifications and experience required for the assessment of <i>reserves*/resources*</i> in the type of <i>deposit*</i> involved, i.e., who are competent to do the required assessment. The requirements may be different in different countries, e.g., in some countries a license is required.
cut-off values	Economic and technological data, such as minimum tonnage, minimum content, minimum quality, maximum transport distance, that are decisive for the <i>economic viability*</i> of a <i>deposit*</i> .
Deposit	Deposits are economically viable (currently or in the future), natural accumulations or enrichments of mineral raw materials. They can consist, for example, of one or more orebodies. The <i>economic viability*</i> of different parts of a deposit can differ. If a deposit is not economically viable, it is termed a <i>mineral occurrence*</i> , <i>uneconomic occurrence*</i> , or simply <i>occurrence*</i> or <i>mineralization*</i> .
detailed exploration	Exploration to obtain detailed, three-dimensional data about a deposit or part of it. It includes examination and sampling of outcrops, trenches, boreholes, shafts, and adits. The samples are taken close enough together that size, form, structure, content, and other characteristics of the <i>deposit*</i> can be determined with a high degree of accuracy. Further <i>exploration*</i> would not significantly increase knowledge of the <i>deposit*</i> .
economic and mining engineering data	This term describes the economic and technical aspects of mining the <i>deposit*</i> or part of it, e.g., legal aspects, profitability and market aspects, environmental and land use planning aspects, transportation, mining and processing technology. This information is documented in a <i>feasibility*</i> or <i>prefeasibility study*</i> or in more general, less exact, form in a <i>geological study*</i> .

economic viability

The evaluation of the *geological data** and the *economic and mining engineering data** leads to conclusions about the *economic viability** of the *deposit** or part of it. These conclusions are documented in a *prefeasibility**, *feasibility**, or other study or are derived from the current status of mine operations. The last-named is especially true for *low to no risk projects**. The following *reserve*/resource** categories are distinguished:

- (a) economic: On the basis of a *feasibility study** or *mining report**, the *deposit** or part of it can be profitably mined under current conditions. These conditions include subsidies. The reserves are termed "proved mineral reserve". If this conclusion is made on the basis of a *prefeasibility study**, the *reserve** is termed "probable mineral reserve".
- (b) potentially economic: On the basis of a *feasibility study**, the *deposit** or part of it cannot be profitably mined under current conditions, but may be in the future if economic, technological, environmentally relevant, or other conditions change. The *resource** is termed "feasibility mineral resource".
If this conclusion is made on the basis of a *prefeasibility study**, the *resource** is termed "prefeasibility mineral resource".
- (c) intrinsically economic: At the time of classification, a decision cannot be made between "economic reserve" and "potentially economic resource".
- (d) Resources that are not economically viable at present nor will be in the foreseeable future (*uneconomic occurrences**) are not entered in the UN Framework Classification diagram.

exploration

In the exploration of a *deposit** or part of it, it is systematically investigated whether the *deposit** contains resources of a quality and tonnage that may be considered economic. Depending on the degree of thoroughness and detail, a distinction is made between *general exploration** and *detailed exploration**. The limits of the *mineralization** are first determined (*general exploration**) and then the *deposit** is systematically and intensively investigated, including the taking and analysis of samples (*detailed exploration**).

feasibility study

The financing and investment decisions for projects that require a medium to high investment (*medium to high-risk projects**) are made on the basis of a feasibility study. Such a study is generally required by a bank before a loan is granted. A detailed description of the make-up of a feasibility study and a *prefeasibility study** is given in UNECE, document ENERGY/1998/17 (pp. 16–23).

In a feasibility study, all available geological, engineering, environmentally relevant, legal, and economic information is examined. An environmental impact study is also normally required. The

confidence limits for the cost data must normally be within $\pm 10\%$ and no further studies should be necessary for an investment decision. The information required for this degree of exactness is derived from *reserve** data obtained from *detailed exploration**, pilot processing tests, and capital and operating costs obtained, e.g., from offers from equipment suppliers.

A feasibility study leads to reliable conclusions about the *economic viability** of the deposit. The conclusions of a feasibility study are more reliable than those of a *prefeasibility study**, which in turn are more reliable than the economic conclusions of a *geological study**. In contrast to a *geological study**, feasibility and *prefeasibility studies** involve a **team** that includes geologists, mining engineers, economists, engineers, lawyers, and other experts. All of the team members of all of the studies must be *competent persons**.

general exploration

The initial investigations after a *mineralization** is discovered are called general exploration. The methods used include geological mapping, widely spaced sampling, trenching, and drilling to determine the amounts and quality (for which mineral analyses in the laboratory may be made) of the *mineralization**, as well as limited interpretation based on direct and indirect methods. The objective is to determine the main geological characteristics of the *deposit** and their persistence. Of special interest is initial information about the size, form, structure, and tonnage of the *deposit** as a whole. Further *exploration** (*detailed exploration**) would significantly increase the knowledge of the *deposit**. The reliability should be sufficient to decide whether in *medium to high-risk projects** a *prefeasibility study** and *detailed exploration** are justified.

geological data

This term includes all information that deals directly with the *deposit**, *occurrence**, or part of it, e.g., the kind and tonnage of the *mineralization**, the geology, the mineralogy, and the petrography. This information, together with the *economic and mining engineering data**, is used to characterize the *deposit** (or *occurrence**).

geological study

A geological study is usually written following the geological investigations of one of the following types of *exploration**: *reconnaissance**, *prospecting**, *general exploration**, *detailed exploration**. The make-up of a geological study is described in UNECE, document ENERGY/1998/17 (pp. 11–15).

The objective of a geological study is to determine the uniformity, tonnage, and quality of a *mineralization** or a *deposit** as a basis for investment decisions and to report the results obtained. It is incorporated in further studies (*feasibility** and *prefeasibility studies**). A preliminary assessment of *economic viability** is made on the basis of *cut-off values** for content, thickness, depth, and costs, the last of which are estimated on the basis of similar operations. In this assessment, no distinction is made between economic reserves and potentially economic resources, owing to a lack of detailed information and the risks involved in *medium to high-*

*risk projects**. This preliminary assessment only permits the conclusion that the *deposit** is intrinsically economic, i.e., potentially economic to economic.

The *resource** class assigned by a geological study depends on the degree of exactness of the geological investigations: "measured mineral resource" for *detailed exploration**, "indicated mineral resource" for *general exploration**, "inferred mineral resource" for *prospecting**, and "reconnaissance mineral resource" for *reconnaissance**.

In contrast, in the case of *low to no risk projects** it may be possible even with relatively little knowledge of the *deposit** to classify the *deposit** or part of it as economic or potentially economic only on the basis of a comparison with a similar *deposit** nearby.

In contrast to a *feasibility** or *prefeasibility study**, a geological study is prepared only by a geologist (sometimes together with a mining engineer) **without participation of other experts** (e.g., economists, engineers, lawyers). The geologist and mining engineer must be *competent persons**.

intrinsically economic	This term is used when a decision cannot be made whether a <i>deposit*</i> or part of it is economic or potentially economic, because information on the economic viability is lacking.
irregular mining	This expression designates a mining venture that is only sporadically operated. In the case of <i>low to no risk projects*</i> , it can be generally concluded that the <i>deposit*</i> is only potentially economic and is mined only when the economic, technological, and infrastructural conditions are favorable.
low to no risk project	<p>The expression low to no risk project is largely synonymous with <i>small-scale mining*</i>, which differs in significance depending on the mineral resource and country. This kind of project has the following characteristics:</p> <ul style="list-style-type: none">• Neither a <i>feasibility*</i> nor a <i>prefeasibility study*</i> are generally carried out.• The operations do not follow the plans of an engineer.• The financing is not done by professionals, i.e., it is not done on the basis of a <i>feasibility*</i> or <i>prefeasibility study*</i>, so-called "bankable studies".• Usually, mining law offers simplified procedures or does not apply at all.• The operations are usually done manually or with very simple tools. <p>Among others, artisanal operations and cooperatives belong to this category.</p>
medium to high-risk project	This term is used for normal, mechanized mining operations of various sizes. In these projects, a medium to high investment is necessary. Such

projects are usually regulated by mining law. In most cases, such a project is started on the basis of a positive result of a *feasibility** or *prefeasibility study**, operated in a systematic way according to plans by engineers, and financed on a professional basis. It is normally financed by other parties, e.g., banks, who require a "bankable study", such as a *feasibility** or *prefeasibility study**.

- mineral occurrence** A mineral occurrence is a *mineralization** that has not been explored or is not economically viable. Such *occurrences** are not included in the UN Framework Classification. Mineral occurrence, *mineralization**, *uneconomic occurrence** and *occurrence** are more or less synonymous terms.
- mineralization** This is a neutral term for *mineral occurrences** and enrichments that differ from the normal geology of the area. It is used when it is not possible to distinguish between an *occurrence** (i.e., uneconomic) and *deposit** (i.e., economic). They are not included in the UN Framework Classification. *Mineralization*, *mineral occurrence**, *uneconomic occurrence** and *occurrence** are more or less synonymous terms.
- mining report** A mining report gives the current status of the mining of a *deposit** or part of it, furnishing detailed and exact figures for *reserves** and *remaining or additional resources**. It is usually prepared by the mine operators, giving amounts and quality of the mineral raw materials extracted during the report period, as well as changes in the *economic viability** resulting from changes in costs and prices, technological developments, new legal requirements with respect to environmental protection, etc.
- mining status** Before *reserve*/resource** figures are entered in the UN Framework Classification diagram, especially of low to no risk mining projects, it must be decided which of the following possibilities applies:
- (a) regular mining of the *deposit** or part of it: The *deposit** is mined profitably on a continual basis. This can also mean that operations are seasonal, with regular interruptions, either due to the climate or because the operators are occupied with other work. In general, when this is the case, it can be concluded that the *reserves** of the *deposit** are "economic" (see *economic viability**).
 - (b) irregular mining of the *deposit**: The *deposit** or part of it is mined profitably sporadically. One reason for this is that the mineral(s) of the *deposit** cannot be sold continually on the market. In general, when this is the case, it can be concluded that *resources** of the *deposit** are "potentially economic" (see *economic viability**).
 - (c) exhausted: The economically viable part of the *deposit** is mined out. Consequently, no *reserve*/resource** figures can be entered in the UNFC diagram.

occurrence	Occurrence, <i>mineral occurrence*</i> , <i>uneconomic occurrence*</i> and <i>mineralization *</i> are more or less synonymous terms. They are not included in the UN Framework Classification.
prefeasibility study	<p>A prefeasibility study contains a preliminary assessment of the <i>economic viability*</i> of a <i>deposit*</i> or part of it and is the basis for decisions about whether further studies should be carried out, e.g., <i>detailed exploration*</i> and a <i>feasibility study*</i>. A prefeasibility study is normally conducted at the conclusion of successful <i>exploration*</i> for <i>medium to high-risk projects*</i> and includes all of the available geological, mining engineering, environmentally relevant, legal, and economic information. The make-up of a prefeasibility study is described in UNECE, document ENERGY/1998/17 (pp. 16–23).</p> <p>For relatively advanced projects, the confidence limits in the prefeasibility study should be ± 25 %. For less advanced projects, higher error limits may be expected.</p> <p><i>Reserve*/resource*</i> figures from <i>detailed exploration*</i> and <i>general exploration*</i>, laboratory test data, and cost estimates based on catalogs or comparable mining operations are the basis for the information in a prefeasibility study. The aspects treated in a <i>feasibility study*</i> are also handled in a prefeasibility study, but in less detail. The reliability of the conclusions is less than that in a <i>feasibility study*</i>, but greater than that of a <i>geological study*</i>.</p> <p>In contrast to a <i>geological study*</i>, <i>feasibility studies*</i> and <i>prefeasibility studies*</i> are conducted by a team of experts, including geologists, mining engineers, economists, lawyers, etc.</p>
pre-investment study	<p>This expression refers to studies used for making investment decisions about the operation of a normal mine (<i>medium to high-risk project*</i>). Such studies include</p> <ul style="list-style-type: none">• <i>prefeasibility studies*</i> and• <i>feasibility studies*</i>. <p>For <i>low to no risk projects*</i> (<i>small-scale mining*</i>), a <i>geological study*</i> can under certain circumstances function as a pre-investment study.</p>
prospecting	<p>In prospecting, an area indicated to be prospective by known geological parameters is explored for <i>mineralization*</i>. Prospecting trenches may be dug and/or one or two boreholes drilled. No systematic geological investigations are conducted. <i>Resource*</i> figures are correspondingly inexactly known.</p>
reconnaissance	<p>In a reconnaissance survey, an area is explored for the presence of a specific mineral resource and certain parameters that indicate the formation of this mineral or rock. Any <i>resource*</i> figures are reliable only to an order of magnitude. They are highly uncertain and should be entered in the UNFC diagram only if sufficient data is available and a</p>

positive assessment can be made by comparison with other, known *deposits** in the region.

regular mining

This expression designates a mining venture that is continually in regular operation. This can also mean that operations are seasonal, with regular interruptions.

In the case of *low to no risk projects**, it can be generally concluded from ongoing, regular mining that the *deposit** is economic (see also *mining status**).

remaining or additional resources

The *total resources** minus the *reserves** are termed remaining or additional resources or simply *resources**.

reserve(s)

Reserves are the economically viable part of the *total resources** of a mineral *deposit** as demonstrated by a *feasibility study** or a *prefeasibility study**. Mineral reserves are subdivided in order of increasing confidence level into "probable mineral reserve" (*prefeasibility study**) and "proved mineral reserve" (*feasibility study**).

An exception is made in the case of *low to no risk projects** in which the economic viability is evident by the current mining/quarrying or on the basis of a comparison with a similar *deposit** nearby.

resource(s)

The term resource is not understood the same way in all languages. In the UN Reserves/Resources Classification, resource is that part of the *total resources** that is not classified as *reserve** and is also termed *remaining or additional resource**. A resource may become economically viable in the foreseeable future but is not so at present.

The term "resources" is normally used in English in the way *total resources** are defined here.

small-scale mining

See *low to no risk project**.

total resources

Total resources comprise the economic *reserves**, potentially economic *resources** and intrinsically economic *resources**. The last two are referred to as *remaining or additional resources**. The term should be used only if figures for both *reserves** **and** *remaining or additional resources** are given, either in percent or as absolute values.

uneconomic occurrence

Enrichments of minerals that are not currently or in the foreseeable future of economic interest. They are not included in the UN Framework Classification. Uneconomic occurrence, *mineralization**, *mineral occurrence** and *occurrence** are more or less synonymous terms.

Acknowledgements

The author wishes to thank Mr. R. Clark Newcomb of the BGR for the translation of the manuscript. Mr. Robert Ehrhardt, also BGR, made valuable suggestions with respect to the layout of the tables. Thanks also go to Mr. Dietmar Kelter, BGR, for fruitful discussions and to Mr. Andrej Szubelj, Slovenia, for his valuable comments.

IV. References

- FETTWEIS, G. (1994): Historical Development of Reserve/Resources Classifications with Emphasis on the United Nations Classification of Mineral Resources of 1979 and its Consequences for the Austrian Norm-Classification of 1989.– Proc. Workshop on Reassessment of Coal and Mineral Deposits under Market Economy Conditions, pp. 36–62, 7 figs., appendix; Berlin.
- KELTER, D. (1991): Classification Systems for Coal Resources – a Review of the Existing Systems and Suggestions for Improvements.– Geol. Jb., A 127, 347–359, 7 figs.; Hannover.
- KELTER, D. & WELLMER, F.-W. (1993): Is the Introduction of a 3-dimensional Coal Reserves/Resources Classification Desirable? – Zt. der Förderer d. Bergbaus u. d. Hüttenwesens (fbh), Nr. 2, 1993/Nr. 1, 1994, pp. 11–13, 1 fig.; Berlin.
- LORENZ, W. (1994): Reserves/Resources Classification of Industrial Minerals and Rocks.– Proc. Workshop on Reassessment of Coal and Mineral Deposits under Market Economy Conditions, pp. 97–101, 1 fig.; Berlin.
- LORENZ, W., GWOSDZ, W. & TOMS H. (2000): The UN International Framework Classification for Reserves/Resources Applied to Mineral Construction materials.– Erzmetall 53 (2000) Nr.1, 26–30, 1 fig.
- UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (1978): Manual for the Preparation of Industrial Feasibility Studies, 258 pp.; New York.
- UNITED NATIONS – ECE (1997): United Nations International Framework Classification for Reserves/Resources – Solid Fuels and Mineral Commodities.– Economic Commission for Europe, ENERGY/WP.1/R.70, 17 February 1997, 21 pp., 7 figs.; Geneva.
- UNITED NATIONS – ECE (1998): Draft Guidelines to the United Nations International Framework Classification for Reserves/Resources.– Economic Commission for Europe, ENERGY/1998/17 – 20 July 1998, 23 pp 5 figs., 2 appendices.
- WELLMER, F.-W. (1994): The Importance of and Need for an Internationally Acceptable Reserve/Resource Classification System.– Proc. Workshop on Reassessment of Coal and Mineral Deposits under Market Economy Conditions, pp. 22–35, 5 figs., 2 tables; Berlin.

Appendix

UN Framework Classification
- for medium to high-risk mining projects -

UN Framework Classification	National System	Detailed Exploration	General Exploration	Prospecting	Reconnaissance
Feasibility Study and/or Mining Report		1 (111) 2 (211)	<i>usually</i>		
Pre-feasibility Study		1 (121) [+] 2 (221) [+]	<i>not</i>		
Geological Study		3 (331)	3 (332)	3 (333)	3 (334)

categories of economic viability: 1 = economic 2 = potentially economic 3 = intrinsically economic (economic to potentially economic)
 (111) = code deposit:
 date:

UN Framework Classification
- extended for low to no risk mining projects -

UN Framework Classification	National System	Detailed Exploration	General Exploration	Prospecting	Reconnaissance
Feasibility Study and/or Mining Report		1 (111) 2 (211)	<i>usually</i>		
Pre-feasibility Study		1 (121) [+] 2 (221) [+]	<i>not</i>		
Geological Study		1 (131)	1 (132)	1 (133)	1 (134)
		2 (231)	2 (232)	2 (233)	2 (234)
		3 (331)	3 (332)	3 (333)	3 (334)

categories of economic viability: 1 = economic 2 = potentially economic 3 = intrinsically economic (economic to potentially economic)
 (111) = code deposit: Date:

Additional classes to accommodate economic reserves and potentially economic resources of low to no risk projects