30 Cannon Street, London EC4M 6XH, United Kingdom
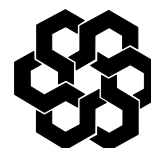**Tel: +44 (0)20 7246 6410   Fax: +44 (0)20 7246 6411**
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International
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Board

INFORMATION FOR OBSERVERS

Board Meeting: **22 June 2007, London**

Project: **Extractive Activities research project**

Subject: **Comparison of Petroleum and Minerals Reserves and Resource Classification Systems (Agenda Paper 13A)**

Comparison of Petroleum and Minerals Reserves and Resource Classification Systems

SPE/CRIRSCO Convergence Team Supplemental Report

Submitted to the:

**International Accounting Standards Board
Extractive Activities Working Group**

A Joint Report submitted by:

**Committee for Mineral Reserves
International Reporting Standards (CRIRSCO)**

and

**Society of Petroleum Engineers (SPE)
– Oil & Gas Reserves Committee**

April 2007

Introduction

The following report supplements that submitted by the Convergence Team to the IASB [research project team] in May 2006; updates reflect changes to the SPE petroleum guidance as contained in their recently approved Petroleum Resource Management System (PRMS). Appendix A is an updated version of the classification correlation charts.

Background

Minerals and petroleum are naturally occurring materials that are non-renewable and thus subject to depletion.

Minerals (sometimes referred to as solid minerals) are naturally occurring materials that include metals, industrial minerals, gemstones, uranium, and fossilized organic material (coal).

Petroleum is a naturally occurring mixture consisting predominantly of hydrocarbons in the gaseous, liquid or solid phase.

The Minerals and Petroleum industries have independently developed classification systems and terminology to categorize the estimated quantities of material that exist in nature based on the level of knowledge available to develop the estimates and the risk and uncertainty implicit in any estimation process. Consideration is also given to the extent to which the mineral quantities can be technically and economically recovered based on the application of available extraction and processing technologies.

Several classification systems have been developed to support technical and commercial analysis. Moreover, individual regulatory agencies have defined rules for public disclosure of the estimated marketable quantities and their associated value.

The dominant international classification system for minerals is that published by the Committee for Mineral Reserves International Reporting Standards (CRIRSCO: 2006). The system is primarily targeted at establishing international best practice standards for regulatory and public disclosures and combines the basic components of a number of national reporting codes and guidelines that have been adopted in similar forms by all the major agencies outside of the US Securities and Exchange Commission (SEC). The classification is applied, with small modifications or extensions, by most mining companies for the purpose of internal resource management.

The dominant classification system for petroleum is that jointly published by the Society of Petroleum Engineers, the World Petroleum Council, the American Association of Petroleum Geologists, and the Society of Petroleum Evaluation Engineers and hereinafter referred to as the Petroleum Resource Management System (SPE-PRMS). These are technical guidelines that are adopted in slightly modified form for internal

resource management by most oil and gas companies. Most of the major regulatory agencies have developed disclosure guidelines that impose classification rules similar to, but not directly linked to, the SPE-PRMS. Regulatory agencies typically mandate disclosure of only a subset of the total reserves and resources defined in the SPE-PRMS; for example, the SEC specifies that only Proved Reserves should be disclosed.

IASB/Convergence Team Interface – Status

In November 2005, the IASB Extractive Activities Project Team submitted a request to SPE and CRIRSCO summarized as follows:

"In comparing the definitions of reserves and resources that are in use in the minerals and oil & gas industries during these sessions, it emerged that potential exists for those definitions of reserves and resources to become more closely aligned such that they could become more compatible with each other and with the accounting framework. Realising greater compatibility in the definitions would have clear benefits for a future International Financial Reporting Standard dealing with extractive activity accounting."

Based on this request, SPE and CRIRSCO formed a joint "Convergence Team" to research the potential for increased alignment of their classification systems. Research culminated in a working session between the organizations in Calgary in late February 2006 and a submission of preliminary results to the IASB Project Team in May 2006 after review by the SPE Oil and Gas Reserves Committee (OGRC) and CRIRSCO members. The Project Team replied in early July with their comments; SPE and CRIRSCO submitted a joint response in August 2006.

Following these exchanges, the representatives from SPE-CRIRSCO Convergence Team and the IASB Extractive Activities Project Team convened a joint working session in Geneva on October 12, 2006. Representatives of the UNECE Ad Hoc Group of Experts (AHGE), the International Organization of Securities Commissions (IOSCO) and the US Securities and Exchange Commission (SEC) also participated in this meeting as Observers.

Recognizing that the SPE was in the midst of a project to revise existing classification and guidance, the SPE_CRIRSCO Convergence Team committed to update prior reports at the completion of this project. The SPE/WPC/AAPG/SPEE Petroleum Resources Management System was approved in March 2007 and the following update to the May 2006 SPE_CRIRSCO Convergence document is provided.

Comparison of Reserves and Resource Classification Systems – An Update

Petroleum and Minerals have developed similar, but somewhat different, classification systems as illustrated in the following summary graphics.

WORKING DRAFT ONLY
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The report is a working draft and further updates and revisions will be made as appropriate.
Any views expressed herein do not necessarily represent the views of the
SPE Oil & Gas Reserves Committee or CRIRSCO.

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Petroleum

Figure 1 shows the SPE-PRMS approved in March 2007.Note in figure 1 that the petroleum classification has been slightly modified from the 2000 version as shown in our prior reports by addition of terminology within the Contingent Resources to identify cumulative/scenario estimates (1C/2C/3C). The categorization criteria are identical to that used in Reserves but the projects do not meet the commercial risk guidelines that allow reserves attribution.

While not adopting specific labels, increments within Contingent Resources can be informally identified as C1, C2, and C3 and would generally align with the Measured, Indicated and Inferred categories as used in the Minerals Classification.
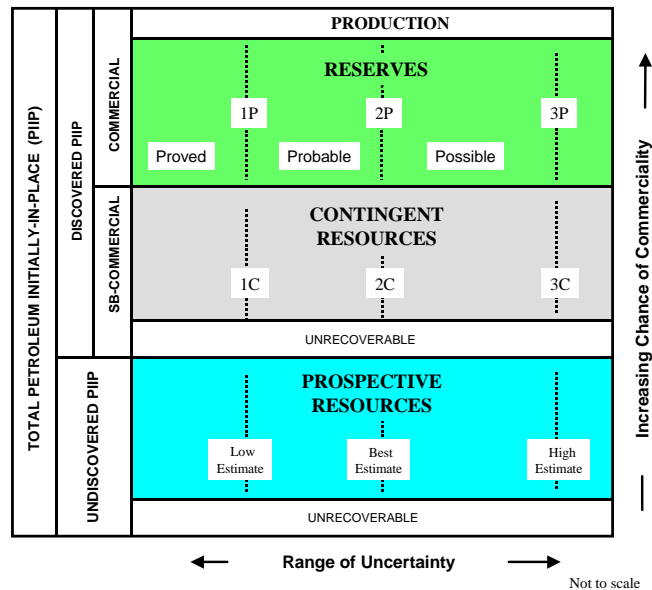

Figure 1: SPE/WPC/AAPG/SPEE 2007 Petroleum Classification System

The SPE-PRMS provides evaluators several options to further characterize projects to improve communication better support portfolio analysis (figure 2). The Project Maturity sub-classes align with the decision gates used internally as projects mature towards the ultimate "on production" status. A project constitutes an "investment opportunity" and is defined at the level at which the decision is made to proceed with capital investment that will move the project to a higher level of maturity. This may vary from the decision to drill an exploration single well to committing to a multi-million dollar project that integrates production and processing facilities. Such subdivisions are primarily designed to support internal project and portfolio analyses. Once projects satisfy commercial risk criteria, the associated quantities are classified as Reserves. These quantities may be allocated to Reserves Status subdivisions (Developed/Undeveloped) based on the funding and operational status of wells and associated facilities within the reservoir development plan.

Petroleum projects may be further characterized by their Economic Status. All projects classified as Reserves must be economic under defined conditions. Based on assumptions regarding future conditions and their impact on ultimate economic viability, projects classified as Contingent Resources may be broadly divided into two groups:

- Marginal Contingent Resources are those quantities associated with technically feasible projects that are either currently economic or projected to be economic under reasonably forecasted improvements in commercial conditions but are not committed for development because of one or more contingencies.

- Sub-Marginal Contingent Resources are those quantities associated with discoveries for which analysis indicates that technically feasible development projects would not be economic and/or other contingencies would not be satisfied under current or reasonably forecasted improvements in commercial conditions. These projects nonetheless should be retained in the inventory of discovered resources pending unforeseen major changes in commercial conditions.

Where evaluations are incomplete such that it is premature to clearly define ultimate chance of commerciality, the economic status may be identified as "undetermined".
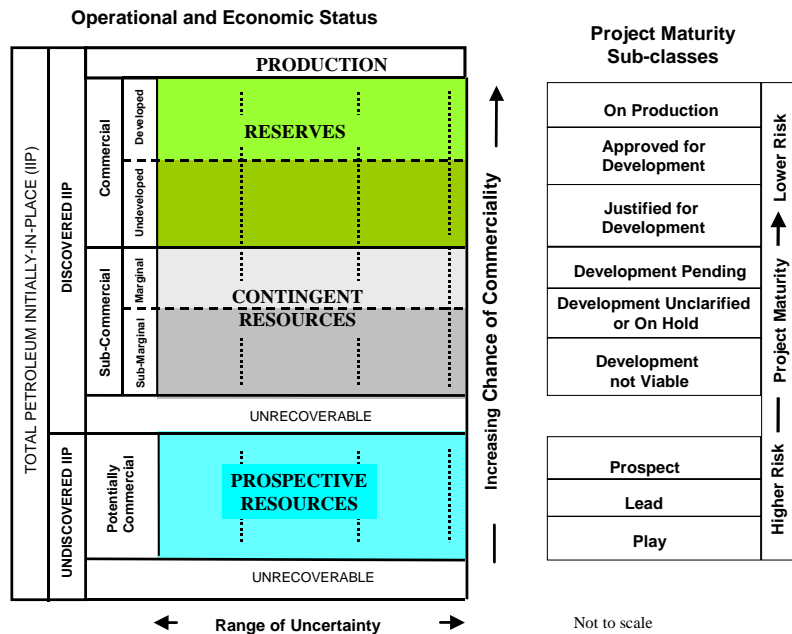

Figure 2: Sub-classification and Project Modifier Options in SPE-PRMS

Minerals

The CRIRSCO classification system (figure 3) remains unchanged from that published in 2006 and contained in the May 2006 Convergence Study:

Exploration
Results

| Mineral | Mineral |
| Resources | Reserves |

Increasing Level
of Geological
Knowledge
and Confidence

Inferred

Indicated ⟷ Probable

Measured ⟷ Proved

Consideration of mining, metallurgical, economic, marketing, legal,
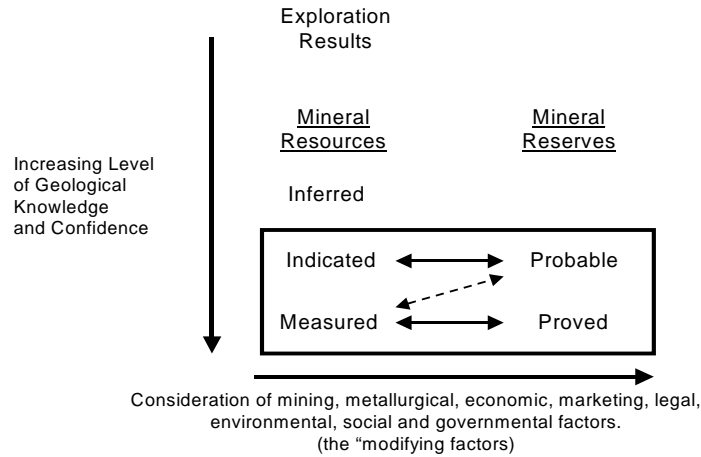environmental, social and governmental factors.
(the "modifying factors)

Figure 3: CRIRSCO (2006) Classification

While similar decision-gates as described for petroleum may be applied by individual mining companies as part of their internal business processes, they are not part of the classification criteria for reporting purposes.

Based on prior Convergence Team meetings, figure 4 graphically illustrates the alignment between minerals and the 2007 petroleum classification systems.
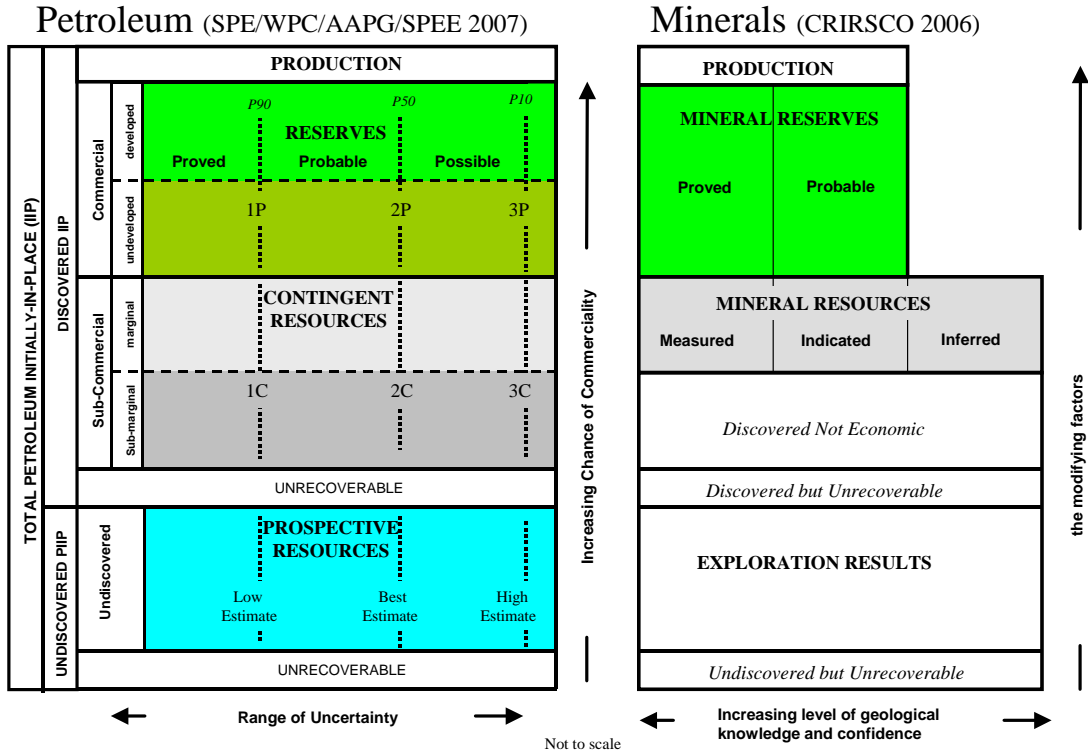
Figure 4: Comparison of Petroleum and Minerals Classification Systems

For those categories of mineralisation where it is possible to establish direct equivalents the graphic and the associated class and category definitions (Appendix A), demonstrate close alignment. Mineral Resources are considered equivalent to petroleum's Marginal Contingent Resources. Regarding remaining differences:

Discovered Sub-Marginal and Prospective Resources

Petroleum Sub-Marginal Contingent Resources are those discovered deposits/accumulations for which no projects are identified that would support development under current conditions or reasonably expected improvements in technology and commercial conditions. The CRIRSCO system currently does not have categories for mineralisation that is demonstrably uneconomic or yet to be discovered. However, there are reasonable parallels in exploration results and exploration targets that may be used by companies internally to develop mineral inventories ahead of publishing any resulting Mineral Resources.

Assessment Methods

Cumulative/scenario labels in petroleum (e.g. 2P or 2C) have no equivalent in the minerals classification. This reflects variations in the evaluation work process, and, as discussed in the May 2006 report, also the physical nature of the materials being

considered. Petroleum evaluations utilize combination of scenario and incremental approaches; the scenario methods can be derived using deterministic or probabilistic analysis methods. When using probabilistic methods, the SPE guidelines define quantitative limits in their reserve categories (1P/1C </= P90, 2P/2C </= P50, 3P/3C </= P10).

Lack of mobility and more complex distribution of ore (and its grade) in mineral deposits do not support the type of analytical methods employed in petroleum. The minerals industry uses advance stochastic analysis techniques in their underlying assessments but do not routinely incorporate analysis results to establish quantitative probability limits in their classification system.

Possible Reserves Issue

Note that upside scenarios (in-place and/or recovery efficiency) in the petroleum system for commercial projects are labeled 3P and the increment over the 2P (best estimate) is labeled as Possible Reserves. While such upside is informally recognized in the minerals industry, for reporting purposes the quantities would be included in Inferred Mineral Resources to indicate the lower level of confidence associated with such estimates. This is in part due to the mobility associated with conventional petroleum that would allow accessing this upside within the same general development while the solid nature of most minerals would preclude recovery under a fixed mine design. Also, rather than being an upside on an existing resource estimate, Inferred Resources may simply reflect the staged process by which mineral deposits are explored, and the relative lack of data in the early stages of exploration. The geological uncertainty inherent in Inferred Mineral Resources means that while they can be used internally in economic assessments, and reported externally as resources, they cannot be converted directly to Mineral Reserves.

Economic vs. Commercial

Economic projects are those where the cash flow schedule generates a positive net present value under a defined discount rate; the same definition applies to petroleum and mineral projects.

In order to generate project cash flows, assumptions must be made regarding prices, costs, and various technological, legal, social, environmental and governmental factors. Mining refers to these as modifying factors while petroleum uses the term contingencies. Where one or more of these factors/contingencies have a significant chance of preventing project implementation, or where studies of the modifying factors have not been completed, the project and associated recoverable quantities are classified as Mineral Resources or Contingent Resources. In other words, the economic attribute is conditional both on completing the evaluation of modifying factors/contingencies and on the outcome of this assessment showing that the assumed factors are sufficient to allow implementation.

In the petroleum industry, it is recommended that one other factor be considered: the timing of the development. If development is likely to take place in a reasonable time frame (SPE suggests 5 years), then the material is classed as Commercial and declared as Reserves. Where, due to the above factors or just the internal prioritization of projects, development will not take place within five years the classification reverts to Marginal Contingent Resources. There are circumstances in which delays significantly longer than 5 years are acceptable but these cases and the logic must be clearly documented.

Figure 5 illustrates the logic flow in petroleum resource classification. The end result is that to be classified as commercial, a project must be economic, there must be a reasonable expectation of satisfying the contingencies, and there must be a commitment to initiate development within a reasonable time frame.
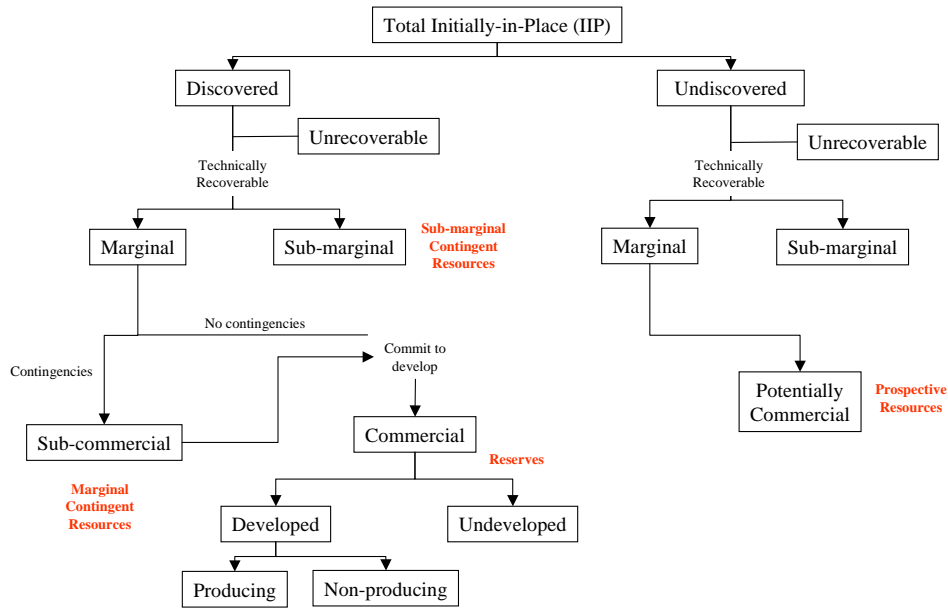

Figure 5: Petroleum Classification Logic

Figure 6 shows an approximation of the equivalent logic process for minerals.
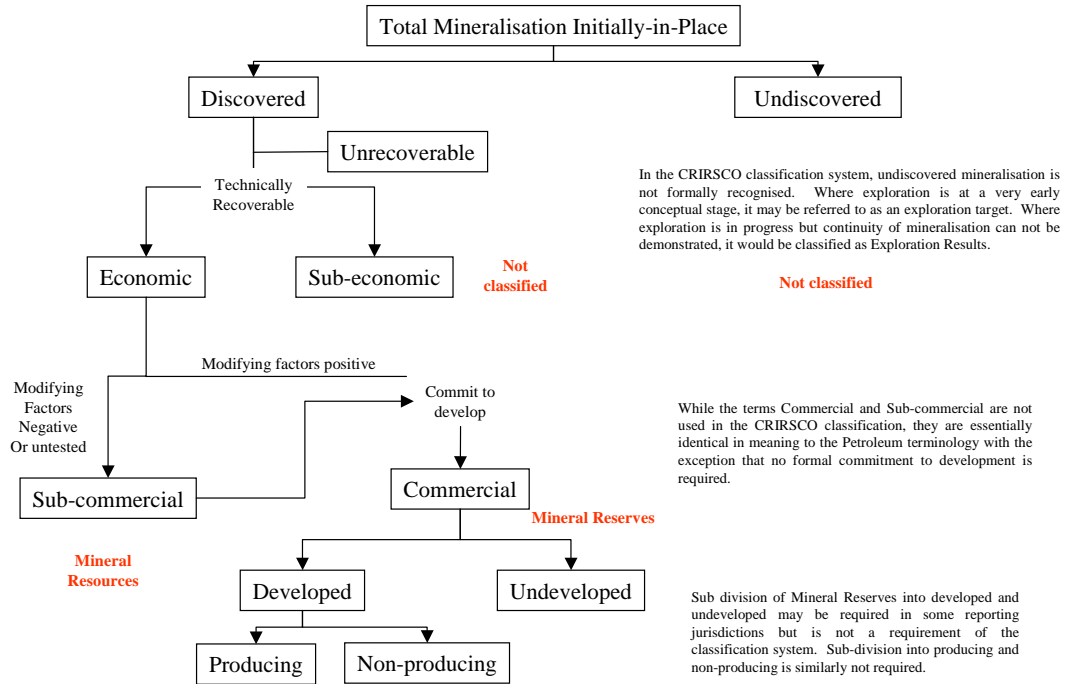

Figure 6: Minerals Classification Logic

While the minerals system does not make an explicit distinction between 'economic' and 'commercial', the term economic is often used loosely to cover all of the modifying factors in converting of a resource to a reserve. Although the completion of feasibility studies does not require a decision to mine, in practice any feasibility study that has not been implemented within 5 years would require a restudy and quantities would either be retained as Mineral Reserves; 'refreshed' on an annual basis, or downgraded to Mineral resource pending that restudy.

Summary

All of the above indicates to the Convergence Team that there is a high degree of compatibility in the classification logic that petroleum and minerals evaluators apply in determining quantities of their respective materials that reside in a field or a deposit.

Appendix A provides a correlation of the classes and categories as defined in CRIRSCO for minerals and SPE for Petroleum. This chart has been updated from that submitted to the IASB in May 2006 to reflect changes in the revised SPE 2007 Petroleum Resource Management System.

APPENDIX A: Classification Mapping - CRIRSCO to SPE/WPC/AAPG/SPEE

CRIRSCO 2006	SPE/WPC/AAPG/SPEE 2007
Mineral Reserve – the economically minable 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. Appropriately detailed assessments and 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 could reasonably be justified. Mineral Reserves are sub-divided in order of increasing confidence into Probable Mineral Reserves and Proved Mineral Reserves.	**Reserves** – those quantities of petroleum anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions. Reserves must satisfy four criteria: they must be discovered, recoverable, commercial, and remaining based on the development project(s) applied. Reserves are further subdivided in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by their development and production status. To be included in the Reserves class, a project must be sufficiently defined to establish its commercial viability. There must be a reasonable expectation that all required internal and external approvals will be forthcoming, and there is evidence of firm intention to proceed with development within a reasonable time frame. A reasonable time frame for the initiation of development depends on the specific circumstances and varies according to the scope of the project. While five years is recommended as a benchmark, a longer time frame could be applied where, for example, development of economic projects are deferred at the option of the producer for, among other things, market-related reasons, or to meet contractual or strategic objectives. In all cases, the justification for classification as Reserves should be clearly documented. To be included in the Reserves class, there must be a high confidence in the commercial producibility of the reservoir as supported by actual production or formation tests. In certain cases, Reserves may be assigned on the basis of well logs and/or core analysis that indicate that the subject reservoir is hydrocarbon bearing and is analogous to reservoirs in the same area that are producing or have demonstrated the ability to produce on formation tests.

CRIRSCO 2006	SPE/WPC/AAPG/SPEE 2007
Proved Mineral Reserve – the economically minable part of a Measured Mineral Resource. It includes diluting materials and allowances for losses which may occur when the material is mined. Appropriately detailed assessments and studies will have been carried out, and including consideration of, and modification by, realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These studies demonstrate at the time of reporting that extraction is justified.	**Proved Reserves** – those quantities of petroleum, which by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under defined economic conditions, operating methods, and government regulations. If deterministic methods are used, the term reasonable certainty is intended to express a high degree of confidence that the quantities will be recovered. If probabilistic methods are used, there should be at least a 90% probability that the quantities actually recovered will equal or exceed the estimate.
Probable Mineral Reserve – the economically minable 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. Appropriately detailed assessments and studies will have been carried out, and include consideration of a modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. The results of the studies demonstrate at the time of reporting that extraction could reasonably be justified.	**Probable Reserves** – those additional Reserves which analysis of geoscience and engineering data indicate are less likely to be recovered than Proved Reserves but more certain to be recovered than Possible Reserves. It is equally likely that actual remaining quantities recovered will be greater than or less than the sum of the estimated Proved plus Probable Reserves (2P). In this context, when probabilistic methods are used, there should be at least a 50% probability that the actual quantities recovered will equal or exceed the 2P estimate
No direct equivalent category of Mineral Reserves.	**Possible Reserves** - those additional reserves which analysis of geoscience and engineering data indicate are less likely to be recoverable than Probable Reserves. The total quantities ultimately recovered from the project have a low probability to exceed the sum of Proved plus Probable plus Possible (3P) which is equivalent to the high estimate scenario. When probabilistic methods are used, there should be at least a 10% probability that the actual quantities recovered will equal or exceed the 3P estimate.

CRIRSCO 2006	SPE/WPC/AAPG/SPEE 2007
	Contingent Resources – Those quantities of petroleum estimated, as of a given date, to be potentially recoverable from known accumulations by application of development projects, but which are not currently considered to be commercially recoverable due to one or more contingencies. Contingent Resources may include, for example, projects for which there are currently no viable markets, or where commercial recovery is dependent on technology under development, or where evaluation of the accumulation is insufficient to clearly assess commerciality. Contingent Resources are further categorized in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by their economic status.
Mineral Resource – a concentration or occurrence of material of 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, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories.	**Marginal Contingent Resources** – Those quantities associated with technically feasible projects that are either currently economic or projected to be economic under reasonably forecasted improvements in commercial conditions but are not committed for development because of one or more contingencies.
No formalized direct equivalent class, or sub-class, is defined by CRIRSCO. Informally these are referred to as "Discovered Not Economic".	**Para-Marginal Contingent Resources** – Those quantities associated with discoveries for which analysis indicates that technically feasible development projects would not be economic and/or other contingencies would not be satisfied under current or reasonably forecasted improvements in commercial conditions. These projects nonetheless should be retained in the inventory of discovered resources pending unforeseen major changes in commercial conditions.

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CRIRSCO 2006	SPE/WPC/AAPG/SPEE 2007
Measured Mineral Resource – 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 grade continuity.	**C1** – Category criteria are identical to those of Proved Reserves conditional on meeting Reserves class criteria. If deterministic methods are used, there should be a high degree of confidence that the C1 quantities will be recovered. If probabilistic methods are used, there should be at least a 90% probability that the quantities actually recovered will equal or exceed the 1C estimate.
Indicated Mineral Resource – 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.	**C2** – Category criteria are identical to those of Probable Reserves conditional on meeting Reserves class criteria. It is equally likely that actual remaining quantities recovered will be greater than or less the 2C estimate. In this context, when probabilistic methods are used, there should be at least a 50% probability that the actual quantities recovered will equal or exceed the 2C estimate
Inferred Mineral Resource – 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.	**C3** – Category criteria are identical to those of Possible Reserves conditional on meeting Reserves class criteria. The total quantities ultimately recovered from the project have a low probability to exceed the 3C estimate which is equivalent to the high estimate scenario. When probabilistic methods are used, there should be at least a 10% probability that the actual quantities recovered will equal or exceed the 3C estimate.

CRIRSCO 2006	SPE/WPC/AAPG/SPEE 2007
Exploration Results include data and information generated by exploration programmes that may be of use to investors but which may not be part of a formal declaration of Minerals Resources or Mineral Reserves. It should be made clear in public reports that contain Minerals Exploration results that it is inappropriate to use such information to derive estimates of tonnage and grade.	**Prospective Resources** - Those quantities of petroleum which are estimated, as of a given date, to be potentially recoverable from undiscovered accumulations. Potential accumulations are evaluated according to their chance of discovery and, assuming a discovery, the estimated quantities that would be recoverable under defined development projects. It is recognized that the development programs will be of significantly less detail and depend more heavily on analog developments in the earlier phases of exploration.