Glossary of Terms Used in Petroleum Reserves/Resources Definitions

For several decades, the terminology used in the classification of petroleum reserves and resources has been the subject of study and ongoing revision. Since the mid-1930s, numerous technical organizations, regulatory bodies, and financial institutions have introduced ever more complex terminologies for the classification of petroleum reserves.

In addition, the evolution of technology has yielded more precise engineering methods for reserve evaluation and has intensified the need for an improved nomenclature to achieve consistency among professionals working with petroleum reserves terminology.

In recognition, the Society of Petroleum Engineers (SPE) and the World Petroleum Council (WPC, formerly World Petroleum Congresses) developed a set of petroleum reserves definitions which were presented to the industry in March 1997. These represented a major step forward in their mutual desire to improve the level of consistency in reserves estimation and reporting on a worldwide basis.

As a further development, SPE and WPC recognized the potential benefits to be obtained by supplementing those definitions to cover the entire resource base, including those quantities of petroleum contained in accumulations that are currently sub-commercial or that have yet to be discovered.

These other resources represent potential future additions to reserves and are therefore important to both countries and companies for planning and portfolio management purposes. In February 2000, the two organizations in conjunction with the American Association of Petroleum Geologists (AAPG), developed resources definitions that encompassed the entire range of petroleum reserves and resources.

By their very nature, these two documents include references to terminology which had yet to be defined by the three organizations. The objective of this glossary is to clarify the meaning of those terms.

Term	Definition
1P	Equivalent to Proved Reserves
2P	The Sum of Proved Reserves plus Probable Reserves
3P	The Sum of Proved Reserves plus Probable Reserves plus Possible Reserves
Accumulation	An individual body of moveable petroleum

Analogous Reservoir	An analogous reservoir is one in the same geographic area that is formed by the same, or very similar geological processes as, a reservoir in question (or under study for reserves evaluation) as regards sedimentation, diagenesis, pressure, temperature, chemical and mechanical history, and structure. It also has the same or similar geologic age, geologic features, and reservoir rock and fluid properties. Analogous features and characteristics can include approximate depth, pressure, temperature, reservoir drive mechanism, original fluid content, oil gravity, reservoir size, gross thickness, pay thickness, net-to-gross ratio, lithology, heterogeneity, porosity and permeability. The development scheme for a reservoir (e.g. as reflected by well spacing) can also be important in establishing the relevance of the analogy.
Associated Gas	Associated Gas is a natural gas found in contact with or dissolved in crude oil in the reservoir. It can be further categorized as Gas-Cap Gas or Solution Gas.
Barrels of Oil Equivalent	See Crude Oil Equivalent
Behind-pipe Reserves	Behind-pipe reserves are expected to be recovered from zones in existing wells, which will require additional completion work or future recompletion prior to the start of production.
Bitumen	See Natural Bitumen
Buy Back Agreement	An agreement between a host government and a contractor under which the host pays the contractor an agreed price for all volumes of hydrocarbons produced by the contractor. Pricing mechanisms typically provide the contractor with an opportunity to recover investment at an agreed level of profit. These agreements may include financial incentives for more efficient, lower cost developments and production levels higher than the minimum level agreed. These agreements may give rights to oil volumes and generally carry a risk for the contractor. They may allow booking of reserves.
Carried Interest	A carried interest is an agreement under which one party (the carrying party) agrees to pay for a portion or all of the pre-production costs of another party (the carried party) on a license in which both own a portion of

	the working interest. This arises when the carried party is either unwilling to bear the risk of exploration or is unable to fund the cost of exploration or development directly. Owners may enter into carried interest arrangements with existing or incoming joint venture partners at the exploration stage, the development stage, or both.
Coalbed Methane	Natural gas contained in coal deposits, whether or not stored in gaseous phase. Coalbed methane, though usually mostly methane, may be produced with variable amounts of inert or even non-inert gases.
Commercial	A project is commercial if the degree of commitment is such that the accumulation is expected to be developed and placed on production within a reasonable time frame. A reasonable time frame for the initiation of development depends on the specific circumstances but, in general, should be limited to around 5 years.
Committed Project	Petroleum development projects are committed when firm commitments have been made for the expenditures and activities needed to bring a discovered accumulation to the production stage. Undeveloped projects are committed only when it can be clearly demonstrated that there is intent to develop them and bring them to production. Intent may be demonstrated with firm funding/financial plans, declarations of commerciality, regulatory approvals and satisfaction of other conditions that would otherwise prevent the project from being developed and brought to production. These commitments should be unconditional, except for timing that may be dependent on the development of prior committed projects. An example of this would be where production is dedicated to a long-term sales contract and will only be developed as and when the capacity is required to satisfy the contract.
Completion	Completion of a well. The process by which a well is brought to its final classification - basically dry hole, producer, or injector. A dry hole is completed by plugging and abandonment. A well deemed to be producible of petroleum, or used as an injector, is completed by establishing a connection between the reservoir(s) and the surface so that fluids can be produced from, or injected into the reservoir. Various methods are utilized to establish this connection, but they commonly involve the installation of some combination of borehole equipment, casing and tubing, and surface injection or production facilities.

Completion Interval	The specific reservoir interval(s) that is (are) open to the borehole and connected to the surface facilities for production or injection.
Concession	A grant of access for a defined area and time period that transfers certain rights to hydrocarbons that may be discovered from the host country to an enterprise. The enterprise is generally responsible for exploration, development, production and sale of hydrocarbons that may be discovered. Typically granted under a legislated fiscal system where the host country collects taxes, fees and sometimes royalty on profits earned.
Condensate	Condensates are a portion of natural gas of such composition that are in the gaseous phase at temperature and pressure of the reservoirs, but that, when produced, are in the liquid phase at surface pressure and temperature.
Contingent Project	Development and production of recoverable quantities has not been justified, due to conditions that may or may not be fulfilled.
Contingent Resources	Those quantities of petroleum which are estimated, on a given date, to be potentially recoverable from known accumulations but which are not currently considered to be commercially recoverable.
Continuous-Type Deposit	A petroleum accumulation that is pervasive throughout a large area and which is not significantly affected by hydrodynamic influences. Examples of such deposits include "basin-center" gas and gas hydrate accumulations.
Conventional Crude Oil	Petroleum found in liquid form, flowing naturally or capable of being pumped without further processing or dilution (see Crude Oil).
Conventional Deposit	A discrete accumulation related to a localized geological structural feature and/or stratigraphic condition, typically with each accumulation bounded by a down-dip contact with an aquifer, and which is significantly affected by hydrodynamic influences, such as the buoyancy of petroleum in water.
Conventional Gas	Conventional Gas is a natural gas occurring in a normal porous and permeable reservoir rock, either in the gaseous phase or dissolved in crude oil, and which technically can be produced by normal production practices.

Conveyance	Certain transactions that are in substance borrowings repayable in cash or its equivalent and shall be accounted for as borrowings and may not qualify for the recognition and reporting of oil and gas reserves. These include: 1) a) Cash advances to operators to finance exploration in return for the right to purchase oil or gas discovered. b) Funds advanced for exploration that is repayable by offset against purchases of oil or gas discovered, or in cash if insufficient oil or gas is produced by a specified date. 2) Funds advanced to an operator that are repayable in cash out of the proceeds from a specified share of future production of a producing property, until the amount advanced plus interest at a specified or determinable rate is paid in full, shall be accounted for as a borrowing and do not qualify for the recognition of reserves. The advance is a payable for the recipient of the cash and receivable for the party making the advance. Such transactions fall into a category commonly referred to as production payments.
Cost Recovery	Under a typical production-sharing agreement, the contractor is responsible for the field development and all exploration and development expenses. In return, the contractor recovers costs (investments and operating expenses) out of the gross production stream. The contractor normally receives payment in oil production and is exposed to both technical and market risks.
Crude Oil	Crude Oil is the portion of petroleum that exists in the liquid phase in natural underground reservoirs and remains liquid at atmospheric conditions of pressure and temperature. Crude Oil may include small amounts of non-hydrocarbons produced with the liquids. Crude Oil has a viscosity of less than or equal to 10,000 centipoises at original reservoir temperature and atmospheric pressure, on a gas free basis.
Crude Oil Equivalent	Converting gas volumes to the oil equivalent is customarily done on the basis of the heating content or calorific value of the fuel. There are a number of methodologies in common use. Before aggregating, the gas volumes first must be converted to the same temperature and pressure. Common industry gas conversion factors usually range between 1.0 barrel of oil equivalent (boe) = 5.6 thousand standard cubic feet of gas (mscf) to 1.0 boe = 6.0 mscf.
Cumulative Production	Production of oil and gas to date.

Current Economic Conditions	Establishment of current economic conditions should include relevant historical petroleum prices and associated costs and may involve an averaging period that is consistent with the purpose of the reserve estimate, appropriate contract obligations, corporate procedures, and government regulations involved in reporting these reserves.
Deterministic Estimate	The method of estimation of reserves or resources is called deterministic if a single best estimate is made based on known geological, engineering, and economic data.
Developed Reserves	Developed reserves are expected to be recovered from existing wells including reserves behind pipe. Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. Developed reserves may be sub-categorized as producing or non-producing.
Development not Viable	Of significant size, but awaiting development of a market or removal of other constraints to development, which may be technical, environmental, or political, for example.
Development on Hold	No current plans to develop or to acquire additional data at this time.
Development Pending	Requires further data acquisition and/or evaluation in order to confirm commerciality.
Discovered	The term applied to a petroleum accumulation/reservoir whose existence has been determined by its actual penetration by a well, which has also clearly demonstrated the existence of moveable petroleum by flow to the surface or at least some recovery of a sample of petroleum. Log and/or core data may suffice for proof of existence of moveable petroleum if an analogous reservoir is available for comparison. (See also “Known Accumulation”: Petroleum quantities that are discovered are in “known accumulations” or “known reservoirs”).
Discovered Petroleuminitially-in-place	That quantity of petroleum which is estimated, on a given date, to be contained in known accumulations, plus those quantities already produced therefrom. Discovered Petroleum-initially-in-place may be subdivided into Commercial and Sub-commercial categories, with the estimated

	potentially recoverable portion being classified as Reserves and Contingent Resources respectively.
Dry Gas	Dry Gas is a natural gas containing insufficient quantities of hydrocarbons heavier than methane to allow their commercial extraction or to require their removal in order to render the gas suitable for fuel use. (Also called Lean Gas)
Dry Hole	A well found to be incapable of producing either oil or gas in sufficient quantities to justify completion as an oil or gas well.
Economic	In relation to petroleum reserves and resources, economic refers to the situation where the income an operation exceeds the expenses involved in, or attributable to, that operation.
Economic Interest	U.S. Treasury Regulation Sec. 1. 611-1(6)(1): An economic Interest is possessed in every case in which the taxpayer has acquired by investment any Interest in mineral in place and secures, by any form of legal relationship, income derived from the extraction of the mineral … to which he must look for a return of his capital.
Entitlement	Reserves consistent with the cost recovery plus profit hydrocarbons that are recoverable under the terms of the contract or lease are typically reported by the upstream contractor.
Estimated Ultimate Recovery	Those quantities of petroleum which are estimated, on a given date, to be potentially recoverable from an accumulation, plus those quantities already produced therefrom.
Exploration	Prospecting for undiscovered petroleum.
Field	An area consisting of a single reservoir or multiple reservoirs all grouped on, or related to, the same individual geological structural feature and/or stratigraphic condition. There may be two or more reservoirs in a field that are separated vertically by intervening impermeable rock, laterally by local geologic barriers, or both. It could be defined differently by regulatory authorities.

Flare Gas	Total volume of vented or flared gas.
Flow Test	An operation on a well designed to demonstrate the existence of moveable petroleum in a reservoir by establishing flow to the surface and/or to provide an indication of the potential productivity of that reservoir. Some flow tests, such as drill stem tests (DSTs), are performed in the open hole. A DST is used to obtain reservoir fluid samples, static bottomhole pressure measurements, indications of productivity and short-term flow and pressure buildup tests to estimate permeability and damage extent. Other flow tests, such as single-point tests and multi-point tests, are performed after the well has been cased. Single-point tests typically involve a measurement or estimate of initial or average reservoir pressure and a flow rate and flowing bottomhole pressure measurement. Multi-point tests are used to establish gas well deliverability and absolute open flow potential.
Fluid Contacts	Typically defined as Oil/Water Contact or Gas/Oil Contact
Forward Sales	There are a variety of forms of transactions that involve the advance of funds to the owner of an interest in an oil and gas property in exchange for the right to receive the cash proceeds of production, or the production itself, arising from the future operation of the property. In such transactions, the owner almost invariably has a future performance obligation, the outcome of which is uncertain to some degree. Determination as to whether the transaction represents a sale or financing rests on the particular circumstances of each case.
Fuel Gas	Gas used for field and plant operations. Substantial savings can be achieved to the operating cost of a project by avoiding the purchase of alternative supplies of gas or refined fuels such as diesel. SPE guidance allows the option to include fuel gas as part of the reserves estimate as long as an appropriate expense for the gas is included in the cash flow analysis.
Gas Balance	In gas production operations involving multiple working interest owners, an imbalance in gas deliveries can occur. These imbalances must be monitored over time and eventually balanced in accordance with accepted accounting procedures.

Gas Cap Gas	Gas-Cap Gas is a free natural gas which overlies and is in contact with crude oil in the reservoir. It is a subset of Associated Gas.
Gas Plant Products	Gas Plant Products are natural gas liquids recovered from natural gas in gas processing plants and, in some situations, from field facilities. Gas Plant Products include ethane, propane, butanes, butanes-propane mixtures, natural gasoline and plant condensates, sulphur, carbon dioxide, nitrogen and helium.
Geostatistical Methods	A variety of mathematical techniques and processes dealing with the collection, analysis, interpretation and presentation of masses of geological, geophysical and engineering data to (mathematically) describe the variability and uncertainties within any reservoir unit or pool; specifically related here to resource and reserve estimates, including the definition of (all) well and reservoir parameters in 1, 2 and 3 dimensions and the resultant modeling and potential prediction of various aspects of performance. Examples of such processes include: Monte Carlo simulation, 2D gridding and modeling of the spatial variability of geological and petrophysical properties, simulated annealing, object-based simulation, multiple-point statistics, the use of (semi) variograms, and 3D stochastic modeling. New applications include fuzzy mathematics, fast flow simulation, well intervention, and lithology and fluid prediction.
Hydrocarbons	Hydrocarbons are chemical compounds consisting wholly of hydrogen and carbon.
Improved Recovery	Improved Recovery is the extraction of additional petroleum, beyond Primary Recovery, from naturally occurring reservoirs by supplementing the natural forces in the reservoir. It includes water-flooding, secondary processes, tertiary processes and any other means of supplementing natural reservoir recovery processes. (also called Enhanced Recovery)
Injection	The forcing or pumping of substances into a porous and permeable subsurface rock formation. Examples of injected substances can include either gases or liquids.
Known Accumulation	The term accumulation is used to identify an individual body of moveable petroleum. The key requirement to consider an accumulation as known, and hence contain reserves or contingent resources, is that each

	accumulation/reservoir must have been penetrated by a well. In general, the well must have clearly demonstrated the existence of moveable petroleum in that reservoir by flow to surface or at least some recovery of a sample of petroleum from the well. However, where log and/or core data exist, this may suffice, provided there is a good analogy to a nearby and geologically comparable known accumulation.
Lead	Potential area where one or more accumulations are currently poorly defined and require more data acquisition and/or evaluation in order to be classified as a prospect. A lead will occur within a play.
Lease Condensates	Lease Condensate is natural gas liquids recovered from produced gas (associated and non-associated), in gas-liquid separators or field facilities.
Loan Agreement	A loan agreement is typically used by a bank, other financial investor, or partner to finance all or part of an oil and gas project. Compensation for funds advanced is limited to a specified interest rate. The lender does not participate in profits earned by the project above this interest rate. There is normally a fixed repayment schedule for the amount advanced, and repayment of the obligation is made before any return to equity investors. Risk is limited to default of the borrower or failure of the project. Variations in production, market prices, and sales do not normally affect compensation. Reserves are not recognized under this type of agreement.
Low/Best/High Estimates	The range of uncertainty reflects a reasonable range of estimated potentially recoverable volumes for an individual accumulation or a project. In the case of reserves, and where appropriate, this range of uncertainty can be reflected in estimates for proved reserves (1P), proved plus probable reserves (2P), and proved plus probable plus possible reserves (3P) scenarios. For other resource categories, the equivalent terms Low Estimate, Best Estimate, and High Estimate are recommended.
Lowest Known	The deepest observed occurrence of a producible hydrocarbon accumulation as demonstrated by well log, flow test or core data.
Mineral Interest	Mineral Interests in Properties Including (I) a fee ownership or lease, concession or other interest representing the right to extract oil, or gas subject to such terms as may be imposed by the conveyance of that interest,(ii) royalty interests, production payments payable in oil or gas, and

	other nonoperating interests in properties operated by others; and (iii) those agreements with foreign governments or authorities under which a reporting entity participates in the operation of the related properties or otherwise serves as producer of the underlying reserves (as opposed to being an independent purchaser, broker, dealer or importer). Properties do not include other supply agreements or contracts that represent the right to purchase, rather than extract, oil and gas.
Monte Carlo Simulation	A type of stochastic mathematical simulation which randomly and repeatedly samples input distributions (e.g. reservoir properties) to generate a results distribution (e.g. recoverable petroleum volumes).
Natural Bitumen	Natural Bitumen is the portion of petroleum that exists in the semi-solid or solid phase in natural deposits. In its natural state it usually contains sulphur, metals and other non-hydrocarbons. Natural Bitumen has a viscosity greater than 10,000 centipoises measured at original temperature in the deposit and atmospheric pressure, on a gas free basis. In its natural viscous state, it is not normally recoverable at commercial rate through a well. Natural Bitumen generally requires upgrading prior to normal refining. (Also called Crude Bitumen)
Natural Gas	Natural Gas is the portion of petroleum that exists either in the gaseous phase or is in solution in crude oil in natural underground reservoirs, and which is gaseous at atmospheric conditions of pressure and temperature. Natural Gas may include amounts of non-hydrocarbons.
Natural Gas Liquids	Natural Gas Liquids are those portions of natural gas which are recovered as liquids in separators, field facilities or gas processing plants. Natural Gas Liquids include but are not limited to ethane, propane, butanes, pentanes, and natural gasoline. Condensate may or may not be included.
Natural Gas Liquids to Gas Ratio	Ratio of natural gas liquids to gas (in barrels/million cubic feet) in an oil field, calculated using measured natural gas liquids and gas volumes at stated conditions.
Net Profits Interest	An interest that receives a portion of the net proceeds from a well, typically after all costs have been paid.

Net Working Interest	A company's working interest reduced by royalties or share of production owing to others under applicable lease and fiscal terms.
Non Hydrocarbon Gas	In the event that non-hydrocarbon gases are present, the reported volumes should reflect the condition of the gas at the point of sale. Correspondingly, the accounts will reflect the value of the gas product at the point of sale. Hence, if gas sold as produced includes a proportion of carbon dioxide, for example, the reserves and production should also include that CO2. In the case of the CO2 being extracted before sale and the sales gas containing only hydrocarbon gases, the reserves and production should reflect only the hydrocarbon gases that will be sold.
Non-Associated Gas	Non-Associated Gas is a natural gas found in a natural reservoir that does not contain crude oil.
Non-Conventional Gas	Non-Conventional Gas is a natural gas found in unusual underground situations such as very impermeable reservoirs, hydrates, and coal deposits.
Non-producing Reserves	Reserves subcategorized as non-producing include shut-in and behind-pipe reserves. Shut-in reserves are expected to be recovered from (1) completion intervals which are open at the time of the estimate, but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. Behind-pipe reserves are expected to be recovered from zones in existing wells, which will require additional completion work or future recompletion prior to the start of production.
Offset Well Location	Potential drill location adjacent to an existing well. The offset distance may be governed by well spacing regulations. Proved volumes on the existing well are indicated by either conclusive formation test or production. For proved volumes to be assigned to an offset well location there must be conclusive, unambiguous technical data which supports the reasonable certainty of production of hydrocarbon volumes and sufficient legal acreage to economically justify the development without going below the shallower of the fluid contact or the lowest known hydrocarbon.
On Production	Currently producing and selling petroleum to market.

Operator	The company or individual responsible for managing an exploration, development, or production operation.
Overlift / Underlift	Production overlift or underlift can occur in annual records because of the necessity for companies to lift their entitlement in parcel sizes to suit the available shipping schedules as agreed among the parties. At any given financial year-end, a company may be in overlift or underlift. Based on the production matching the company's accounts, production should be reported in accord with and equal to the liftings actually made by the company during the year, and not on the production entitlement for the year.
Penetration	The intersection of a wellbore with a reservoir.
Petroleum	Petroleum is a naturally occurring mixture consisting predominantly of hydrocarbons in the gaseous, liquid or solid phase.
Petroleum-in-Place	Petroleum-in-Place is the total quantity of petroleum that is estimated to exist originally in naturally occurring reservoirs. Oil-in-place, gas-in-place, bitumen-inplace, are defined in the same manner.
Pilot Project	A small scale test or trial operation that is used to assess the suitability of a method for commercial application.
Planned for Development	Satisfies all the criteria for reserves, and there is a firm intent to develop, but detailed development planning and/or necessary approvals/contracts have yet to be finalized.
Play	Recognized prospective trend of potential prospects, but which requires more data acquisition and/or evaluation to define specific leads or prospects.
Pool	See Reservoir.
Possible Reserves	Possible reserves are those unproved reserves which analysis of geological and engineering data suggests are less likely to be recoverable than probable reserves. In this context, when probabilistic methods are used, there should be at least a 10% probability that the quantities actually

	recovered will equal or exceed the sum of estimated proved, plus probable, plus possible reserves. In general, possible reserves may include (1) reserves which, based on geological interpretations, could possibly exist beyond areas classified as probable, (2) reserves in formations that appear to be petroleum bearing, based on log and core analysis but may not be productive at commercial rates, (3) incremental reserves attributed to infill drilling that are subject to technical uncertainty, (4) reserves attributed to improved recovery methods when (a) a project or pilot is planned, but not in operation and (b) rock, fluid, and reservoir characteristics are such that a reasonable doubt exists that the project will be commercial, and (5) reserves in an area of the formation that appears to be separated from the proved area by faulting and geological interpretation indicates the subject area is structurally lower than the proved area. Often referred to as P3.
Primary Recovery	Primary recovery is the extraction of petroleum from reservoirs utilizing only the natural energy available in the reservoirs to move fluids through the reservoir rock or other points of recovery.
Probabilistic Estimate	The method of estimation is called probabilistic when the known geological, engineering, and economic data are used to generate a range of estimates and their associated probabilities.
Probable Reserves	Probable reserves are those unproved reserves which analysis of geological and engineering data suggests are more likely than not to be recoverable. In this context, when probabilistic methods are used, there should be at least a 50% probability that the quantities actually recovered will equal or exceed the sum of estimated proved plus probable reserves. In general, probable reserves may include (1) reserves anticipated to be proved by normal step-out drilling where sub-surface control is inadequate to classify these reserves as proved, (2) reserves in formations that appear to be productive, based on well log characteristics, but lack core data or definitive tests and which are not analogous to producing or proved reservoirs in the area, (3) incremental reserves attributable to infill drilling that could have been classified as proved if closer statutory spacing had been approved at the time of the estimate, (4) reserves attributable to improved recovery methods that have been established by repeated commercially successful applications when (a) a project or pilot is planned, but not in operation and (b) rock, fluid, and reservoir characteristics appear favorable for commercial application, (5) reserves in an area of the formation that appears to be separated from the proved area by faulting and the geologic

	interpretation indicates the subject area is structurally higher than the proved area, (6) reserves attributable to a future workover, treatment, retreatment, change of equipment, or other mechanical procedures, where such procedure has not been proved successful in wells which exhibit similar behavior in analogous reservoirs, and (7) incremental reserves in proved reservoirs where an alternative interpretation of performance or volumetric data indicates more reserves than can be classified as proved. Often referred to as P2.
Producing Reserves	Reserves subcategorized as producing are expected to be recovered from intervals which are open and producing at the time of the estimate. Improved recovery is considered producing only after the improved recovery project is in operation.
Production	The quantity of petroleum produced in a given period.
Production Sharing Contract	In a production-sharing contract between a contractor and a host government, the contractor typically bears all risk and costs for exploration, development, and production. In return, if exploration is successful, the contractor is given the opportunity to recover the investment from production, subject to specific limits and terms. The contractor also receives a stipulated share of the production remaining after cost recovery, referred to as profit hydrocarbons. Ownership is retained by the host government; however, the contractor normally receives title to the prescribed share of the volumes as they are produced. Reserves consistent with the cost recovery plus profit hydrocarbons that are recoverable under the terms of the contract are typically reported by the upstream contractor.
Profit Split	Under a typical production-sharing agreement, the contractor is responsible for the field development and all exploration and development expenses. In return, the contractor is entitled to a share of the remaining profit oil or gas. The contractor receives payment in oil or gas production and is exposed to both technical and market risks.
Project	This represents the link between the petroleum accumulation and the decisionmaking process, including budget allocation. A project may, for example, constitute the development of a single reservoir or field, or an incremental development for a producing field, or the integrated development of a group of several fields. In general, an individual project

	will represent the level at which a decision is made on whether or not to proceed (i.e., spend money), and there should be an associated range of estimated recoverable volumes for that project.
Prorationing	The allocation of production among reservoirs and wells or pipeline allocation of capacity among shippers, etc.
Prospect	Potential accumulation that is sufficiently well defined to represent a viable drilling target.
Prospective Resources	Those quantities of petroleum which are estimated, on a given date, to be potentially recoverable from undiscovered accumulations.
Proved Developed Reserves	Proved Developed Reserves are those Proved Reserves that can be expected to be recovered through existing wells and facilities and by existing operating methods. Improved recovery reserves can be considered as Proved Developed Reserves only after an improved recovery project has been installed and favorable response has occurred or is expected with a reasonable degree of certainty. (See Developed Reserves) Developed reserves are expected to be recovered from existing wells, including reserves behind pipe. Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. Developed reserves may be sub-categorized as producing or non-producing. **Producing:** Reserves subcategorized as producing are expected to be recovered from completion intervals which are open and producing at the time of the estimate. Improved recovery reserves are considered producing only after the improved recovery project is in operation. **Non-producing:** Reserves subcategorized as non-producing include shut-in and behind-pipe reserves. Shut-in reserves are expected to be recovered from (1) completion intervals which are open at the time of the estimate, but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. Behind-pipe reserves are expected to be recovered from zones in existing wells, which will require additional completion work or future re-completion prior to the start of production.

Proved Reserves	Proved reserves are those quantities of petroleum which, by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under current economic conditions, operating methods, and government regulations. Proved reserves can be categorized as development or undeveloped. 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. Often referred to as P1, sometimes referred to as “proven”.
Proved Undeveloped Reserves	Proved Undeveloped Reserves are those Proved Reserves that are expected to be recovered from future wells and facilities, including future improved recovery projects which are anticipated with a high degree of certainty in reservoirs which have previously shown favorable response to improved recovery projects. (See Undeveloped)
Purchase Contracts	A contract to purchase oil and gas provides the right to purchase a specified volume at an agreed price for a defined term. Under purchase contracts, exposure to technical and market risks are borne by the seller. While a purchase or supply contract can provide long-term access to reserves through production, it does not convey the right to extract, nor does it convey a financial interest in the reserves. Consequently, reserves would not be recognized by the buyer under this type of agreement.
Pure-Service Contract	A pure-service contract is an agreement between a contractor and a host government that typically covers a defined technical service to be provided or completed during a specific period of time. The service company investment is typically limited to the value of equipment, tools, and personnel used to perform the service. In most cases, the service contractor's reimbursement is fixed by the terms of the contract with little exposure to either project performance or market factors. Payment for services is normally based on daily or hourly rates, a fixed turnkey rate, or some other specified amount. Payments may be made at specified intervals or at the completion of the service. Payments, in some cases, may be tied to the field performance, operating cost reductions, or other important metrics. Risks of the service company under this type of contract are usually limited to nonrecoverable costs overruns, losses owing to client breach of contract, default, or contract dispute. These agreements

	generally do not have exposure to production volume or market price; consequently, reserves are not usually recognized under this type of agreement.
Range of Uncertainty of recoverable hydrocarbon quantities	See Resource Uncertainty Categories.
Raw Natural Gas	Raw Natural Gas is natural gas as it is produced from the reservoir. It includes varying amounts of the heavier hydrocarbons which liquefy at atmospheric conditions, and water vapor; and may also contain sulphur compounds such as hydrogen sulphide, and other non-hydrocarbon gases such as carbon dioxide, nitrogen or helium, but which, nevertheless, is exploitable for its hydrocarbon content. Raw Natural Gas is often not suitable for direct utilization by most types of consumers.
Reasonable Certainty	If deterministic methods for estimating reserves are used, then 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 volumes actually recovered will equal or exceed the estimate. The Security and Exchange Commission considers the concept of reasonable certainty to imply that, as more technical data becomes available, a positive, or upward, revision is much more likely than a negative, or downward, revision.
Recoverable Resources	Those quantities of hydrocarbons which are estimated to be producible from accumulations, either discovered or undiscovered.
Recovery Efficiency	A numeric expression of that portion of in-place quantities of petroleum estimated to be recoverable by specific processes or projects, most often represented as a percentage.
Reserves	Reserves are those quantities of hydrocarbons which are anticipated to be commercially recovered from known accumulations from a given date forward.

Reservoir	A subsurface rock formation containing one or more individual and separate natural accumulations of moveable petroleum that is confined by impermeable rock and is characterized by a single-pressure system. Also referred to as "Pool."
Resource Uncertainty Categories	Any estimation of resource quantities for an accumulation or group of accumulations is subject to uncertainty and should, in general, be expressed as a range. The function of the three primary categories of reserves (proved, probable, possible) is to illustrate the range of uncertainty in the estimate of the potentially recoverable volume of petroleum from a known accumulation. Such estimates, which are done initially for each well or reservoir, may be made deterministically or probabilistically and are then aggregated for the accumulation/project as a whole. Provided a similar logic is applied for all 12 volumetric estimates (including contingent and prospective resources), the estimate of uncertainty for each accumulation can be tracked over time from exploration through discovery, development, and production. This approach provides an extremely effective basis for evaluating the validity of the methodology used for the estimate of potentially recoverable volumes. The range of uncertainty reflects a reasonable range of estimated potentially recoverable volumes for an individual accumulation or a project. In the case of reserves, and where appropriate, this range of uncertainty can be reflected in estimates for proved reserves (IP), proved, plus probable reserves (2P), and proved, plus probable, plus possible reserves (3P) scenarios. For other resource categories, the equivalent terms low estimate, best estimate, and high estimate are recommended.
Resources	See Total petroleum initially-in-place.
Revenue Sharing Contrac	Revenue-sharing contracts are very similar to the production-sharing contracts described earlier, with the exception of contractor payment. With these contracts, the contractor usually receives a defined share of revenue rather than a share of the production. As in the production- sharing contract, the contractor provides the capital and technical expertise required for exploration and development. If exploration efforts are successful, the contractor can recover those costs from the sale revenues. A very similar type of agreement is commonly known as a risked-service contract. This type of agreement is also often used where the contracting party provides expertise and capital to rehabilitate or institute improved recovery operations in an existing field. Provided that the requirements for

	reserves recognition are satisfied, reported reserves are typically based on the economic interest held or the financial benefit received.
Reversionary Interest	The right of future possession of an interest in a property when a specified condition has been met.
Risk	The probability of loss or failure. As “risk” is generally associated with the negative outcome, the term “chance” is preferred for general usage to describe the probability of a discrete event occurring.
Risk and Reward	Risk and reward associated with oil and gas production activities stems primarily from the variation in revenues from technical and economic risks. Many companies use exposure to risk in conjunction with the rights that they are assigned to operate and to take volumes in kind to support reserves reporting. Technical risk affects a company's ability to physically extract and recover hydrocarbons and is usually dependent on a number of technical parameters. Economic risk is a function of the success of a project and is critically dependent on the ability to economically recover the in-place hydrocarbons.
Risk Service Contract	These agreements are very similar to the production-sharing agreements with the exception of contractor payment. With a risked-service contract, the contractor usually receives a defined share of revenue rather than a share of the production. As in the production-sharing contract, the contractor provides the capital and technical expertise required for exploration and development. If exploration efforts are successful, the contractor can recover those costs from the sale revenues and receive a share of profits through a contract-defined mechanism. Under existing SEC regulations, it may be more difficult for the contractor to justify reserves recognition, and special care must be taken in drafting the agreement. Provided that the requirements for reserves recognition are satisfied, reported reserves are typically based on the economic interest held or the financial benefit received.
Royalty	Royalty refers to payments that may be due to the host government, mineral owner, or landowner, in return for the producer having access to the petroleum. Many agreements allow for the producer to lift the royalty volumes, sell them on 13 behalf of the royalty owner, and pay the proceeds

	to the owner. A few agreements provide for the royalty to be taken only in kind by the royalty owner.
Shut-in Reserves	Shut-in reserves are expected to be recovered from (1) completion intervals which are open at the time of the estimate, but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons.
Solution Gas	Solution Gas is a natural gas which is dissolved in crude oil in the reservoir at the prevailing reservoir conditions of pressure and temperature. It is a subset of Associated Gas.
Sour Natural Gas	Sour Natural Gas is a natural gas that contains sulphur, sulphur compounds and/or carbon dioxide in quantities that may require removal for effective use.
Stochastic	Adjective defining a process involving or containing a random variable or variables or involving chance or probability such as a stochastic stimulation.
Sub-Commercial	A project is Sub-commercial if the degree of commitment is not such that the accumulation is expected to be developed and placed on production within a reasonable time frame. A reasonable time frame for the initiation of development depends on the specific circumstances but, in general, should be limited to around 5 years.
Sweet Natural Gas	Sweet Natural Gas is a natural gas that contains no sulphur or sulphur compounds at all, or in such small quantities that no processing is necessary for their removal in order that the gas may be used directly as a non-corrosive domestic heating fuel.
Taxes	Enforced contributions to the public funds, levied on persons, property, or income by governmental authority.
Total Petroleum Initially-in-place	The entire resource base (Total Petroleum-initially-in-place) is generally accepted to be all those estimated quantities of petroleum contained in the subsurface, as well as those quantities already produced. This was defined

	previously by the WPC as "Petroleum-in-place" and has been termed "Resource Base" by others.
Uncertainty	The range of possible outcomes in an estimate.
Under Development	All necessary approvals have been obtained, and development of the project is underway.
Undeveloped Reserves	Undeveloped reserves are expected to be recovered: (1) from new wells on undrilled acreage, (2) from deepening existing wells to a different reservoir, or (3) where a relatively large expenditure is required to (a) recomplete an existing well or (b) install production or transportation facilities for primary or improved recovery projects.
Unitization	Process whereby owners of adjoining properties allocate reserves, production, costs, etc.
Unproved Reserves	Unproved reserves are based on geologic and/or engineering data similar to that used in estimates of proved reserves; but technical, contractual, economic, or regulatory uncertainties preclude such reserves being classified as proved. Unproved reserves may be further classified as probable reserves and possible reserves. Unproved reserves may be estimated assuming future economic conditions different from those prevailing at the time of the estimate. The effect of possible future improvements in economic conditions and technological developments can be expressed by allocating appropriate quantities of reserves to the probable and possible classifications.
Unrecoverable Resources	The portion of discovered or undiscovered petroleum-initially-in-place quantities not currently considered to be recoverable. A portion of these quantities may become recoverable in the future as commercial circumstances change, technological developments occur, or addition data is acquired.
Well Abandonment	The permanent plugging of a dry hole or of a well that no longer produces petroleum or is no longer capable of producing petroleum profitably. Several steps are involved in the abandonment of a well: permission for abandonment and procedural requirements are secured from official agencies; the casing is removed and salvaged if possible; and one or more

	cement plugs and/or mud are placed in the borehole to prevent migration of fluids between the different formations penetrated by the borehole.
Wet Gas	Wet (Rich) Gas is a natural gas containing sufficient quantities of hydrocarbons heavier than methane to allow their commercial extraction or to require their removal in order to render the gas suitable for fuel use.
Working Interest	A company's equity interest in a project before reduction for royalties or production share owed to others under the applicable fiscal terms.