

CSA Staff Notice 51-324

Revised Glossary to NI 51-101 Standards of Disclosure for Oil and Gas Activities

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Section 1.1 of National Instrument 51-101 *Standards of Disclosure for Oil and Gas Activities* (NI 51-101 or Rule) defines a number of terms used in *NI 51-101*, Form 51-101F1 *Statement of Reserves Data and Other Oil and Gas Information* (Form 51-101F1), Form 51-101F2 *Report on [Reserves Data][,][Contingent Resources Data][and][Prospective Resources Data] by Independent Qualified Reserves Evaluator or Auditor* (Form 51-101F2), Form 51-101F3 *Report of Management and Directors on Oil and Gas Disclosure* (Form 51-101F3), Form 51-101F5 *Notice of Ceasing to Engage in Oil and Gas Activities* (Form 51-101F5) and Companion Policy 51-101 *Standards of Disclosure for Oil and Gas Activities* (Companion Policy). Terms italicized in this Glossary are defined herein. Section 1.2 of *NI 51-101* provides that terms used in the *Rule* but not defined in the *Rule*, National Instrument 14-101 *Definitions (NI 14-101)* or the securities statute in the *jurisdiction* have the meaning or interpretation, if any, set out in the Canadian Oil and Gas Evaluation Handbook (*COGE Handbook*).

Part 1 of this Glossary explains much of the terminology used in *NI 51-101* and its forms and the Companion Policy. It is provided only as a convenience to users of *NI 51-101*, to assist them in better understanding the purpose and application of *NI 51-101*. Part 2 of the Glossary focuses on the *reserves* explanations and is derived from section 5 of volume 1 of the *COGE Handbook*.

The explanations in Part 1 of this Glossary are derived from a number of sources, including section 1.1 of *NI 51-101*, *NI 14-101* and the *COGE Handbook*. Where applicable, the source document for the explanation is indicated in square brackets after the explanation (even if the explanation is not verbatim to the source document). These explanations may change from time to time. Readers are cautioned to consult a current edition of the source document for updated explanations.

Background or further guidance may be found in the source documents:

- The *COGE Handbook* can be obtained from the Society of Petroleum Engineers, Calgary Section (Telephone 403-930-5454; email specal@spe.org; website www.speca.ca).
- *NI 14-101* can be viewed on the websites of a number of *securities regulatory authorities*.

Part 1 of this Glossary includes definitions of the various categories of *resources other than reserves* that are identified and defined in the *COGE Handbook*. At the present time, these categories are as follows:

- *total petroleum initially-in-place* (equivalent to *total resources*);
- *discovered petroleum initially-in-place* (equivalent to *discovered resources*);
- *discovered unrecoverable petroleum initially-in-place* (equivalent to *discovered unrecoverable resources*);
- *contingent resources*;
- *undiscovered petroleum initially-in-place* (equivalent to *undiscovered resources*);
- *undiscovered unrecoverable petroleum initially-in-place* (equivalent to *undiscovered unrecoverable resources*); and
- *prospective resources*.

Readers are cautioned to consult a current edition of the *COGE Handbook* for updated *resource* categories and definitions.

PART 1 DEFINITIONS

The terms (and plural, singular or other grammatical variants thereof) set out in the left column below have the meanings respectively set out in the right column.

Defined Term	Meaning
<i>1934 Act</i>	The Securities Exchange Act of 1934 of the United States of America, as amended from time to time. [NI 14-101]
<i>Abandonment and reclamation costs</i>	All costs associated with the process of restoring a <i>reporting issuer's property</i> that has been disturbed by <i>oil and gas activities</i> to a standard imposed by applicable government or regulatory authorities. [NI 51-101]
<i>Accumulation</i>	An individual body of <i>petroleum</i> in a <i>reservoir</i> . [COGE Handbook]
<i>Adsorption</i>	The adhesion of molecules to a surface. This may occur as physisorption, due to weak van der Waals forces, chemisorption, the result of covalent bonding, or to electrostatic attraction. [COGE Handbook]
<i>Alternate reference point</i>	A location at which quantities and values of a <i>product type</i> are measured before the <i>first point of sale</i> . [NI 51-101]
<i>Amenable volumes</i>	<p>A subsurface stratigraphic interval containing a certain minimum thickness of continuous, predominantly <i>bitumen</i>-saturated sand, net of non-<i>reservoir</i>, with porosity and mass <i>bitumen</i> content (ratio of <i>bitumen</i> to water and mineral matter) meeting specific criteria (typically, a minimum of 27 and 7-8 percent, respectively).</p> <p>This is the volume of <i>bitumen</i> that it is estimated could be physically extracted from an <i>accumulation</i> being evaluated after the application of <i>reservoir</i> cut-offs and project technical considerations, but before consideration of regulatory aspects, and surface limitations such as access. [COGE Handbook]</p>
<i>Annual information form</i>	A completed Form 51-102F2 <i>Annual Information Form</i> , or in the case of an <i>SEC</i> issuer (as defined in National Instrument 51-102 Continuous Disclosure Obligations) a completed Form 51-102F2 or an annual report or transition report under the 1934 Act on Form 10-K, Form 10-KSB or Form 20-F. [NI 51-102]
<i>Analogous fields</i>	Fields having similar <i>properties</i> that are at a more advanced stage of development or <i>production</i> history than the field of specific interest; may provide concepts or patterns to assist in the interpretation of more limited data. [COGE Handbook]

Analogous information Information about an area outside the area in which the *reporting issuer* has an interest or intends to acquire an interest, which is referenced by the *reporting issuer* for the purpose of drawing a comparison or conclusion to an area in which the *reporting issuer* has an interest or intends to acquire an interest, which comparison or conclusion is reasonable, and includes:

- historical information concerning *reserves*;
- estimates of the volume or value of *reserves*;
- historical information concerning *resources*;
- estimates of the volume or value of *resources*;
- historical *production* amounts;
- *production* estimates; or
- information concerning a *field*, well, basin or *reservoir*.

[NI 51-101]

Analogy The process of transferring information on a subject *accumulation* or *reservoir* (the analogue or source) to another *accumulation* or *reservoir* (the target or subject). (See also reservoir analogue and recovery process analogue.) [COGE Handbook]

Anticipated results Information that may, in the opinion of a reasonable person, indicate the potential value or quantities of *resources* in respect of the *reporting issuer's resources* or a portion of its *resources* and includes:

- estimates of volume;
- estimates of value;
- areal extent;
- pay thickness;
- flow rates; or
- *hydrocarbon* content. [NI 51-101]

Audit In relation to *reserves data*, the process whereby an *independent qualified reserves auditor* carries out procedures designed to allow the *independent qualified reserves auditor* to provide reasonable assurance, in the form of an opinion that the *reporting issuer's reserves data* (or specific parts thereof) have, in all *material* respects, been determined and presented in accordance with the *COGE Handbook* and are, therefore, free of *material* misstatement.

Because of

- (a) the nature of the subject matter (estimates of future results with many uncertainties);
- (b) the fact that the *independent qualified reserves auditor* assesses the qualifications and experience of the *reporting issuer's* staff, assesses the *reporting issuer's* systems, procedures and controls and

relies on the competence of the *reporting issuer's* staff and the appropriateness of the *reporting issuer's* systems, procedures and controls; and

- (c) the fact that tests and samples (involving examination of underlying documentation supporting the determination of the *reserves* and *future net revenue*) as opposed to complete *evaluations*, are involved; the level of assurance is designed to be high, though not absolute.

The level of assurance cannot be described with numeric precision. It will usually be less than, but reasonably close to, that of an *independent evaluation* and considerably higher than that of a *review*.
[*COGE Handbook*]

bbl

Barrel. [*COGE Handbook*]

Bitumen

A naturally occurring solid or semi-solid *hydrocarbon*

- (a) consisting mainly of heavier *hydrocarbons*, with a viscosity greater than 10,000 millipascal-seconds (mPa·s) or 10,000 centipoise (cP) measured at the *hydrocarbons'* original temperature in the *reservoir* and at atmospheric pressure on a gas-free basis, and
 - (b) that is not primarily recoverable at economic rates through a well without the implementation of enhanced recovery methods.
- [*NI 51-101*]

BOE

Barrel of *oil* equivalent. [*NI 51-101* and *COGE Handbook*]

By-product

A substance that is recovered as a consequence of producing a *product type*. [*NI 51-101*]

Chance of commerciality

The product of the *chance of discovery* and the *chance of development*. [*COGE Handbook*]

Chance of development

The estimated probability that, once discovered, a *known accumulation* will be *commercially* developed. [*COGE Handbook*]

Chance of discovery

The estimated probability that exploration activities will confirm the existence of a significant *accumulation* of potentially recoverable *petroleum*. [*COGE Handbook*]

Coal bed methane

Natural gas that

- (a) primarily consists of methane, and
- (b) is contained in a coal deposit. [*NI 51-101*]

COGE Handbook

The "Canadian Oil and Gas Evaluation Handbook" maintained by the Society of Petroleum Evaluation Engineers (Calgary Chapter), as amended from time to time. [NI 51-101]

Commercial

When a *project* is commercial this implies that the essential social, environmental, and economic conditions are met, including political, legal, regulatory, and contractual conditions. Considerations with regard to determining commerciality include

- economic viability of the related development *project*;
- a reasonable expectation that there will be a market for the expected sales quantities of *production* required to justify development;
- evidence that the necessary *production* and transportation facilities are available or can be made available;
- evidence that legal, contractual, environmental, governmental, and other social and economic concerns will allow for the actual implementation of the recovery *project* being *evaluated*;
- a reasonable expectation that all required internal and external approvals will be forthcoming. Evidence of this may include items such as signed contracts, budget approvals, and approvals for expenditures, etc.
- evidence to support a reasonable timetable for development. A reasonable time frame for the initiation of development depends on the specific circumstances and varies according to the scope of the project. Although five years is recommended as a maximum time frame for classification of a project as commercial, 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. [COGE Handbook]

Conceptual (scoping) study

The initial stage of the development of a project scenario, with limited detail and typically based on limited information. [COGE Handbook]

Contingency

A condition that must be satisfied for a portion of *contingent resources* to be classified as *reserves* that is: (a) specific to the *project* being *evaluated*; and (b) expected to be resolved within a reasonable timeframe.

For additional information, see section 2.5 of the *ROTR Guidelines*. Note that the Petroleum Resources Management System equates contingency with conditions, which are defined as follows: "the economic, marketing, legal, environmental, social, and governmental factors forecast to exist and impact the project during the time period being evaluated." Contingency was not defined in the *COGE Handbook*

before the *ROTR Guidelines* was published, although a similar list is provided. The term "condition" is purely descriptive and does not imply that any action is required, whereas a "contingency" is a factor that must be resolved in order to reclassify a resource. The Petroleum Resources Management System Guidelines use the term "critical contingency" and, although some contingencies may be more easily resolved than others, they are all go/no-go decision gates that must be resolved. (See also technical contingency.) [*COGE Handbook*]

<i>Contingent resources</i>	Those quantities of <i>petroleum</i> estimated, as of a given date, to be potentially recoverable from <i>known accumulations</i> using <i>established technology</i> or <i>technology under development</i> , but which are not currently considered to be <i>commercially</i> recoverable due to one or more <i>contingencies</i> . (See also economic contingent resources, and sub-economic contingent resources.) [<i>COGE Handbook</i>]
<i>Contingent resources data</i>	Means <ul style="list-style-type: none">(a) an estimate of the volume of <i>contingent resources</i>, and(b) the <i>risked</i> net present value of <i>future net revenue of contingent resources</i>. [<i>NI 51-101</i>]
<i>Conventional natural gas</i>	<i>Natural gas</i> that has been generated elsewhere and has migrated as a result of hydrodynamic forces and is trapped in discrete <i>accumulations</i> by seals that may be formed by localized structural, depositional or erosional geological features. [<i>NI 51-101</i>]
<i>Crude oil</i>	A mixture consisting mainly of pentanes and heavier <i>hydrocarbons</i> that exists in the liquid phase in <i>reservoirs</i> and remains liquid at atmospheric pressure and temperature. <i>Crude oil</i> may contain small amounts of sulphur and other non- <i>hydrocarbons</i> but does not include liquids obtained from the processing of <i>natural gas</i> . [<i>COGE Handbook</i>]
<i>CSA</i>	The Canadian Securities Administrators, an association consisting of the thirteen <i>securities regulatory authorities</i> in Canada.
<i>Cut-off</i>	A limiting value of a <i>reservoir</i> parameter that removes non-contributing intervals from <i>resource</i> calculations. The <i>petroleum</i> contained in the <i>reservoir</i> below a cut-off is classified as <i>unrecoverable</i> . [<i>COGE Handbook</i>]
<i>Developed non-producing reserves</i>	See Part 2 of this Glossary. [<i>COGE Handbook</i>]

<i>Developed producing reserves</i>	See Part 2 of this Glossary. [<i>COGE Handbook</i>]
<i>Developed reserves</i>	See Part 2 of this Glossary. [<i>COGE Handbook</i>]
<i>Development costs</i>	<p>Costs incurred to obtain access to <i>reserves</i> and to provide facilities for extracting, treating, gathering and storing the <i>oil</i> and <i>gas</i> from the <i>reserves</i>.</p> <p>More specifically, <i>development costs</i>, including applicable <i>operating costs</i> of <i>support equipment and facilities</i> and other costs of development activities, are costs incurred to:</p> <ul style="list-style-type: none">(a) gain access to and prepare well locations for drilling, including surveying well locations for the purpose of determining specific development drilling sites, clearing ground, draining, road building, and relocating public roads, <i>gas</i> lines and power lines, to the extent necessary in developing the <i>reserves</i>;(b) drill and equip <i>development wells</i>, development type <i>stratigraphic test wells</i> and <i>service wells</i>, including the costs of platforms and of well equipment such as casing, tubing, pumping equipment and the wellhead assembly;(c) acquire, construct and install <i>production</i> facilities such as flow lines, separators, treaters, heaters, manifolds, measuring devices and <i>production</i> storage tanks, <i>natural gas</i> cycling and processing plants, and central utility and waste disposal systems; and(d) provide improved recovery systems.
<i>Development not viable</i>	Where no further data acquisition or evaluation is currently planned and hence there is a low <i>chance of development</i> . [<i>COGE Handbook</i>]
<i>Development on hold</i>	Where there is a reasonable <i>chance of development</i> , but there are major non-technical <i>contingencies</i> to be resolved that are usually beyond the control of the operator. [<i>COGE Handbook</i>]
<i>Development pending</i>	Where resolution of the final conditions for development is being actively pursued (high <i>chance of development</i>). [<i>COGE Handbook</i>]
<i>Development study</i>	The most detailed step in the development of a <i>project</i> evaluation scenario. It is based on detailed geological and engineering study and economic analysis of information on the specific <i>project</i> , and provides sufficient information for the creation of a development plan, from which a development decision can be made. [<i>COGE Handbook</i>]
<i>Development unclarified</i>	When the evaluation is incomplete and there is ongoing activity to resolve any risks or uncertainties. [<i>COGE Handbook</i>]

<i>Development well</i>	A well drilled inside the established limits of an <i>oil</i> or <i>gas reservoir</i> , or in close proximity to the edge of the <i>reservoir</i> , to the depth of a stratigraphic horizon known to be productive.
<i>Discovered petroleum initially-in-place</i>	<p>That quantity of <i>petroleum</i> that is estimated, as of a given date, to be contained in <i>known accumulations</i> prior to <i>production</i>.</p> <p>The recoverable portion of <i>discovered petroleum initially-in-place</i> includes <i>production</i>, <i>reserves</i> and <i>contingent resources</i>; the remainder is <i>unrecoverable</i>. [<i>COGE Handbook</i>]</p>
<i>Discovered resources</i>	Refer to <i>discovered petroleum initially-in-place</i> as both terms are equivalent. [<i>COGE Handbook</i>]
<i>Discovered unrecoverable petroleum initially-in-place</i>	<p>That portion of <i>discovered petroleum initially-in-place</i> which is estimated, as of a given date, not to be recoverable by future development <i>projects</i>.</p> <p>A portion of these quantities may become recoverable in the future as <i>commercial</i> circumstances change or technological developments occur; the remaining portion may never be recovered due to the physical/chemical constraints represented by subsurface interaction of fluids and <i>reservoir</i> rocks. [<i>COGE Handbook</i>]</p>
<i>Discovered unrecoverable resources</i>	Refer to <i>discovered unrecoverable petroleum initially-in-place</i> as both terms are equivalent.
<i>Discovery</i>	The confirmation of the existence of an <i>accumulation</i> of a significant quantity of potentially recoverable <i>petroleum</i> . For additional information, see section 2.2.2 of the <i>COGE Handbook</i> , vol. 2 Definitions. [<i>COGE Handbook</i>]
<i>Economic contingent resources</i>	Those <i>contingent resources</i> that are currently economically recoverable. [<i>COGE Handbook</i>]
<i>Effective date</i>	In respect of information, the date as at which, or for the period ended on which, the information is provided. [<i>NI 51-101</i>]
<i>Established technology</i>	Methods that have been proven to be successful in <i>commercial</i> applications. [<i>COGE Handbook</i>]
<i>Evaluation</i>	In relation to <i>reserves data</i> or <i>resources other than reserves</i> , the process whereby an economic analysis is made of a <i>property</i> to arrive at an estimate of a range of net present values of the estimated <i>future net</i>

revenue resulting from the *production* of the *reserves* or *resources other than reserves* associated with the *property*. [COGE Handbook]

<i>Experimental technology</i>	A technology that is being field tested to determine the technical viability of applying a recovery process to <i>unrecoverable discovered petroleum initially-in-place</i> in a subject <i>reservoir</i> . It cannot be used to assign any class of recoverable <i>resources</i> (i.e., <i>reserves</i> , <i>contingent resources</i> , <i>prospective resources</i>). [COGE Handbook]
<i>Exploitable bitumen in-place (EBIP)</i>	This is the volume of accessible <i>bitumen</i> that is estimated could be extracted from a volume considered to be amenable to exploitation, after the application of regulatory factors and surface limitations. [COGE Handbook]
<i>Exploration costs</i>	<p>Costs incurred in identifying areas that may warrant examination and in examining specific areas that are considered to have <i>prospects</i> that may contain <i>oil</i> and <i>gas reserves</i>, including costs of drilling <i>exploratory wells</i> and exploratory type <i>stratigraphic test wells</i>.</p> <p>Exploration costs may be incurred both before acquiring the related <i>property</i> (sometimes referred to in part as "prospecting costs") and after acquiring the <i>property</i>. <i>Exploration costs</i>, which include applicable <i>operating costs</i> of <i>support equipment and facilities</i> and other costs of exploration activities, are:</p> <ul style="list-style-type: none">(a) costs of topographical, geochemical, geological and geophysical studies, rights of access to <i>properties</i> to conduct those studies, and salaries and other expenses of geologists, geophysical crews and others conducting those studies (collectively sometimes referred to as "geological and geophysical costs");(b) costs of carrying and retaining <i>unproved properties</i>, such as delay rentals, taxes (other than income and capital taxes) on <i>properties</i>, legal costs for title defence, and the maintenance of land and <i>lease</i> records;(c) dry hole contributions and bottom hole contributions;(d) costs of drilling and equipping <i>exploratory wells</i>; and(e) costs of drilling exploratory type <i>stratigraphic test wells</i>.
<i>Exploratory well</i>	A well that is not a <i>development well</i> , a <i>service well</i> or a <i>stratigraphic test well</i> .
<i>First point of sale</i>	The first point after initial <i>production</i> at which there is a transfer of ownership of a <i>product type</i> . [NI 51-101]
<i>Forecast prices and costs</i>	Future prices and costs that are:

- (a) generally accepted as being a reasonable outlook of the future;
- (b) if, and only to the extent that, there are fixed or presently determinable future prices or costs to which the *reporting issuer* is legally bound by a contractual or other obligation to supply a physical product, including those for an extension period of a contract that is likely to be extended, those prices or costs rather than the prices and costs referred to in paragraph (a).
[NI 51-101]

<i>Foreign geographic area</i>	A geographic area outside North America within one country or including all or portions of a number of countries.
<i>Form 51-101F1</i>	Form 51-101F1 <i>Statement of Reserves Data and Other Oil and Gas Information</i> .
<i>Form 51-101F2</i>	Form 51-101F2 <i>Report on [Reserves Data][,][Contingent Resources Data][and][Prospective Resources Data] by Independent Qualified Reserves Evaluator or Auditor</i> .
<i>Form 51-101F3</i>	Form 51-101F3 <i>Report of Management and Directors on Oil and Gas Disclosure</i> .
<i>Form 51-101F4</i>	Form 51-101F4 <i>Notice of Filing of 51-101F1 Information</i> .
<i>Form 51-101F5</i>	Form 51-101F5 <i>Notice of Ceasing to Engage in Oil and Gas Activities</i>
<i>Future income tax expenses</i>	<p><i>Expenses</i> estimated (generally, year-by-year):</p> <ul style="list-style-type: none">(a) making appropriate allocations of estimated unclaimed costs and losses carried forward for tax purposes, between <i>oil and gas activities</i> and other business activities;(b) without deducting estimated future costs (for example, Crown royalties) that are not deductible in computing taxable income;(c) taking into account estimated tax credits and allowances (for example, royalty tax credits); and(d) applying to the future pre-tax net cash flows relating to the <i>reporting issuer's oil and gas activities</i> the appropriate year-end statutory tax rates, taking into account future tax rates already legislated.
<i>Future net revenue</i>	A forecast of revenue, estimated using <i>forecast prices and costs</i> or constant prices and costs, arising from the anticipated development and production of <i>resources</i> , net of the associated royalties, <i>operating costs</i> , <i>development costs</i> , and <i>abandonment and reclamation costs</i> . [NI 51-101]
<i>Gas</i>	Includes <i>natural gas, conventional natural gas, coal bed methane, gas</i>

hydrates, shale gas, and synthetic gas.

<i>Gas hydrate</i>	A naturally occurring crystalline substance composed of water and gas in an ice-lattice structure. [NI 51-101]
<i>Gross</i>	(a) In relation to a <i>reporting issuer's</i> interest in <i>production</i> or <i>reserves</i> , its "company <i>gross reserves</i> ", which are the <i>reporting issuer's</i> working interest (operating or non-operating) share before deduction of royalties and without including any royalty interests of the <i>reporting issuer</i> . (b) In relation to wells, the total number of wells in which a <i>reporting issuer</i> has an interest. (c) In relation to <i>properties</i> , the total area of <i>properties</i> in which a <i>reporting issuer</i> has an interest.
<i>Heavy crude oil</i>	<i>Crude oil</i> with a relative density greater than 10 degrees API gravity and less than or equal to 22.3 degrees API gravity. [NI 51-101]
<i>Hydrocarbon</i>	A compound consisting of hydrogen and carbon, which, when naturally occurring, may also contain other elements such as sulphur. [NI 51-101]
<i>Independent</i>	In respect of the relationship between a <i>reporting issuer</i> and a person or company, the relationship between the <i>reporting issuer</i> and that person or company in which there is no circumstance that could, in the opinion of a reasonable person aware of all relevant facts, interfere with that person's or company's exercise of judgment regarding the preparation of information which is used by the <i>reporting issuer</i> . [NI 51-101]
<i>Instrument</i> (or NI 51-101)	National Instrument 51-101 <i>Standards of Disclosure for Oil and Gas Activities</i> .
<i>Jurisdiction</i>	For the purposes of NI 51-101, a province or territory of Canada. [NI 14-101]
<i>Kerogen</i>	A solid organic substance, insoluble in organic solvents, that results from the degradation of algae and woody plant material. [COGE Handbook]
<i>Kerogenous shale</i> (oil shale)	Shale that contains the solid <i>hydrocarbon kerogen</i> , which can sometimes be burned without processing or can be converted to liquid <i>petroleum</i> by a pyrolysis process, either in situ or at surface after mining. [COGE Handbook]
<i>Known accumulation</i>	An <i>accumulation</i> that has been penetrated by a well that has demonstrated the existence of a significant quantity of potentially recoverable <i>petroleum</i> , preferably by flow testing that demonstrates that the <i>petroleum</i>

is moveable. If there is no flow test, log and/or core data may suffice, provided a good *commercial* analogue is available to justify the assumption that the *petroleum* is moveable. Where log and/or core data demonstrate the existence of an *accumulation* but recovery potential can only be justified through extensive testing or *experimental technology*, the associated *petroleum initially-in-place* must be classified as *discovered unrecoverable* until a technically viable recovery technology can be demonstrated. [COGE Handbook]

- Lead** A potential *accumulation* within a *play* that requires more data acquisition and/or evaluation in order to be classified as a *prospect*. [COGE Handbook]
- Lease** An agreement granting to the lessee rights to explore, develop and exploit a *property*.
- Light crude oil** *Crude oil* with a relative density greater than 31.1 degrees API gravity. [NI 51-101]
- Marketable** In respect of *reserves* or sales of *oil, gas* or associated *by-products*, the volume of *oil, gas* or associated *by-products* measured at the point of sale to a third party, or of transfer to another division of the issuer for treatment prior to sale to a third party. For *gas*, this may occur either before or after the removal of *natural gas liquids*. For *heavy crude oil* or *bitumen*, this is before the addition of diluent.
- Material (or materiality)** For the purposes of NI 51-101, information is *material*, in respect of a *reporting issuer*, if it would be likely to influence a decision by a reasonable investor to buy, hold or sell a security of the *reporting issuer*.

This meaning differs from the definitions of "material change" and "material fact" in *securities legislation*. [NI 51-101]
- Mcf** Thousand cubic feet. [COGE Handbook]
- McfGE** Thousand cubic feet of *gas* equivalent. [NI 51-101 and COGE Handbook]
- Medium crude oil** *Crude oil* with a relative density that is greater than 22.3 degrees API gravity and less than or equal to 31.1 degrees API gravity. [NI 51-101]
- Natural gas** A naturally occurring mixture of *hydrocarbon gases* and other gases. [NI 51-101]
- Natural gas liquids (or NGLs)** Those *hydrocarbon* components that can be recovered from *natural gas* as a liquid including, but not limited to, ethane, propane, butanes, pentanes plus, and condensates. [NI 51-101]

Net	<ul style="list-style-type: none">(a) In relation to a <i>reporting issuer's</i> interest in <i>production</i> or <i>reserves</i>, the <i>reporting issuer's</i> working interest (operating or non-operating) share after deduction of royalty obligations, plus the <i>reporting issuer's</i> royalty interests in <i>production</i> or <i>reserves</i>.(b) In relation to a <i>reporting issuer's</i> interest in wells, the number of wells obtained by aggregating the <i>reporting issuer's</i> working interest in each of its <i>gross</i> wells.(c) In relation to a <i>reporting issuer's</i> interest in a <i>property</i>, the total area in which the <i>reporting issuer</i> has an interest multiplied by the working interest owned by the <i>reporting issuer</i>.
Net pay	That portion of the thickness of a <i>reservoir</i> from which <i>petroleum</i> can be produced or extracted. [<i>COGE Handbook</i>]
NI 14-101	National Instrument 14-101 <i>Definitions</i> .
NI 51-101 or the Instrument	National Instrument 51-101 <i>Standards of Disclosure for Oil and Gas Activities</i> .
NI 51-102	National Instrument 51-102 <i>Continuous Disclosure Obligations</i> .
Oil	Includes <i>crude oil</i> , <i>bitumen</i> , <i>tight oil</i> and <i>synthetic crude oil</i> .
Oil and gas activities	Includes the following: <ul style="list-style-type: none">(a) searching for a <i>product type</i> in its natural location;(b) acquiring <i>property</i> rights or a <i>property</i> for the purpose of exploring for or removing <i>product types</i> from their natural locations;(c) any activity necessary to remove <i>product types</i> from their natural locations, including construction, drilling, mining and production, and the acquisition, construction, installation and maintenance of <i>field</i> gathering and storage systems including treating, <i>field</i> processing and <i>field</i> storage;(d) producing or manufacturing of <i>synthetic crude oil</i> or <i>synthetic gas</i>; but does not include any of the following: <ul style="list-style-type: none">(e) any activity that occurs after the <i>first point of sale</i>;(f) any activity relating to the extraction of a substance other than a <i>product type</i> and their <i>by-products</i>;(g) extracting <i>hydrocarbons</i> as a consequence of the extraction of geothermal steam. [<i>NI 51-101</i>]

<i>Oil and gas metric</i>	A numerical measure of a <i>reporting issuer's oil and gas activities</i> .
<i>Operating costs</i>	<i>Production costs</i> .
<i>Ore</i>	Ore is a mining term describing oil sand with a minimum thickness that can be technically removed with current mining equipment and contains a minimum <i>bitumen</i> content required for anticipated extraction technology. [COGE Handbook]
<i>Petroleum</i>	A naturally occurring mixture consisting predominantly of <i>hydrocarbons</i> in the gaseous, liquid, or solid phase. [COGE Handbook]
<i>Play</i>	A family of geologically similar fields, <i>discoveries, prospects, and leads</i> . [COGE Handbook]
<i>Possible reserves</i>	See Part 2 of this Glossary. [COGE Handbook]
<i>Pre-development study</i>	An intermediate step in the development of a <i>project</i> evaluation scenario. The amount of information that is available for the <i>reservoir</i> of interest is greater than for a <i>conceptual study</i> . In particular, the <i>petroleum initially-in-place</i> has been reasonably well defined and the remaining uncertainty lies largely in the recovery factor and the economic viability. The level of economic analysis is sufficient to assess development options and overall <i>project</i> viability, but is insufficient for a final investment decision or for seeking outside major financing. [COGE Handbook]
<i>Preparation date</i>	In respect of written disclosure, the most recent date to which information relating to the period ending on the <i>effective date</i> was considered in the preparation of the disclosure. [NI 51-101]
<i>Probable reserves</i>	See Part 2 of this Glossary. [COGE Handbook]
<i>Product type</i>	Any of the following: <ul style="list-style-type: none">(a) <i>bitumen</i>;(b) <i>coal bed methane</i>;(c) <i>conventional natural gas</i>;(d) <i>gas hydrates</i>;(e) <i>heavy crude oil</i>;(f) <i>light crude oil and medium crude oil combined</i>;(g) <i>natural gas liquids</i>;(h) <i>shale gas</i>;(i) <i>synthetic crude oil</i>;(j) <i>synthetic gas; or</i>(k) <i>tight oil</i>. [NI 51-101]

Production

The cumulative quantity of *petroleum* that has been recovered at a given date. [*COGE Handbook*]

Recovering, gathering, treating, field or plant processing (for example, processing *gas* to extract *natural gas liquids*) and field storage of *oil* and *gas*.

The *oil* production function is usually regarded as terminating at the outlet valve on the *lease* or field production storage tank. The *gas* production function is usually regarded as terminating at the plant gate. In some circumstances, it may be more appropriate to regard the production function as terminating at the first point at which *oil*, *gas* or their by-products are delivered to a main pipeline, a common carrier, a refinery or a marine terminal.

Production costs (or Operating costs)

Costs incurred to operate and maintain wells and related equipment and facilities, including applicable *operating costs of support equipment and facilities* and other costs of operating and maintaining those wells and related equipment and facilities.

Lifting costs become part of the cost of *oil* and *gas* produced.

Examples of *production costs* are:

- (a) costs of labour to operate the wells and related equipment and facilities;
- (b) costs of repairs and maintenance;
- (c) costs of materials, supplies and fuel consumed, and supplies utilized, in operating the wells and related equipment and facilities;
- (d) costs of workovers;
- (e) *property* taxes and insurance costs applicable to *properties* and wells and related equipment and facilities; and
- (f) taxes, other than income and capital taxes.

Professional organization

A self-regulatory organization of engineers, geologists, other geoscientists or other professionals whose professional practice includes *reserves evaluations* or *reserves audits*, that:

- (a) admits members primarily on the basis of their educational qualifications;
- (b) requires its members to comply with the professional standards of competence and ethics prescribed by the organization that are

relevant to the estimation, *evaluation, review or audit of reserves data*;

- (c) has disciplinary powers, including the power to suspend or expel a member; and
- (d) is either:
 - (i) given authority or recognition by statute in a *jurisdiction of Canada*; or
 - (ii) accepted for this purpose by the *securities regulatory authority* or the *regulator*. [NI 51-101]

Project

A defined activity, or set of activities, that provides the basis for the assessment and classification of *resources*. [COGE Handbook]

Project Evaluation Scenario Status

The degree to which the project scenario has been developed. Three levels of development are identified - conceptual, pre-development, and development. For additional information, see section 2.4.7 Recovery Project Evaluation Scenario Status in section 2 of volume 2 of the *COGE Handbook*. (See also *conceptual (scoping) study, pre-development study, and development study*.) [COGE Handbook]

Project Maturity Sub-Classes for Contingent Resources

See also *development unclarified, development pending, development on hold, and development not viable*. [COGE Handbook]

Property

Includes:

- (a) fee ownership or a *lease, concession, agreement, permit, licence* 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;
- (b) royalty interests, *production* payments payable in *oil* or *gas*, and other non-operating interests in *properties* operated by others; and
- (c) an agreement with a foreign government or authority under which a *reporting issuer* participates in the operation of *properties* or otherwise serves as "producer" of the underlying *reserves* (in contrast to being an *independent purchaser, broker, dealer* or importer).

A *property* does not include supply agreements, or contracts that represent a right to purchase, rather than extract, *oil* or *gas*.

Property acquisition costs

Costs incurred to acquire a *property* (directly by purchase or *lease*, or indirectly by acquiring another corporate entity with an interest in the *property*), including:

- (a) costs of *lease* bonuses and options to purchase or *lease* a *property*;
- (b) the portion of the costs applicable to *hydrocarbons* when land including rights to *hydrocarbons* is purchased in fee;
- (c) brokers' fees, recording and registration fees, legal costs and other costs incurred in acquiring *properties*.

Prospect

A geographic or stratigraphic area, in which the *reporting issuer* owns or intends to own one or more *oil* and *gas* interests, which is geographically defined on the basis of geological data and which is reasonably anticipated to contain at least one *reservoir* or part of a *reservoir* of *oil* and *gas*.

Prospective resources

Those quantities of *petroleum* estimated, as of a given date, to be potentially recoverable from undiscovered *accumulations* by application of future development projects.

Prospective resources have both an associated *chance of discovery* and a *chance of development*. [*COGE Handbook*]

Prospective resources data

Means

- (a) an estimate of the volume of *prospective resources*, and
- (b) the *risked* net present value of *future net revenue* of *prospective resources*; [*NI 51-101*]

Proved property

A *property* or part of a *property* to which *reserves* have been specifically attributed.

Proved reserves

See Part 2 of this Glossary. [*COGE Handbook*]

Qualified reserves auditor

An individual who:

- (a) in respect of particular *reserves data*, *resources* or related information, possesses professional qualifications and experience appropriate for the estimation, *evaluation*, *review* and *audit* of the *reserves data*, *resources* and related information; and
- (b) is a member in good standing of a *professional organization*. [*NI 51-101*]

Qualified reserves evaluator

An individual who:

- (a) in respect of particular *reserves data*, *resources* or related information, possesses professional qualifications and experience appropriate for the estimation, *evaluation* and *review* of the *reserves data*, *resources* and related information; and
- (b) is a member in good standing of a *professional organization*. [*NI 51-101*]

<i>Qualified reserves evaluator or auditor</i>	A <i>qualified reserves evaluator</i> or a <i>qualified reserves auditor</i> . [NI 51-101]
<i>Recovery process analogue</i>	A recovery process that is an <i>established technology</i> or <i>technology under development</i> in the <i>analogue reservoir</i> that can be applied to the subject <i>reservoir</i> being evaluated. [COGE Handbook]
<i>Recovery technology status</i>	See <i>established technology</i> , <i>technology under development</i> , and <i>experimental technology</i> . [COGE Handbook]
<i>Refinery</i>	A refinery (depending on the processes in the facility) can use different <i>crude oils</i> , conventional (unprocessed) or synthetic (already <i>upgraded</i> once) including <i>heavy crude oil</i> and <i>bitumen</i> , to make final products for the market or specialized products for further processing, like petrochemicals. [COGE Handbook]
<i>Regulator</i>	The <i>securities regulatory authority</i> or a person who holds a specified position with the <i>securities regulatory authority</i> (in several instances, its Executive Director or Director) in each <i>jurisdiction</i> . [NI 14-101]
<i>Reporting issuer</i>	(a) A " <i>reporting issuer</i> " as defined in <i>securities legislation</i> ; or (b) in a <i>jurisdiction</i> in which the term is not defined in <i>securities legislation</i> , an issuer of securities that is required to file financial statements with the <i>securities regulatory authority</i> .
<i>Reservation</i>	In relation to a report on <i>reserves data</i> or <i>resources</i> (if applicable), a modification of the standard report of an <i>independent qualified reserves evaluator or auditor</i> on <i>reserves data</i> or <i>resources</i> set out in <i>Form 51-101F2</i> , caused by a departure from the <i>COGE Handbook</i> or by a limitation in the scope of work that the <i>independent qualified reserves evaluator or auditor</i> considers necessary. A modification may take the form of a qualified or adverse opinion or a denial of opinion.
<i>Reserves</i>	See Part 2 of this Glossary. [COGE Handbook]
<i>Reserves data</i>	Estimates of <i>proved reserves</i> and <i>probable reserves</i> and related <i>future net revenue</i> estimated using <i>forecast prices</i> and <i>costs</i> . [NI 51-101]
<i>Reservoir</i>	A subsurface rock unit that contains an <i>accumulation of petroleum</i> . [COGE Handbook]

<i>Reservoir Analogue</i>	A <i>reservoir</i> with similar rock properties (lithological, depositional, diagenetic, and structural), fluid properties (<i>hydrocarbon</i> type, composition, density, and viscosity), <i>reservoir</i> conditions (depth, temperature, and pressure) and drive mechanisms that can be used as a model for the subject <i>reservoir</i> being evaluated. [<i>COGE Handbook</i>]
<i>Resource Type</i>	Describes the <i>accumulation</i> and is determined by the combination of the type of <i>hydrocarbon</i> and the rock in which it occurs. For additional information, see section 2.1.3 Resource Types of section 2 of volume 2 of the <i>COGE Handbook</i> . [<i>COGE Handbook</i>]
<i>Resources</i>	<i>Petroleum</i> quantities that originally existed on or within the earth's crust in naturally occurring <i>accumulations</i> , including discovered and undiscovered (recoverable and <i>unrecoverable</i>) plus quantities already produced. <i>Total resources</i> is equivalent to <i>total petroleum initially-in-place</i> . [<i>COGE Handbook</i>]
<i>Review</i>	<p>In relation to the role of a <i>qualified reserves evaluator or auditor</i> in respect of <i>reserves data</i>, steps carried out by the <i>qualified reserves evaluator or auditor</i>, consisting primarily of enquiry, analytical procedures, analysis, review of historical <i>reserves</i> performance and discussion with <i>reserves</i> management staff related to a <i>reporting issuer's reserves data</i>, with the limited objective of assessing whether the <i>reserves data</i> is "plausible" in the sense of appearing to be worthy of belief based on the information obtained by the <i>qualified reserves evaluator or auditor</i> as a result of carrying out such steps. Examination of documentation is not required unless the information does not appear to be plausible.</p> <p>A <i>reserves</i> review, due to the limited nature of the investigation involved, does not provide the level of assurance provided by a <i>reserves audit</i>. Although <i>reserves</i> reviews can be done for specific applications, they are not a substitute for an <i>audit</i>. [<i>COGE Handbook</i>]</p>
<i>Risked</i>	Adjusted for the probability of loss or failure in accordance with the <i>COGE Handbook</i> . [<i>NI 51-101</i>]
<i>SEC</i>	The Securities and Exchange Commission of the United States of America. [<i>NI 14-101</i>]

<i>Securities legislation</i>	<p>The statute (in most cases entitled the "Securities Act") and subordinate legislation (in most cases including regulations or rules) specified, for each <i>jurisdiction</i>, in <i>NI 14-101</i>.</p> <p>References in <i>NI 51-101</i> to <i>securities legislation</i> are to be read as references to <i>securities legislation</i> in the particular <i>jurisdiction</i>.</p>
<i>Securities regulatory authority</i>	<p>The securities commission or comparable body specified, for each <i>jurisdiction</i>, in <i>NI 14-101</i>.</p> <p>References in <i>NI 51-101</i> to the <i>securities regulatory authority</i> are to be read as references to the <i>securities regulatory authority</i> in the particular <i>jurisdiction</i>.</p>
<i>SEDAR</i>	<p>The System for Electronic Document Analysis and Retrieval referred to in National Instrument 13-101 <i>System for Electronic Document Analysis and Retrieval (SEDAR)</i>.</p>
<i>Service well</i>	<p>A well drilled or completed for the purpose of supporting <i>production</i> in an existing <i>field</i>. Wells in this class are drilled for the following specific purposes: <i>gas</i> injection (<i>natural gas</i>, propane, butane or flue <i>gas</i>), water injection, steam injection, air injection, salt-water disposal, water supply for injection, observation, or injection for combustion.</p>
<i>Shale gas</i>	<p><i>Natural gas</i>:</p> <ul style="list-style-type: none">(a) contained in dense organic-rich rocks, including low-permeability shales, siltstones and carbonates, in which the <i>natural gas</i> is primarily adsorbed on the kerogen or clay minerals, and(b) that usually requires the use of hydraulic fracturing to achieve economic production rates. [<i>NI 51-101</i>]
<i>Solution gas</i>	<p><i>Gas</i> dissolved in <i>crude oil</i>.</p>
<i>Stratigraphic test well</i>	<p>A drilling effort, geologically directed, to obtain information pertaining to a specific geologic condition. Ordinarily, such wells are drilled without the intention of being completed for <i>hydrocarbon production</i>. They include wells for the purpose of core tests and all types of expendable holes related to <i>hydrocarbon</i> exploration.</p> <p><i>Stratigraphic test wells</i> are classified as</p> <ul style="list-style-type: none">(a) "exploratory type" if not drilled into a proved <i>property</i>; or(b) "development type", if drilled into a proved <i>property</i>. <p>Development type stratigraphic wells are also referred to as</p>

"evaluation wells".

<i>Sub-economic contingent resources</i>	Those <i>contingent resources</i> that are not currently economically recoverable. There should be a reasonable expectation of a change in economic conditions within the near future that will result in them becoming economically viable. [<i>COGE Handbook</i>]
<i>Support equipment and facilities</i>	Equipment and facilities used in <i>oil and gas activities</i> , including seismic equipment, drilling equipment, construction and grading equipment, vehicles, repair shops, warehouses, supply points, camps, and division, district or field offices.
<i>Supporting filing</i>	A document filed by a <i>reporting issuer</i> with a <i>securities regulatory authority</i> . [<i>NI 51-101</i>]
<i>Synthetic crude oil</i>	A mixture of liquid <i>hydrocarbons</i> derived by upgrading <i>bitumen</i> , <i>kerogen</i> or other substances such as coal, or derived from <i>gas</i> to liquid conversion and may contain sulphur or other compounds. [<i>NI 51-101</i>]
<i>Synthetic gas</i>	A gaseous fluid (a) generated as a result of the application of an in-situ transformation process to coal or other <i>hydrocarbon</i> -bearing rock; and (b) comprised of not less than 10% by volume of methane. [<i>NI 51-101</i>]
<i>Technical contingency</i>	A technical issue that must be resolved to allow the <i>commercial</i> application of a recovery process technology to a specific <i>reservoir</i> . [<i>COGE Handbook</i>]
<i>Technology under development</i>	A recovery process that has been determined to be technically viable via field test and is being field tested further to determine its economic viability in the subject <i>reservoir</i> . <i>Contingent resources</i> may be assigned if the <i>project</i> provides information that is sufficient and of a quality to meet the requirements for this <i>resource class</i> . (Note: this replaces the definition in the <i>COGE Handbook</i> volume 1, Appendix A - Glossary. [<i>COGE Handbook</i>])
<i>Tight Oil</i>	<i>Crude oil</i> (a) contained in dense organic-rich rocks, including low-permeability shales, siltstones and carbonates, in which the <i>crude oil</i> is primarily contained in microscopic pore spaces that are poorly connected to one another, and (b) that typically requires the use of hydraulic fracturing to achieve economic <i>production</i> rates. [<i>NI 51-101</i>]

<i>Total petroleum initially-in-place</i>	<p>That quantity of <i>petroleum</i> that is estimated to exist originally in naturally occurring <i>accumulations</i>.</p> <p>It includes that quantity of <i>petroleum</i> that is estimated, as of a given date, to be contained in <i>known accumulations</i>, prior to <i>production</i>, plus those estimated quantities in <i>accumulations</i> yet to be discovered. [<i>COGE Handbook</i>]</p>
<i>Total resources</i>	<p>Refer to <i>total petroleum initially-in-place</i> as both terms are equivalent. [<i>COGE Handbook</i>]</p>
<i>Total volume (m³): bitumen in-place (m³) (TV:BIP)</i>	<p>The ratio of the total volume of material under consideration for mining to the total contained <i>bitumen</i> within the ore component of that volume. The in-place <i>bitumen</i> content is derived exclusively from the component model blocks or zones, which have been determined to be <i>ore</i>, through an <i>ore-waste</i> discrimination process. [<i>COGE Handbook</i>]</p>
<i>Undeveloped reserves</i>	<p>See Part 2 of this Glossary. [<i>COGE Handbook</i>]</p>
<i>Undiscovered petroleum initially-in-place</i>	<p>That quantity of <i>petroleum</i> that is estimated, on a given date, to be contained in <i>accumulations</i> yet to be discovered.</p> <p>The recoverable portion of <i>undiscovered petroleum initially-in-place</i> is referred to as <i>prospective resources</i>; the remainder is <i>unrecoverable</i>. [<i>COGE Handbook</i>]</p>
<i>Undiscovered resources</i>	<p>Refer to <i>undiscovered petroleum initially-in-place</i> as both terms are equivalent. [<i>COGE Handbook</i>]</p>
<i>Undiscovered unrecoverable petroleum initially-in-place</i>	<p>That portion of <i>undiscovered petroleum initially-in-place</i> which is estimated, as of a given date, not to be recoverable by future development projects.</p> <p>A portion of these quantities may become recoverable in the future as <i>commercial</i> circumstances change or technological developments occur; the remaining portion may never be recovered due to the physical/chemical constraints represented by subsurface interaction of fluids and <i>reservoir</i> rocks. [<i>COGE Handbook</i>]</p>
<i>Undiscovered unrecoverable resources</i>	<p>Refer to <i>undiscovered unrecoverable petroleum initially-in-place</i> as both terms are equivalent.</p>
<i>Unproved property</i>	<p>A <i>property</i> or part of a <i>property</i> to which no <i>reserves</i> have been specifically attributed.</p>
<i>Unrecoverable</i>	<p>That portion of discovered or undiscovered <i>petroleum initially-in-place</i></p>

quantities which is estimated, as of a given date, not to be recoverable by future development *projects*. A portion of these quantities may become recoverable in the future as commercial circumstances change or technological developments occur; the remaining portion may never be recovered due to the physical/chemical constraints represented by subsurface interaction of fluids and *reservoir* rocks. [*COGE Handbook*]

Upgrader

An upgrader is a facility that processes either *heavy crude oil* or *bitumen* into products that can either flow without diluent being added or other blends of *crude* with properties that are now desirable in a typical *refinery*. Many different blends can be made at an upgrader for the final user. One of the most common (sweet synthetic) is the premium *crude*, which is made from a blend of treated naphtha, kerosene (distillate) and gas oil. This product has been sold in the market place since the late 1960s. It is also possible to make untreated blends of upgraded *crude oils* and final products like diesel fuel. Typically, gasoline is not made at an upgrader. [*COGE Handbook*]

Upgrading

Upgrading is a term used to describe the process of changing the structure or improving the quality of a *heavy crude oil* or *bitumen* to allow either further use as a final product or feedstock to a *refinery*. Typically, *heavy oils* and *bitumen* contain large amounts of asphaltenes, metals, sulphur, and nitrogen components. Removal of these components or impurities will usually result in a higher price for the upgraded *oil*.

Constituents like asphaltenes are long chain aromatic ring type hydrocarbons that are prone to coking (a term which results in these long chain molecules breaking and then rejoining to form even longer chain molecules), which will plug or foul equipment and catalyst. [*COGE Handbook*]

U.S. federal securities laws

The federal statutes of the United States of America concerning the regulation of securities markets and trading in securities and the regulations, rules, forms and schedules under those statutes, all as amended from time to time. [*NI 14-101*]

PART 2 DEFINITIONS OF *RESERVES*

This Part is derived from Section 5 of Volume 1 of the *COGE Handbook* (Second Edition, September 1, 2007). Consult a current edition of the *COGE Handbook* for updates and for additional explanation and guidance.

The following *reserves* definitions and guidelines are designed to assist evaluators in making *reserves* estimates on a reasonably consistent basis, and assist users of evaluation reports in understanding what such reports contain and, if necessary, in judging whether evaluators have followed generally accepted standards.

The guidelines outline

- general criteria for classifying *reserves*,
- procedures and methods for estimating *reserves*,
- confidence levels of individual entity and aggregate *reserves* estimates,
- verification and testing of *reserves* estimates.

The determination of *oil* and *gas reserves* involves the preparation of estimates that have an inherent degree of associated uncertainty. Categories of *proved*, *probable*, and *possible reserves* have been established to reflect the level of these uncertainties and to provide an indication of the probability of recovery.

The estimation and classification of *reserves* requires the application of professional judgement combined with geological and engineering knowledge to assess whether or not specific *reserves* classification criteria have been satisfied. Knowledge of concepts including uncertainty and risk, probability and statistics, and deterministic and probabilistic estimation methods is required to properly use and apply *reserves* definitions. These concepts are presented and discussed in greater detail within the guidelines in Section 5.5 [of the *COGE Handbook*].

The following definitions apply to both estimates of individual *reserves* entities and the aggregate of *reserves* for multiple entities.

Reserves Categories

Reserves are estimated remaining quantities of *oil* and *natural gas* and related substances anticipated to be recoverable from *known accumulations*, as of a given date, based on

- analysis of drilling, geological, geophysical and engineering data;
- the use of established technology;
- specified economic conditions, which are generally accepted as being reasonable, and shall be disclosed.

Reserves are classified according to the degree of certainty associated with the estimates.

- (a) **Proved reserves** are those *reserves* that can be estimated with a high degree of certainty to be recoverable. It is likely that the actual remaining quantities recovered will exceed the estimated *proved reserves*.
- (b) **Probable reserves** are those additional *reserves* that are less certain to be recovered than *proved reserves*. It is equally likely that the actual remaining quantities recovered will be greater or less than the sum of the estimated *proved* plus *probable reserves*.
- (c) **Possible reserves** are those additional *reserves* that are less certain to be recovered than *probable reserves*. It is unlikely that the actual remaining quantities recovered will exceed the sum of the estimated *proved* plus *probable* plus *possible reserves*.

Other criteria that must also be met for the classification of *reserves* are provided in [Section 5.5.4 of the *COGE Handbook*].

Development and Production Status

Each of the *reserves* categories (*proved*, *probable* and *possible*) may be divided into *developed* and *undeveloped* categories:

- (a) **Developed reserves** are those *reserves* that are expected to be recovered from existing wells and installed facilities or, if facilities have not been installed, that would involve a low expenditure (e.g., when compared to the cost of drilling a well) to put the *reserves* on *production*. The *developed* category may be subdivided into producing and non-producing.

Developed producing reserves are those *reserves* that are expected to be recovered from completion intervals open at the time of the estimate. These *reserves* may be currently producing or, if shut-in, they must have previously been on *production*, and the date of resumption of *production* must be known with reasonable certainty.

Developed non-producing reserves are those *reserves* that either have not been on *production*, or have previously been on *production* but are shut-in and the date of resumption of *production* is unknown.

- (b) **Undeveloped reserves** are those *reserves* expected to be recovered from *known accumulations* where a significant expenditure (e.g., when compared to the cost of drilling a well) is required to render them capable of *production*. They must fully meet the requirements of the *reserves* category (*proved, probable, possible*) to which they are assigned.

In multi-well pools it may be appropriate to allocate total pool *reserves* between the *developed* and *undeveloped* categories or to subdivide the *developed reserves* for the pool between *developed producing* and *developed non-producing*. This allocation should be based on the estimator's assessment as to the *reserves* that will be recovered from specific wells, facilities, and completion intervals in the pool and their respective development and *production* status.

Levels of Certainty for Reported Reserves

The qualitative certainty levels referred to in the definitions above are applicable to “individual *reserves* entities”, which refers to the lowest level at which *reserves* calculations are performed, and to “reported *reserves*”, which refers to the highest level sum of individual entity estimates for which *reserves* estimates are presented. Reported *reserves* should target the following levels of certainty under a specific set of economic conditions:

- at least a 90 percent probability that the quantities actually recovered will equal or exceed the estimated *proved reserves*;
- at least a 50 percent probability that the quantities actually recovered will equal or exceed the sum of the estimated *proved plus probable reserves*; and
- at least a 10 percent probability that the quantities actually recovered will equal or exceed the sum of the estimated *proved plus probable plus possible reserves*.

A quantitative measure of the certainty levels pertaining to estimates prepared for the various *reserves* categories is desirable to provide a clearer understanding of the associated risks and uncertainties. However, the majority of *reserves* estimates are prepared using deterministic methods that do not provide a mathematically derived quantitative measure of probability. In principle, there should be no difference between estimates prepared using probabilistic or deterministic methods.

Additional clarification of certainty levels associated with *reserves* estimates and the effect of aggregation is provided in Section 5 [of the *COGE Handbook*].

Questions

Please refer questions to any of the following:

Craig Burns
Manager, Oil and Gas
Alberta Securities Commission
403-355-9029
craig.burns@asc.ca

Floyd Williams
Senior Petroleum Evaluation Engineer
Alberta Securities Commission
403-297-4145
floyd.williams@asc.ca

Christopher Peng
Legal Counsel, Corporate Finance
Alberta Securities Commission
403-297-4230
christopher.peng@asc.ca

Gordon Smith
Senior Legal Counsel, Corporate Finance
British Columbia Securities Commission
604-899-6656 or 800-373-6393 (toll free across Canada)
gsmith@bcsc.bc.ca

Darin Wasylik
Senior Geologist
British Columbia Securities Commission
604-899-6517 or 800-373-6393 (toll free across Canada)
dwasylik@bcsc.bc.ca

Luc Arsenault
Géologue
Autorité des marchés financiers
514-395-0337 ext. 4373 or 877-525-0337 (toll free across Canada)
luc.arsenault@lautorite.qc.ca