

Oil & Gas Spotlight

Reserves Matter(s) — Deloitte Hosts E&P Roundtable

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The Bottom Line

E&P companies must understand the factors that increase a project's or an area's "chance of commerciality."

- Deloitte's Oil & Gas practice recently hosted a roundtable to discuss the importance of reserves and the need for exploration and production (E&P) companies to monitor their available hydrocarbon resources and reserves to determine how they will address the growing demand for energy.
- To understand the nature of their developed and undeveloped resources, E&P companies will need help from oil and gas technical experts, which use the petroleum resources classification framework when evaluating a company's total "petroleum initially in place" (PIIP). Under this framework, resource accumulations are categorized as discovered or undiscovered PIIP as well as commercial or subcommercial PIIP.
- E&P companies must understand the factors that increase a project's or an area's "chance of commerciality," including the nuances related to the classification of hydrocarbon accumulations as "discovered" or "undiscovered." Companies must also understand the range of uncertainty related to each category since this will directly affect estimated quantities.
- To ensure that their reserves and resources are properly classified, accurately calculated, and appropriately reported, E&P companies must (1) be aware of the nature of their accumulations, (2) know the reporting requirements, (3) familiarize themselves with the concepts and terminology in an evaluation report, and (4) understand the purpose and use of the accumulation evaluations.

Beyond the Bottom Line

On April 17, 2013, Deloitte's Oil & Gas practice hosted a roundtable discussion in Houston, Texas. At this invitation-only event, attendees from E&P companies discussed the petroleum resources classification framework and specifics related to the identification and characterization of hydrocarbon resources and reserves. The roundtable was moderated by Deloitte's U.S. AERS Oil & Gas Audit Leader Paul Horak. The keynote speaker was industry leader Robin Bertram.¹

This *Oil & Gas Spotlight* highlights (1) the importance of reserves to an oil and gas company, (2) the nature of the petroleum resources classification framework used by oil and gas companies to estimate petroleum quantities, and (3) best practices to ensure that resources are properly classified, accurately calculated, and appropriately reported.

Importance of Reserves

With the expansion of the global economy, the demand for energy has increased worldwide. To meet this demand, E&P companies are enhancing their efforts to maximize the extraction of hydrocarbon-related products from the ground and must therefore continually monitor their available resources to ensure growth and increased company value going forward.

Background

Oil and gas properties are one of the most significant items on an E&P company's balance sheet. Such properties and the information related to them (i.e., oil and gas reserves) are key metrics considered by (1) industry analysts, (2) investors and potential investors, (3) industry regulators, and (4) others interested in understanding a company's valuation. To standardize practices, procedures, and guidelines for evaluating reserves, the Society of Petroleum Engineers, World Petroleum Council, Society of Petroleum Evaluation Engineers (SPEE), and American Association of Petroleum Geologists together developed the [Petroleum Resources Management System \(PRMS\)](#), which, as stated in its preamble, "provides a consistent approach to estimating petroleum quantities, evaluating development projects, and presenting results within a comprehensive classification framework."

Quantities of reserves is a key metric for assessing the value of a company and its projects. Accordingly, regulatory agencies oversee the reserve information in a company's financial reporting package. For example, the SEC and other regulatory agencies monitor, evaluate, and ask questions about the reserve information that companies report. These agencies also continually refine the financial reporting and related disclosure requirements to ensure that users' investment decisions are based on reliable information.

Understanding the Petroleum Resources Classification Framework

A significant portion of the roundtable's keynote address was devoted to discussing the petroleum resources classification framework outlined in the PRMS, which serves as the basis for determining how resource quantities in undiscovered hydrocarbon accumulations are calculated as well as how these quantities can achieve "proved reserves" status.

It All Starts With PIIP

PIIP is the total amount of hydrocarbons in a naturally formed accumulation or deposit. This amount is estimated at a particular point in time and consists of (1) known hydrocarbons in an accumulation that have yet to go through the production process ("discovered PIIP") and (2) estimated hydrocarbons in an accumulation that have yet to be discovered ("undiscovered PIIP"). Discovered PIIP and undiscovered PIIP make up the total available resources in an accumulation.

¹ Robin Bertram is a partner with Deloitte Canada's Resource Evaluation & Advisory group. He is the chair of the standing committee for the *Canadian Oil and Gas Evaluation Handbook* and was a member of the SPEE Evaluation of Resources Plays Committee, which authored "SPEE Monograph 3, Guidelines for the Practical Evaluation of Undeveloped Reserves in Resource Plays."

Quantities of reserves is a key metric for assessing the value of a company and its projects.

Whether resources ultimately become contingent resources or even reserves depends on the company's ability to discover the reserves and the company's willingness to develop the area.

Discovered and undiscovered PIIIP include quantities, estimated at a point in time, that are not considered recoverable in the normal course of a development project. If technologies or commercial circumstances improve, a portion of these quantities may later be reclassified as recoverable. However, some will always be unrecoverable because of inherent physical or chemical constraints.

A fundamental goal of an E&P company is to increase the chance of commerciality of its hydrocarbon resources. It does so by identifying the available hydrocarbons in its area of operations and shifting them from undiscovered PIIIP to discovered PIIIP and then from discovered PIIIP into reserves. Because this process involves a number of assumptions and technical considerations, the company will need help from oil and gas engineers and geoscientists.

Undiscovered Territory

As noted above, undiscovered PIIIP is the amount of hydrocarbons estimated to be contained in undiscovered accumulations at a given point in time. Companies estimate the undiscovered PIIIP by using various assumptions, models, and geotechnical information and by considering the discovered PIIIP in the surrounding areas. The estimated hydrocarbons in the undiscovered PIIIP are known as "prospective resources."

Prospective resources are hydrocarbon quantities estimated at a point in time that may, as a result of future development projects, be recoverable from undiscovered accumulations. Whether resources ultimately become contingent resources or even reserves depends on the company's ability to discover the reserves (i.e., the chance of discovery) and the company's willingness to develop the area (i.e., chance of development). In addition, the identification and quantification of prospective resources depends on the maturity of the project. For example, the company may characterize the undiscovered area as a play, lead, or prospect.

Each project-maturity subclass² is characterized distinctly. For example:

- A "play" is a "project associated with a prospective trend of potential prospects, but which requires more data acquisition and/or evaluation in order to define specific leads or prospects."
- A "lead" is a "project associated with a potential accumulation that is currently poorly defined and requires more data acquisition and/or evaluation in order to be classified as a prospect."
- A "prospect" is a "project associated with a potential accumulation that is sufficiently well defined to represent a viable drilling target."

While engineers and geoscientists take into account the "chance of discovery" and the "chance of development" when determining quantities of prospective resources, these assumptions include a range of uncertainty³ about whether the hydrocarbons will be found. The range of uncertainty for prospective resources is subdivided into three broad categories: (1) low estimate, (2) best estimate, and (3) high estimate. Quantities of prospective resources that would fall into each of these categories are probability weighted by engineers, who would generally assume the following:

- *Low estimate (P90)* — There is a 90 percent chance that the low volume estimate or more will be recovered.
- *Best estimate (P50)* — It is equally likely that more or less of the volume estimate will be recovered.
- *High estimate (P10)* — There is a 10 percent chance that the high volume estimate or more will be recovered.

² Definitions of project-maturity subclasses are from the PRMS.

³ The range of uncertainty takes into account estimated recoverable hydrocarbon quantities for a project or accumulation as well as factors such as quality of the areas (e.g., good reservoir rock, poor rock, or shale).

For a hydrocarbon accumulation to be considered “discovered,” it must have been penetrated by a well and there must be evidence of the existence of moveable hydrocarbon products.

What Has Been Discovered

Discovered PIIP is the amount of hydrocarbons estimated to be contained in discovered accumulations at a given point in time. For a hydrocarbon accumulation to be considered “discovered,” it must have been penetrated by a well and there must be evidence of the existence of moveable hydrocarbon products. The discovered PIIP is classified as either subcommercial or commercial, depending on its chance of commerciality.

Subcommercial Project

A subcommercial project is one in which hydrocarbons may exist but, because of contingencies, it is at such a low maturity level that the accumulations are not expected to be developed and brought online in the near term. Contingencies that would cause the accumulation to be considered subcommercial can be broadly separated into two groups: technical and nontechnical. Technical contingencies are related to extracting the hydrocarbons from the ground (e.g., the company may need to identify a cost-effective way of extracting the hydrocarbons, or the technology may need to be developed for the process). Nontechnical contingencies are related to other issues (e.g., limitations to market access, governmental regulations, local jurisdictional restrictions).

The resulting quantities of hydrocarbons in the subcommercial category are known as “contingent resources,” and whether their commerciality can be increased depends on the contingencies and the maturity of the related projects. Project maturity can be further divided into three classes: (1) development pending, (2) development unclarified or on hold, and (3) development not viable.

Each project-maturity subclass⁴ is characterized distinctly. For example:

- “Development pending” refers to a “discovered accumulation where project activities are ongoing to justify commercial development in the foreseeable future.”
- “Development unclarified or on hold” refers to a “discovered accumulation where project activities are on hold and/or where justification as a commercial development may be subject to significant delay.”
- “Development not viable” refers to a “discovered accumulation for which there are no current plans to develop or to acquire additional data at the time due to limited production potential.”

Companies would be required to take additional steps to move projects in these maturity subclasses into commercial production.

As they would do for undiscovered PIIP, engineers and geoscientists would determine the quantities of subcommercial contingent resources by considering a range of uncertainty that is subdivided into categories 1C, 2C, and 3C (see [Appendix A](#)). These categories are defined in the same manner as the low estimate, best estimate, and high estimate categories for prospective resources. Engineers would calculate the quantities of prospective resources in light of these estimates and probabilities.

Commercial Project

A commercial project is one in which hydrocarbons may exist and all conditions have been addressed that would allow the accumulation to be developed and brought online in the near term (five years is generally considered the benchmark, but the period could be longer under certain circumstances). In a commercial project, the hydrocarbons that are available to be extracted are known as “reserves.” As mentioned above, reserves are one of the more significant amounts recorded on an oil and gas company’s balance sheet, and the reserve balance is subject to the most scrutiny by stakeholders, including regulators and investors.

⁴ Definitions of project-maturity subclasses are from the PRMS.

Evaluating the quantities of reserves depends on the reserves' classification and whether they are proved, probable, or possible.

Paragraph (a)(26) of SEC Regulation S-X, Rule 4-10,⁵ defines “reserves” as follows:

Reserves are estimated remaining quantities of oil and gas and related substances anticipated to be economically producible, as of a given date, by application of development projects to known accumulations. In addition, there must exist, or there must be a reasonable expectation that there will exist, the legal right to produce or a revenue interest in the production, installed means of delivering oil and gas or related substances to market, and all permits and financing required to implement the project.

According to the PRMS, to qualify as reserves, the hydrocarbons must satisfy four criteria as of the evaluation date: they must be (1) discovered, (2) recoverable, (3) commercial, and (4) remaining.

As with other undiscovered PIIP and subcommercial discovered PIIP, “increasing the chance of commerciality” of the reserves depends on the project maturity, which can be divided into three classes: (1) “on production,” (2) “approved for development,” and (3) “justified for development.”

Each project-maturity subclass⁶ is characterized distinctly. For example:

- “On production” refers to a “development project [that] is currently producing and selling petroleum to market.”
- “Approved for development” means that all “necessary approvals have been obtained, capital funds have been committed, and implementation of the development project is underway.”
- “Justified for development” means that implementation of the “development project is justified on the basis of reasonable forecast commercial conditions at the time of reporting, and there are reasonable expectations that all necessary approvals/contracts will be obtained.”

Evaluating the quantities of reserves depends on the reserves’ classification and whether they are proved, probable, or possible. Those terms are defined as follows:

- *Proved reserves (P1)* — Estimated quantities of crude oil, natural gas, and natural gas liquids, which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. Prices take into account contractual arrangements, but not future conditions. If deterministic methods of estimation are used, reasonable certainty means a high degree of confidence (i.e., much more likely than not to be achieved).
- *Probable reserves (P2)* — Additional reserves that, on the basis of analysis of geoscience and engineering data, are less certain to be recovered than proved reserves but more certain to be recovered than possible reserves. It is equally likely that actual remaining quantities recovered will be greater than or less than the sum of the estimated proved plus probable reserves.
- *Possible reserves (P3)* — Additional reserves that are less likely to be recovered than probable reserves. There is a low probability that the total quantities recovered will exceed the sum of the proved plus probable plus possible reserves.

In calculating quantities, engineers would generally assume the following in considering the range of uncertainty for reserves that are (1) proved, (2) proved plus probable, and (3) proved probable plus possible:

- *Proved (P90)* — There is a 90 percent chance that the low volume estimate would be recovered.
- *Proved plus probable (P50)* — There is just as much of a chance that the resulting volumes would be recovered than not.

⁵ SEC Regulation S-X, Rule 4-10, *Financial Accounting and Reporting for Oil and Gas Producing Activities Pursuant to the Federal Securities Laws and the Energy Policy and Conservation Act of 1975*.

⁶ Definitions of project-maturity subclasses are from the PRMS.

- *Proved probable plus possible (P10)* — There is a low (e.g., 10 percent) chance that the estimated volumes would be recovered.

These assumptions are the same as those used in the low estimate (P90), best estimate (P50), and high estimate (P10) of prospective resources.

Best Practices

In response to questions, the keynote speaker at the roundtable identified certain best practices to help E&P companies ensure that resources are properly classified, accurately calculated, and appropriately reported.

Understand the Nature of Accumulations

E&P companies should understand the differences between discovered and undiscovered accumulations since they will directly affect whether hydrocarbons are classified as prospective resources, contingent resources, or reserves. Determining whether discovered accumulations are commercial or subcommercial will also affect the classification of contingent resources and reserves.

Discovered Versus Undiscovered

As noted above, to be considered “discovered,” an accumulation must have been penetrated by a well, and there must be evidence of moveable petroleum. A nearby discovery of a hydrocarbon accumulation does not, in of itself, result in a determination that the current area is discovered. Further, contingent resources or reserves cannot be identified in an undiscovered area. Some accumulations might include both discovered and undiscovered volumes.

Commercial Versus Subcommercial

In determining volumes, companies need to assess whether their operations are truly commercial. Commercial status could be affected by the development timeline, the project’s economic viability, reasonable market expectations, availability of major production and transportation facilities, and evidence of all necessary regulator and corporate approvals. If, on the basis of these factors, the accumulation is determined to be subcommercial, the hydrocarbons must not be classified as reserves.

Know the Reporting Requirements

Public companies must understand and comply with the following rules and regulations:

- Regulation S-X, Rule 4-10.
- Regulation S-K, Item 1202.⁷
- Industry Guide 4.⁸
- ASC 932.⁹

Oil and gas companies may be subject to other regulatory or jurisdictional reporting requirements, most of which are related to quantifying and providing qualitative disclosures about reserves. A company’s financial reporting teams as well as its technical experts should be familiar with these requirements since the evaluation of the hydrocarbon reserves may directly affect the company’s ability to provide the required disclosures.

E&P companies should understand the differences between discovered and undiscovered accumulations since they will directly affect the classification of the hydrocarbons as prospective resources, contingent resources, or reserves.

⁷ SEC Regulation S-K, Item 1202, *Disclosure of Reserves*.

⁸ SEC Industry Guide 4, *Prospectus Relating to Interests in Oil and Gas Programs*.

⁹ FASB Accounting Standards Codification Topic 932, *Extractive Activities — Oil and Gas*.

Master the Lingo

The company's financial reporting team may not be as well versed as technical experts in the practices, procedures, and guidelines related to hydrocarbon accumulation evaluation reports and related conclusions. Team members should familiarize themselves with definitions, classification, and characterization criteria to better understand how this information can be used to meet the company's compliance requirements.

Understand the Purpose and Use of the Accumulation Evaluations

In today's economic environment, E&P companies try to maximize their value by (1) acquiring other companies or specific E&P upstream assets, (2) disposing of a subsidiary or part of its operations, or (3) merging with another company. In these transactions, companies must consider information related to the developed and undeveloped accumulations, and management must understand the information in evaluation reports and its impact on the value of any M&A transaction. Such information might also affect the purchase price allocation if these deals are consummated.

Thinking Ahead

Deloitte's Oil & Gas practice will continue to monitor activity related to accounting standard setting, SEC rulemaking, and regulatory compliance requirements. As warranted, the team will publish additional issues of *Oil & Gas Spotlight* about these activities as well as host industry seminars, *Dbriefs* webcasts, and roundtable discussions.

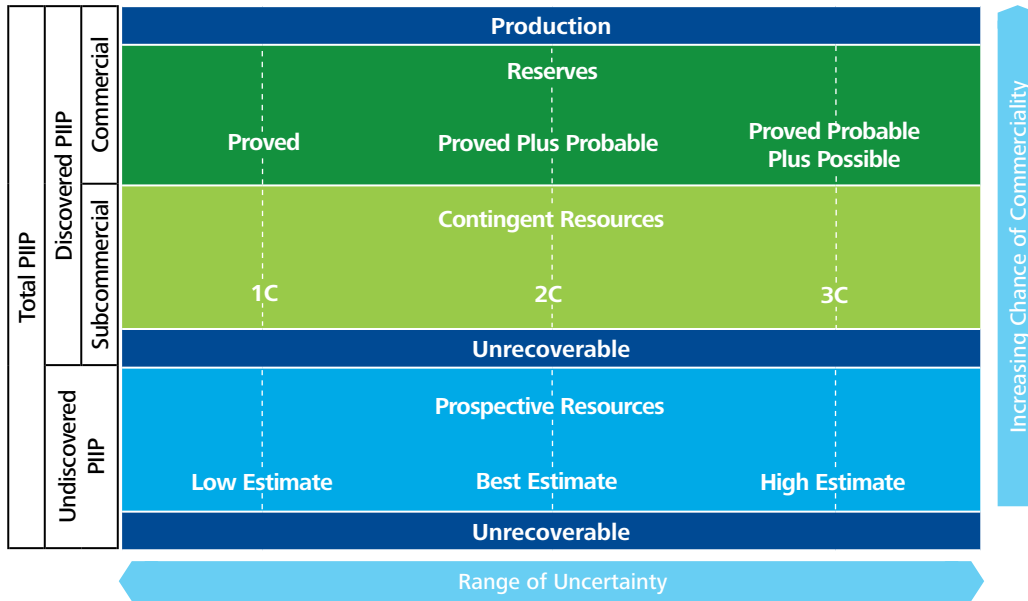
Potential topics of future roundtables include discussions related to the following:

- *Business combinations* — Considerations for companies interested in acquiring U.S. natural gas assets.
- *Internal controls* — Changes related to compliance in the 10 years that the Sarbanes-Oxley Act has been in effect.

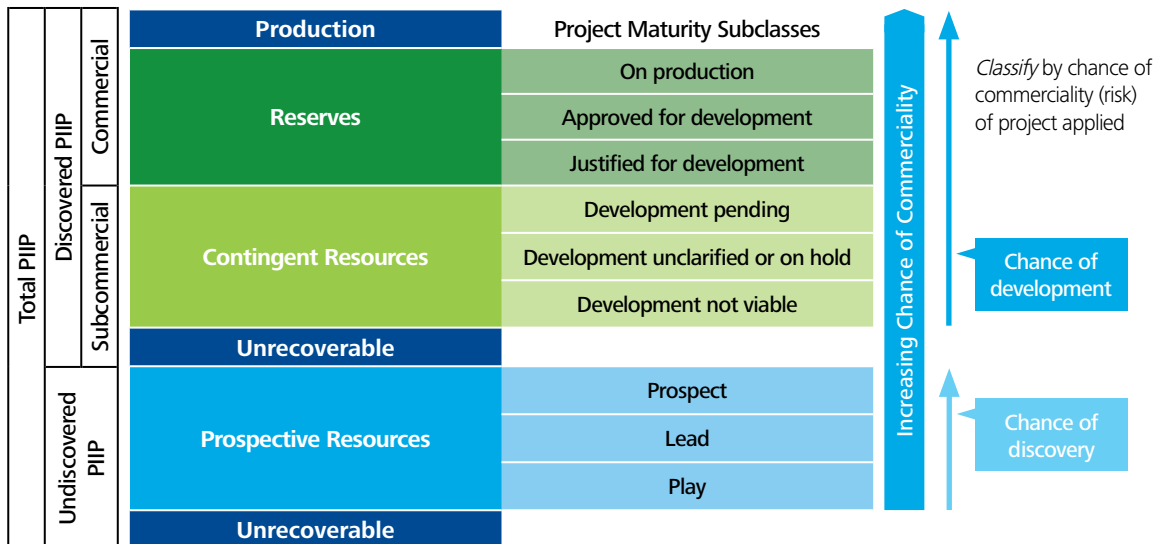
Appendix — Petroleum Resources Classification Framework and Classification of Resources and Reserves

Evaluations are based on recognized practices, procedures, and guidelines of the SEC’s Regulation S-X, the PRMS, and the Canadian Oil and Gas Evaluation Handbook.¹⁰

Petroleum Resources Classification Framework



Classification of Resources and Reserves



¹⁰ Images adapted from PRMS 2007.

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