

PRMS Errata 2022

Changes between version 1.02 and version 1.03

Title page was changed from “Revised August 2022” To “Revised June 2018, v. 1.03” to avoid confusion.

Changes between version 1.01 and version 1.02

1. Issue: Unclear language in the definition of Gas Hydrates.

Definition of Gas Hydrates reads as follows:

Gas Hydrates	2.4	Naturally occurring crystalline substances composed of water and gas, in which a solid water lattice accommodates gas molecules in a cage-like structure or clathrate. At conditions of standard temperature and pressure, one volume of saturated methane hydrate will contain as much as 164 volumes of methane gas. Gas hydrates are included in unconventional resources, but the technology to support commercial maturity has yet to be developed.
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At standard conditions, the hydrate will no longer contain, but rather will release that much methane gas.

Solution:

Naturally occurring crystalline substances composed of water and gas, in which a solid water lattice accommodates gas molecules in a cage-like structure or clathrate. ~~At conditions of standard temperature and pressure, one volume of saturated methane hydrate will contain as much as 164 volumes of methane gas.~~ One volume of saturated methane hydrate will contain as much as 164 volumes of methane gas at standard temperature and pressure conditions. Gas hydrates are included in unconventional resources, but the technology to support commercial maturity has yet to be developed.

2. Issue: Inconsistent treatment of synthetic oil and synthetic gas.

Note: We were made aware of a synthetic gas project, where coal was being treated in situ to generate synthetic natural gas. The evaluator wanted to use PRMS to evaluate the project, but was concerned that it might be an improper application since although synthetic crude oil is mentioned, synthetic gas is not. These types of projects are pretty rare, but if we recognize synthetic crude, it seems inconsistent that we would not recognize synthetic gas, or at least synthetic gas derived from petroleum resources.

PRMS implies that syncrude is acceptable even though it is obviously not “naturally occurring,” which is a condition that we state in the very first sentence in the preamble to PRMS as well as elsewhere:

Preamble: Petroleum resources are the quantities of hydrocarbons naturally occurring on or within the Earth’s crust.

- 1.1.0.1 Petroleum is defined as a **naturally occurring mixture** consisting of hydrocarbons in the gaseous, liquid, or solid state.
- 1.1.0.2 The term resources as used herein is intended to encompass all quantities of **petroleum naturally occurring within the Earth's crust**...
- 1.1.1.5 A: **Total Petroleum Initially-In-Place (PIIP)** is all quantities of petroleum that are estimated to exist originally in **naturally occurring accumulations**
- Glossary: Petroleum: Defined as a **naturally occurring mixture** consisting of hydrocarbons in the gaseous, liquid, or solid phase.

In section 3.2.9.2, synthetic crude oil is mentioned, noting that it is acceptable to include with other liquid hydrocarbons, and so by inference, it is suggested that it is acceptable to include in PRMS.

3.2.9.2 Oil, condensate, bitumen and **synthetic crude oil** can be summed together without conversion (i.e., 1 bbl volume = 1 BOE). NGLs may need to be converted, depending on the actual composition. Natural gas must be converted to report on a BOE basis.

A definition of synthetic crude oil is included in the glossary:

A mixture of hydrocarbons derived by upgrading (i.e., chemically altering) natural bitumen from oil sands, kerogen from oil shales, or processing of other substances such as natural gas or coal. Synthetic crude oil may contain sulfur or other non-hydrocarbon compounds and has many similarities to crude oil.

Note: The terms “synthetic gas” and “synthetic natural gas” appear to be used somewhat interchangeably but can be quite different compounds. Synthetic Natural Gas (sometimes Substitute Natural Gas) is predominately methane that can be produced from fossil fuels or biofuels. Synthetic Gas (Syngas, synthesis gas) is primarily hydrogen and carbon monoxide. It most commonly is derived from coal, but can have biomass sources such as wood or charcoal. It is not the intent of PRMS to be broad enough to encompass sources such as biomass, but rather to allow the inclusion of synthetic gas (whether “synthetic gas” or “synthetic natural gas”) derived from naturally occurring petroleum / hydrocarbon reservoirs or deposits.

Solution:

Section 3.2.9.2. revised as follows:

3.2.9.2. Oil, condensate, bitumen and synthetic crude oil can be summed together without conversion (i.e., 1 bbl volume = 1 BOE). NGLs may need to be converted, depending on the actual composition. Natural gas **and Synthetic Gas** must be converted to report on a BOE basis.

Add a definition for synthetic gas in the Glossary:

Synthetic Natural Gas (or Synthetic Gas): 3.2.9 A fuel gas, whether predominately methane or carbon monoxide, derived from fossil fuels such as coal, oil shale, or other naturally occurring petroleum resources.

3. Issue: PRMS reference – short version

In the preamble, note that:

The document is referred **to by the abbreviated term SPE-PRMS**, with the caveat that the full title, including clear recognition of the co-sponsoring organizations, has been initially stated. In 2011, the

SPE/WPC/AAPG/SPEE/SEG published Guidelines for the Application of the PRMS (referred to as Application Guidelines).

Yet throughout the remainder of PRMS, the document is simply referred to it as PRMS rather than SPE-PRMS.

Solution:

Revised the preamble as follows:

The document is referred to by the abbreviated term SPE-PRMS or simply PRMS, with the caveat that the full title, including clear recognition of the co-sponsoring organizations, has been initially stated. In 2011, the SPE/WPC/AAPG/SPEE/SEG published Guidelines for the Application of the PRMS (referred to as Application Guidelines).

4. Issue: Definition of Development not viable

There is an inconsistency between the Table 1 Definition of “...limited production potential” and the glossary definition of “...limited commercial potential”

Table 1: Definition: A discovered accumulation for which there are no current plans to develop or to acquire additional data at the time because of limited **production** potential.

Table 1: Guidelines: The project is not seen to have potential for eventual commercial development at the time of reporting, but the theoretically recoverable quantities are recorded so that the potential opportunity will be recognized in the event of a major change in technology or commercial conditions.

The project decision gate is the decision not to undertake further data acquisition or studies on the project for the foreseeable future.

Glossary: A discovered accumulation for which there are contingencies resulting in there being no current plans to develop or to acquire additional data at the time due to limited **commercial** potential. A project maturity sub-class of Contingent Resources.

Solution:

Revise the definition in Table 1 as follows:

Table 1: Definition: A discovered accumulation for which there are no current plans to develop or to acquire additional data at the time because of limited ~~production~~ commercial potential.

5. Issue: Inconsistency between 3.1.2.1 and glossary for definition of Economic.

Section 3.1.2.1 describes the economic determination using a zero percent discount rate, whereas the glossary discusses economic in terms of a discount rate greater than or equal to zero percent. The glossary is not, strictly speaking, in error, but since the real test is at zero percent, the glossary definition should be revised to only zero percent, since introducing discount rates

greater than zero could be misunderstood to imply that commercial discount rates should be a part of the determination.

Section 3.1.2.1: Economic determination of a project is tested assuming a **zero percent discount rate (i.e., undiscounted)**. A project with a positive undiscounted cumulative net cash flow is considered economic. Production from the project is economic when the revenue attributable to the entity interest from production exceeds the cost of operation. A project's production is economically producible when the net revenue from an ongoing producing project exceeds the net expenses attributable to a certain entity's interest. The ADR costs are excluded from the economic producibility determination. A project is commercial when it is economic and it meets the criteria discussed in Section 2.1.2.

Glossary: Economic: A project is economic when it has a positive undiscounted cumulative cash flow from the effective date of the evaluation, the net revenue exceeds the net cost of operation (i.e., positive cumulative net cash flow at **discount rate greater than or equal to zero percent**).

Solution:

Revise the Glossary definition as follows:

Economic: A project is economic when it has a positive undiscounted cumulative cash flow from the effective date of the evaluation: the net revenue exceeds the net cost of operation (i.e., positive cumulative net cash flow at ~~discount rate greater than or equal to zero percent~~ a zero percent discount rate).

6. Issue: Incomplete references in Preamble.

There are several references that use a description of the document rather than its name.
Recommendation: Paragraph 2 is shown below with revised references:

Solution:

International efforts to standardize the definitions of petroleum resources and how resources volumes are estimated began in the 1930s. Early guidance focused on Proved Reserves. Building on work initiated by the Society of Petroleum Evaluation Engineers (SPEE), the Society of Petroleum Engineers (SPE) published definitions for all reserves categories in 1987. In the same year, the World Petroleum Council (WPC), then known as the World Petroleum Congress, independently published reserves definitions that were strikingly similar. In 1997, the two organizations jointly released a single set of definitions for reserves that could be used worldwide. In 2000, the American Association of Petroleum Geologists (AAPG), SPE, and WPC jointly developed a classification system for all petroleum resources. This was followed by ~~the supplemental application evaluation guidelines (Guidelines for the Evaluation of Reserves and Resources 2001), standards for Estimating and Auditing Standards for Reserves information (2001, latest revision June 2019 revised 2007)~~, and a glossary of terms used in resources definitions (2005). In 2007, the *SPE/WPC/AAPG/SPEE Petroleum Resources Management System (PRMS)* was issued and subsequently supported by the Society of Exploration Geophysicists (SEG). The document is referred to by the abbreviated term SPE-PRMS, with the caveat that the full title, including clear recognition of the co-sponsoring organizations, has been initially stated. In 2011, the SPE/WPC/AAPG/SPEE/SEG published *Guidelines for the Application of the PRMS* (referred to as Application Guidelines).

7. Minor Editing Issues:

Solution A: Section 2.2.0.2 shown with correction: add “reserves” for clarity, change “commercial chance of success”(an undefined term) to “chance of commerciality”(a defined term).

2.2.0.2. The uncertainty in a project’s recoverable quantities is reflected by the 1P, 2P, 3P, Proved (P1), Probable (P2), Possible (P3) ~~reserves~~; 1C, 2C, 3C, C1, C2, and C3 ~~contingent resources~~; or 1U, 2U, and 3U ~~prospective~~ resources categories. The ~~chance of commerciality~~ ~~commercial chance of success~~ is associated with resources classes or sub-classes and not with the resources categories reflecting the range of recoverable quantities.

Solution B: Non-Sales definition shown with correction (Glossary):

That portion of estimated recoverable or produced quantities that will not be included in sales as contractually defined at the reference point. Non-sales include quantities of CiO, flare, and surface losses, and may include non-hydrocarbons.

Solution C: Risk and Reward definition shown with correction (Glossary):

Risk and reward associated with oil and gas production activities are attributed primarily from the variation in revenues caused d by technical and economic risks. The exposure to risk in conjunction with entitlement rights is required to support an entity’s resources recognition. Technical risk affects an entity’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 cost, price, and political or other economic factors.

Solution D: Split Classification definition shown with correction (Glossary):

A single project should be uniquely assigned to a sub-class along with its uncertainty range. For example, a project cannot have quantities categorized as 1C, 2P, and 3P. This is referred to as “split classification.” If there are differing commercial conditions, separate sub-classes should be defined.

Solution E: Section 2.1.3.5.2 shown with correction:

2.1.3.5.2. Maturity terminology and definitions for each project maturity class and sub-class are provided in Table ~~4~~1. This approach supports the management of portfolios of opportunities at various stages of exploration, appraisal, and development. Reserve sub-classes must achieve commerciality while Contingent and Prospective Resources sub-classes may be supplemented by associated quantitative estimates of chance of commerciality to mature.

Solution F: Figure 2.1 show with correction:

The arrows on the x -axis should extend farther to align with the vertical lines. The “Not to scale” notation at the bottom should be associated with the arrows, as was done for Figure 1.1. Shown below are the figures as they currently exist.

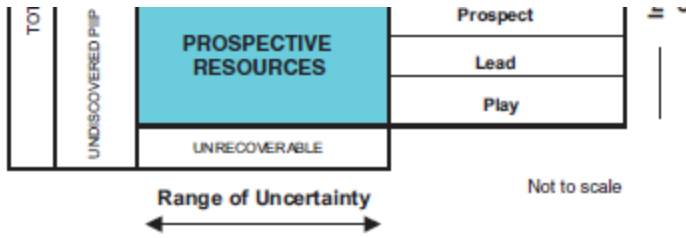


Figure 2.1—Sub-classes based on project maturity

Corrected Figure 2.1:

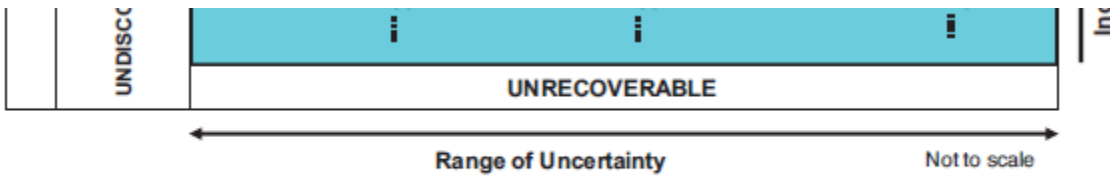


Figure 1.1—Resources classification framework

Solution G: Section 1.1.0.3 shown with correction:

Note: Unrecoverable Petroleum is not a defined term. Unrecoverable Resources is a defined term and should be substituted here. The reference to Unrecoverable Petroleum probably arises from the discussion in 1.1.0.2, and while Unrecoverable Petroleum is not incorrect, Unrecoverable Resources should be used as the more correct and consistent term.

1.1.0.3 Figure 1.1 graphically represents the PRMS resources classification system. The system classifies resources into discovered and undiscovered and defines the recoverable resources classes: Production, Reserves, Contingent Resources, and Prospective Resources, as well as Unrecoverable Resources Petroleum.

