



Navigating the Changing World of Reserves and Resources in the Context of the PRMS

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What constitutes Technology Under Development?

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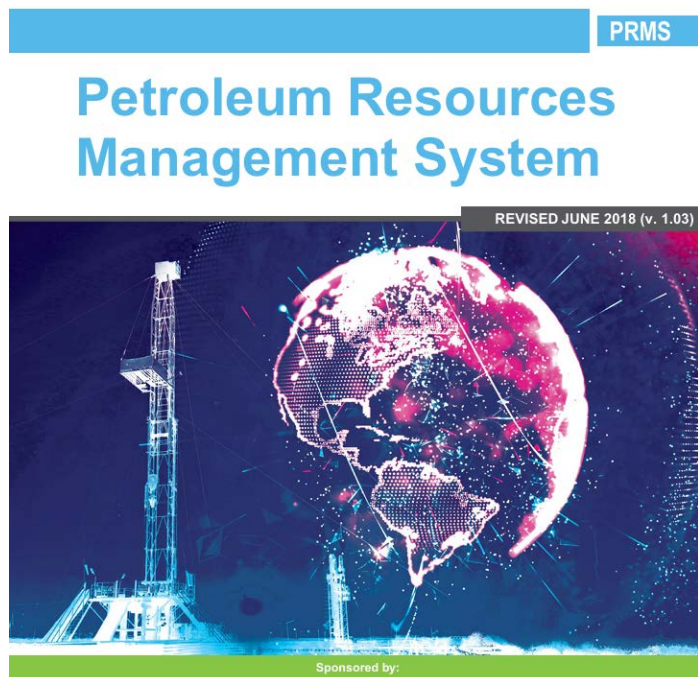
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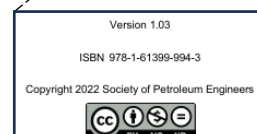
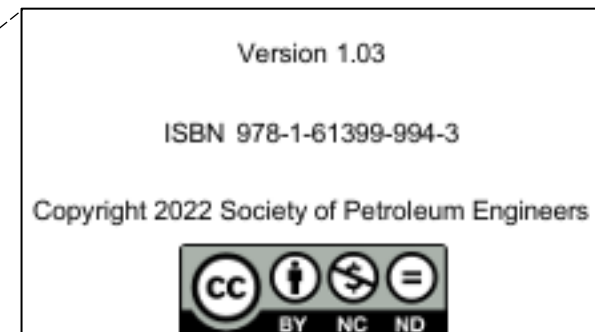


Petroleum Resources Management System

(revised June 2018)

Sponsored by:

- Society of Petroleum Engineers (SPE)
- World Petroleum Council (WPC)
- American Association of Petroleum Geologists (AAPG)
- Society of Petroleum Evaluation Engineers (SPEE)
- Society of Exploration Geophysicists (SEG)
- Society of Petrophysicists and Well Log Analysts (SPWLA)
- European Association of Geoscientists & Engineers (EAGE)



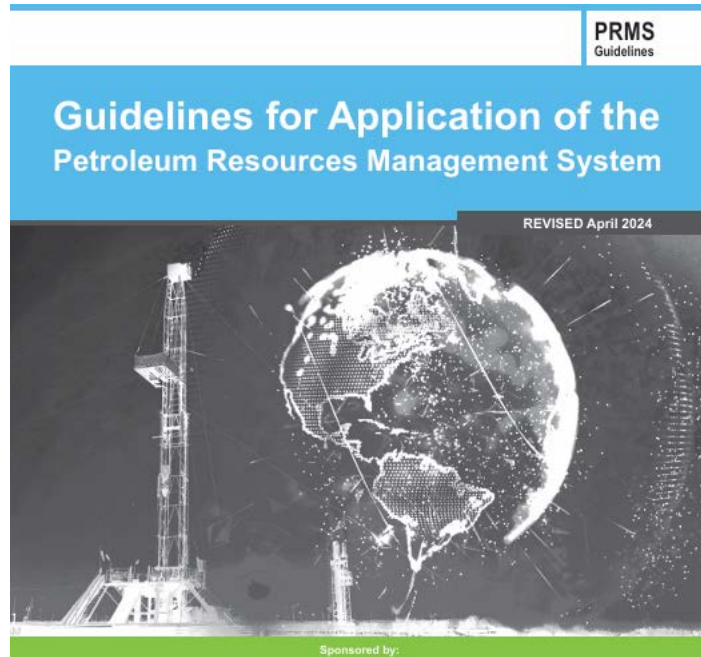
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2018 PRMS v1.03, #.#.#.#, p##

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Guidelines for Application of the Petroleum Resources Management System

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2024 Guides v1.01, #.#.#.#, p##

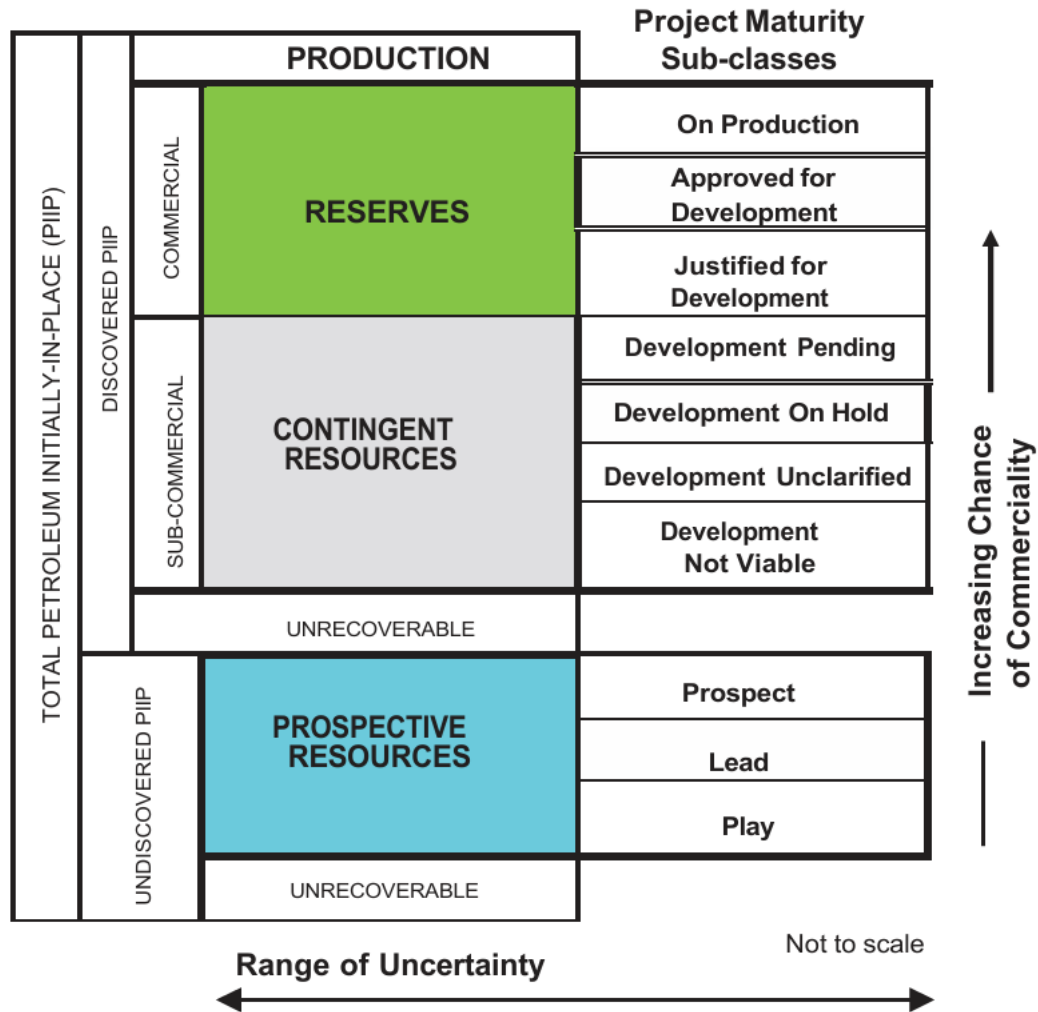
2018 PRMS introduces Technology Under Development

- B. Contingent Resources** are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from known accumulations, by the application of development project(s) not currently considered to be commercial owing to one or more contingencies. Contingent Resources have an associated **chance of development**. Contingent Resources may include, for example, projects for which there are currently no viable **markets**, or **where commercial recovery is dependent on technology under development**, or where evaluation of the accumulation is insufficient to clearly assess commerciality. Contingent Resources are further categorized in accordance with the range of uncertainty associated with the estimates and should be sub-classified based on project maturity and/or **economic** status.



2018 PRMS introduces Technology Under Development

Technology Under Development	2.1.1	Technology that is currently under active development and that has not been demonstrated to be commercially viable. There should be sufficient direct evidence (e.g., a test project/pilot) to indicate that the technology may reasonably be expected to be available for commercial application.
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Technology Under Development (TUD) is not one of the sub-classes

But volumes contingent on TUD must relate to or be classified under one of these sub-classes

Figure 2.1—Sub-classes based on project maturity



What subclass should TUD fall under?

Based on your understanding of the 2018 PRMS

Justified for development

Development Pending

Development on Hold

Development Unclassified

Development not Viable

Unrecoverable

Multiple

What about the sub-class for TUD?

How to assess the sub-class of the contingent resources volumes is apparently left undefined.

If this was intentional, it would behoove the reader for the authors to add a comment that CRs contingent on TUD could fall under various sub-classes, and judgment should be exercised in how the sub-class is identified. Justification for such sub-classification should be clearly documented.

If it was unintentional, it should be addressed in the upcoming revision, and guidance should be provided as well.

What sub-class should TUD fall under?

- Justified for development — No; this is a Reserves SC
- Development Pending — Maybe depending on stage
- Development on Hold — Most likely
- Development Unclarified — Potentially?
- Development not Viable — Apparently not but maybe so?
- Unrecoverable — Apparently so

Section 2.3 Clarifies CR vs Unrecoverable

For projects not yet deemed commercial, Contingent Resources may be assigned if the recoverable quantity is dependent on either “established technology” or “technology under development.” The following guidelines should be used to distinguish these Contingent Resources from those significant quantities that should be classified as Discovered Unrecoverable:

- The technology has been demonstrated to be commercially viable in analogous reservoirs; in this case, the Discovered Recoverable quantities may be classified as Contingent Resources.
- The technology has been demonstrated to be commercially viable in other reservoirs that are *not* analogous, and a pilot project will be necessary to demonstrate commerciality for this reservoir.
 - If a pilot project is conducted and deemed technically successful, then Discovered Recoverable quantities from the full project may be classified as Contingent Resources.
 - If a pilot project is conducted and deemed technically unsuccessful, then all quantities should be classified as Discovered Unrecoverable.
- The technology has *not* been demonstrated to be commercially viable but is currently under active development, and there is sufficient direct evidence (e.g., from a test project in an analogous reservoir) to indicate that it may reasonably be expected to be available for commercial application. In this case, Discovered Recoverable quantities from the full project may be classified as Contingent Resources.
- The technology has *not* been demonstrated to be viable and is *not* currently under active development; in this case, all quantities should be classified as Discovered Unrecoverable.

CR sub-class?

Discovered Unrecoverable

Unrecoverable?

- E. **Unrecoverable Resources** are that portion of either discovered or undiscovered PIIP evaluated, as of a given date, to be unrecoverable by the currently defined project(s). **A portion of these quantities may become recoverable in the future as** commercial circumstances change, **technology is developed**, or additional data are acquired. The remaining portion may never be recovered because of physical/chemical constraints represented by subsurface interaction of fluids and reservoir rocks.

Unrecoverable?

The quantities that are classified as Unrecoverable should be limited to those that are currently not technically recoverable by a defined project based on established technology or technology under development (see Section 2.3). A portion of these Unrecoverable quantities may become recoverable in the future if new technology is developed, commercial circumstances change, or additional data is acquired.

Unrecoverable?

Discovered accumulations may contain in-place quantities that are not considered viable to recover using established technology or technology under development; such quantities may be classified as **Discovered Unrecoverable** (i.e., no Contingent Resources). Future technological advances or improvements in commercial circumstances may move those Unrecoverable quantities to **Contingent Resources or Reserves** (PRMS § 2.1.1.2).

Development Not Viable?

<p>Development Not Viable</p>	<p>A discovered accumulation for which there are no current plans to develop or to acquire additional data at the time because of limited commercial potential.</p>	<p>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.</p> <p>The project decision gate is the decision not to undertake further data acquisition or studies on the project for the foreseeable future.</p>
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Development Not Viable?

- **Development Not Viable** is assigned when a technically viable project has been assessed as being of insufficient potential to warrant development, acquiring additional data, or any further efforts to remove contingencies. However, the estimated recoverable quantities are recorded so that the potential development opportunity will be recognized in the **event of a major change in technology** and/or commercial conditions. Projects in this subclass would be expected to have a low chance of commerciality.

Development Unclarified?

Development Unclarified	<p>A discovered accumulation where project activities are under evaluation and where justification as a commercial development is unknown based on available information.</p>	<p>The project is seen to have potential for eventual commercial development, but further appraisal/evaluation activities are ongoing to clarify the potential for eventual commercial development.</p>
		<p>This sub-class requires active appraisal or evaluation and should not be maintained without a plan for future evaluation. The sub-class should reflect the actions required to move a project toward commercial maturity and economic production.</p>

Development Unclarified?

- **Development Unclarified** is for discovered accumulations where additional data and analysis are required to define a development plan, and appraisal activities are ongoing to clarify the potential for development (e.g., a recent discovery). Contingencies have yet to be fully defined, and the chance of commerciality may be difficult to assess with any confidence.

Development On Hold?

Development on Hold

A discovered accumulation where project activities are on hold and/or where justification as a commercial development may be subject to significant delay.

The project is seen to have potential for commercial development. Development may be subject to a significant time delay. Note that a change in circumstances, such that there is no longer a probable chance that a critical **contingency** can be removed in the foreseeable future, could lead to a reclassification of the project to Not Viable status.

The project decision gate is the decision to either proceed with additional evaluation designed to clarify the potential for eventual commercial development or to temporarily suspend or delay further activities pending resolution of external contingencies.

Development On Hold?

Development On Hold is typified when a development plan has been identified, and the project is considered to have at least a reasonable chance of commerciality, but there are contingencies that need to be resolved before the project can move toward development. The contingencies may be either internal or external (examples: lack of funding, uncertainty of obtaining necessary permits). The primary difference between Development Pending and Development On Hold is that in the former case, the remaining contingencies are being addressed (e.g., data collection, negotiations) and are reasonably expected to be resolved within a reasonable time frame, whereas **in the latter case, resolution of the primary contingencies may be seen less favorably and be subject to a significant time delay (e.g., technology advancement,** market development, regulatory policy progression). Any change in circumstances, such that there is no longer a probable chance that a critical contingency can be removed in the foreseeable future, could lead to a reclassification of the project to a Development Not Viable sub-class.

Development Pending?

Development Pending

A discovered accumulation where project activities are ongoing to justify commercial development in the foreseeable future.

The project is seen to have reasonable potential for eventual commercial development, to the extent that further data acquisition (e.g., drilling, seismic data) and/or evaluations are currently ongoing with a view to confirming that the project is commercially viable and providing the basis for selection of an appropriate development plan. **The critical contingencies have been identified and are reasonably expected to be resolved within a reasonable time-frame.** Note that disappointing appraisal/evaluation results could lead to a reclassification of the project to On Hold or Not Viable status.

The project decision gate is the decision to undertake further data acquisition and/or studies designed to move the project to a level of technical and commercial maturity at which a decision can be made to proceed with development and production.

Development Pending?

- **Development Pending** is limited to those projects that are **actively subject to project-specific activities, such as appraisal drilling or detailed evaluation**, that are designed to confirm commerciality and/or **to determine the optimum development scenario**. In addition, it may include projects that have nontechnical contingencies, provided these contingencies are currently being actively pursued by the developers and are expected to be resolved positively within a reasonable time frame. Such projects would be expected to have a high probability of becoming a commercial development (i.e., a high chance of commerciality).

What about the sub-class for TUD?

How to assess the sub-class of the contingent resources volumes is apparently left undefined.

If this was intentional, it would behoove the reader for the authors to add a comment that CRs contingent on TUD could fall under various sub-classes, and judgment should be exercised in how the sub-class is identified. Justification for such sub-classification should be clearly documented.

If it was unintentional, it should be addressed in the upcoming revision, and guidance should be provided as well.

Other questions

- Does or should CRs contingent on TUD include a reasonable timeframe component?
 - On hold does not include the reasonable timeframe stipulation.
 - Unclarified requires a plan for future evaluation.

Other questions

- What constitutes "under active development" (Table 2, p 51)?
 - Is a desktop study sufficient?
 - Is a delay in pilot execution a justifiable reason to leave the volumes in the On Hold category?
 - Is ongoing activity in one area that may be analogous sufficient to maintain CRs in another area?

Other questions

- What constitutes "sufficient direct evidence (e.g., a test project/pilot)" (Table 2, p51)?

Other questions

- How many pilot project plans can be implemented and fail before volumes must be reclassified as Discovered Unrecoverable (Guidelines 2.3, p10)?
 - Supposing the operator truly is under active development of technology and has 2 or 3 potential projects defined

Other questions

- What is the distinguishing factor between reclassifying On Hold volumes to Discovered Unrecoverable (Guidelines 2.3, p10) vs to Not Viable (Table 1, p33)?