RYDER SCOTT

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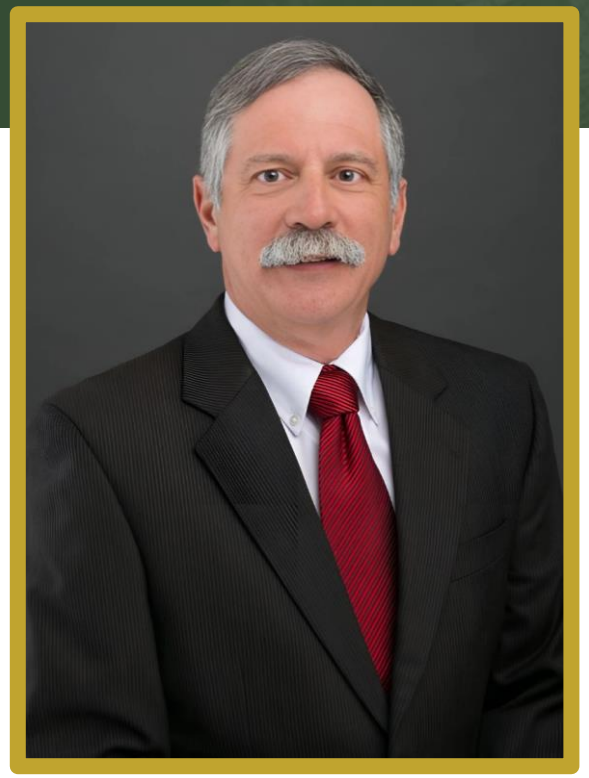

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Dan Olds, P.E., is Managing Senior Vice President and a member of the Board of Directors at Ryder Scott Company, where he has served for more than two decades. With over 40 years of petroleum engineering experience, he is recognized for expertise in reserves evaluations, economic analysis, and regulatory compliance across North America, South America, and Asia.

He has led major reserves audits and valuation projects, including certification audits and fiscal regime renegotiations, and has provided expert witness testimony in state and federal courts. His technical strengths include reservoir engineering, PSC tax modeling, and Competent Person's Reports, with specialization in unconventional resources and A&D.

Earlier in his career, Dan held leadership roles at Wintershall Energy and PricewaterhouseCoopers. He holds a B.S. in Petroleum Engineering from West Virginia University and an MBA from the University of Houston.

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SPE-PRMS Frequently Asked Questions (FAQs)

Presented by:
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Did you know?

- Part of the work for the PRMS Applications Guidelines included a listing of Frequently Asked Questions.
- These questions are posted on the SPE website and include responses from the OGRC.
- There are 42 questions that cover a variety of topics:
  - Communication with the SPE OGRC
  - Production
  - Reserves
  - Contingent Resources
  - Prospective Resources
  - Miscellaneous Topics

2.1. Question: Fig 1.1 includes Production. This Production should be "raw," which means combined sales and non-sales. Raw Production is required for reservoir voidage in Discovered PIIP (Raw Production + Reserves + Contingent Resources + Unrecoverable). However, §1.1.0.5 C describes production as being measured in terms of the sales product specifications.

1.1.0.5 C Production is the cumulative quantities of petroleum that have been recovered at a given date. While all recoverable resources are estimated, and production is measured in terms of the sales product specifications, raw production (sales plus non-sales) quantities are also measured and required to support engineering analyses based on reservoir voidage.

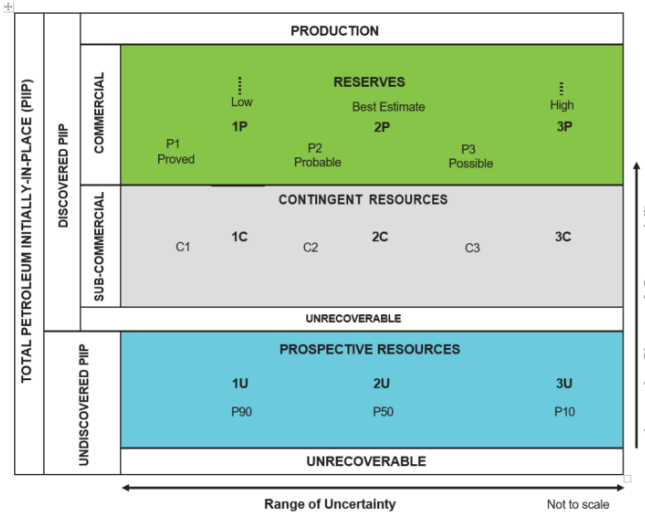

Figure 1.1—Resources classification framework

Answer: [Oct. 2022] Production in Fig 1.1 is the cumulative quantities recovered at a given date of either (i) “Raw Production” when ensuring consistency in voidage and material balance calculations or (ii) petroleum measured in terms of the sales or marketable hydrocarbons (depending on how Consumed in Operations is recognized) product specifications that are recognized at the Reference Point(s) for Reserves and Resources classification.

If the Reference Point is at the wellhead, then Production = Raw Production.

3.3. Question : 1P = 0 and P1 + P2 = 2P. If the 1P (or P1) is uneconomic when using the deterministic incremental method, what is 2P? Is it P1 + P2 or is it 0 + P2 (which does not add up)?

Answer: [Oct. 2022] If all the low-case quantities fail the Reserves qualification test in the Proved area, then 1P = 0, while if the best-estimate quantities pass the commerciality test (including economic viability), this will allow 2P Reserves recognition.

The deterministic incremental method has discrete estimates made for each category. The development technical evaluation quantities are denoted in the example table.

P1 = proved, requires positive economics of the low estimate

2P = P1 + P2, denotes the best estimate

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Example: Project evaluation example that results in the low and best estimate technical assessment that is then tested for economics. Three different scenarios are shown below to illustrate the technical quantity referenced that "passes" or "fails" an economic testing where the technical low scenario outcome is 5 and the best estimate outcome is 7 (5 + 2).

Scenario	Category Tested for	Technical Assessment (TA)	Reserves after economics test
1) Low case passes economics	P1 P2	5 2	5 2
Reserves	1P = P1 = 5 2P = P1 + P2 = 7		
2) Low case fails and best estimate passes economics	P1	5	0
	P2	2	7
Reserves	1P = P1 = 0 2P = P1 + P2 = 7		
3) Low case and best estimate fail economics	P1	5	0
	P2	2	0
Reserves	1P = P1 = 0 2P = P1 + P2 = 0		

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When the low case fails screening economics, the 2P scenario still respects the best estimate evaluation quantities. Thus, the best estimate outcome will be the same when it has positive economics regardless of the low case economics outcome.

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3.5. Question: Reserves in unpenetrated fault blocks. Can we claim "discovery" status for an unpenetrated conventional accumulation if we have strong justification and are committed to a commercial development, e.g., a 99% success rate (in target or alternate target) from many nearby analogues and application of technology?

Note this is a two part question.

Answer: [Oct. 2022] No, an unpenetrated petroleum accumulation, by definition, is undiscovered and cannot be deemed to be discovered.

A Qualified Reserves Evaluator's evaluation is required in establishing "discovery" status after drilling a well and meeting the PRMS discovery criteria (refer to §2.1.1.) for an accumulation to be a "known accumulation."

Second part of question: Within a "discovered accumulation" that has Reserves, can we include unpenetrated fault blocks in that accumulation as Reserves?

Answer: Yes, provided the hydraulic communication between fault blocks evaluated within the hydrocarbon column (not through a downdip common aquifer) is assessed with a degree of confidence.

Of course, the commercial criteria for Reserves need to be satisfied for such unpenetrated fault blocks.

3.8. Question: Commodity price change impact on Reserves. In an existing "on production" developed project, should we transfer the former Reserves quantities that failed to meet the economics criterion at the end of the year to Contingent Resources (CR)? (With price increases in future years, this quantity may again move back to the existing project.) Alternatively, should we de-book the quantity completely and record zero in both Reserves and Contingent Resources? If we move the quantity to CR, should there be an "on production" or developed status in CR?

Answer: [Oct. 2022] The PRMS uses forecast prices as of the effective date to assess economic viability. If there is a major negative change in the product price forecasts at year-end, projects that are “on production” may no longer meet the economic hurdles for Reserves and would need to be reclassified as CR.

The Reserves will be moved to CR at year end with the updated product prices. The PRMS does not include a sub-class of CR “on production” but it does include the CR “Not Viable” sub-class to describe this situation. §3.1.3.5 explains how to account for production in future years, and the evaluator will need to review the CR annually to determine whether the classification as CR or Reserves is appropriate at the time.

For regulatory reporting, issuers should consult the applicable commodity pricing guidance that the regulator provides.

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Additional note:

§3.1.3.5 of the PRMS explains that: *In some situations, entities may choose to initiate production below or continue production past the economic limit. Production must be economic to be considered as Reserves, and the intent to or act of producing sub-economic resources does not confer Reserves status to those quantities. In these instances, the production represents a movement from Contingent Resources to Production. However, once produced such quantities can be shown in the reconciliation process for production and revenue accounting as a positive technical revision to Reserves. No future sub-economic production can be Reserves.*

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3.11. Question: Project scope in Reserves. Can the same project have different work programs underlying its various Reserves categories? (e.g., 1P with 1 well and tie-in to existing 3rd party facility, 2P assuming 5 wells and tie-in, and 3P with 8 wells and standalone facility construction.)

- **Answer:** [Oct. 2022] There can be variations in the number of wells to be drilled between 1P, 2P, and 3P. However, in the example, changing the surface facility for the 3P scenario has a different facility scope than what is in the 2P development decision in the field development plan that was the technical basis of the project's commerciality investment decision. The feasibility to implement the 3P scope is not aligned with 2P and thus is not allowed. Without the decision to execute and fund up to the 3P activities, the commercial conditions are not met to support the incremental wells and stand-alone facility, Reserves for the standalone facility cannot be recognized in 3P. The 3P can only recognize the high side of the 2P project. A new investment decision for the upside scope will be a separate project and that project will be in Contingent Resources.

- **4.1. Question: Contingent Resources sub-classes. Why is the sub-class "On Hold" considered more mature than the sub-class "Unclarified?"**

Answer: [Oct. 2022] Evaluators are to review the project's chance of commerciality link on the vertical axis of the PRMS framework matrix (Fig. 1.1) on an individual project basis. The evaluator shall not automatically assign a chance of commerciality because of the sub-class name.

The evaluator may conclude that some projects have a greater chance of commerciality than others when placing them in these two sub-classes, especially if results of recent activity have not clarified the project's justification as a commercial development.

In relation to this, the PRMS requires a defined project, commensurate with the maturity of the project, as the basis for its recoverable resources estimates, even for Not Viable and Unclarified (refer to §1.1.0.6 E, §1.2.0.9, §2.1.0.1, §2.2.0.1, and various sections in §4.0).

A project "On Hold" typically will have a development scope but is not being advanced where justification as a commercial development may be subject to a significant delay. In the Unclarified sub-class, the project scope (i.e., size, wells count, facilities, development type, etc.) typically are still under additional evaluation for refinement/selection.

Development Unclarified sub-class is assigned when the project scope has definition but there may still be several development options which depend on evaluation work still underway or there may be commerciality criteria that render the project maturity as "unclarified." Project activities are ongoing in attempt to clarify whether or not the project may mature to Reserves.

4.3. Question: Economic limit consideration in Resources. Should Contingent Resources (or Prospective Resources) be subjected to an economic limit test?

Answer: [Oct. 2022] Resources include quantities from projects that do not meet all Reserves criteria and economics may be one of the criteria not met. Thus, the economic limit may or may not be taken into account for the Contingent Resources assessment. If evaluators include Contingent Resources quantities based on economics within contract terms because they want to clearly define the quantities to be reported as potential Reserves based on project scope envisioned, then they should apply economic producibility with an economic limit test determination. If the objective is to recognize the project's potential recovery, the evaluation process may use a technical limit instead.

Contingent and Prospective Resources have different project maturity sub-class levels and, for projects approaching Commerciality (Contingent Resources Development Pending), evaluators should increase focus on achieving economic criteria. Contingent Resources projects are already discovered and may be approaching Commerciality determination, while Prospective Resources are not at such level of maturity.

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Entities that are maturing a project in the Contingent Resources Development Pending sub-class and intend to move the project into the Reserves class will have economics included in the entity's assessment of project commercial viability.

In preparing to decide to drill Prospective Resources projects in the Prospect sub-class, a risk assessment with economics is typically evaluated to support investment decision. Please note that economics are only one element of commerciality.

Entities may assign less-mature projects with no economic evaluation (or which are non-commercial) to Contingent and Prospective Resources sub-classes that reflect their remaining contingencies. Evaluators should clarify their assumptions and state whether or not they have applied an economic limit test.

2/2

4.7. Question: Reasonable time frame for Contingent Resources. Is there a limit to the time Contingent Resources remain in Development Pending? If so, is a “reasonable” time five years as for Reserves?

Answer: [Oct. 2022] The PRMS does not give a specified time frame a project may reside in Development Pending but does denote the project will achieve commerciality in the foreseeable future. Evaluators should determine the time limit, if any, that resources should remain in Development Pending and should be able to defend their assumptions. The justification must be documented and must be based on the assumptions within the reasonable forecast conditions.

For Reserves, the PRMS denotes five years to be developed as a recommended benchmark while a longer time period could be applied where justified.

4.8. Question: Time limit of sub-classes. Is there a limit to the time Contingent Resources remain in Development Not Viable? Can they remain for decades?

Answer: [Oct. 2022] Evaluators should determine how long resources can remain in Development Not Viable and be able to defend their assumptions. Projects that are not defendable may be considered to be classified as Unrecoverable. Entities should review classifications of their projects in their portfolio regularly.

6.3. Question: Recoverable or Unrecoverable. How do we reconcile the concept of “recoverable hydrocarbons,” and then say the resource is “Discovered Unrecoverable?” (§2.1.1.2)

Answer: [Oct. 2022] The PRMS §2.1.1.1 covers the discovery aspect and the assessment of "potentially recoverable hydrocarbons.", §2.1.1.2 then discusses the situation in which no viable development project can be identified with either established technology or technology under development.

If the evaluator determines that no feasible development plan may exist, then the discovered in-place quantities are regarded as unrecoverable in the classification system. The definition of Discovered Unrecoverable is *discovered petroleum in-place resources that are evaluated, as of a given date, as not able to be recovered by the commercial and sub-commercial projects envisioned* (PRMS Glossary).

6.7. Question: Can quantities beyond an individual project's economic limit rate be included as Reserves based on the "field" or Production-Sharing Contract economics along with other projects that achieved Reserves, as discussed in the PRMS §2.1.3.6.3. In other words, can Reserves include sub-economic quantities for wells, or even projects, provided the overall field economics are positive?

Answer: [Oct. 2022] The referenced project must meet the Reserves criteria to aggregate it with other Reserves. In cases where the project is comprised of one or more wells, each well must meet the Reserves criteria.

When the project is part of a PSC or a similar ring-fenced entity, Reserves can be assigned when it can be demonstrated that the cumulative net cash flow including the project is greater than without it.

6.14

6.14. Question: Abandonment, decommissioning, and restoration (ADR). In the PRMS, it is clear that ADR costs are excluded in the determination of economic limit of a developed project, yet the confusing part is how ADR is applied in evaluation of the economic producibility. §3.1.1.1. B. *The estimated costs and schedule associated with the project to develop, recover, and produce the quantities to the reference point, including ADR costs, based on the entity's view of the expected future costs.* §3.1.2.1 states *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 economically producibility determination. A project is commercial when it is economic and it meets the criteria discussed in Section 2.1.2.* The question is, when is the inclusion of ADR costs a reason to downgrade a project from Reserves into Contingent Resources?

Answer: [Oct. 2022] The inclusion of ADR costs can downgrade a project with Reserves when the project remains undeveloped in a subsequent evaluation and the ADR cost associated with the undeveloped project trigger the net cash flow to be uneconomic.

Once a project is an “ongoing producing” project it is developed Reserves. At that point, the ADR costs are excluded from the economic test.

Where to find the FAQs

- https://www.spe.org/en/industry/reserves/prms-faqs/