



RYDER SCOTT COMPANY
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2009 Ryder Scott Reserves Conference
“Evaluation Challenges in a Changing World”

“Constraints on Using Reliable Technology”

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The information presented in today's presentations represents informed opinions about U.S. SEC reserves reporting regulations but does not purport to be identical to advice to be obtained from the SEC. As with any set of reserves definitions, the applicability of the guidance should be considered on a case by case basis.

Reliable Technology and the New SEC Regulations

Definition of Reliable Technology

Constraining Terms-Consistency and Repeatability

Aspects of Documenting a Compelling Case

Disclosure Requirements

Q&A Session

Technologies Used to Establish Reserves Estimates



- **Old rules allow only specified technologies to be used (e.g., flow tests to surface) to establish reserves**
- New rules allow unspecified technologies proven in practice to lead to correct conclusions [4-10(a)(25)]
- New rules allow technologies that have been demonstrated to be reliable
 - Proprietary technologies included in allowable technologies
- Concise summary disclosures required of technologies that provide basis for additional reserves reported

Using Reliable Technology for Establishing Fluid Contacts



Section II.G.1. Reliable Technology

“revisions to the definition of “proved oil and gas reserves” also included provisions for establishing levels of lowest known hydrocarbons and highest known oil through reliable technology other than well penetrations”

S-X 210.4-10 (a)(22) Proved oil and gas reserves

- (ii) “In the absence of data on fluid contacts, proved quantities in a reservoir are limited by the lowest known hydrocarbons (LKH) as seen in a well penetration unless geoscience, engineering, or performance data and reliable technology establishes a lower contact with reasonable certainty.”*
- (iii) “Where direct observation from well penetrations has defined a highest known oil (HKO) elevation and the potential exists for an associated gas cap, proved oil reserves may be assigned in the structurally higher portions of the reservoir only if geoscience, engineering, or performance data and reliable technology establish the higher contact with reasonable certainty. “*

Section II.F.2 Undeveloped Oil and Gas Reserves

“we are expanding this definition of the term “undeveloped oil and gas reserves” to permit the use of techniques that have been proved effective by actual production from projects in the same reservoir or an analogous reservoir or “by other evidence using reliable technology that establishes reasonable certainty”

S-X 210.4-10 (a)(31)(iii) Undeveloped oil and gas reserves

“(iii) Under no circumstances shall estimates for undeveloped reserves be attributable to any acreage for which an application of fluid injection or other improved recovery technique is contemplated, unless such techniques have been proved effective by actual projects in the same reservoir or an analogous reservoir, as defined in paragraph (a)(2) of this section, or by other evidence using reliable technology establishing reasonable certainty.”

Using Reliable Technology to Establish Reasonable Certainty at Greater Distances for Undeveloped



S-X 210.4-10 (a)(31)(i) Undeveloped oil and gas reserves

(i) “Reserves on undrilled acreage shall be limited to those directly offsetting development spacing areas that are reasonably certain of production when drilled, unless evidence using reliable technology exists that establishes reasonable certainty of economic producibility at greater distances.”

S-X 210.4-10 (a)(25) Reliable Technology

“Reliable technology is a grouping of one or more technologies (including computational methods) that has been field tested and has been demonstrated to provide reasonably certain results with consistency and repeatability in the formation being evaluated or in an analogous formation.”

Let's Examine the Key Words Consistency

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210.4-10 (a)(25) Reliable Technology

“demonstrated to provide reasonably certain results with consistency”

Various Definitions

- Wikipedia
 - **In logic**, a consistent theory is one that **does not contain a contradiction.**
 - **In statistics**, a consistent sequence of estimators is one which converges in probability to the true value of the parameter. Often, the sequence of estimators is **indexed by sample size**, and so the **consistency is as sample size (n) tends to infinity.**
 - **In philosophy**, a major goal is to always sustain a consistent set of beliefs using **sound reasoning.**
- Webster's New Riverside University Dictionary
 - **Agreement** or logical coherence among things or parts
 - **Compatibility or agreement among successive acts**, ideas, or events

Let's Examine the Key Words Repeatability

210.4-10 (a)(25) Reliable Technology

*“demonstrated to provide reasonably certain results with ... **repeatability** in the formation being evaluated or in an analogous formation”*

Various Definitions

- Wikipedia
 - **Repeatability** is the **variation in measurements** taken by a single person or instrument on the same item and under the same conditions. A measurement may be said to be *repeatable* when this **variation is smaller than some agreed limit**. According to the *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, repeatability conditions include:
 - the same measurement procedure
 - the same observer
 - the same measuring instrument, used under the same conditions
 - the same location
 - repetition over a short period of time.
 - Repeatability methods were developed by Bland and Altman (1986). The repeatability coefficient is a precision measure which represents the value below which the absolute difference between two repeated test results may be expected to lie with a probability of 95%. The standard deviation under repeatability conditions is part of precision and accuracy.
- Webster's New Riverside University Dictionary
 - An act of repeating

Section II.G.1. Reliable Technology

“We also proposed to define the term “reliable technology,” expressed in probabilistic terms, as technology that has been proven empirically to lead to correct conclusions in 90% or more of its applications. Several commenters expressed concern that this proposed 90% threshold would be difficult to verify and support on an ongoing basis.¹²¹ We agree that a bright line test would be difficult to apply to a particular technology or mix of technologies to determine their reliability. Therefore, we are not adopting the 90% threshold as part of the definition.”

Are You Ready to Jump In and Use Reliable Technology?

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Section II.G. Reliable Technology

*“This new standard will **permit the use** of a new technology or a combination of technologies **once a company can establish and document the reliability** of that technology or combination of technologies.”*

Section II.G. Reliable Technology

... “the Commission’s staff, as part of the review and comment process, may continue to request companies to provide supplemental data, consistent with current practice, ...which, under the new rules, may include information sufficient to support a company’s conclusion that a technology or mix of technologies used to establish reserves meets the definition of “reliable technology.”

A Few Things to Think About Before You Leap



Question: For Example Can I Use

- Seismic
 - Fluid contacts
 - Reservoir continuity
 - Net pay, porosity or fluid saturation predictions and lateral distributions
- Reservoir Simulation
 - Without a history match
- Fluid Gradient vs Depth Data
 - Fluid contacts
 - Vertical or horizontal continuity

The Answer in Our Opinion Will Be On A Case By Case Basis, But Will Depend On

- Having the case histories in-hand which provide irrefutable evidence of a prediction which is substantiated by a reasonably certain outcome
 - The SEC is on record stating they will **permit** you to use what you can document

Section II.G. Reliable Technology

*“If the company has **not previously disclosed reserves estimates in a filing** with the Commission or is **disclosing material additions to its reserves estimates**, the company **must disclose the technologies** used to establish the appropriate level of certainty for reserves estimates from material properties included in the total reserves disclosed...*

*and the **particular properties do not need to be identified.***

*We believe that requiring such disclosure when **reserves, or material additions to reserves, are reported for the first time** will discourage the use of questionable technologies to establish reserves.*

*However, we do **not** believe it is **necessary** to require a company to **disclose** the technology or technologies relied upon to establish **reserves previously disclosed** under our rules because the permitted technologies have been limited to those permitted by our existing rules.”*

Section II.G.1. Reliable Technology

“The proposal also would have required reliable technology to be “widely accepted.” However, some commenters were concerned that this requirement would exclude proprietary technologies that companies develop internally that have proven to be reliable. We concur with these commenters and have removed the “widely accepted” requirement from the final rule.”

Section II.G. Reliable Technology

*“... disclosure would be limited to a **concise summary** of the technology... used to create the estimate*

*A company would **not be required to disclose proprietary technologies**, or a proprietary mix of technologies, at a level of specificity that would cause competitive harm.*

... the disclosure may be more general. ... a company may disclose that it used a combination of seismic data and interpretation, wireline formation tests, geophysical logs, and core data to calculate the reserves estimate.”

QUESTIONS?

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