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"Petroleum Reserves Estimates and Definitions: Where We Have Been, Where We Are and Where We Seem To Be Going"

Presented by Ronald Harrell, P.E.
Chairman Emeritus - Ryder Scott Company, L.P.

May 15, 2013

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EDITORIAL NOTE

- This presentation is a revision of the 2007-2008 Distinguished Lecture Tour version including significant developments affecting reserves definitions and guidance since that time.

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DL TOUR SCHEDULE

- Sept 17-20, 2007
  - Grayville IL
  - Bloomington IL
  - Traverse City MI
  - Paintsville KY
- Oct 08-11, 2007
  - Boston MA
  - Washington DC
  - Charleston WV
  - Bridgeport WV
- December 2007
  - Geneva
  - Vienna
  - Zagreb
  - Copenhagen
  - The Hague
  - Oslo
  - Stavanger
- January 12-15, 2008
  - Dhahran, Saudi Arabia
  - Awali, Bahrain
  - Muscat, Oman
  - Tripoli, Libya
- February 04-07, 2008
  - Amarillo TX
  - Ft Smith TX
  - Dallas TX
  - Corpus Christi TX
- March 10-13, 2008
  - Shreveport, LA
  - Lafayette, LA
  - Jackson MS
  - Birmingham AL
- April 08-09, 2008
  - Tyler TX
  - Roswell NM
- May 22-28, 2008
  - Ankara, Turkey
  - Baku, Azerbaijian
  - Aktau, Kazakhstan
  - Atyrau, Kazakhstan

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THIS PRESENTATION IS PRIMARILY THE SPE STORY:

- The contributions of many other countries, organizations and individuals predating the SPE is acknowledged and appreciated.
- Notable is API's contribution through their proved oil (and not gas) reserves definitions created in 1936-1937

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Who is the API?

- **Following the entry of the US in WW1, the federal government established the US National Petroleum War Service Committee (NPWSC) to ensure adequate energy supplies to sustain the war effort of the US and its allies. Their task was to confirm the adequacy of near-term oil production, transportation and refining.**
- **Following the 1918 end of the war, the NPWSC became the American Petroleum Institute (API). The API took the lead in establishing industry standards in measurements, quality of materials, communication and ultimately, petroleum reserves.**

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More about the API

- Another intervening event affecting early reserves estimation was the US Stock Market collapse in 1929. "The Great Depression"
- This led to creation of US Securities Exchange Commission (SEC) in 1933.
- Followed by the Securities Act of 1933 and the Securities and Exchange Act of 1934
- API created proved oil reserves definitions in 1936-1937 and estimated US oil reserves annually until 1979.

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American Gas Association

- AGA formed in 1918
- AGA created definitions for natural gas in 1946 and joined API in preparing annual gas reserves reports
- AGA annual reserves reports ceased in 1979 (along with API reports)

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SPE's Role Began 51 Years Ago

- SPE Board appointed 12-man committee in 1962 – "Special Committee On Definitions Of Proved Reserves For Property Evaluation"
- Committee comprised of 2 oil companies, 1 gas pipe line, 1 college professor, 2 banks, 2 insurance companies and 4 consultants

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Committee Members were…

- J.J. Arps – Consultant & chair
- Wm. F. Burke – Lone Star Gas
- Prof. J.M. Campbell – Oklahoma University
- D.V. Carter – Mobil Oil
- C.R. Dodson – United California Bank
- W.S. Eggleston - Consultant
- K.M. Fagin - SW Life Insurance Co.
- C.H. Keplinger - Consultant
- J.F. King – Mutual Life Insurance Co.
- Morris Muscat – Gulf Oil
- E.G. Trostel – Degolyer & MacNaughton
- W.W. Wilson – Continental Illinois Bank

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SPE's Role Began 51 Years Ago – Cont'd

- Definitions Committee reports to SPE Board almost 3 years later
- Proposed definitions were approved by SPE Board in June 1965 – API also approved/AGA dissented
- Board vote: 7 yea, 3 nay, 2 abstained

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Introduction to 1965 Definitions

- Proved Reserves – The quantities of crude oil, natural gas and natural gas liquids which geological and engineering data demonstrate with *reasonable certainty* to be recoverable in the future from known oil and gas reservoirs under existing economic and operating conditions. *They represent strictly technical judgments, and are not knowingly influenced by attitudes of conservatism or optimism.*
- *(*emphasis added)*

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The United States Securities and Exchange Commission (SEC)

- Regulation S-K and Regulation S-X created under the Securities Act of 1933 and the Securities Exchange Act of 1934.
- The SEC adopted its initial oil and gas reserves disclosure requirements between 1978 and 1982.
- Action followed "Arab oil embargo" of '73-74 with gasoline rationing and higher prices.
- Proved SEC reserves definitions prepared with assistance of several SPE members

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A lot has happened since then..

- 1981 – SPE releases proved reserves definitions
- 1987 – SPE (SPEE) adds proved, probable & possible categories. Rejects probabilistic methods.
- 1997 – SPE joins WPC in endorsing deterministic & probabilistic methodologies.
- 2000 – SPE/WPC/AAPG Resource definitions issued – wide global recognition

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Who is the SPE Oil & Gas Reserves Committee (OGRC)?

- Traditionally 3 new members appointed by incoming SPE president annually for three-year terms to serve as a full committee - more recently expanded to as many as 12 or more members
- Broad range of locations and background sought – numerous countries represented at present
- Observers from AAPG, US DOE (EIA), WPC and SPEE. IASB and SEG were 2005 additions
- SEC invited but declined to send an observer

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SPE Board approval in Early 2007

- “New 2007 Resources Definitions” formally released as SPE/WPC/AAPG/SPEE* Petroleum Resources Management System (PRMS) in March 2007
- Adopted by SPE Board in Cairo meeting
- Presented in Muscat, Oman the next day

*New Sponsor

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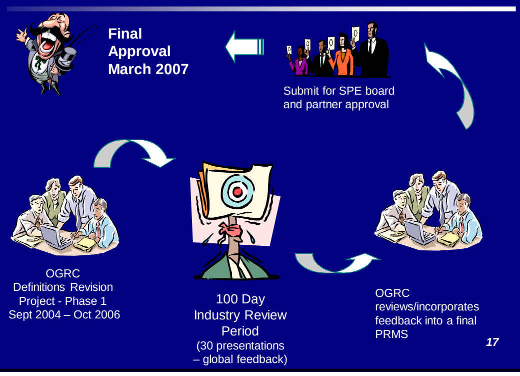
SPE/WPC/AAPG/SPEE PRMS – The “Process”



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What’s Included in “PRMS”

- RESOURCES & RESERVES DEFINITIONS
- RESOURCES & RESERVES GLOSSARY
- DEFINITIONS “MAPPING PROJECT”
- APPLICATIONS GUIDELINES - RELEASED NOVEMBER 1, 2011

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What's New in the PRMS Definitions?

- SYSTEM IS "PROJECT BASED"
- RESOURCES "CLASSIFICATION" IS BASED ON COMMERCIALITY
- RESERVES "CATEGORIZATION" IS BASED ON UNCERTAINTY OF RECOVERY
- PRICES AND COSTS BASED ON FORECAST (AND STATED) CONDITIONS
- RECOGNITION OF UNCONVENTIONAL RESOURCES AND RESERVES
- EXPANDED SECTION ON SELECTION OF "ANALOGS"
- GUIDANCE ON "BOOKING (REFERENCE) POINT"

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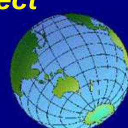
SPE Reserves Mapping Project



Definitions compared in Mapping Project

- United States SEC (PRE 2009)
- United Kingdom
- Alberta Securities Commission - Canada
- Russian Ministry of Natural Resources
- China Petroleum Reserves Office
- Norwegian Petroleum Directorate
- United States Geological Survey – USGS
- United Nations Framework Classification

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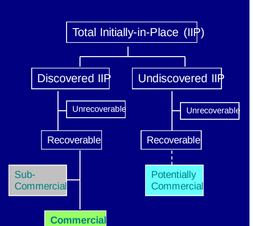
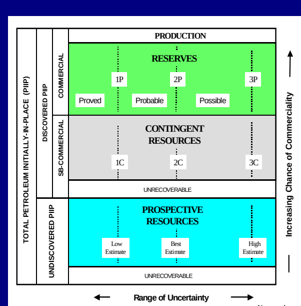
Resources Classification System





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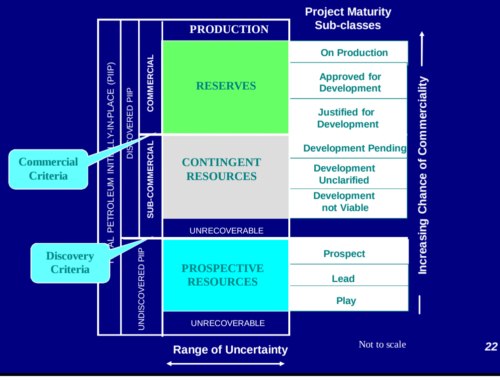
Sub-classify by Project Maturity



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Post PRMS SPE actions

- Revised and updated "Auditing Standards" approved by SPE Board on March 25, 2007
- SPE joined with WPC, AAPG & SPEE to form Joint Committee on Reserves Evaluator Training (JCORET) – SEG joined later
- JCORET consists of up to 3 members from each sponsor plus "at large" Chairperson. Developing training Courses and Modules on
  (1) Resources Definitions,
  (2) Technical "recommended practices"
  and (3) Ethics.

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Further Comments About The US SEC

- The most powerful regulatory body in the world
- Sarbanes-Oxley Act of 2002 amplified interest in reserves reporting competence and compliance
- Expanded emphasis on Company internal/external reserves auditing practices
- Reserves evaluators put on notice to recognize their obligation to maintain competency through continuous quality training opportunities

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Indications of Progress Within The SEC

- *SEC named Dr. John Lee, Distinguished Petroleum Engineering Professor from Texas A&M University, to the position of Academic Fellow to advise and guide the SEC from September 1, 2007 through August 31, 2008.*
- *Dr. Lee was selected as an objective and respected expert to assist in drafting new SEC reserves reporting guidelines.*

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SEC Solicits Public Comments

- *On December 11, 2007 the SEC issued an invitation for public comments (Concept Release) about possible revisions to the reserves reporting process. Comments were due on February 19, 2008.*
- *On June 26, 2008,SEC issued its proposed rule changes and sought industry comments with deadline of September 6 , 2008*

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Summary of SEC's Efforts to Modernize Reserves Reporting Standards

- See following slides were "borrowed" for Dr. John Lee's May 14, 2009 SPE Presentation to Houston Gulf Coast SPE Section.

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Modernization of the SEC Oil and Gas Reserves Reporting Requirements

John Lee
Presented to SPE Gulf Coast Section
14 May 2009

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Summary: Major Changes in Rules*

- Definition of current price changed
- Nontraditional resources considered oil and gas activities
- Modern technology allowed to establish certainty levels
- 'Certainty' criterion replaced by 'reasonable certainty' for PUDs
- Optional disclosure of probable, possible reserves allowed

*As per John Lee – May 14 – SPE/GCS

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What else in happening ?

- SPE cooperating with IASB but US industry acceptance is slow.
- SPE continues to cooperate with major United Nations initiative to "populate" the UN Framework Classification (UNFC) with SPE/WPC/AAPG/SPEE Reserves and Resources definitions
- Several non-English language versions of PRMS have been completed

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Purpose of IASB……

- Develop a single set of high quality, understandable and enforceable global accounting standards to assist participants in world capital markets and other users to make rational economic decisions
- Particularly important to small and intermediate size entities and emerging economies.

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UNITED NATIONS –UNFC

The UNFC Cube…….

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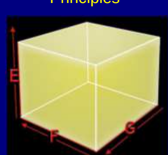
THREE PRINCIPLE AXES..

Principles



Economic and commercial viability

Field project status and feasibility

Geological knowledge

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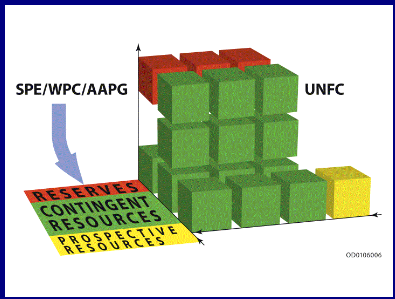
The "UN Cube" Transformation



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Path Forward for SPE - 1

- SPEE & partners are currently working toward "harmonizing" PRMS and Canadian Oil and Gas Handbook (COGEH) definitions.
- SPE/SPEE/AAPG continuing defense of and support for PRMS at the UN.
- Draft agreement has been achieved

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Path Forward for SPE -2

- SPE-led OGRC approved Terms of Reference on April 09, 2013 for a detailed review of PRMS and possible updates.
- Partners (SPEE/AAPG/WPC/SEG) will be engaged in completing draft for industry comments.
- No timetable yet proposed
- Revisions will likely be <u>evolutionary</u> and not <u>revolutionary</u>.

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Where we seem to be going – my opinion….

- SPE will continue to be recognized as the global standards setter in technical resource definitions and application guidance and these will be adopted, at least in part, by major regulatory agencies worldwide (as demonstrated by *defacto adoption by* US SEC and the Alberta Securities Commission)
- Countries/Exchanges recognizing PRMS include Australia, the UK, Hong Kong, South Africa and several others.

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CONCLUSIONS

Thank you for listening.

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