SPE/WPC/AAPG Petroleum Resource Classification System

- Society of Petroleum Engineers (SPE)
  - Oil and Gas Reserves Committee
- World Petroleum Congresses (WPC)
- American Association of Petroleum Geologists (AAPG)
Outline

- Brief history of petroleum resource classification systems
- SPE/WPC/AAPG petroleum resource classification system
- External petroleum reserve reporting by public companies
- Incorporation into UNFC
- Conclusions
Petroleum Resource Classification Systems

- Former Soviet Union system – 1920s
- SPE definition of proved reserves – 1965
- McKelvey Box – 1972
- SPE definitions for probable and possible reserves – 1987
- WPC resource system and definitions – 1987
- SPE/WPC reserve definitions – 1997
- SPE/WPC/AAPG resource definitions and classification system – 2000
Outline

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McKelvey Box
Resource Classification System

<table>
<thead>
<tr>
<th>DISCOVERED</th>
<th>UNDISCOVERED</th>
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<tbody>
<tr>
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<td>RESERVES</td>
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<td>RESOURCES</td>
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<td>Probable Reserves</td>
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<tr>
<td><strong>SUB-COMMERCIAL</strong></td>
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McKelvey Box
SPE/WPC/AAPG Terminology

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<tr>
<td>SUB-COMMERCIAL</td>
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<tr>
<td>CONTINGENT RESOURCES</td>
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</tbody>
</table>
A Consistent Approach to the Assessment of all Assets

- PROJECT MATURITY ……
  - Will the *project* go ahead?

- UNCERTAINTY ……
  - What is the range of the estimated recoverable volumes if the *project* does go ahead?
Norwegian Petroleum Directorate Resource Classification System

UNDISCOVERED RESOURCES
- Prospects
- Leads and unmapped resources

CONTINGENT RESOURCES
- New discoveries that have not been evaluated
- Development not very likely
- Recovery likely, but not clarified
- In the planning phase
- Possible future measures to improve the recovery factor

RESERVES
- Licensees have decided to recover
- Approved development and operation plan
- In production

Historical Production
- Sold and delivered petroleum

Ross Petroleum
June 2004
## SPE/WPC/AAPG Resource Classification System

<table>
<thead>
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<th>DISCOVERED COMMERCIAL</th>
<th>Production</th>
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<tr>
<td>Low</td>
<td>Proved</td>
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<tr>
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<td>Proved + Probable</td>
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<tr>
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<td>Proved + Probable + Possible</td>
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<tr>
<td>DISCOVERED SUB-COMMERCIAL</td>
<td>CONTINGENT RESOURCES</td>
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<tr>
<td>Low</td>
<td>Best</td>
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<td>High</td>
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<tr>
<td>UNDISCOVERED</td>
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Unrecoverable

Range of Uncertainty
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External petroleum reserve reporting by public companies

- SPE/WPC/AAPG system is now widely accepted by industry, but …
  - Most public oil and gas companies are listed on New York stock exchange
  - Must report Proved reserves in accordance with Securities and Exchange Commission (SEC) regulations
External petroleum reserve reporting by public companies

- SEC definition of proved reserves
  - Designed to be conservative and also to provide a consistent basis for comparison
  - Proved reserves only
  - Reasonable certainty of production
  - Existing economic and operating conditions
  - Limitations for proved undeveloped reserves
  - Limitations for secondary recovery methods
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United Nations Framework Classification (UNFC)

UNITED NATIONS INTERNATIONAL FRAMEWORK CLASSIFICATION FOR RESERVES/RESOURCES - Solid Fuels and Mineral Commodities -

- Economic Axis E
  - ECONOMIC E1
  - POTENTIALLY ECONOMIC E2
  - INTRINSICALLY ECONOMIC E3

- Feasibility Axis F
  - FEASIBILITY STUDY/ MINING REPORT F1
  - PREFEASIBILITY STUDY F2
  - GEOLOGICAL STUDY F3
  - DETAILED EXPLORATION F4

- Geological Axis G
  - RECONNAISSANCE G1
  - PROSPECTING G2
  - GENERAL EXPLORATION G3
  - DETAILED EXPLORATION G4

PUBLICATION IN:
- ENGLISH
- FRANÇAIS
- РУССКИЙ

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UNFC – expanded along F-axis

Legend
- Commercial productions
- Non-commercial productions
- In use for one or more commodity
- Not reserves
- Not in use
- Remaining in place

Original slide provided by Sigurd Heiberg
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Conclusions

- SPE/WPC/AAPG have developed a system that is being adopted by many oil and gas companies and organisations around the world.
- The UNFC offers an excellent opportunity to provide a direct and clear link with other systems.
- Harmonization will provide the basis for internationally-consistent reporting of all energy and mineral resources.