

# Volumetrics and Reserves

- **Volumetrics:** An approach used to evaluate the initial reserves of a pay (oil accumulation).
- **Reserve:** The estimated quantities of crude oil, natural gas, gas condensate, liquids recovered from natural gas and associated substances (e.g. sulphur) that is considered commercially viable to recover from a given accumulation.\*

## Types of Reserves

- **Proven** → Well estimated with high degree of certainty under specific economic conditions
- **Probable** → Need more data and simulation to evaluate
- **Possible** → Have greater degree of uncertainty (e.g. presence of a structural trap → geophysical exploration)

\* Chierici, G. L.: In Principles of Petroleum Reservoir Engineering.

# Oil / Gas Reserve Estimates

“The skillful petroleum geologist translates an idea or concept into **barrels of oil or cubic feet of gas** at the surface of the ground”\*

\* Levorsen, A. I.: in **Geology of Petroleum**

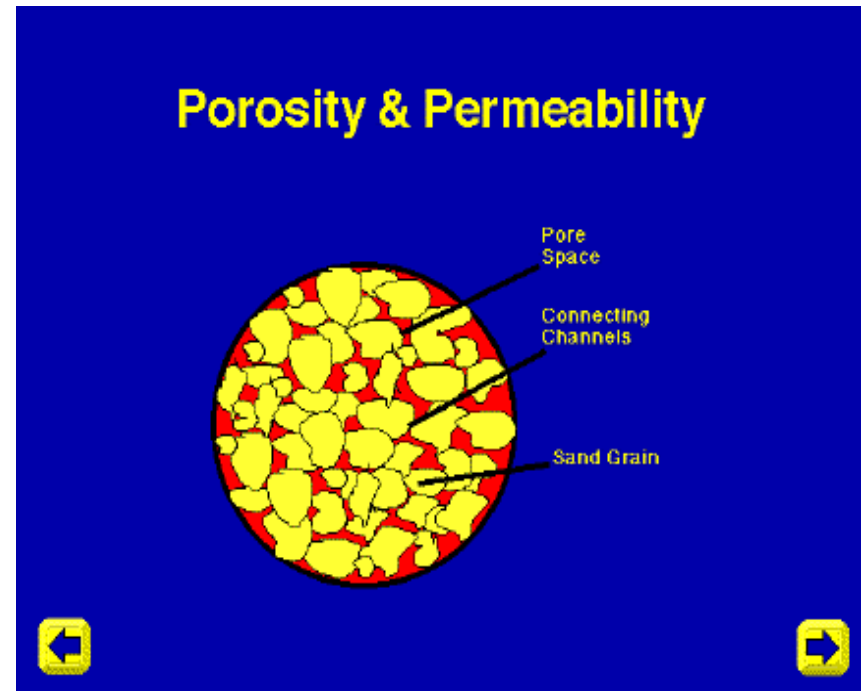
- **Tools**
  - Wells
    - Cores
    - Logs
  - Seismic maps
- **Required Information**
  - Porosity & permeability
  - Thickness
  - Oil/water contact
  - Water saturation
  - Pressure
  - Viscosity

# Wells

- **Wildcat well:** A test well drilled in the hope of discovering a new oil pool.
  - If discovery occurred:
    - Oil well
    - Gas well
  - If not:
    - Dry hole
    - Wet well (water)
- **Development wells:** Wells drilled in the same reservoir after discovery has been made.

# Porosity and Permeability

- **Porosity** is the amount of void spaces in a rock and a measure of how much petroleum the rock will hold.
- **Permeability** is the ease that fluids move through a rock and is determined by the diameter of the channels which connect the pore spaces.



# Basic Equation for Reserve Calculation

$$Oil\_Reserves = \int \int_A \frac{h_n \phi (1 - S_w)}{B_O} E_{R,O} dx dy$$

- Deterministic Equation

$$Oil\_Reserves = \frac{A(1 - S_w) \overline{\phi h_n}}{\overline{B_O}} \overline{E_{R,O}}$$