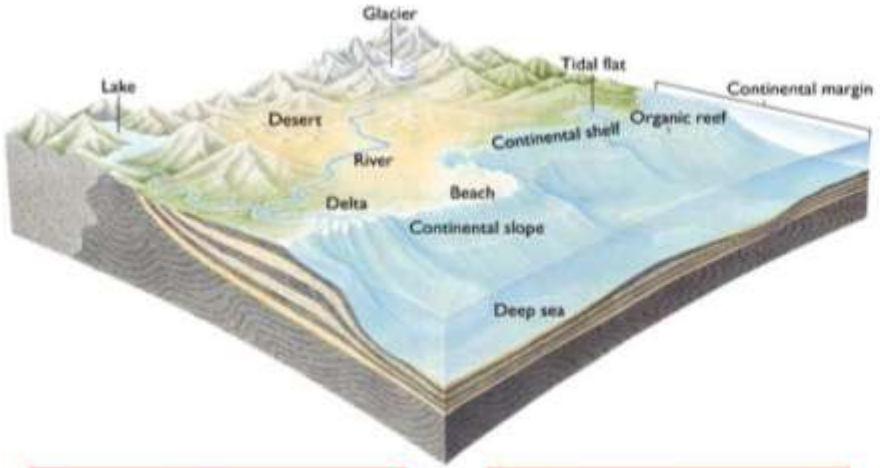
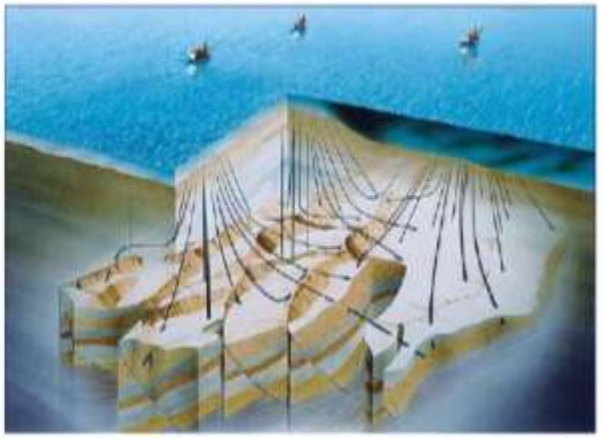
Basic Oil Well Drilling

Drilling Environment





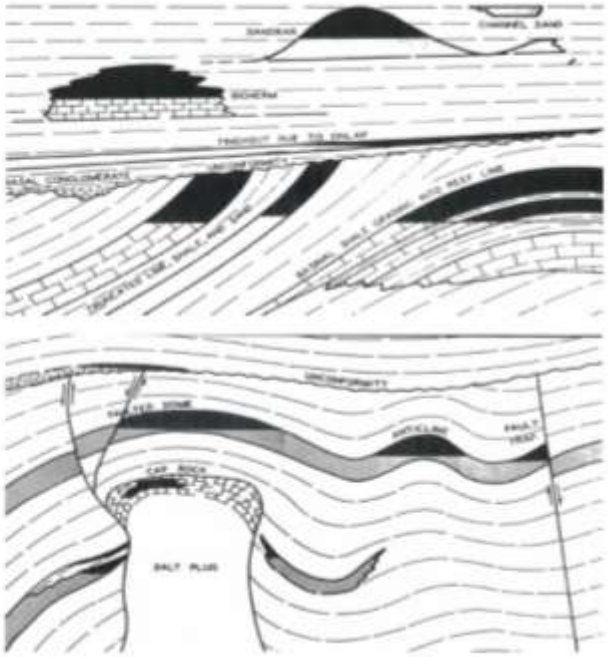
Where do we elect to drill from - to?

Decisions are based upon

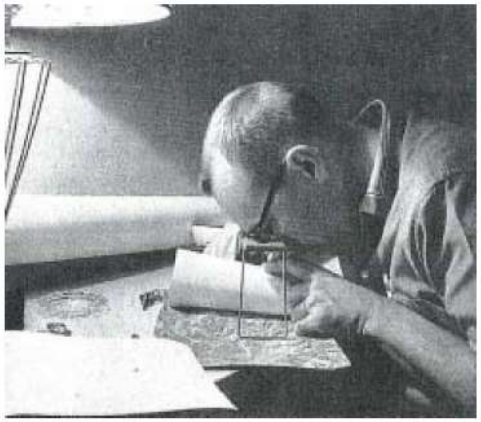
1. The probabilities of finding commercial hydrocarbons in a specific location as indicated by the subsurface team i.e. geologists & geophysicists,
2. The company, body or regulator that holds the licences, leases or agreements granting drilling & production rights, and
3. The availability and capability to funds a specific well or project.

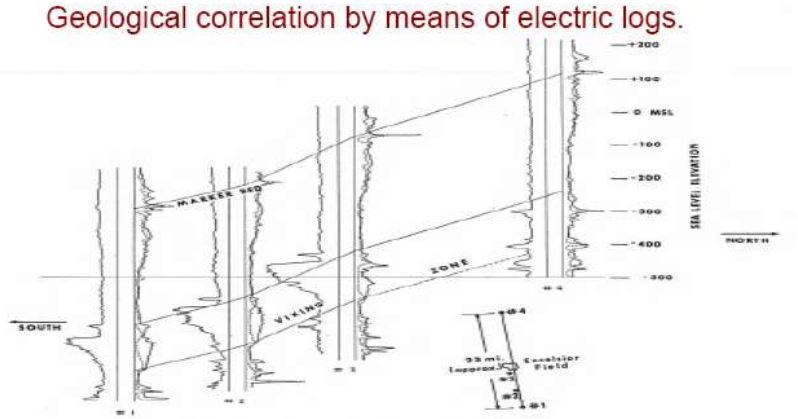
Typical oilfield traps

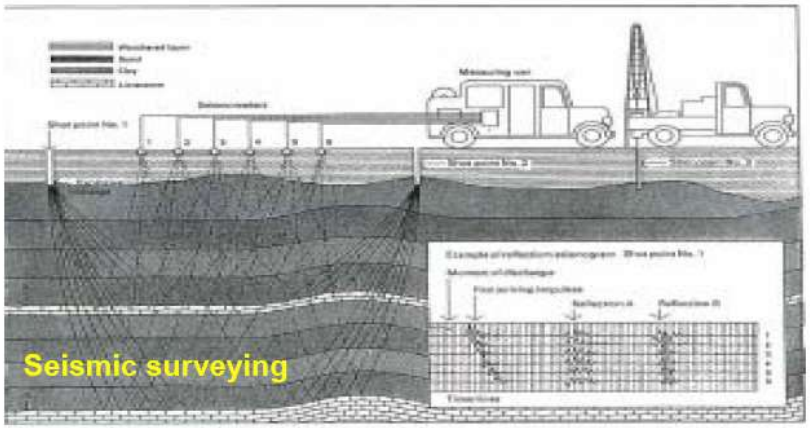
- There are two main types (but not limited to) oil field traps as illustrated,
- They are termed
  - Stratigraphic and
  - Structural traps

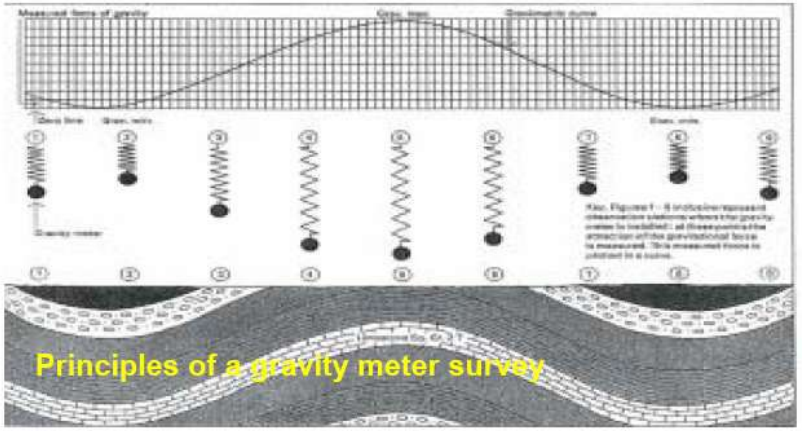


Geology & Geophysics



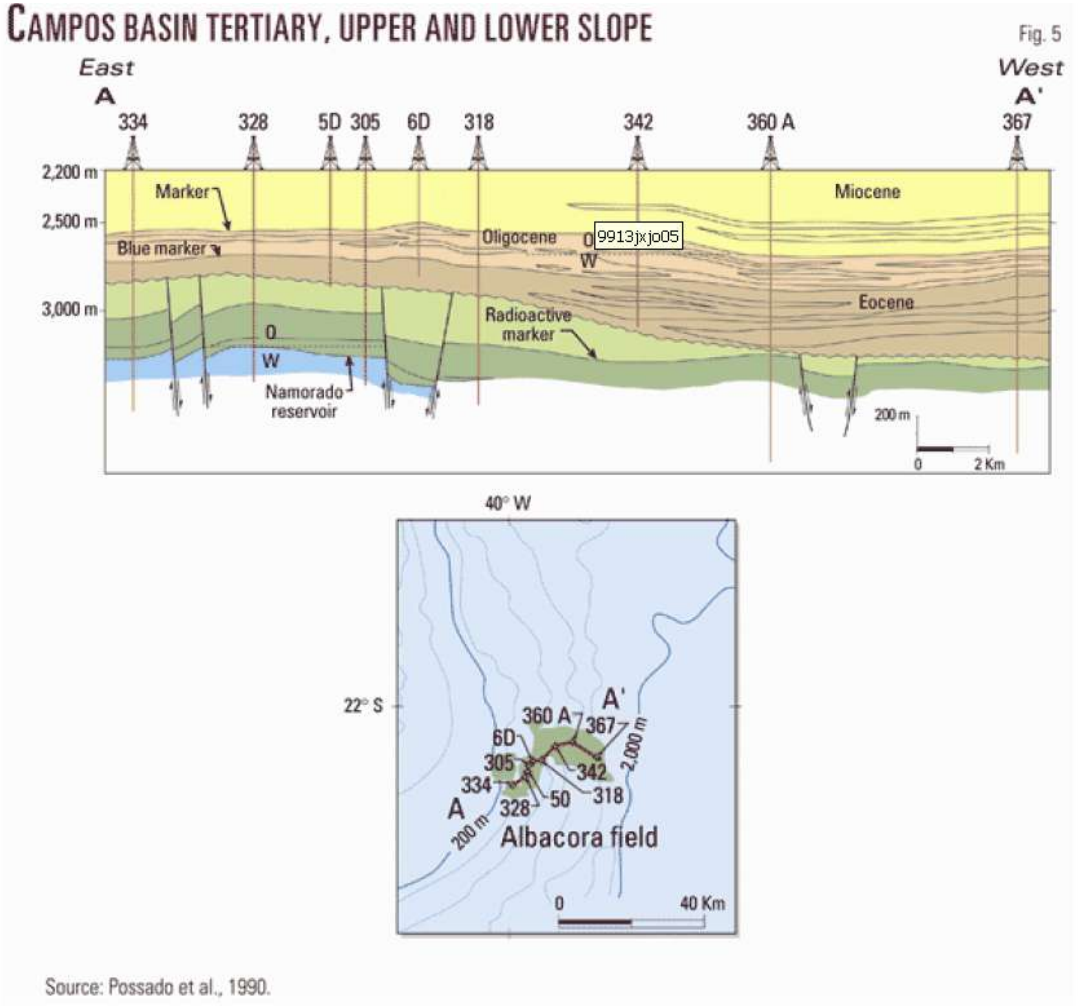


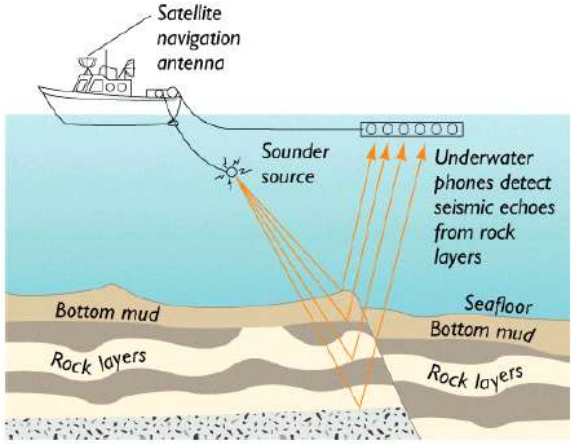




Seismic Surveying

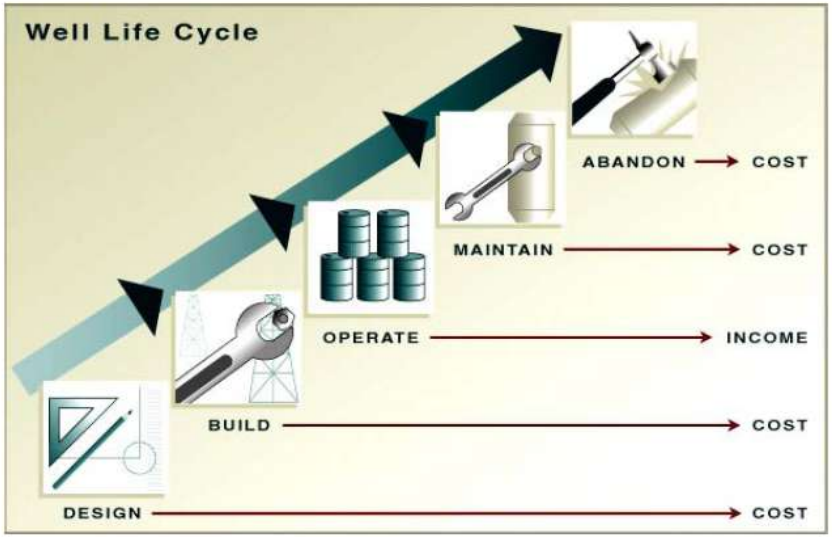
Offshore Geology / Seismic principles





Steps to drilling a well

- Acquire, assess data
  - Justify wells
- Well life cycle
  - Drill well
  - Complete well
  - **Produce and maintain well through life cycle**
  - Abandon well



Casing Setting Depth

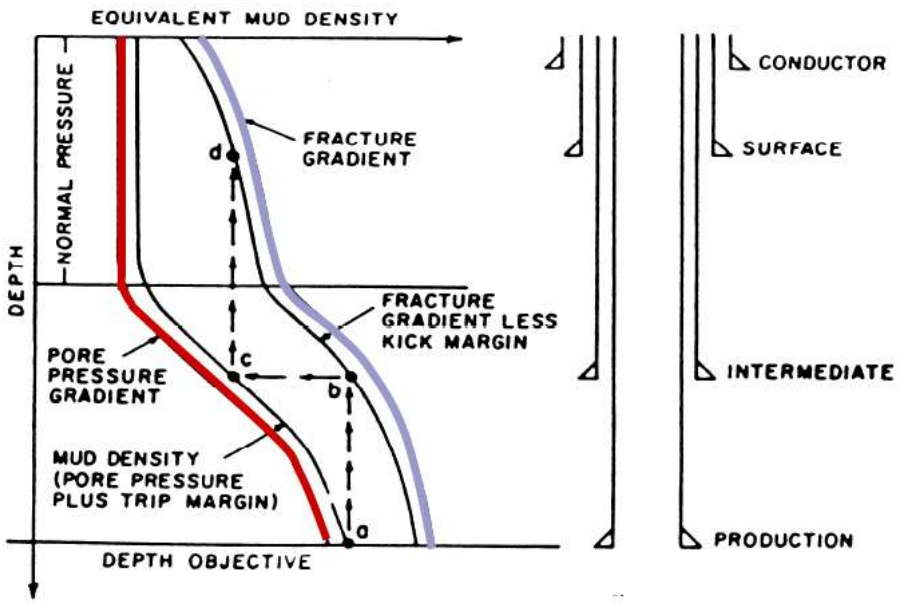
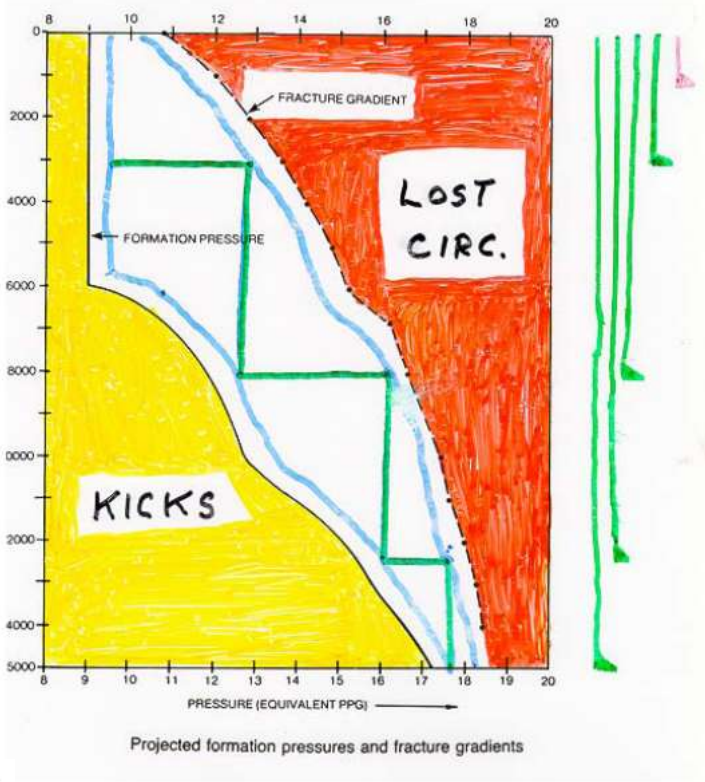


Fig. 7.20—Sample relationship among casing-setting depth, formation pore-pressure gradient, and fracture gradient.



Projected formation pressures and fracture gradients

If the mud fails to control the pressure, oil and gas begins coming to the surface during the drilling process.

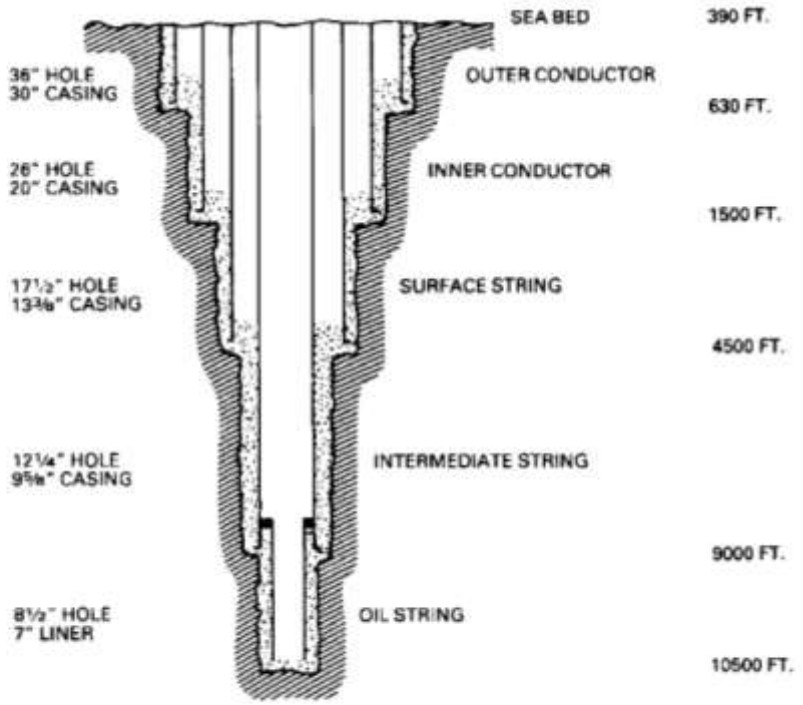
We call this a kick.

If action is not taken then the well fluids will begin coming out of the hole in an uncontrolled manner.

We call this a blowout

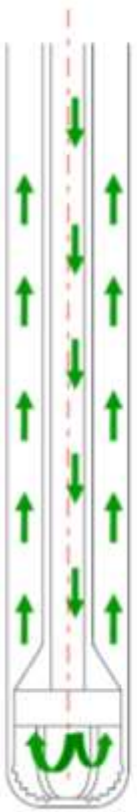
Typical well Requirement

- Type of well?
- Drilling environment
- Wellbore design
- Drilling Tools & equipment needed?
- Mud chemicals volumes
- Cementing, fluids, storage?
- Other 3rd party operations to be conducted?
- People logistics?
- Drilling Contingencies?



A TYPICAL NORTH SEA CASING DESIGN

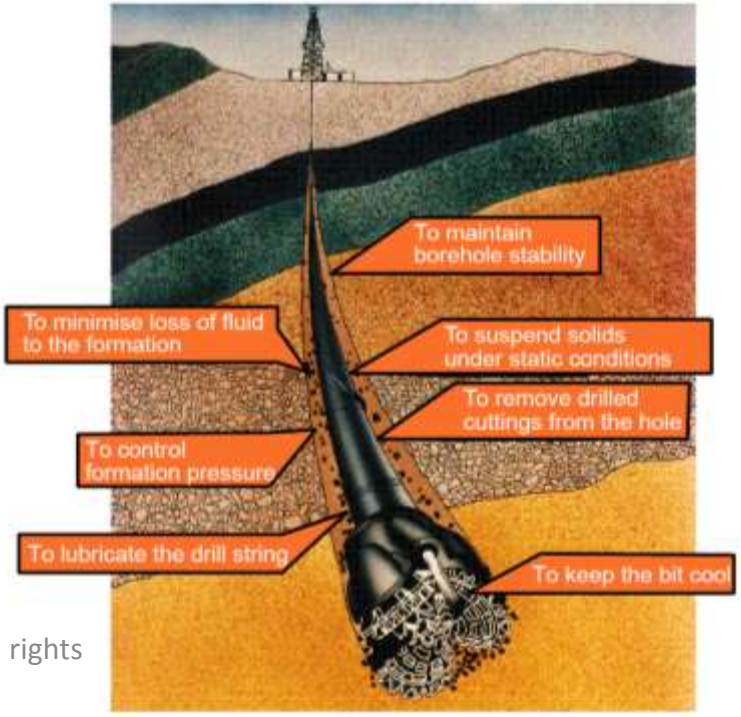
Drilling Fluid



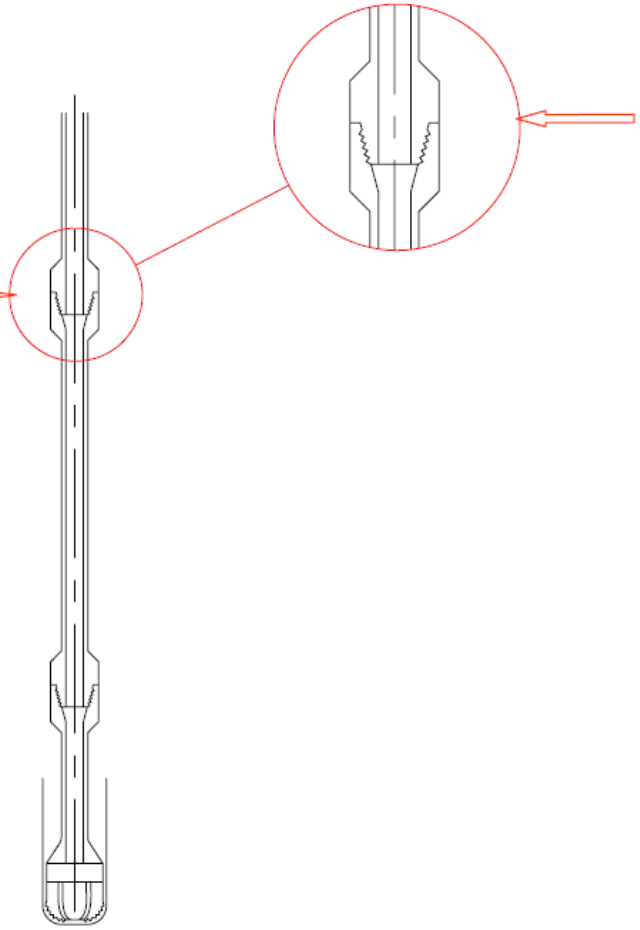
Mud is pumped down the drill pipe and back up the annulus during the **drilling** process to achieve the following:

- Lubricates the drill bit
- Cakes the walls of the hole to prevent collapse.
- Controls pressure of oil or gas by its density
- Carries the drilling chippings to surface.
- Mud is a special mixture of fluids, chemicals & m which are selected to give the required compositic density.

Primary requirements of a drilling mud



Drill Pipe



Drill Pipe and Drill Bit

Tool Joint Connection

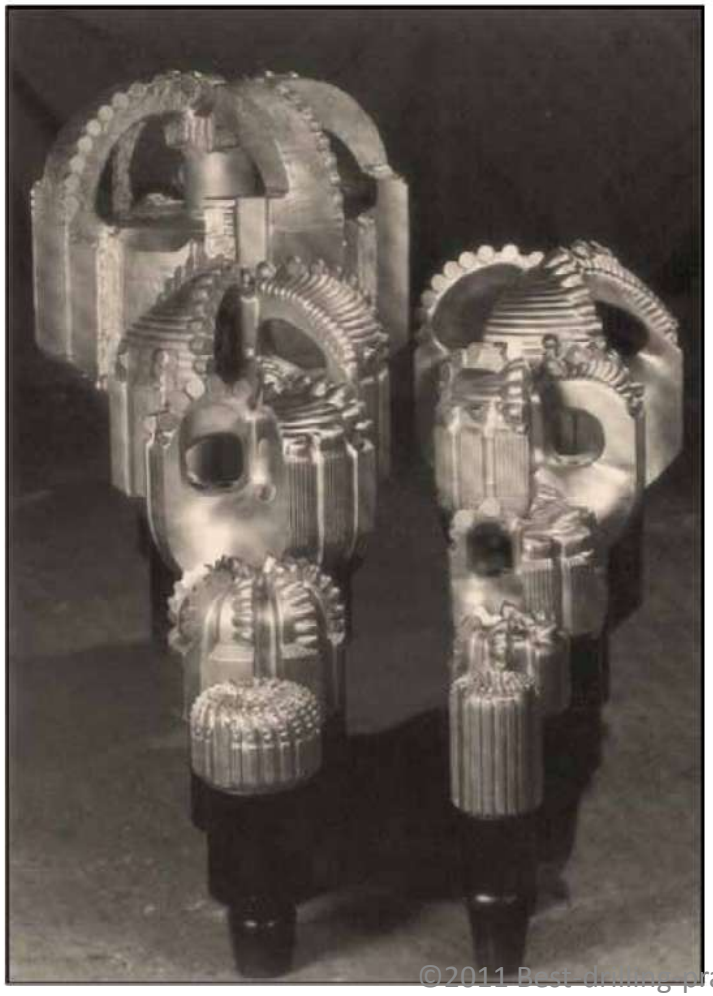
- Taper allows easy stabbing
- Transmits torque
- Gives pressure tight seal

Joints approx 30 ft long

3 joints = a “Stand”

Drill bit hard/diamond

Drill Bits



Steel bits may be faced with tungsten carbide or polycrystalline diamond, depending on the type of rock being cut.