- Place & How to arrive.
- Aim
- Persons

Timetable

- **15 hours / 5 days = 5 hours / day.**
- **30 min.**
- **Ask Questions**

What is the OFF SCHOOL ?

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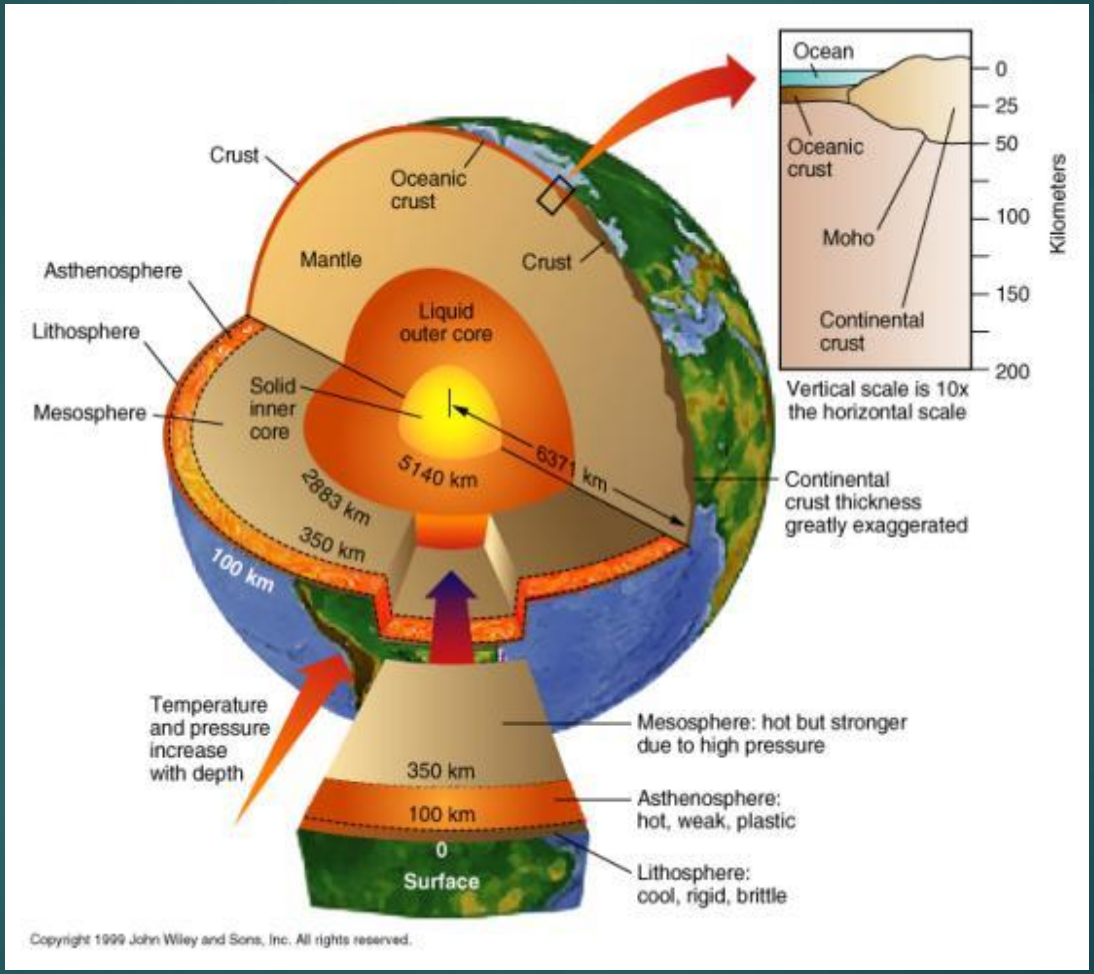
- OFF SCHOOL = Oil Field Familiarisation Course
- ABC Oil Field.

For who?

- Everybody belongs to the oil field
- New Hires
- Office employees
- Fresh Graduates

Geology Introduction



What is Geology

- It is the science of the Earth.
- Branches:

Petroleum, Structural, Mineralogy, ---etc

- Rock Types:

Sedimentary, Igneous & Metamorphic.

- Sedimentary rocks are the most important sources (as shale) & reservoirs (as sandstone).

Petroleum Geology

- What are Hydrocarbons?

Chemically: Hydrocarbons are organic compounds which have “C” & “H”.

Hydrocarbons are the main components of oil & gas.

- How does oil present?

An organic matter (as plants, algae,…) buried under ground. This organic matter decays under high pressure and temperature to kerogen (The primary oil material)

- Where we can find oil?

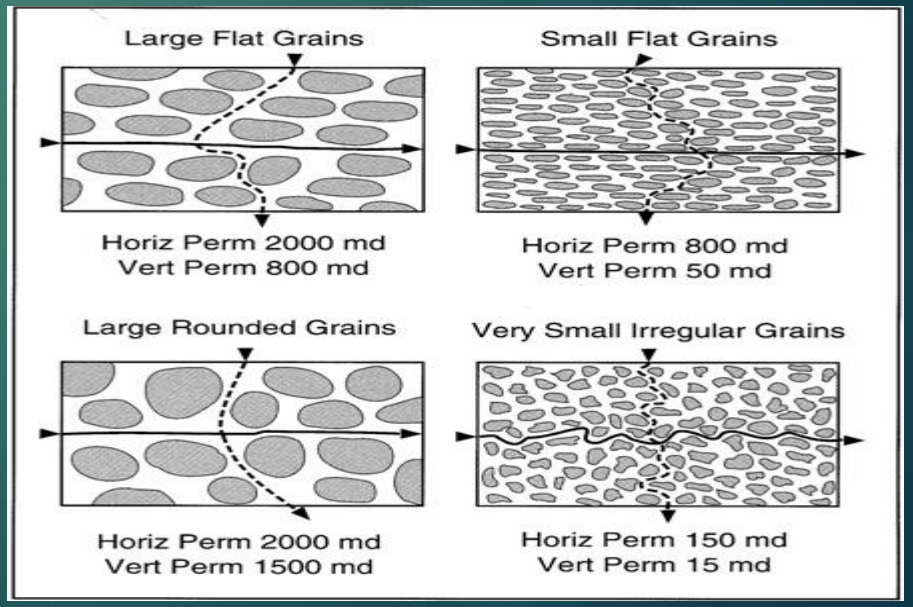
Oil presents in special rock types which called reservoirs after migration from the source rock.

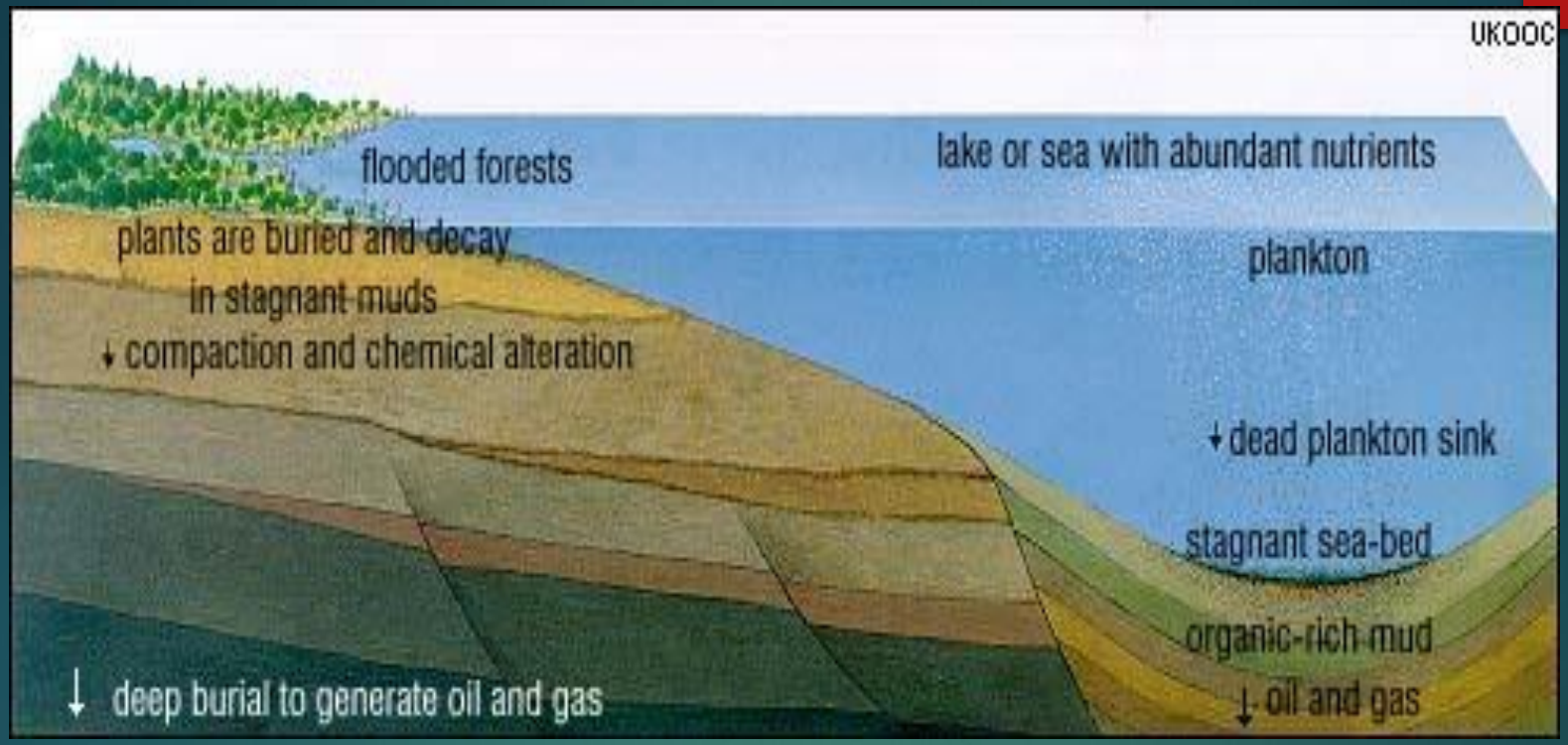
Terminology

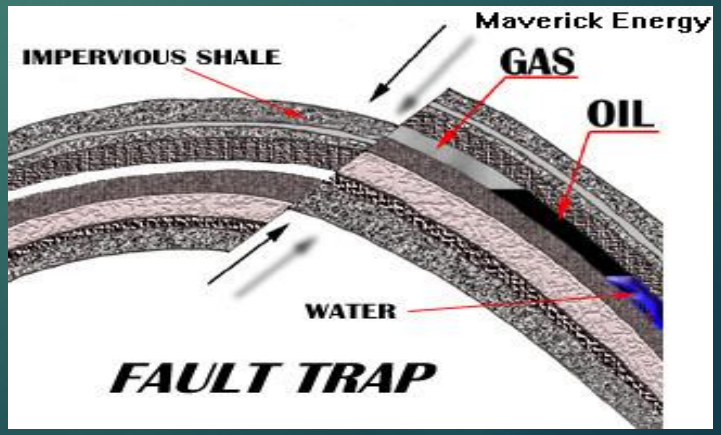
- Source Rock: Rock which reach with organic matter. Ex.: Shale
- Reservoir: Rock which has effective porosity. Ex.: Sandstone
- Cap Rock: An impermeable rock to be above source rock inhibiting migration
- Trap: May be Structural (Fault, fold, ...) or stratigraphical (Sand lenses)

Porosity and Permeability

- Porosity: is the amount of void space in a rock.
- Permeability: is the degree of interconnectivity of these voids (pores).







Rig Types & Rig Components

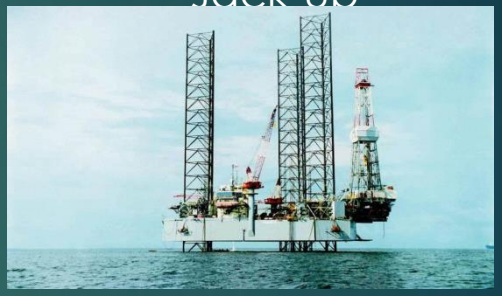
Rig Types:

Onshore (Land) Rigs

Offshore Rigs

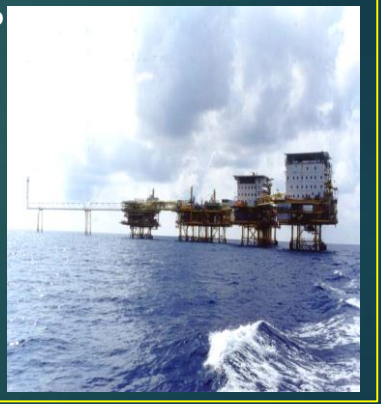
Barges / Tenders

Jack-Up



Semi-Submersible

P



Rig Types & Rig Components

Rig Components

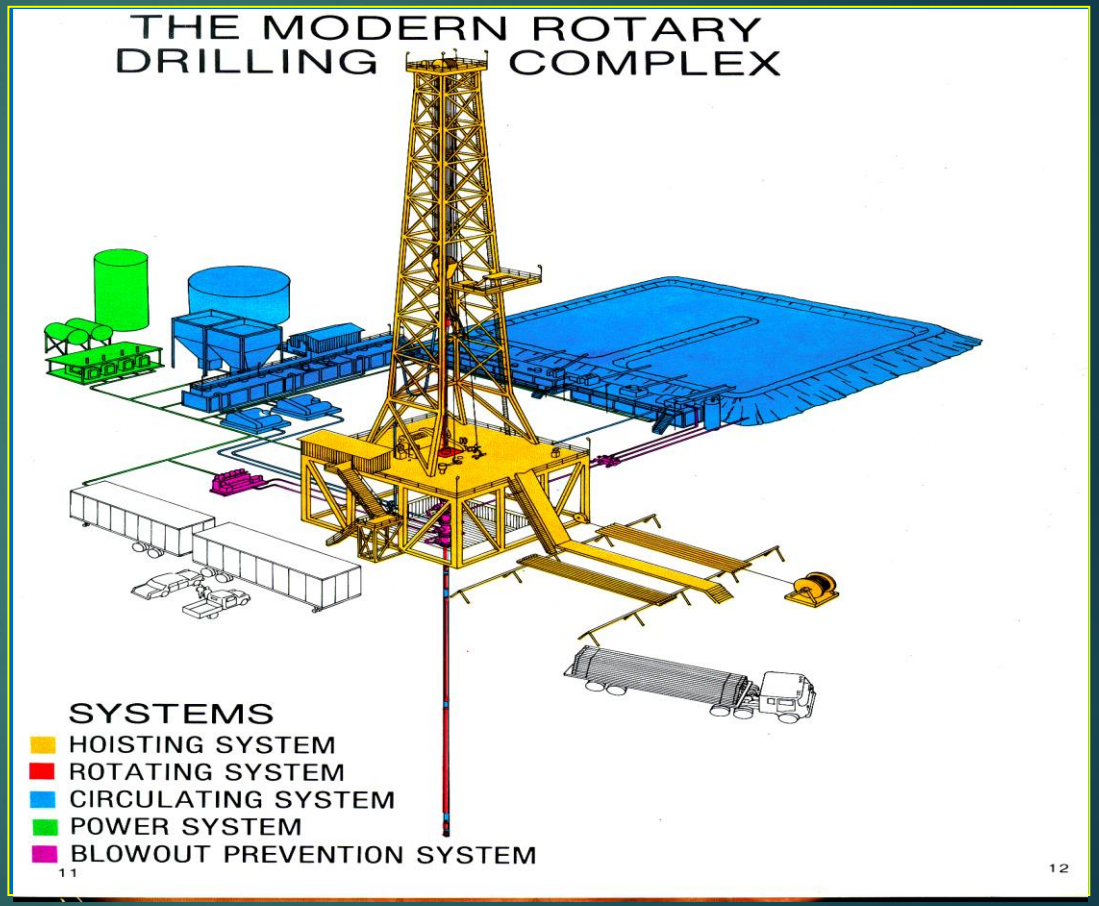
1- Hoisting System.

2- Rotating System.

3- Circulating System.

4- Blowout Prevention System (BOP).

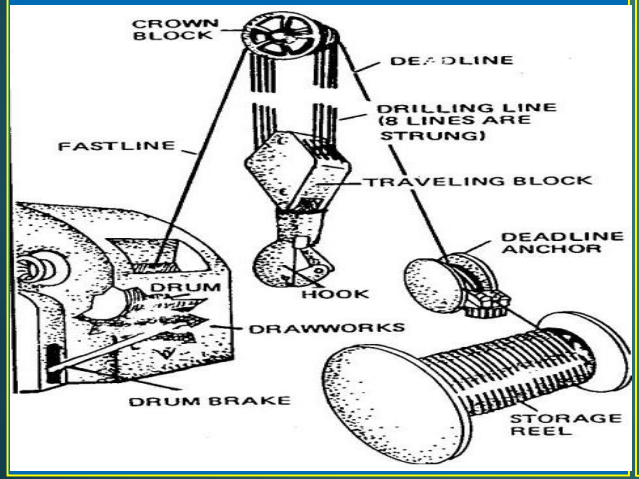
5- Motion Compensation System.

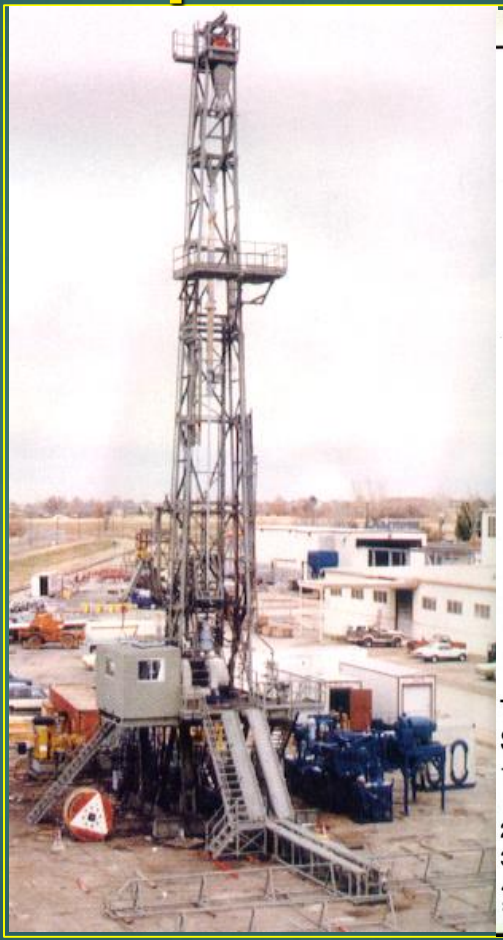


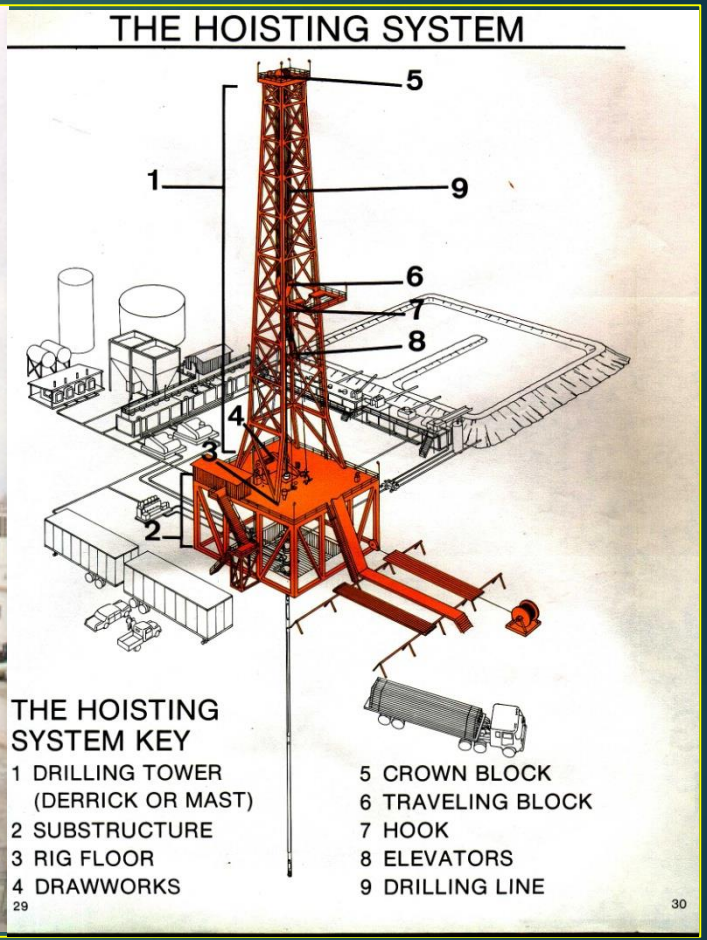
Hoisting System

Components:

- Derrick or Mast
- Crown Block – Sheaves
- Traveling Block
- Hook (Kelly Systems)
- Drill Line
- Draw works
- Deadline Anchor



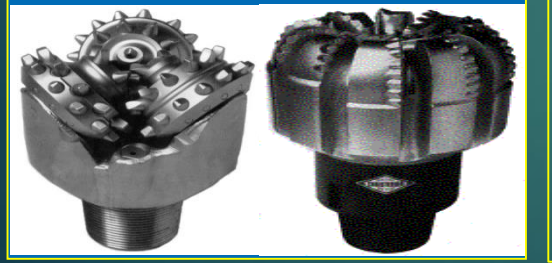




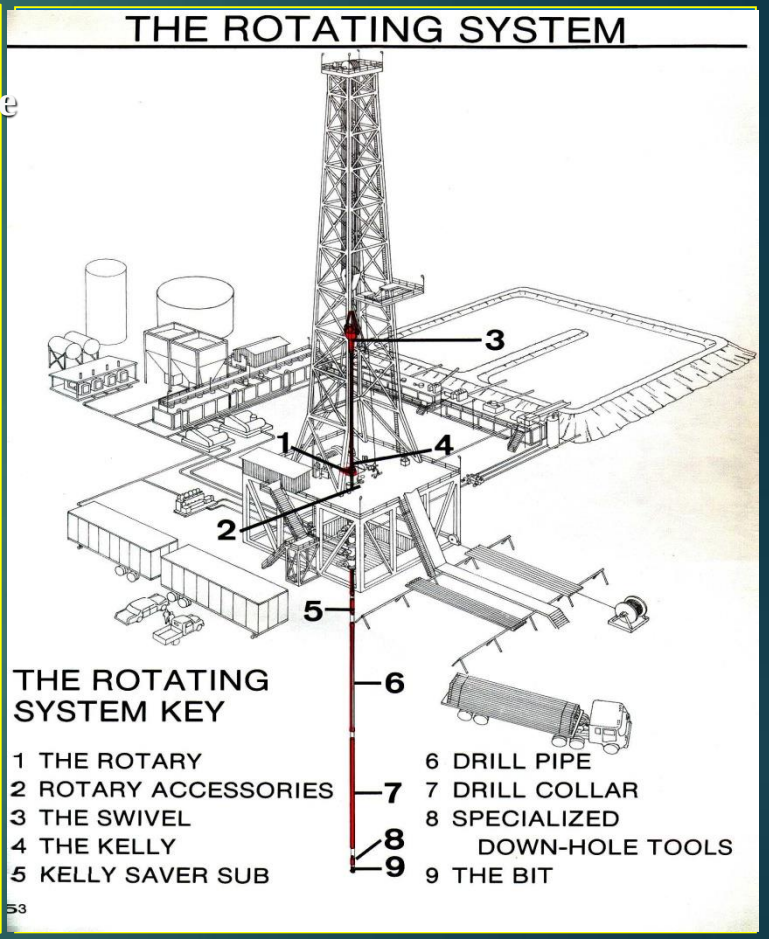
Rotating System

Components:

- Top Drive
- Kelly & Swivel
  - Kelly Drive Bushing
  - Master Bushing
  - Rotary Table (RKB)
- Drill String
  - Drill Bits
  - Drill Collars
  - Drill Pipe & HWDP
  - Subs & Stabilizers



Kelly



Drill Bits

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Two Main Types

Roller Cone Bits (Tri-Cone Bits)

Two types depending on how the teeth are manufactured:

Milled-Tooth Bits

Steel teeth have been milled on The cones

Tungsten Carbide Insert (TCI) Bits (Insert Bits)

Tungsten carbide inserts are pressed into the cones

Fixed Cutters Bits

Made mainly from diamond and divided into three types:

Diamond Bits

Natural diamond

Polycrystalline (PDC) Bits

Synthetic diamond

Thermally Stable Polycrystalline (TSP) Bits

Thermally Resistant PDC.

Miscellaneous Rig Floor Equipment

- Slips

- **Spinning Wrench**

- **Tongs**

- **Mud Box**

Circulating System

Components:

- Mud Pits

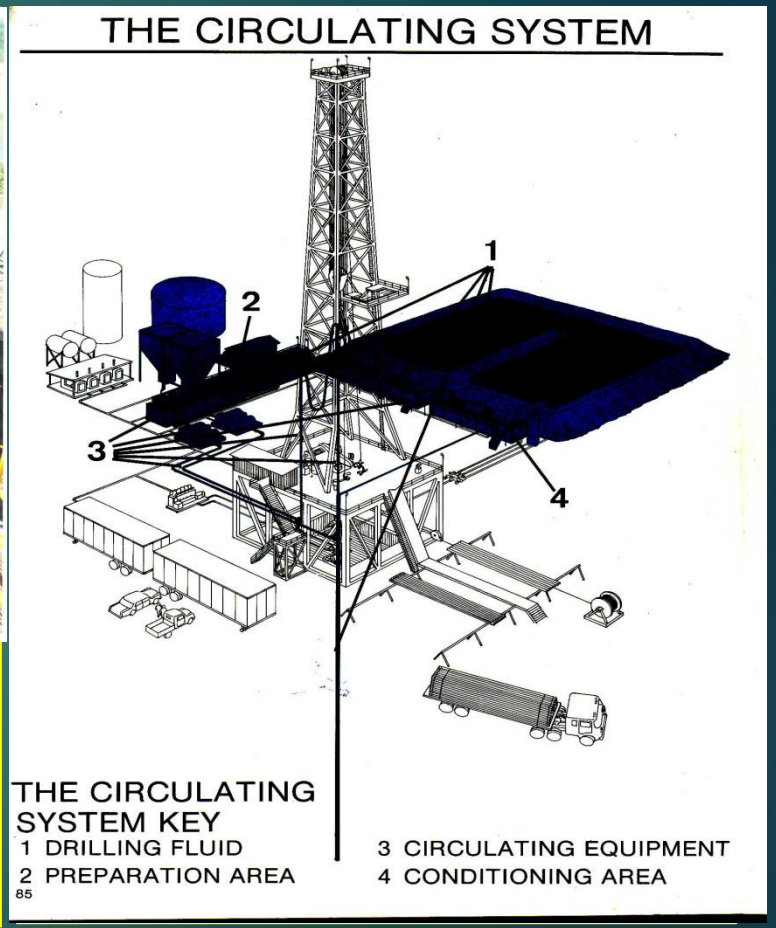
(Suction-Intermediate-Settling)

- Mud Pumps

(Duplex-Triplex)

- Standpipe
- Rotary Hose
- Gooseneck
- Flowline
- Mud Cleaning Equipment

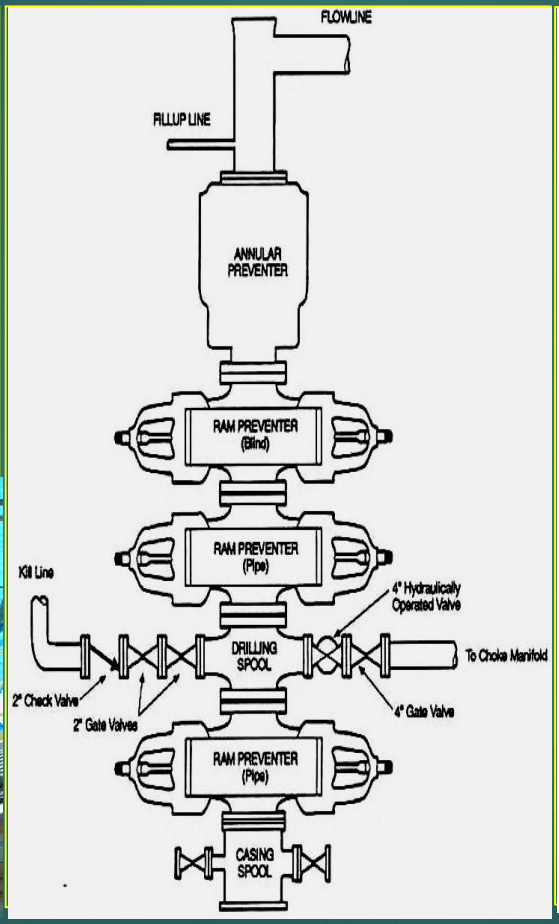
- shakers - sand trap
- Degassers
- desanders & desilters

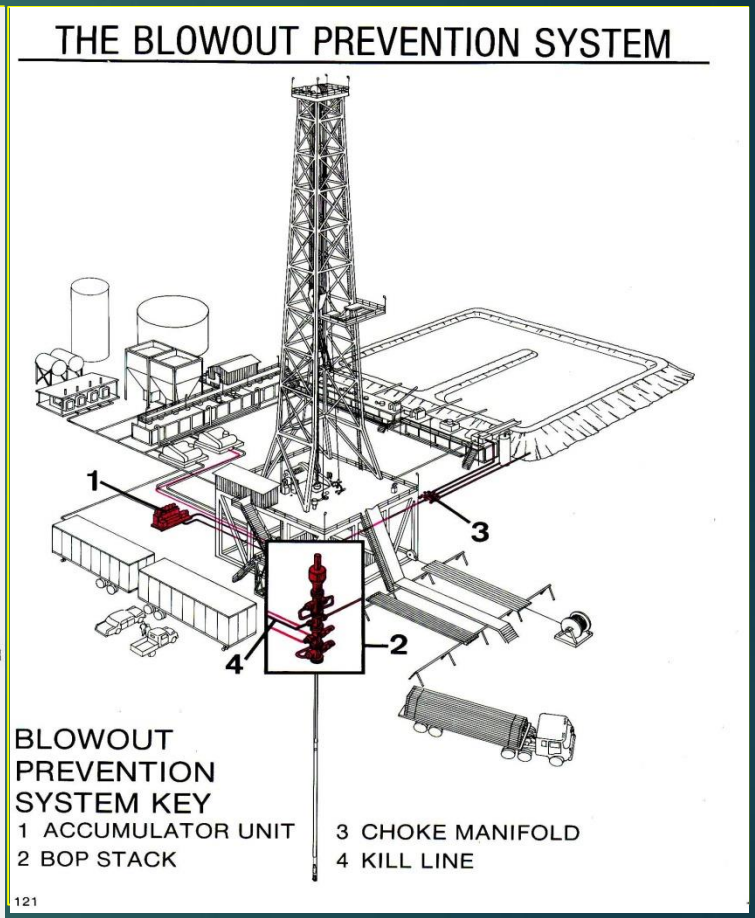


Blowout Prevention System (BOP)

Components:

- Annular Preventor
- Pipe Rams
- Blind Rams
- Shear Rams
- Kill Line
- Choke Line
- Remote BOP Controls





Motion Compensation Syste

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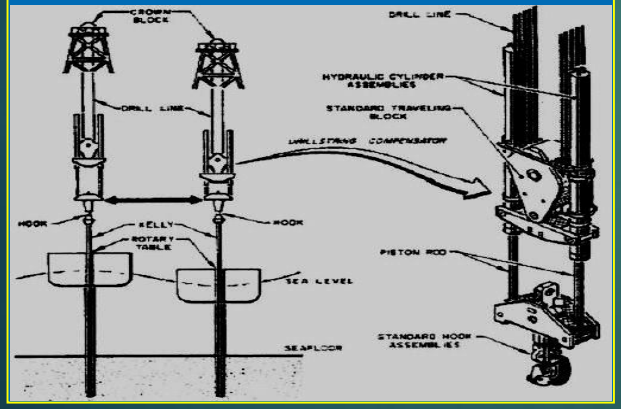
Restricted to floating rigs only - drill ships and semi-submersibles.

3 Basic types:

- **Drillstring Compensator (Heave Compensators)**

- **Mounted between the hook and the traveling block to nullify the effects of rig heave on the drill-string or other hook-supported equipment**

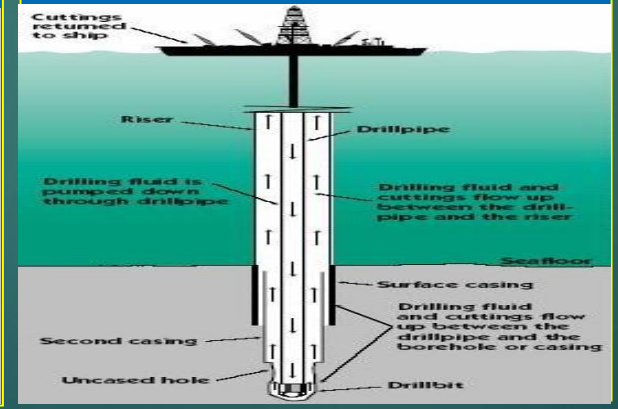


- **Marine Riser**

- **A large diameter pipe that connects the subsea BOP's to a floater.**

- **It provides a path for the drilling fluid, from the borehole to the rig.**

- **To guide the drillstring and other tools to the wellhead on the sea floor.**



- Telescopic or Slip Joint

- Located at the top of the marine riser to compensate for the vertical motion of the rig.

Rig Operations

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- Drilling

-Vertical	-Directional	-Horizontal
Angle=0-3	Angle=3-90	Angle=90

Directional drilling is made using motors.

- **Why we drill directional?**
  - Development work on platforms
  - Fault Drilling
  - Drilling in inaccessible or populated areas
  - Sidetracking and Straightening
  - Salt Dome Drilling
  - Relief Wells

Rig Operations

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- **Tripping**

Types:

- Tripping In
- Tripping Out

Purposes:

- Long Trip (To surface): To Change bit, for casing, …etc
- Short Trip: Condition Trip, wiper trip…

- **Casing**

- Conductor
- Surface Casing
- Intermediate Casing
- Linertvd

- **Cement**

- **Logging**
- Logging while drilling (LWD)
- Wireline Logging

- **Fishing**

- **Coring**

- **Completion**

- **Rig Move**

Personnel on The Rig-site

- **Company Representatives**
  - Company Man (Company Rep.)
  - Drilling Engineer
  - Geologist

- **Rig Crew**
  - OIM
  - Tool Pusher
  - Night Pusher
  - Driller
  - Ass. Driller
  - Derrick Man
  - Floor Men
  - Roustabout
  - Electrician
  - Mechanic
  - Camp boss
  - Material Man
  - Radio Operator
  - Safety Engineer

- **Service**
  - Mud Engineer
  - Mud Logger
  - MWD/LWD
  - Directional Engineer
  - Coring Engineer
  - Cementer
  - Casing Operator
  - Wireline Operator
  - Catering Staff

Drilling Fluids

Types:

- **Water-Base Mud**

Consisted basically from water with other Chemicals.

- **Oil-Base Mud**

Contains oil as basic component with other chemicals.

- **Air**

Rarely to use.

Functions:

1- Remove drilled cuttings around bit from the borehole and carry them to the surface (VIS).

2- Suspend cuttings when circulation is stopped (Gel).

3- Control subsurface Pressures (MWT).

4- Prevent caving the borehole (MWT).

5- Clean, cool and lubricate the drill bit and Drillstring.

6- Seal porous and permeable zones with an impermeable filter cake.

7- Provide maximum information from the formation drilled

Properties:

- Mud Weight (MWT)

Measured using mud balance.
Units: ppg , pcf

- Funnel Viscosity (VIS)

Measured using Marsh Funnel
Units: Sec/qt

- Gel Strength (Gel)

Measured using "Fan VG Meter"
Units: lbs/100ft^2

- Plastic Viscosity (PV)
- Yield Point (YP)
- Water Loss
- Solid %
- Sand%