

# OIL & GAS TECHNOLOGY

## Chapter 2: Upstream Operations

by

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# Chapter Description

- Aims
  - Understand the basic concept and activities for upstream operation.
- Expected Outcomes
  - Explain fundamental knowledge of upstream activities including petroleum system, surveying technologies, E&P phase, reservoir, drilling, coring, cementing and well completion
- References
  - Håvard Devold, 2013, Oil and gas production handbook: An introduction to oil and gas production, transport, refining and petrochemical industry, ABB ATPA Oil and Gas.

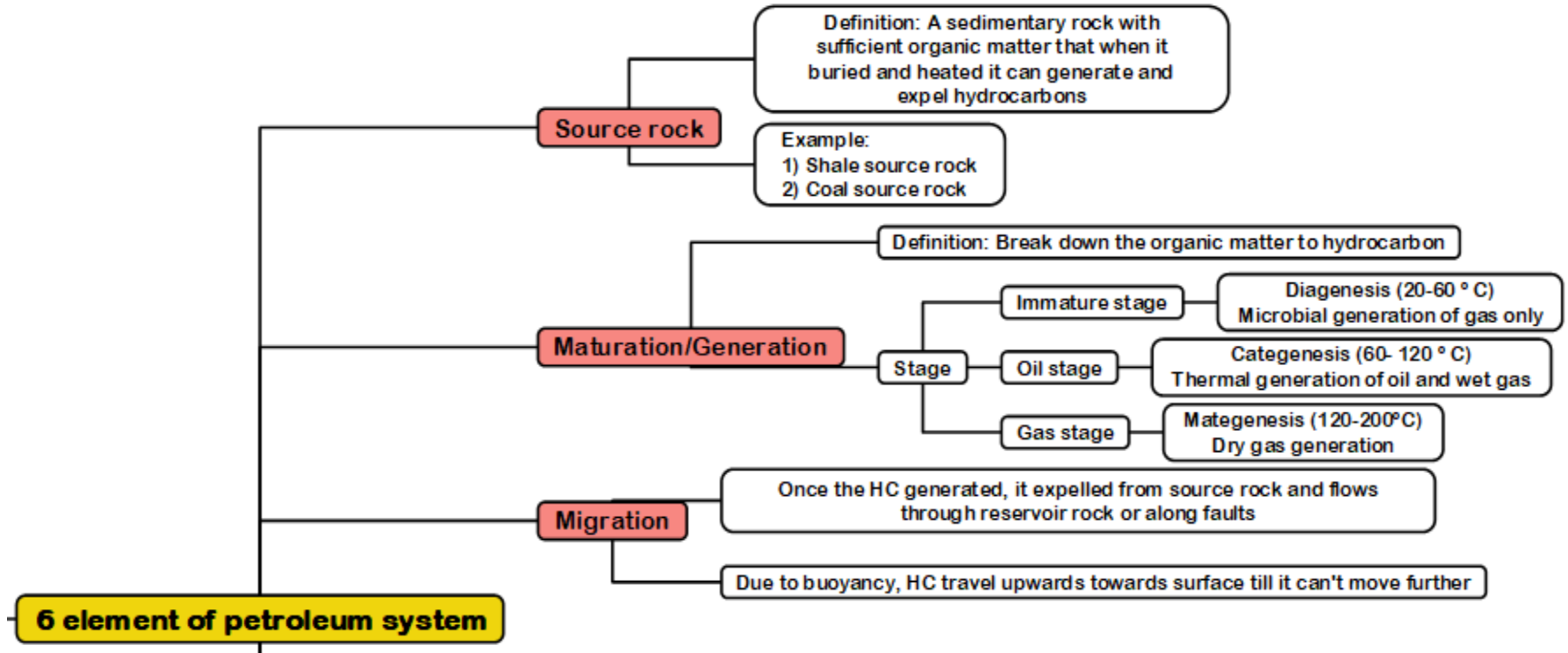


# Content

- 2.1 Petroleum systems
- 2.2 E&P phases
- 2.3 Reservoir
- 2.4 Drilling
- 2.5 Casing
- 2.6 Well completion
- 2.7 Conclusion



# 2.1 Petroleum Systems



# continue...2.1 Petroleum Systems

## 6 element of petroleum system

### Reservoir rock

Definition: A rock that is capable of storing (porosity) and transmitting (permeability) fluids

Porosity=storage void (the void space within the rock)

Types  
1) Siliclastics( Sandstones)  
2) Carbonates (Limestone & dolostones)  
3) Evaporites

Permeability=transmissibility (a measure of how well the rock can allow fluids to pass through it)

### Seals

Definition: A impermeable rock layer that block migration of fluids through it

### Traps

Definition: Configuration of reservoir and seal rocks that allows petroleum to accumulate in the reservoir

#### Types

Stratigraphic

Structural

Anticline trap

Fault trap

Salt dome traps



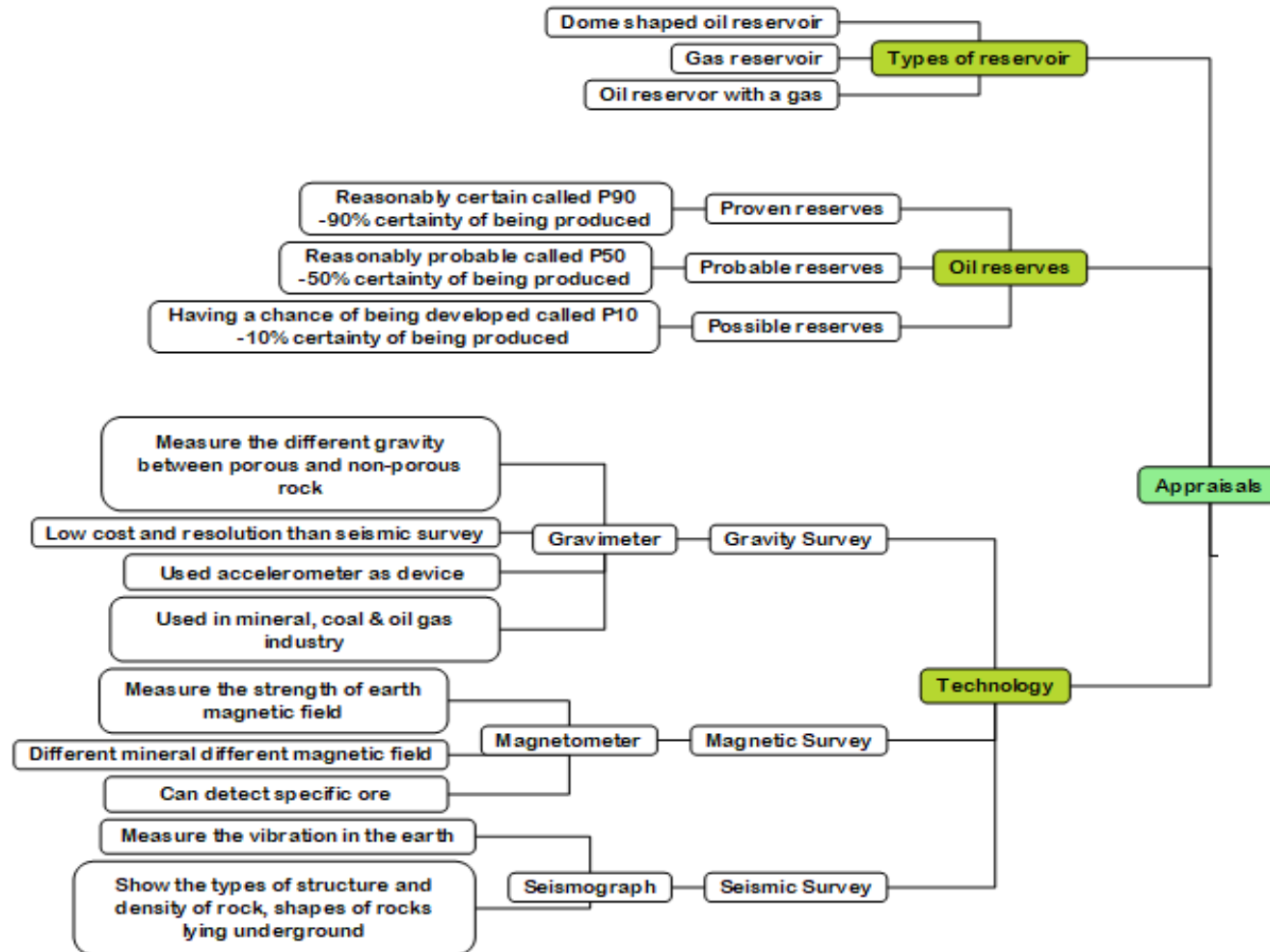
## 2.2 E&P phases

### E&P consists of;

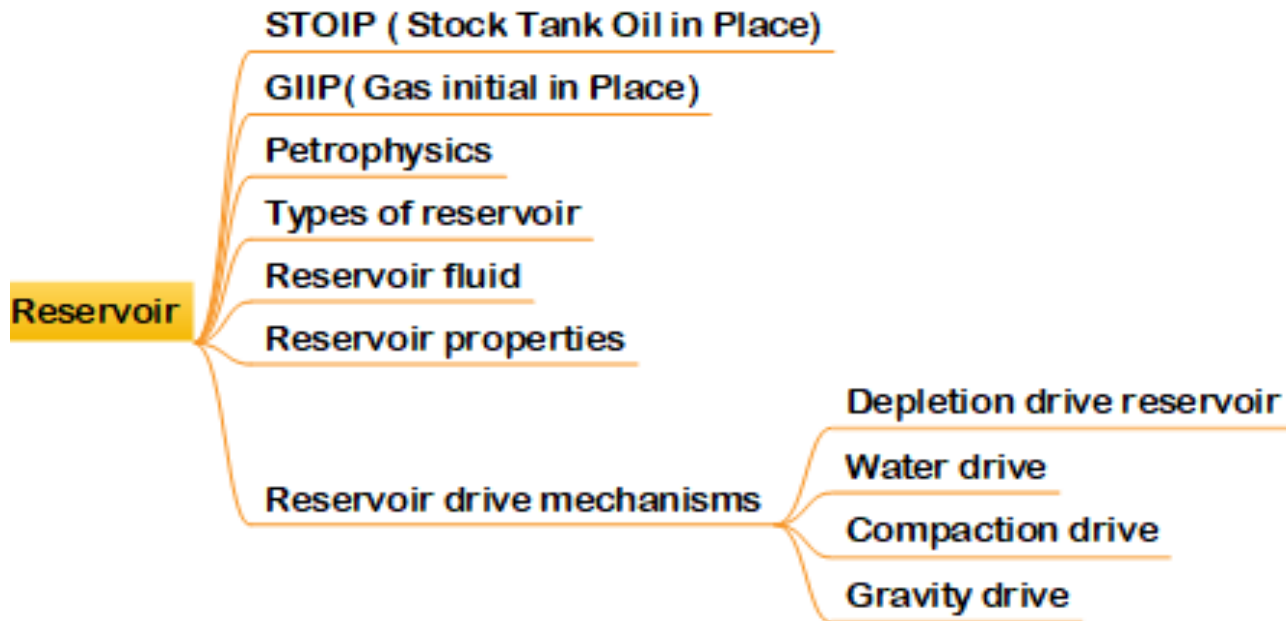
- **Exploration phase**- usually 5 years initial assessment and surveying field that has high possibility to produce oil/gas well
- **Appraisal phase**- usually 3-5 years . To complete appraisal of discoveries and assess remaining potential (success case)
- **Development phase**- 20-25 years can extend further depending on lease renewals and field life
- **Production phase**- 20-25 years can extend further depending on lease renewals and field life
- **Abandonment phase** – after 35-40 years of production



# 2.2 Exploration and Appraisal Phase

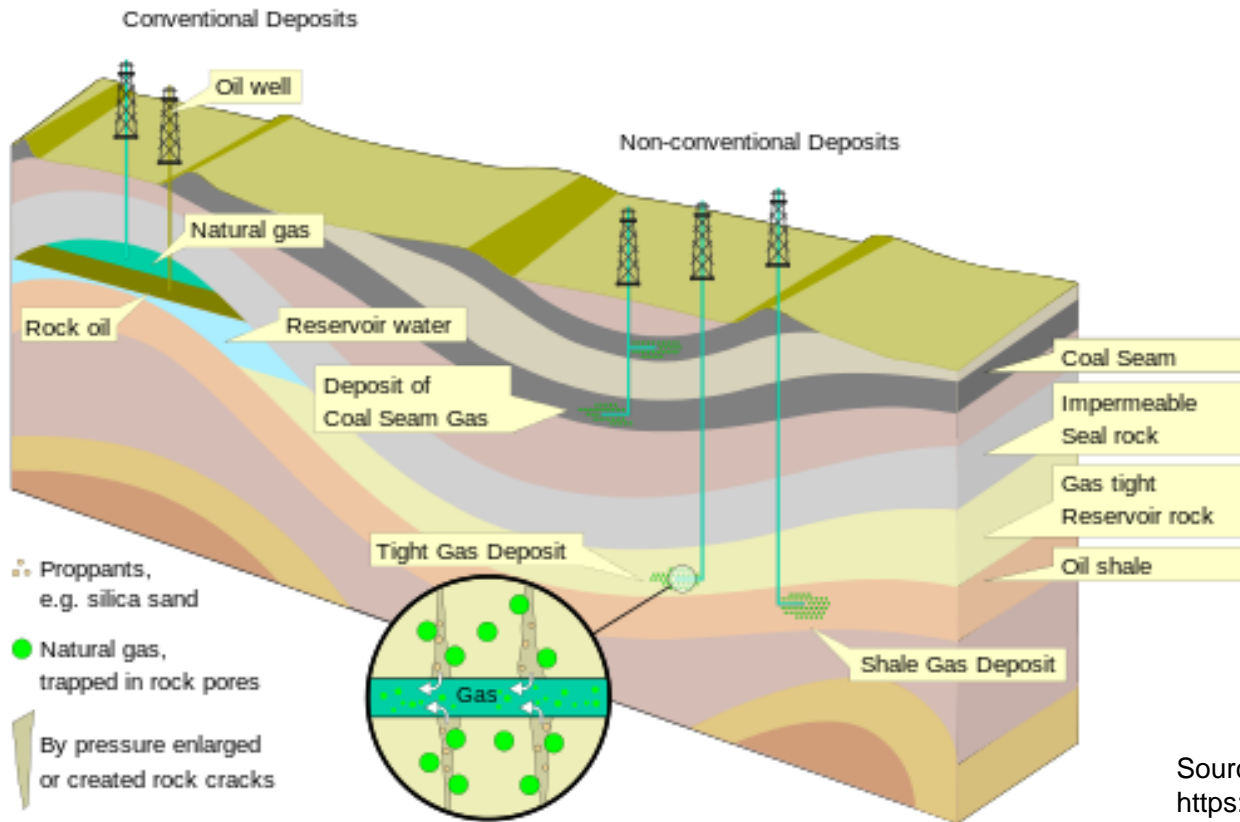


# 2.3 Reservoir





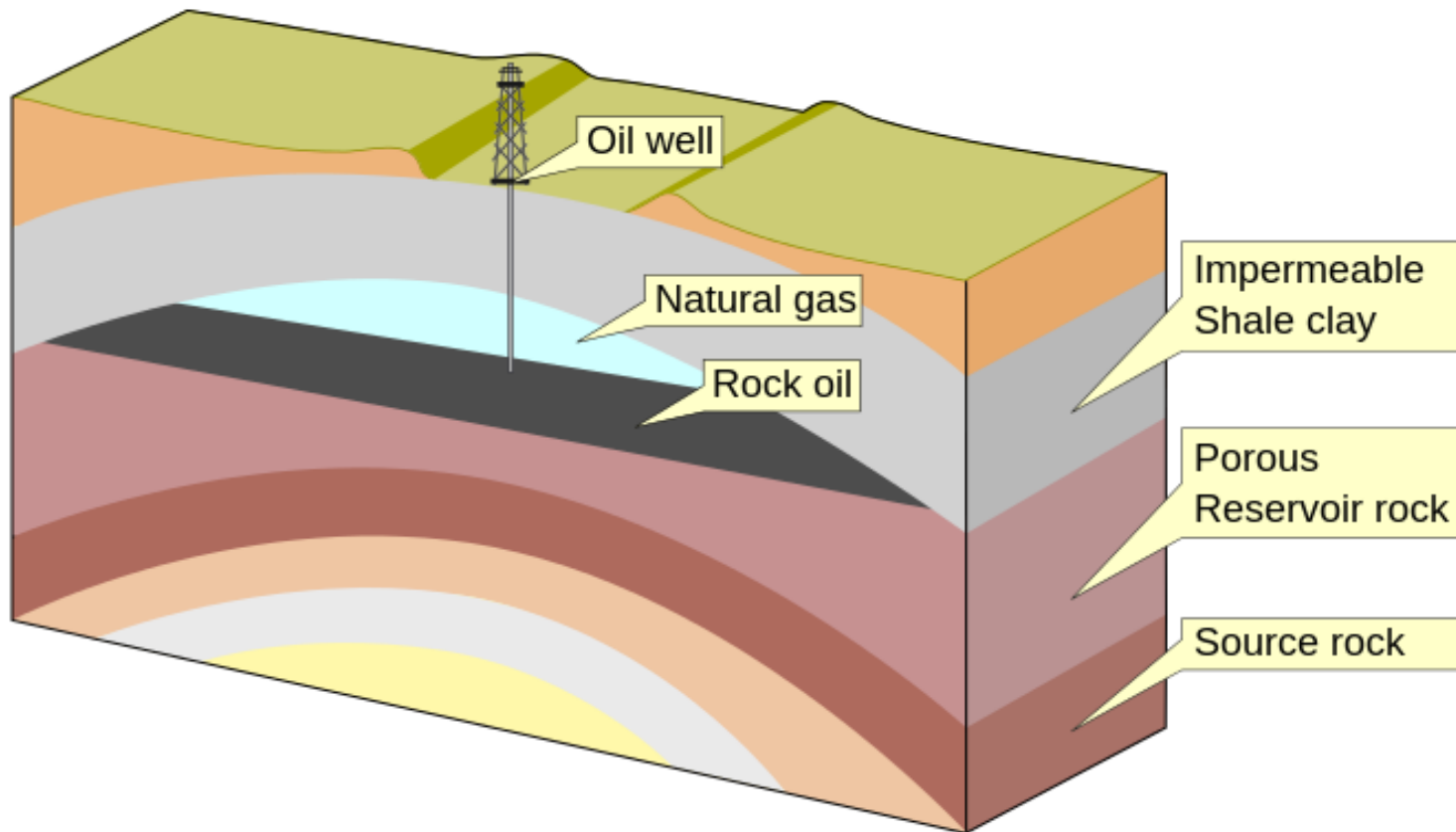
# 2.3 Reservoir



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## 2.3 Reservoir

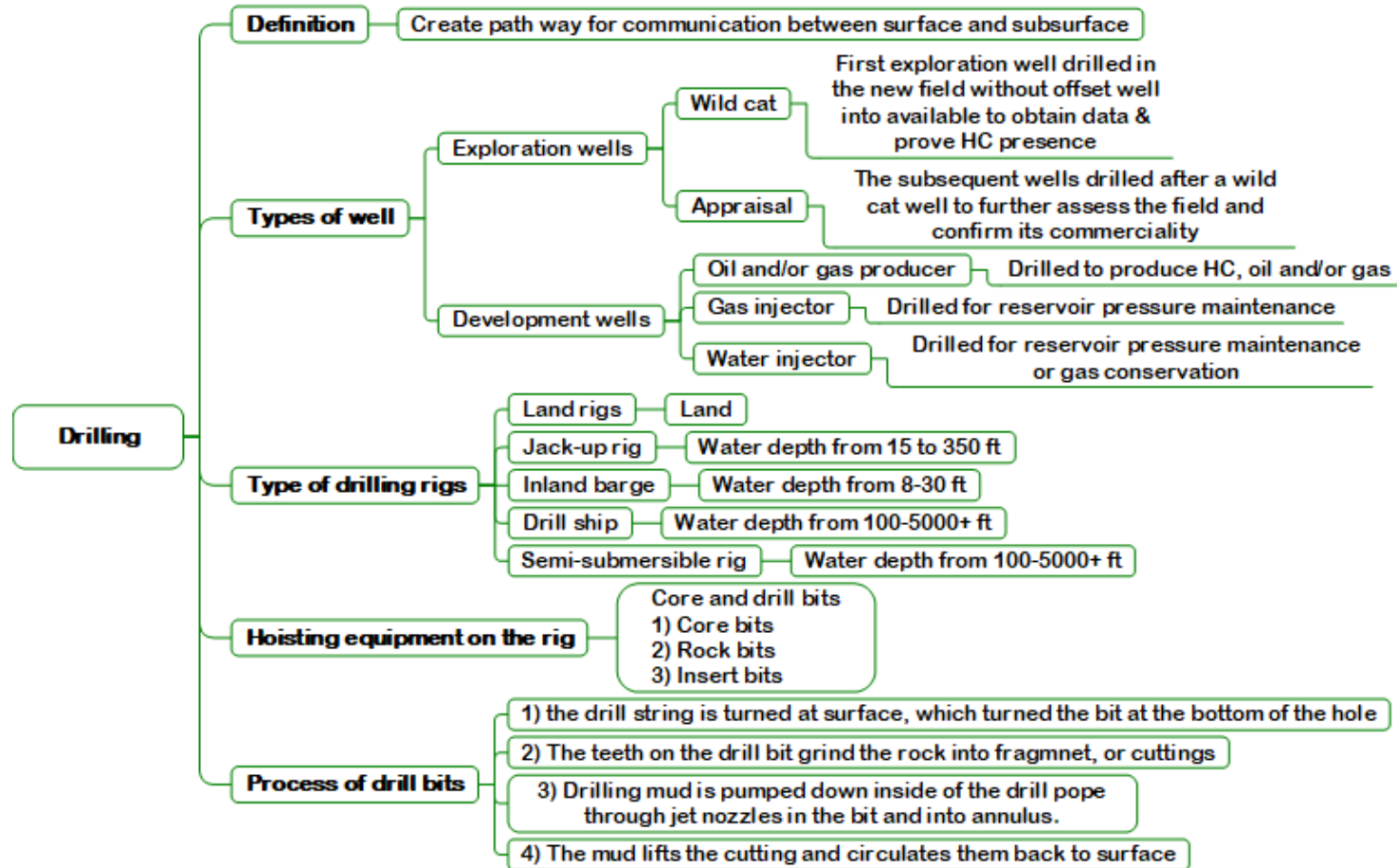


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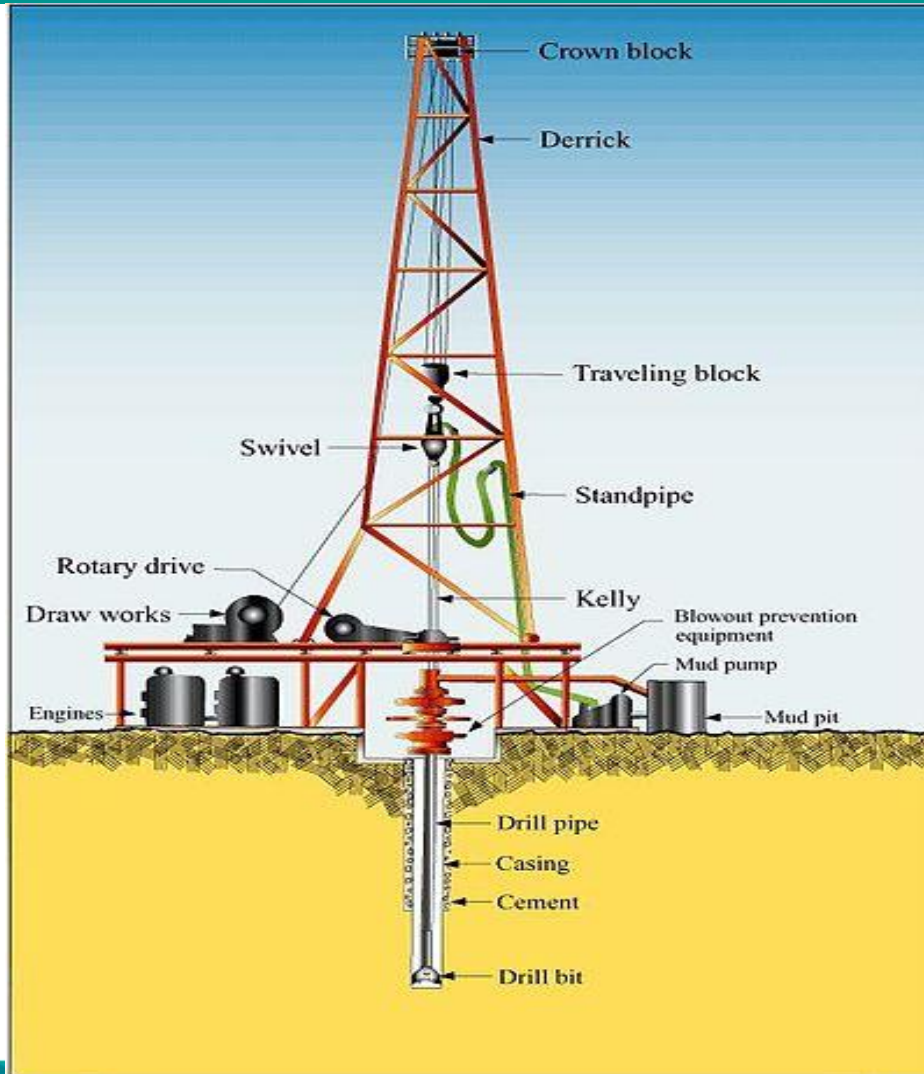


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# 2.4 Drilling



## 2.4 (a) Drilling rig



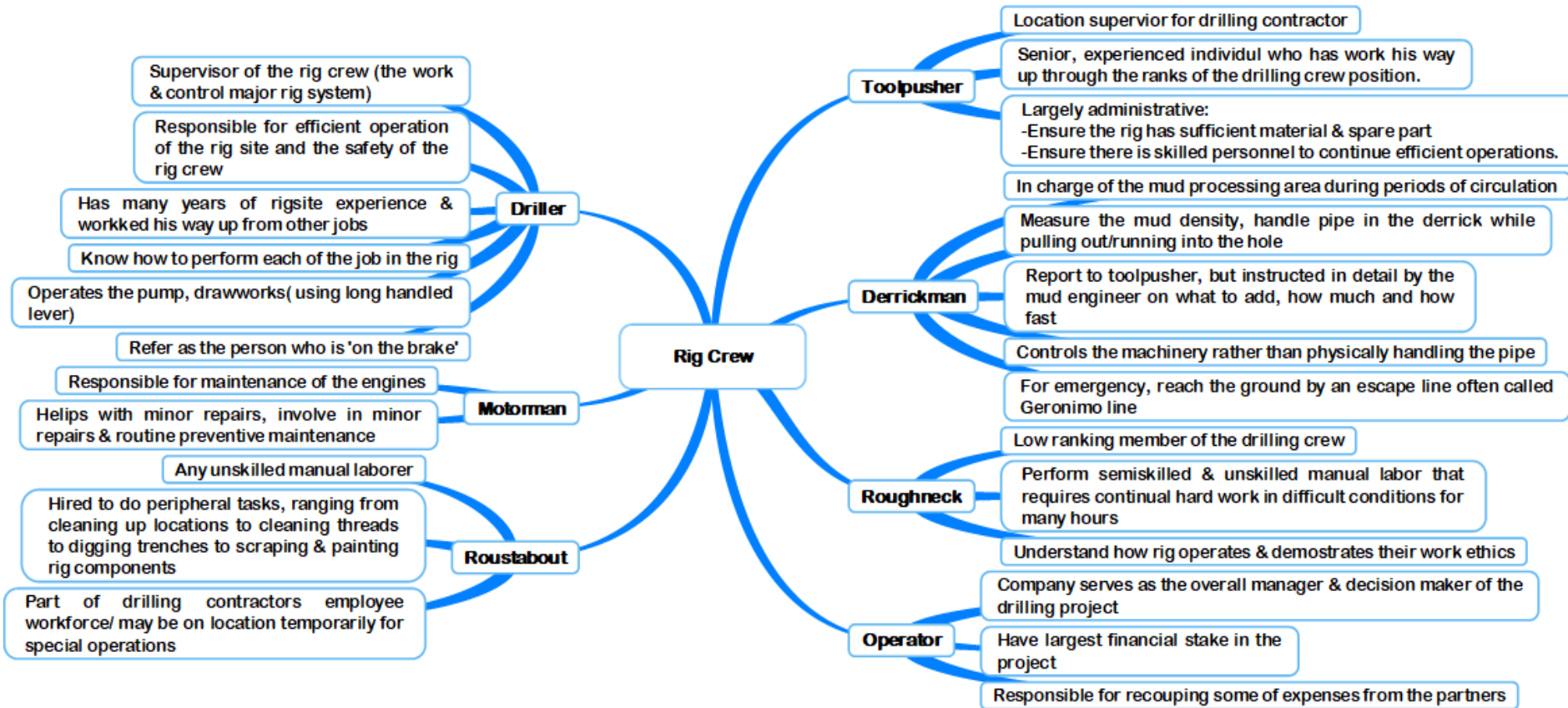
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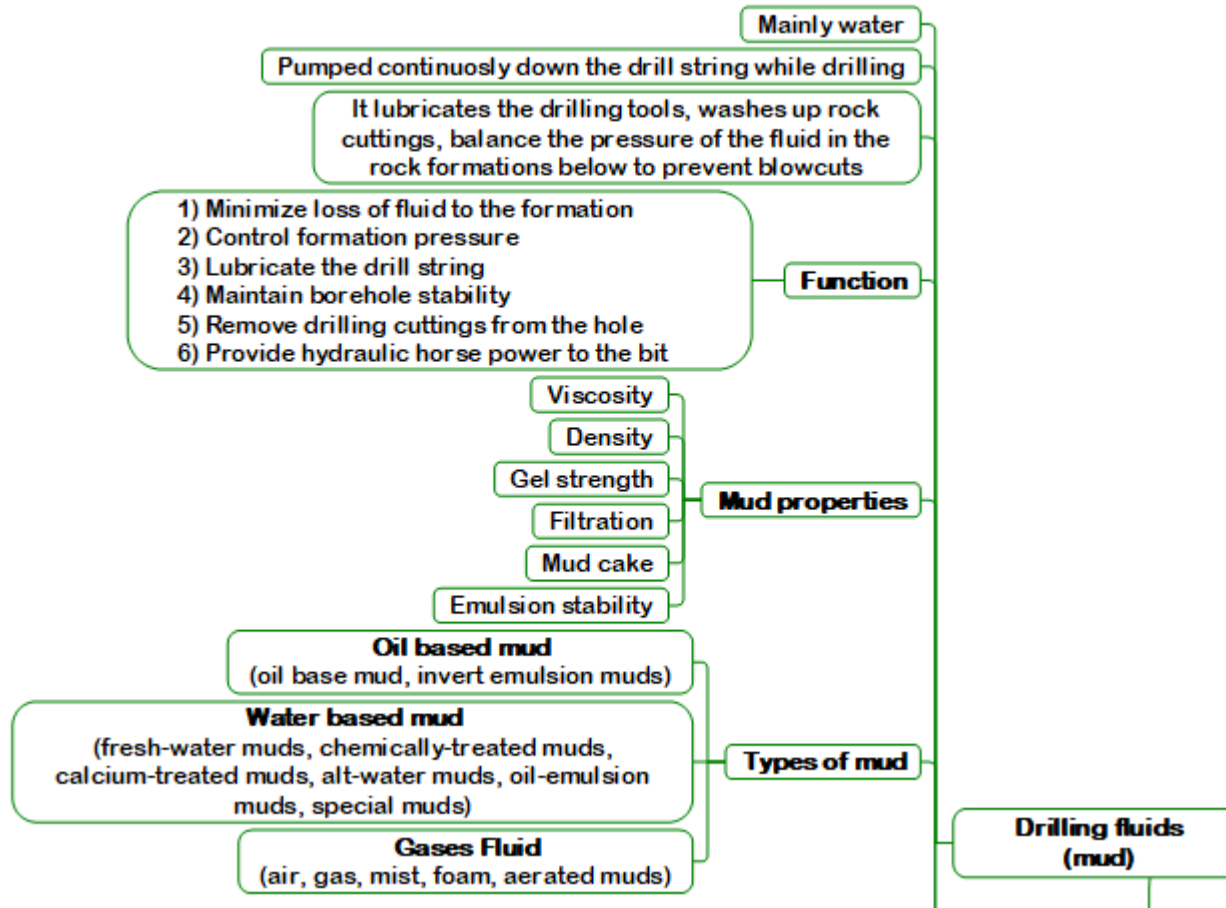


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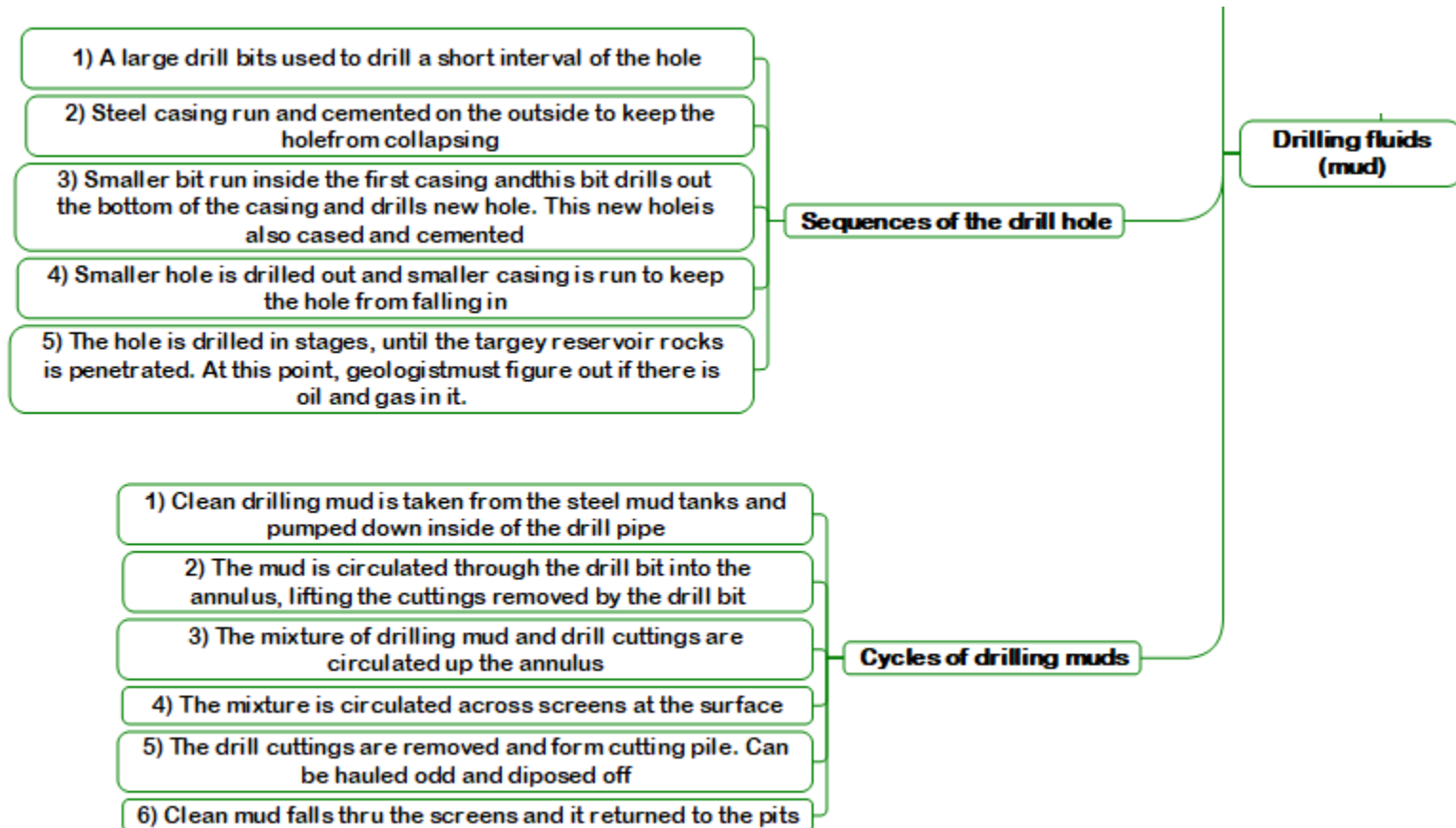
# 2.4 (b) Drilling / Rig Crews



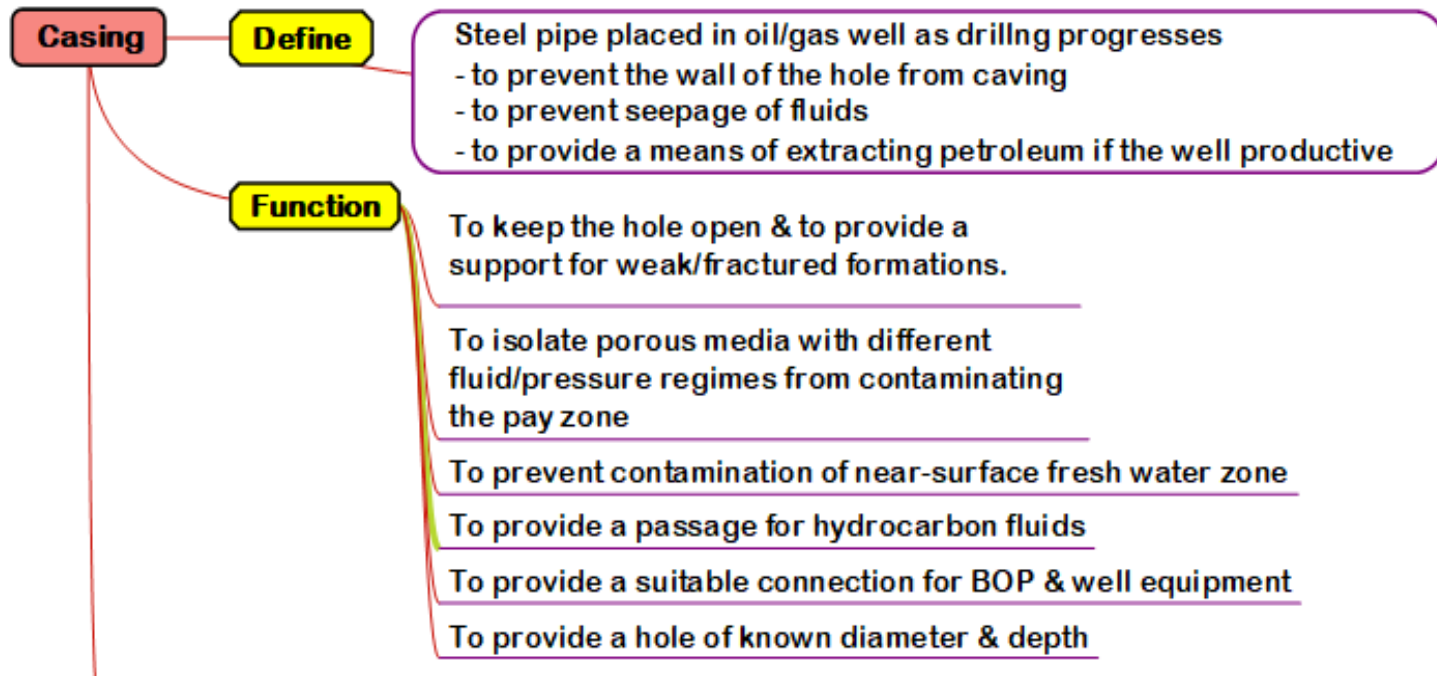
## 2.4 (c) Drilling – drilling fluid/ mud



## 2.4 (d) Drilling – drilling fluid/ mud

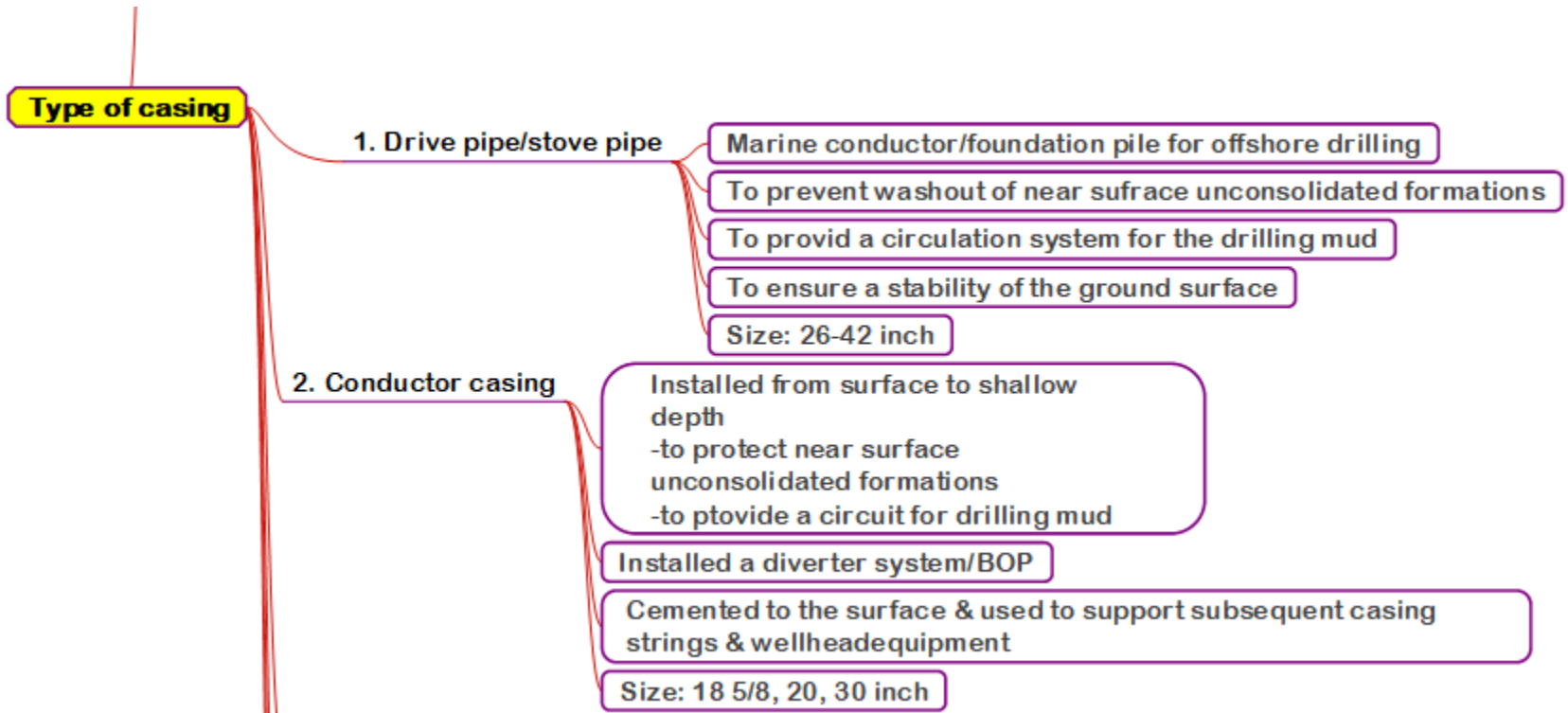


# 2.5 (a) Casing



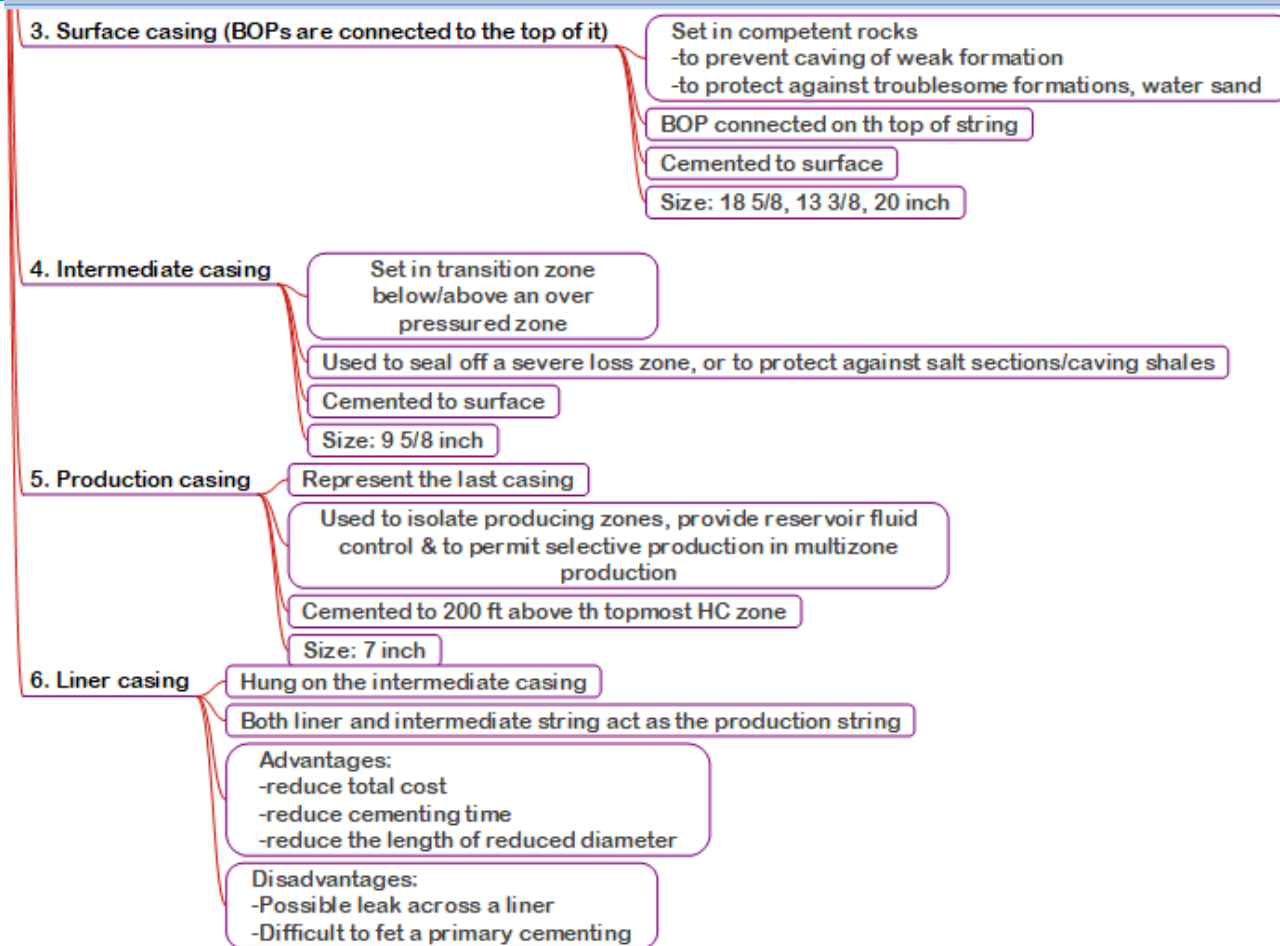


# 2.5 (a) Casing

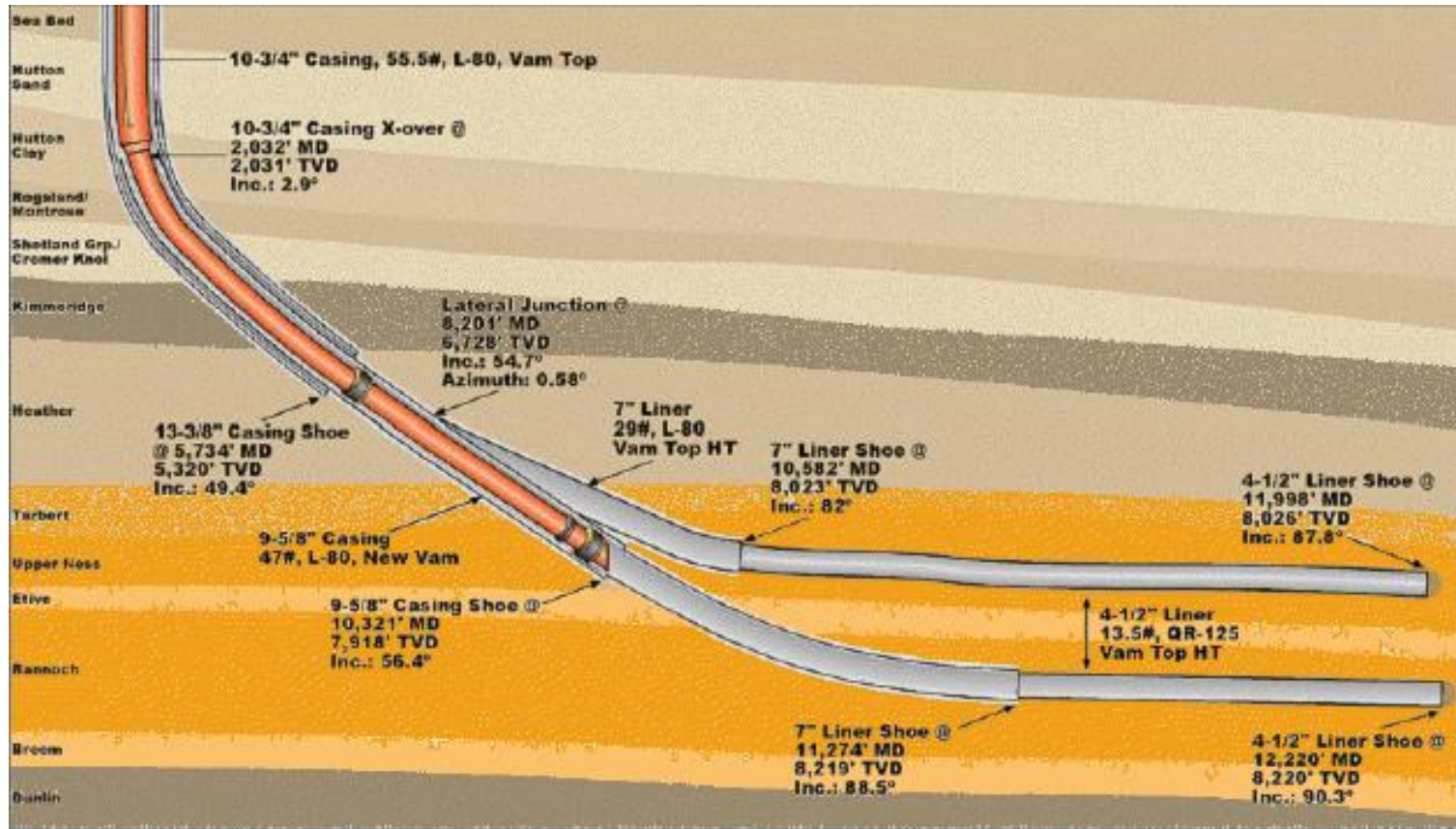


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## 2.5 (a) Casing



# continue... 2.5 (a) Casing

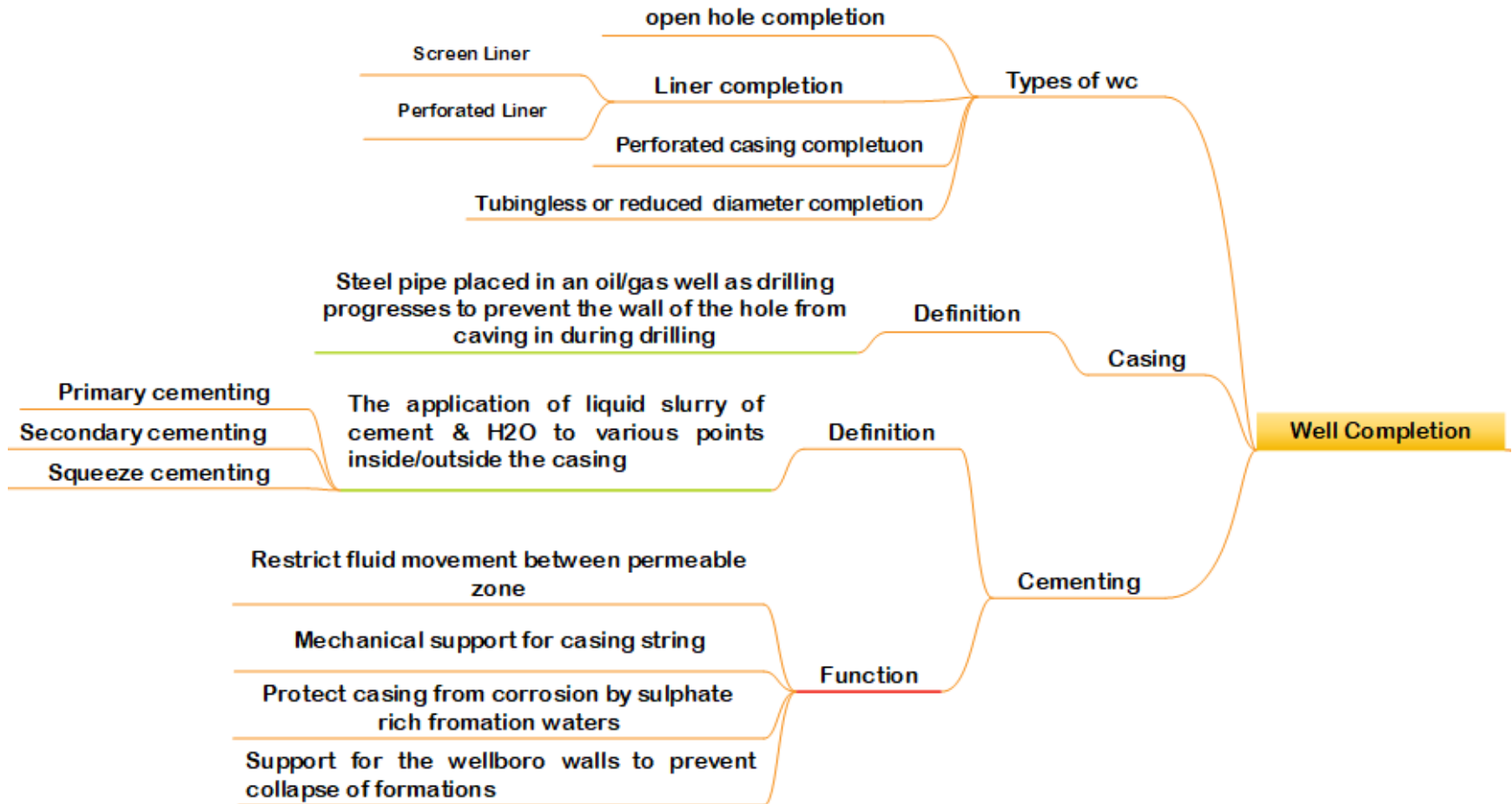


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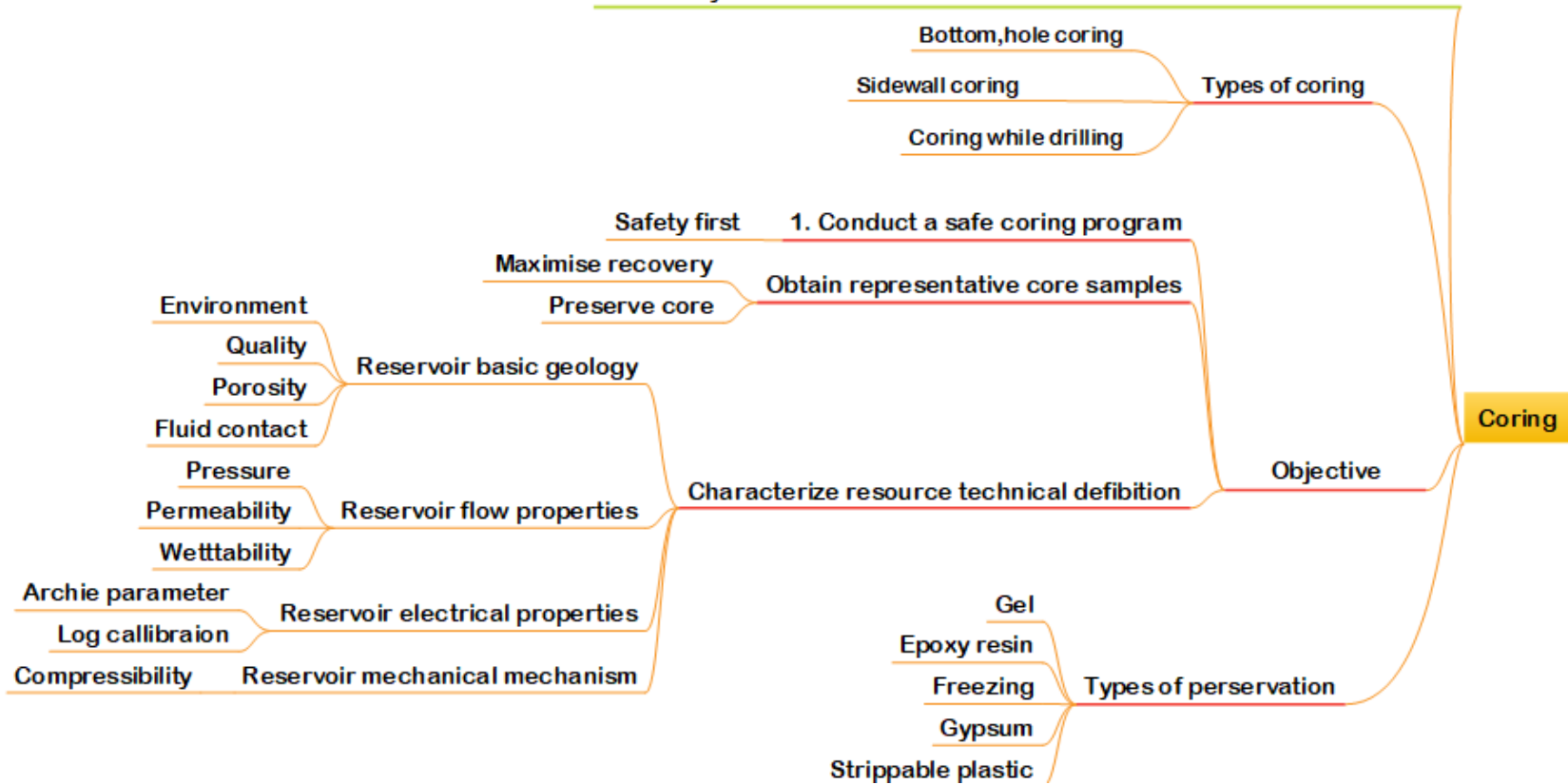
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# 2.6 Well completion



# 2.6 (a) Coring

Definition: obtaining representative reservoir samples by cutting & preserving the reservoir rock to be used for further analyses in laboratory



## 2.6 Conclusion

1. Petroleum system elements is important to understand oil and gas formation
2. Upstream operation are the main key for the production of oil and gas.
3. Surveying is important to identify potential location for oil and gas.
4. Suitable casing is required for production of oil and gas.



**THANK YOU.**



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# Authors Information

Credit to the authors:  
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