



Why do need to study this subject?

Value of oil and gas for Kazakhstan economy.

Outcomes in development of an oilfield.



# Subject

Fundamentals  
of production  
and refining  
engineering

# Chapters

Well drilling

Production of  
oil and gas

Collection,  
storage and  
transport of oil  
and gas

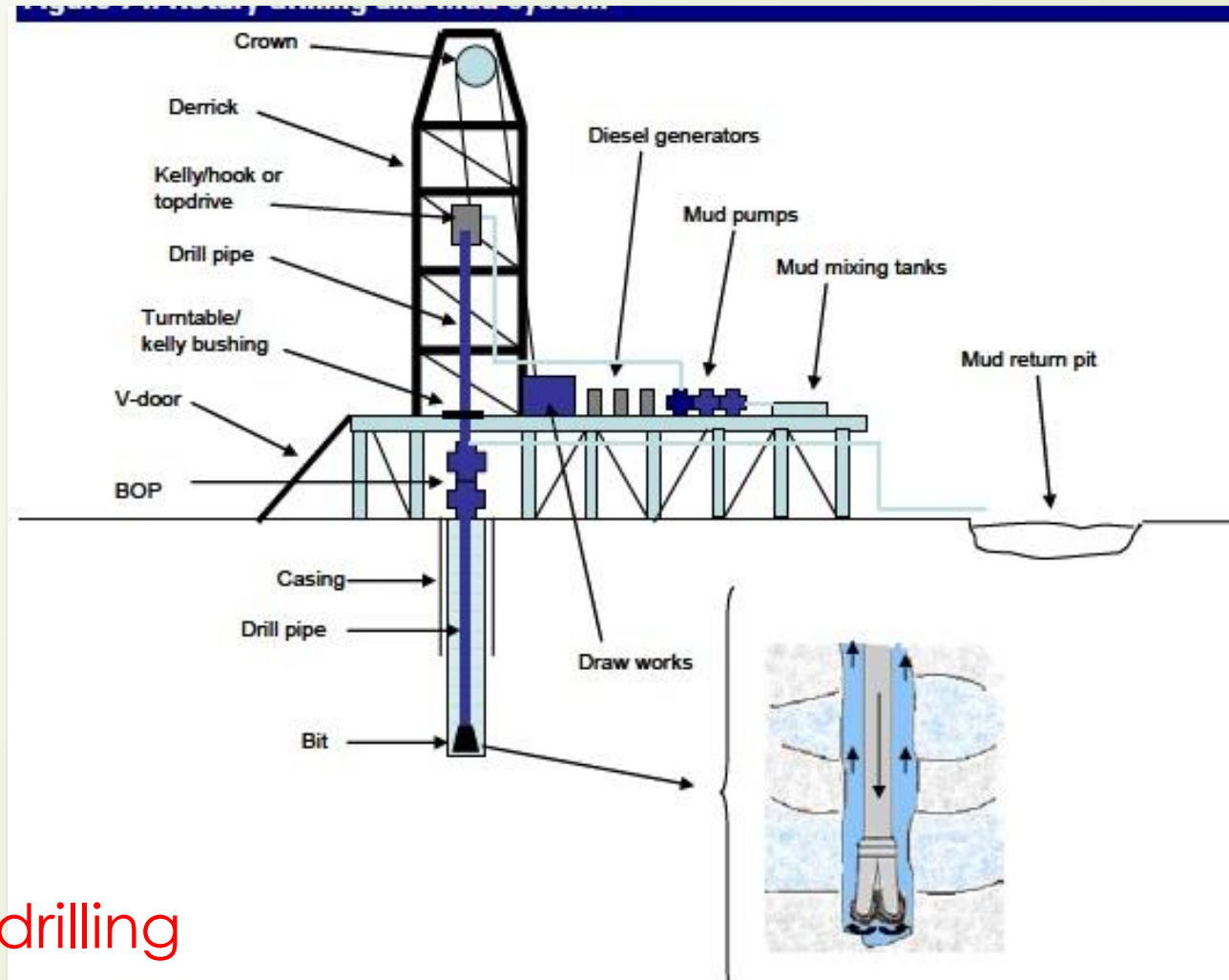
Oil and  
associated gas  
refining

Duration – 5 weeks



## Drilling methods

Auger drilling for construction purposes, environmental and geotechnical drilling, sampling



## Rotary drilling

A sharp, rotating bit, to dig down through the Earth crust



Before drilling commences, certain other arrangements and decisions have to be made. These may include:

**Leasing of the land** - A mineral lease is a contract between the exploration company and land owner. In this case operating company will pay to land owner royalties. The payment of royalties begins with the first production and it is around  $1/8$  of the production, in some cases might be as high as  $1/5$  of the production



## Site preparation

The rig location and the road to the lease will be surveyed and prepared. The drilling lease must be large enough to accommodate the drilling rig, field offices, living quarters if it is an isolated location, drilling supplies and space for any service company equipment or vehicles.

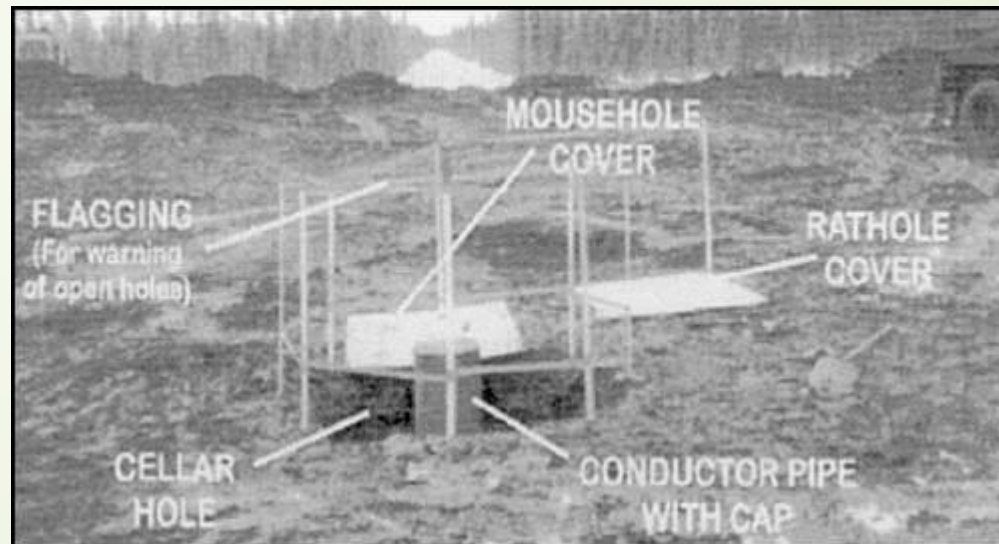
**A normal drilling lease** is 106 x 106 metres (348 x 348 feet) or 1.12 hectares (2.78 acres). Depending on the size of the drilling rig the lease may be as little as half an acre (0.20 hectares). In remote locations, an air strip and a separate area for a camp may also be required.


The lease should be cleaned from soil. Soil must be removed and set aside the lease. If the soil is consolidated.

Once the lease is cleared a service a subcontractor or service company is hired to dig a pit or cellar.

This is usually a metre in depth and up to two metres in diameter. The cellar is lined with large diameter pipe to keep the soil from falling around the drilling equipment. The cellar also provides extra vertical space for the equipment installed under the drilling rig. The well is started in the centre of the cellar. The conductor hole is lined with pipe or conductor casing and may be cemented in place.

- Finding or drilling a source of water;
- Digging a reserve pit, which is used to dispose of rock cuttings and drill mud.






The next step is to set up the rig. Drilling occurs in stages:

1. A surface hole is drilled to a depth between 60 and 400 metres, depending on underground aquifers and area conditions.
2. The crew pulls out drill pipe, drill string and inserts steel pipe, is called surface casing, which is cemented in place to isolate the wellbore and geological formations.
3. The crew installs blowout preventers (BOP), specialized valves are used to seal and control the wells
4. Replacing a drilling bit. This process is called tripping.

Shallow wells today are drilled without bits. Instead of bits is used casing pipe.





**Wildcat:** Speculative exploration well drilled in search of a new oil or gas accumulation

**Exploratory well:** A hole drilled: a) to find oil or gas in an area previously considered unproductive; b) to find a new reservoir in a known field, i.e., one previously producing oil and gas from another reservoir, or c) to extend the limit of a known oil or gas reservoir

**Appraisal Well:** Well drilled after the discovery of oil or gas to establish the limits of the reservoir, the productivity of wells in it and the properties of the oil or gas

**Development well:** A well drilled within the proved area of an oil or gas reservoir to the depth of a stratigraphic horizon known to be productive



<https://www.youtube.com/watch?v=nISKA7PkSzo>