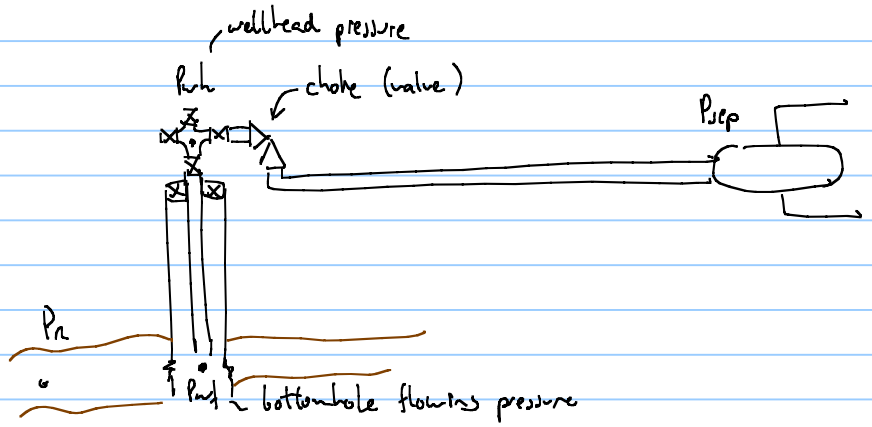
20160123. Class 3:

DECOMMISSIONING AND ABANDONMENT

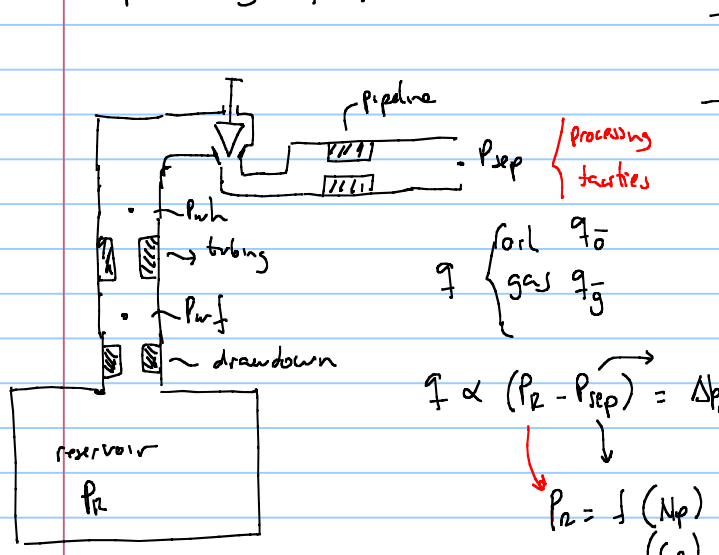
- Engineering "down and clean": flushing and cleaning tanks, processing equipment, piping.
- Coordinate with relevant environmental and governmental authorities.
- Well plugging and abandonment (P&A) → drilling rig
- Cut and remove well conductor and casing.
- Remove topside equipment. →
- Removal of the offshore structure: Lifting operations and transport
- Remove or bury subsea pipelines
- Mark and register leftover installations on marine maps
- Monitoring
- Recovery of material: Scrap (steel) and recycling equipment (Gas turbines, separators, heat exchangers, pumps, processing equipment)
- Disposal of residues

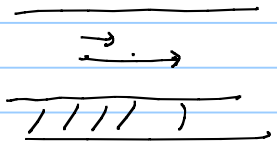
Decommissioning:
Overview of activities
https://www.youtube.com/watch?v=8Xm9VNZul9M
Transport of platform and scrap yard
https://www.youtube.com/watch?v=1GA3EIu81rw

Field performance:



simple analog of field"





$q \begin{cases} \text{oil} & q_o \\ \text{gas} & q_g \end{cases}$

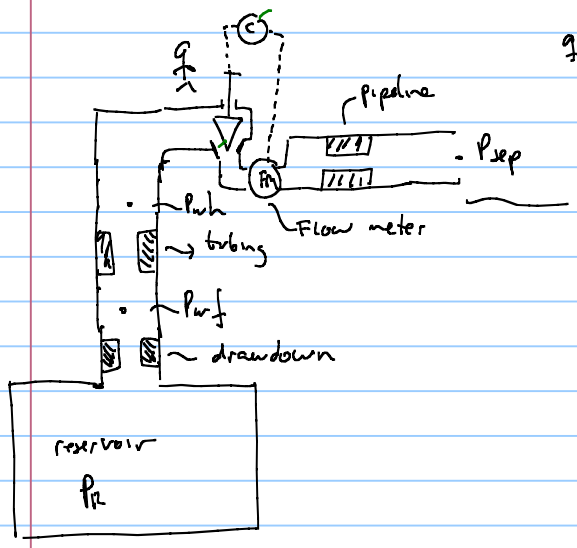
$$q \propto (P_R - P_{sep}) = \Delta p_{drawn} + \Delta p_{tubing} + \Delta p_{pipeline} + \Delta p_{choke}$$

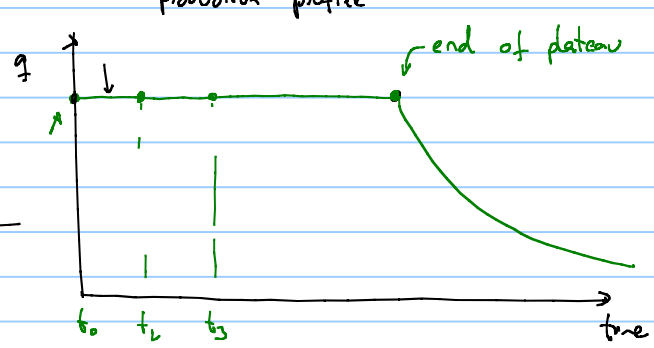
$$P_R = f\begin{pmatrix} N_p \\ G_p \end{pmatrix} \qquad N_p = \int_0^{t^*} q_o(t)\,dt$$

$$G_p = \int_0^{t^*} q_g(t)\,dt$$

operating modes of field

A - constant rate (plateau mode)



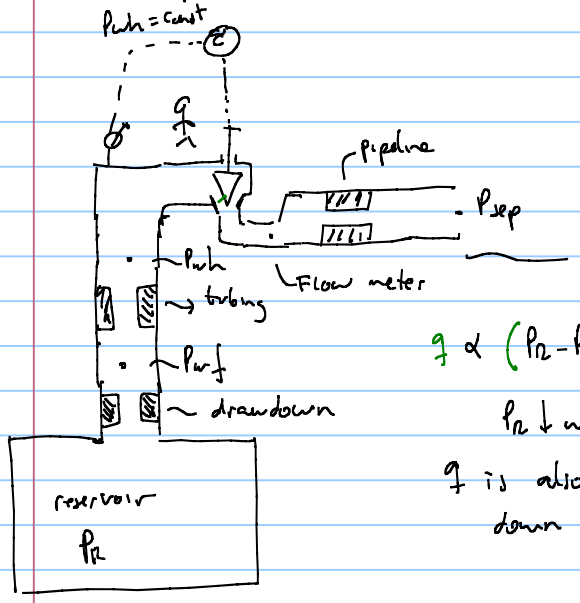


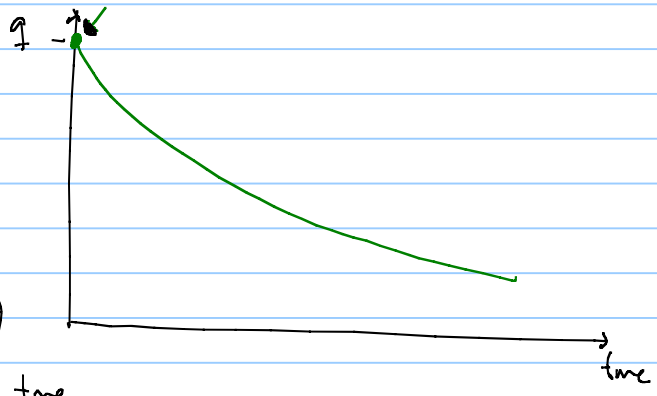
http://www.ipt.ntnu.no/~stanko/Field_Simulator.html

when is this production mode employed?

- in standalone developments with independent processing facilities and offshore structure
New fields with no neighboring fields with spare capacity

B - Constant pressure - rate decline mode



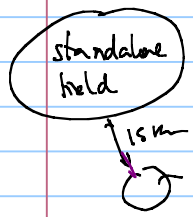


$q \propto (P_R - P_{wh})$

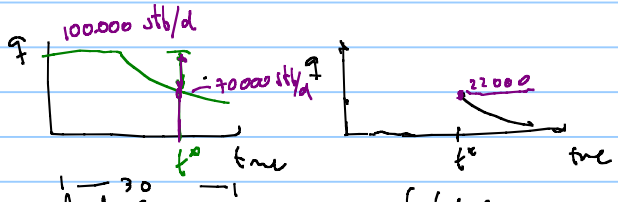
P_R ↓ with time

q is also going down with time

- produce as much as possible as fast as possible
- used for satellite field producing to an existing facility with spare capacity



satellite field produced as a tie-back to the standalone field



http://folk.ntnu.no/stanko/Files/20170402_NCS_Production_Data.xlsx

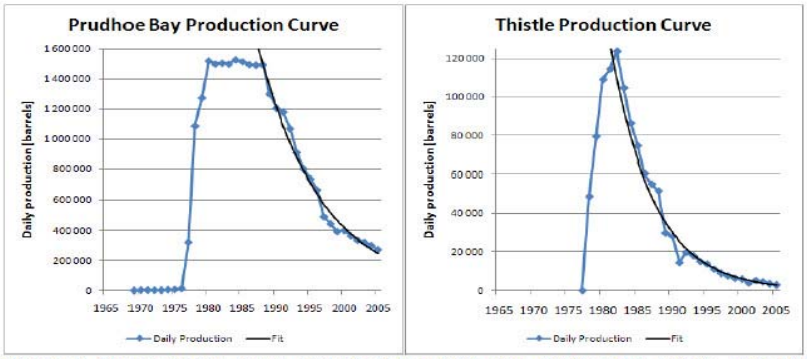
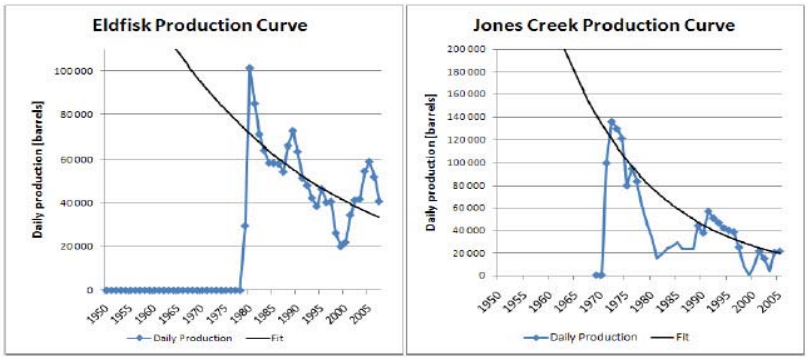
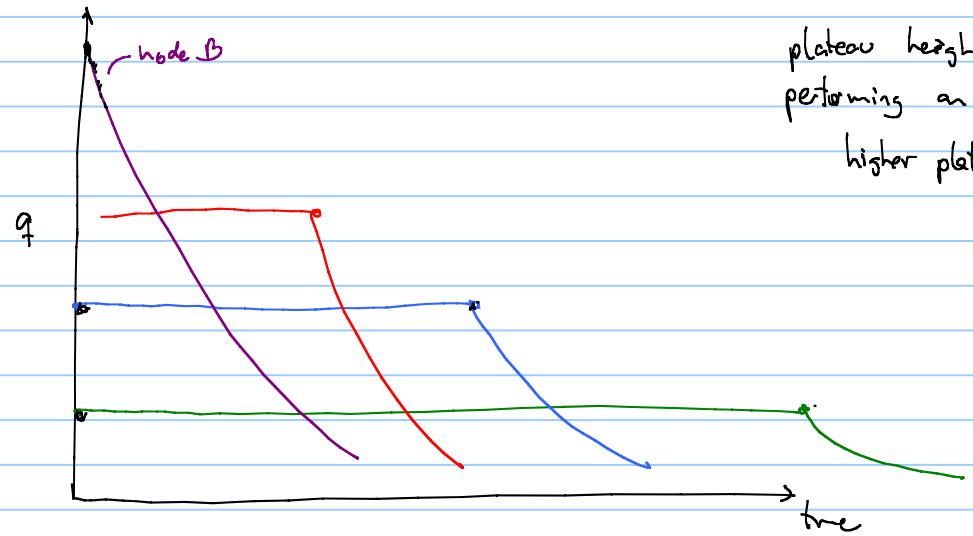


Figure 4: *The production curves of the land-based US giant Prudhoe Bay and the giant UK Thistle offshore field. The approximately exponential average decline rate is clearly seen in these two well-behaved fields.*



https://grandemotte.wordpress.com/oil-and-gas-5-production-decline-rates/

there is a close relationship between plateau height and length

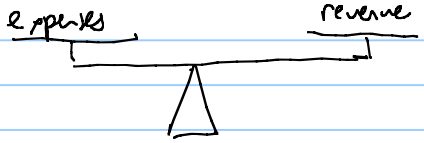


plateau height is determined by performing an NPV analysis.

higher plateau → higher CAPEX (offshore structure, processing facility, pipeline)

→ higher drillex

→ quicker and higher revenue



lower plateau → lower capex

→ lower drillex

→ lower revenue delayed

the plateau height is usually found by performing sensitivity analysis to maximize NPV.

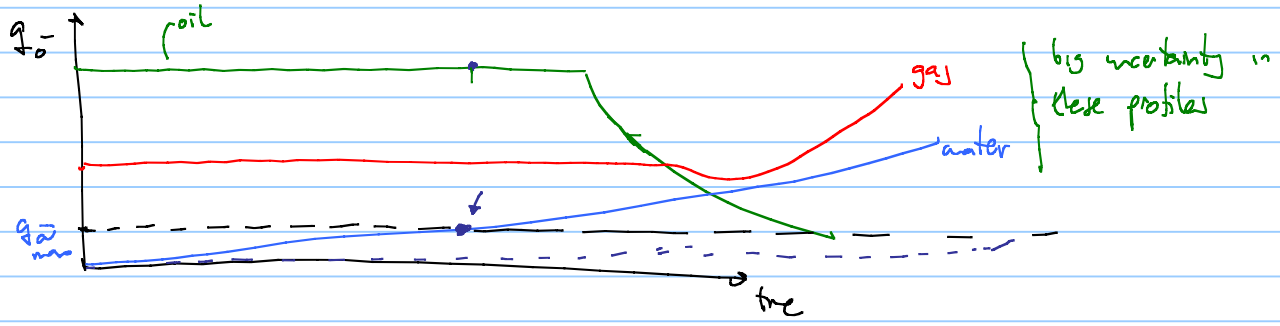
plateau height is usually something I can decide upon

plateau duration is defined by physics ← proper forecast of production profile!

production scheduling ~ define the rates of field / well during the lifetime of field

reservoir management ~ define how much each well will produce { reservoir characteristics (productivity of each well), gas / water coning, sand production, target recovery factor, ... }

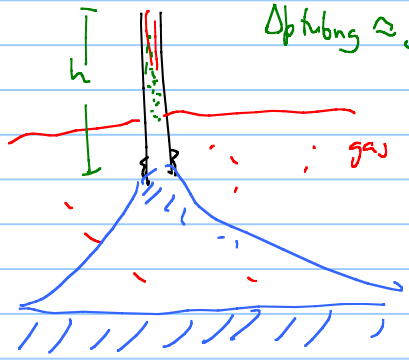
In the development process the associated products { $\bar{g}$ and $\bar{w}$ for oil field; $\bar{o}$ and $\bar{w}$ for gas field } must also be taken into account !!



when designing the processing facilities they are made for a maximum $q_{\bar{g}}$ and $q_{\bar{w}}$

for gas fields oil production is an extra source of revenue ! it can change completely the economy of field for good

water is for gas field



plateau length for gas fields ~ 10 – 30 years

plateau length for oil field ~ 2 → 5 years