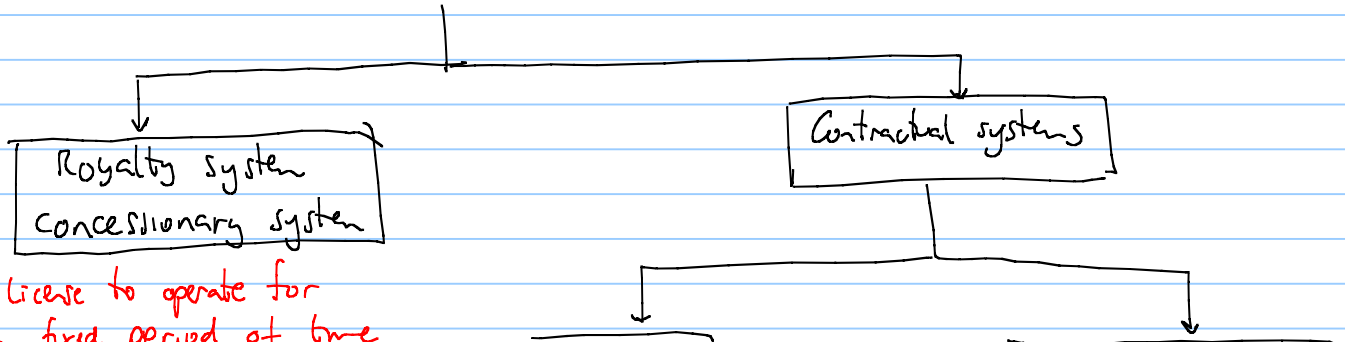
Note Title 12.01.2017

Petroleum fiscal systems (brief)

- in almost every country in the world the owner of the mineral rights is the government (except in the USA).
  - ↳ the individuals pay a tax to state.



- License to operate for a fixed period of time (NORWAY – 30 years)
- UK, France, Norway, Russia Australia, New Zealand, South Africa, Colombia, Argentina

- the company sets their share in money

- the company get share in production

- Company pay royalty on the gross production and a tax on profit

- Company receives a share of {production revenue
  - government receives share in oil/gas
  - Government has decision power on the management of example

Examples: Malaysia, India, Nigeria, Angola, Trinidad, Algeria, Egypt, Yemen, Syria (!), Mongolia, China.

Total oil and gas revenues
→ royalties (%)
Net revenue
(–) OPEX
(–) Depreciation, Amortization,
(–) interest on financing
(–) bonus ?
} deductions
TAXABLE INCOME
(–) TAX (might be split in state and country)
NET INCOME
(AFTER TAX)

TOTAL REVENUE
(–) (%) Royalty
NET REVENUE
(–) deductible cost recovery investment credits
Profit production
company 1 (%)
company 2 (%)
share 3 (%) government
Contractor oil
(–) tax
Net cash flow

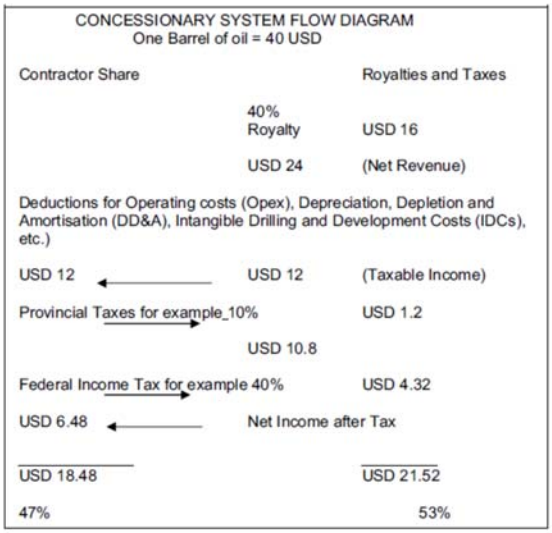


Figure 1.4 Example concessionary system flow diagram

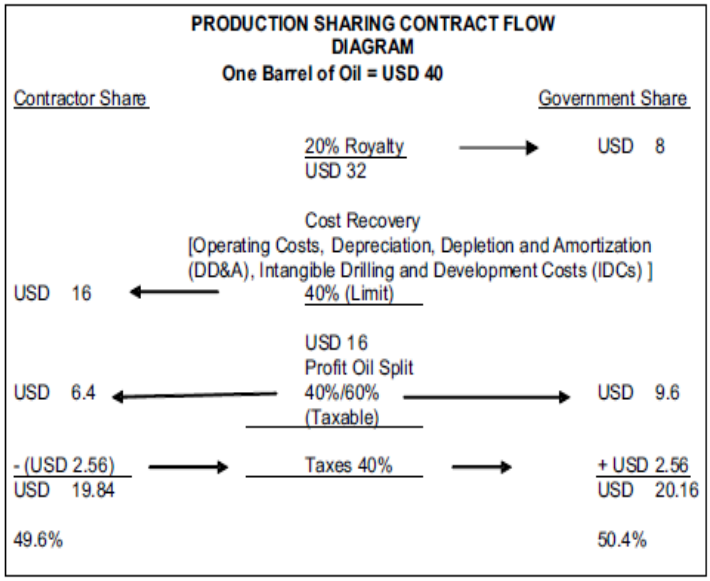
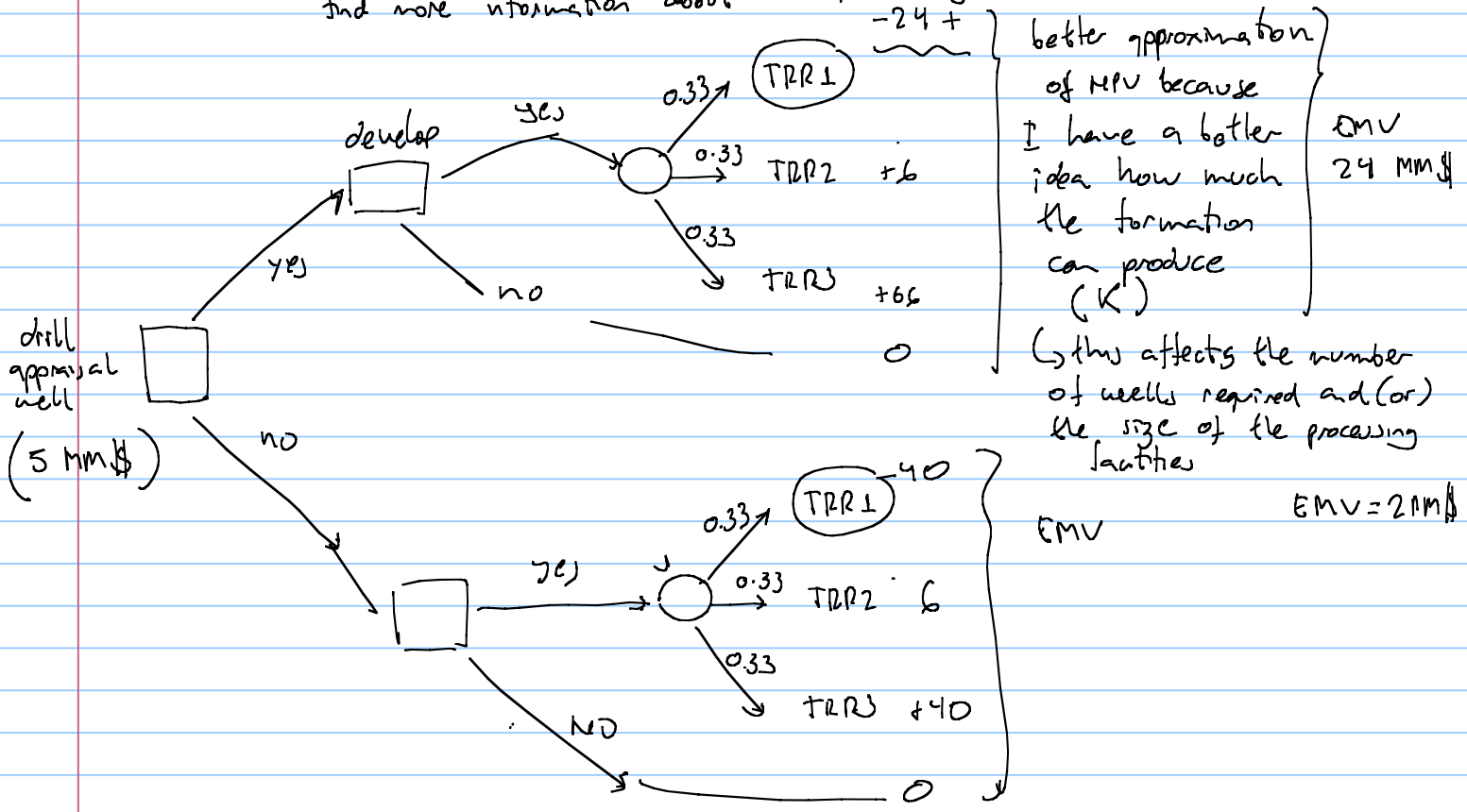


Figure 1.9 Example production sharing contract flow diagram

Decision trees can be used to determine the value of new information given by a specific activity. Determining the value of information.

An example: Drilling an appraisal well to find more information about well productivity

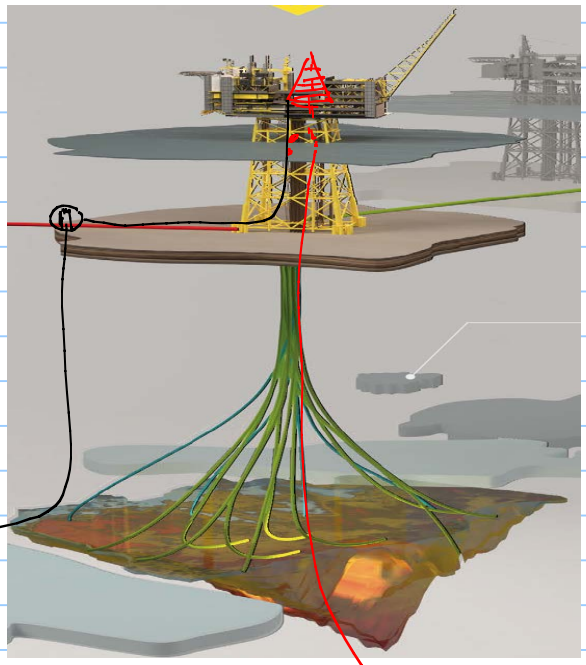


Value of appraisal information = EMV with appraisal − EMV without appraisal = 22 MM$

Layout of hydrocarbon production systems: (focusing offshore Norway)

dry christmas trees (platform wells) + (subsea wells)

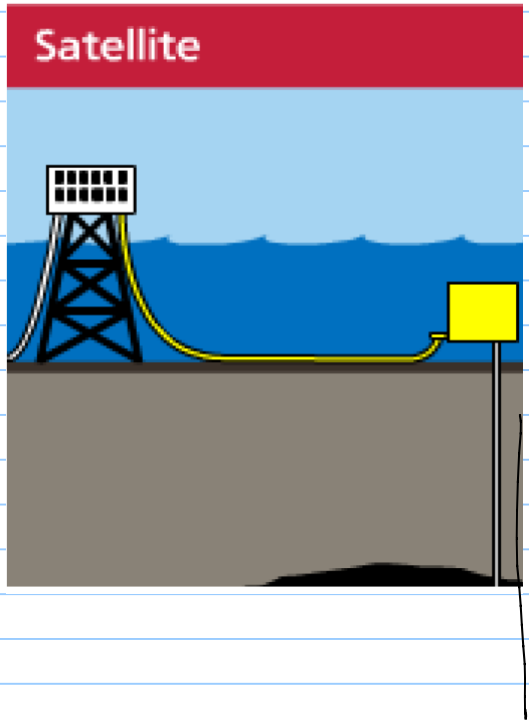
- wells are drilled similar to onshore
- wells are deviated (highly deviated)
- careful for intersecting well paths



well bay

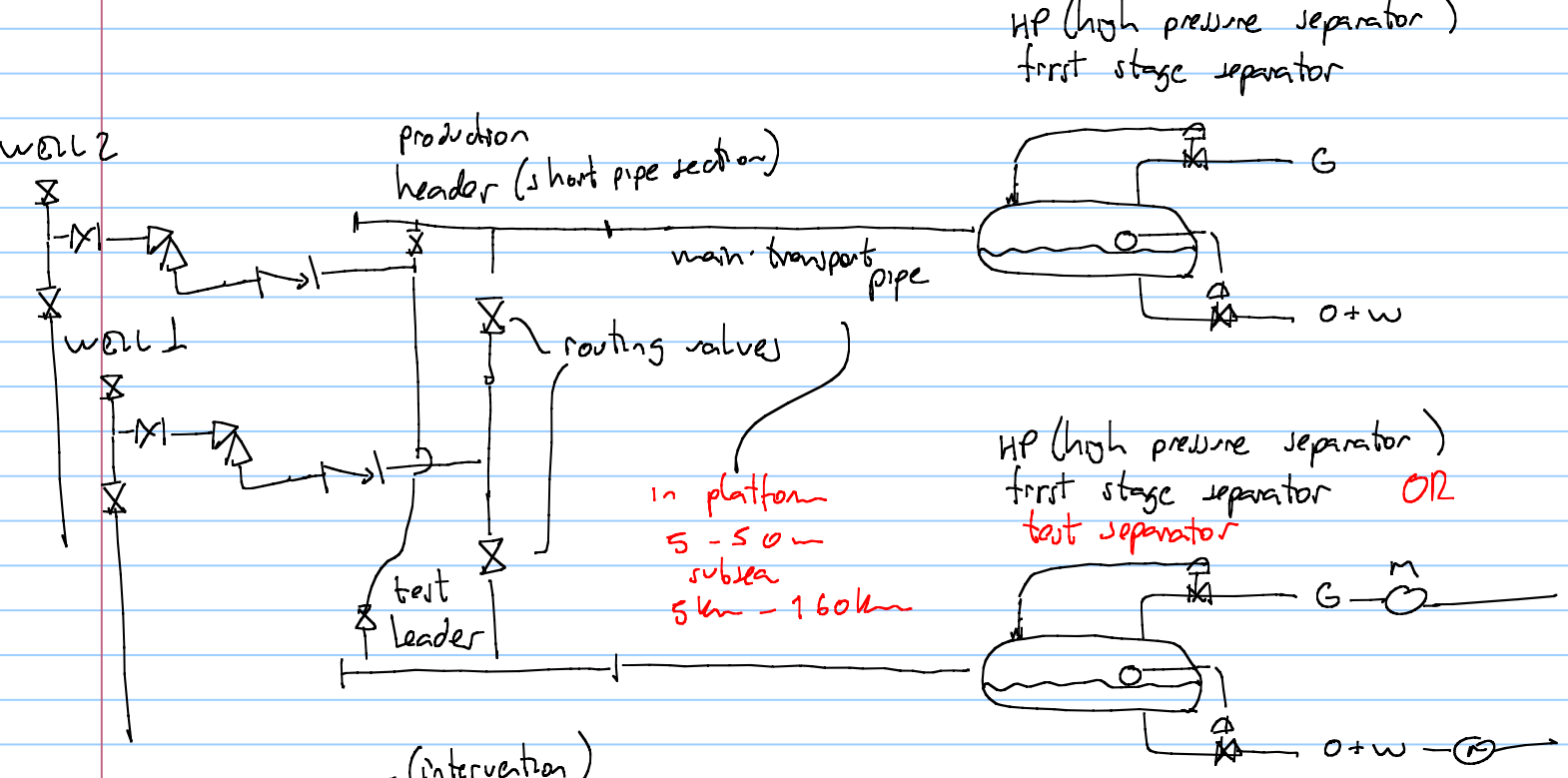
wet christmas trees (subsea wells)

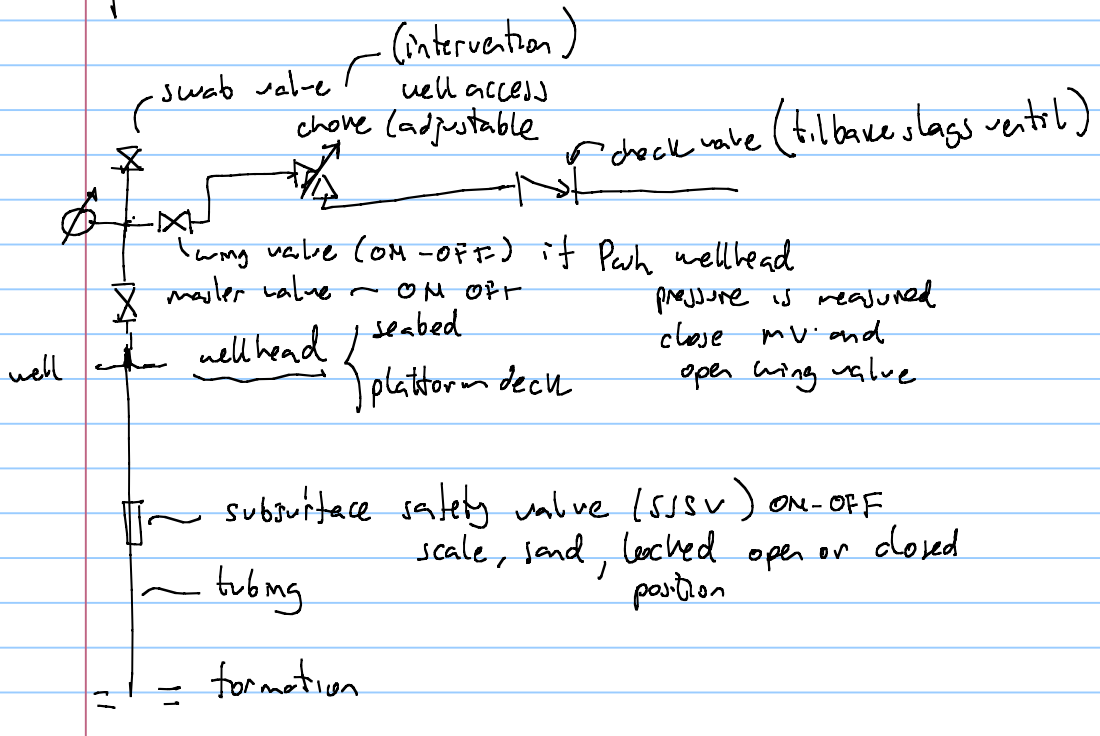
- Drilling is done with a drilling vessel (ship, semi-sub)
- wells are not so deviated if they are not grouped in clusters.



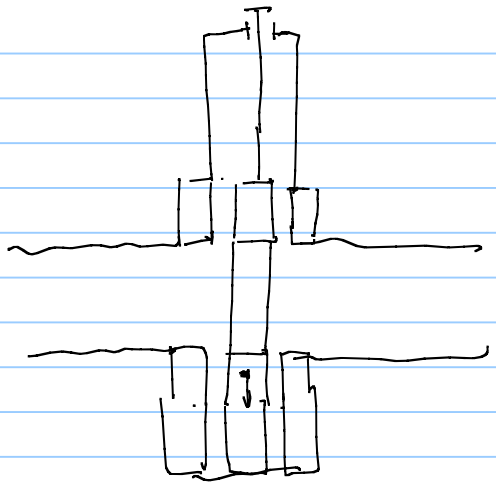
- Production manifold:
  - Comingle (merge production from different sources)
  - Test the well
  - to route the well production to a particular separator

- determine production shares (allocation)
  - estimate the productivity of the well (IPR) inflow performance relationship.
  - to generate data to tune reservoir models (history matching) and improve predictions
  - to sample the fluids → to determine fluid behavior



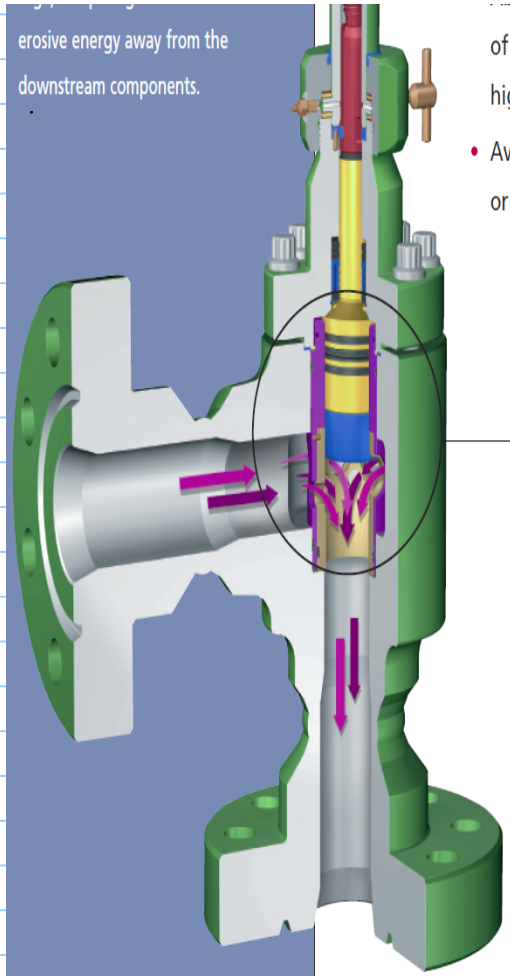


master valve
wing valve
routing valve
} they are usually gate valves



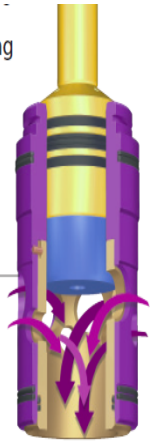
choke → is a control valve, adjustable valve

needle choke
cage choke



of operating conditions, including high sand concentrations.

- Available in manually operated or actuated models.



Control Choke
Cage-Style Trim Design

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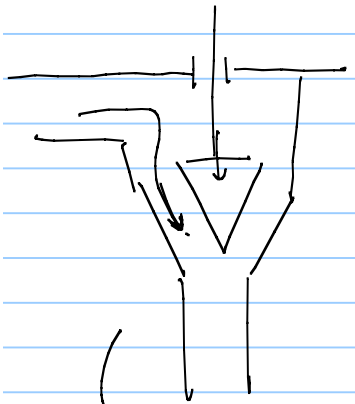
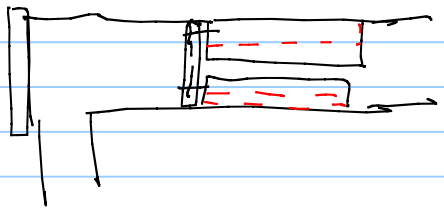
CC40 Control Choke	8
CC60 Control Choke	9
CC70 Control Choke	10
CC80 Control Choke	11
High Temperature and High Pressure	12

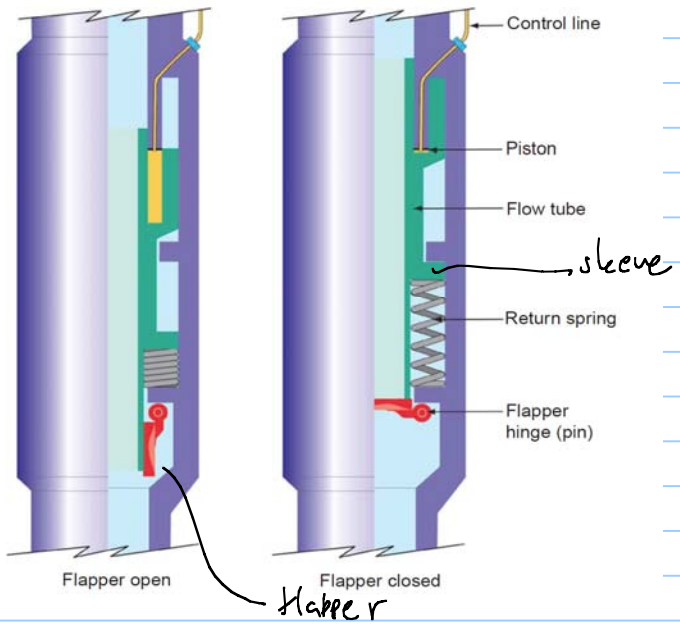
needle choke



prone to erosion due to high V

in onshore fields bean choke is often used to control the production. are not adjustable
cartridge that is replaced with time.





subsurface safety valve ⇒ always energized with a hydraulic line ~100 m ~ below the X-mas tree.

Gulf war (1990's)
Kuwait bombed.

Production manifold for platform wells or onshore wells

Africa (Lybia)

routing valves

test header

main production header

Colombia

Very big difference between dry X-mas trees vs. subsea wells

(tree is cheaper.

Christmas Tree Systems

Onshore tree

Offshore tree

Subsea tree

ROV to operate

alignment /

remote operation

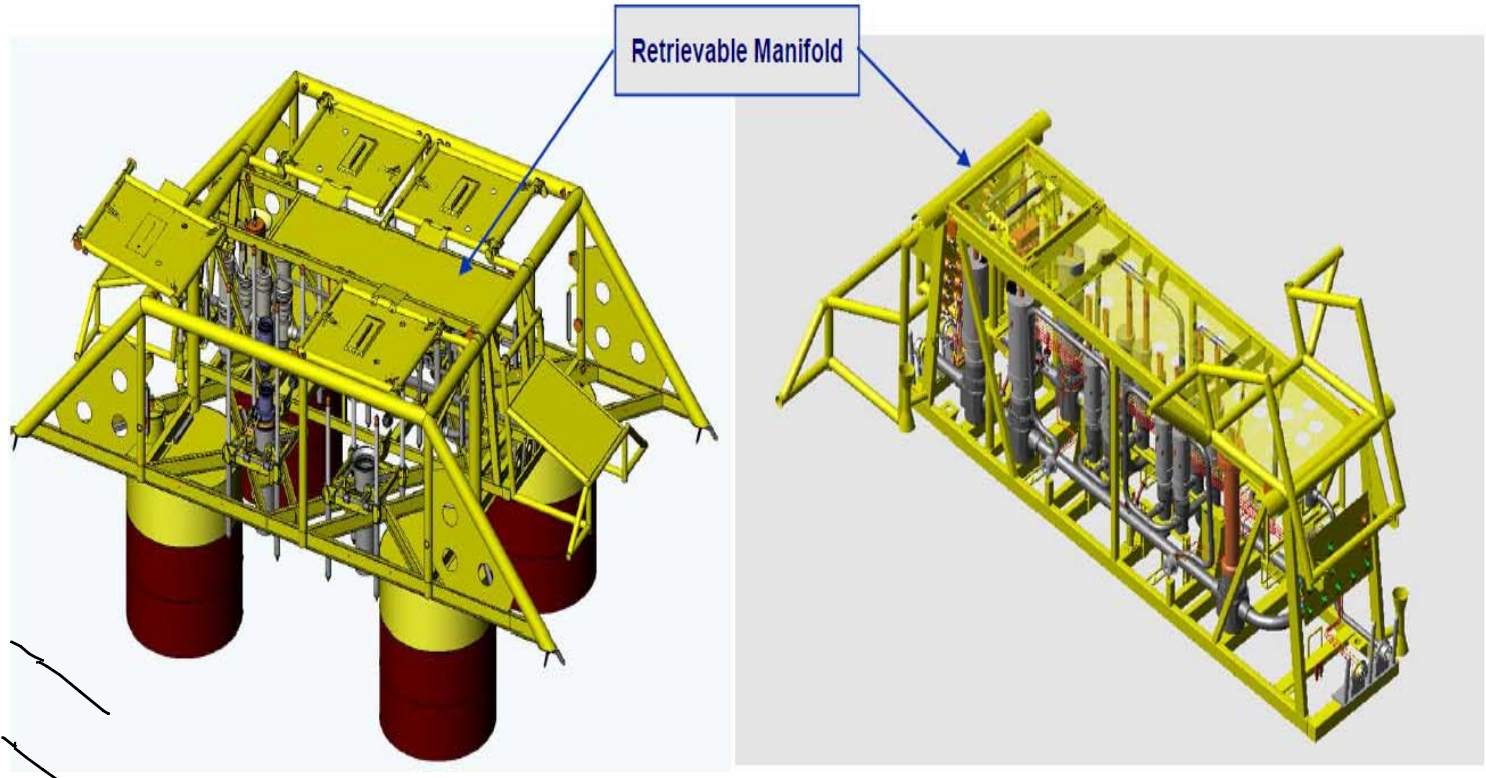
protection

pressure resistance.

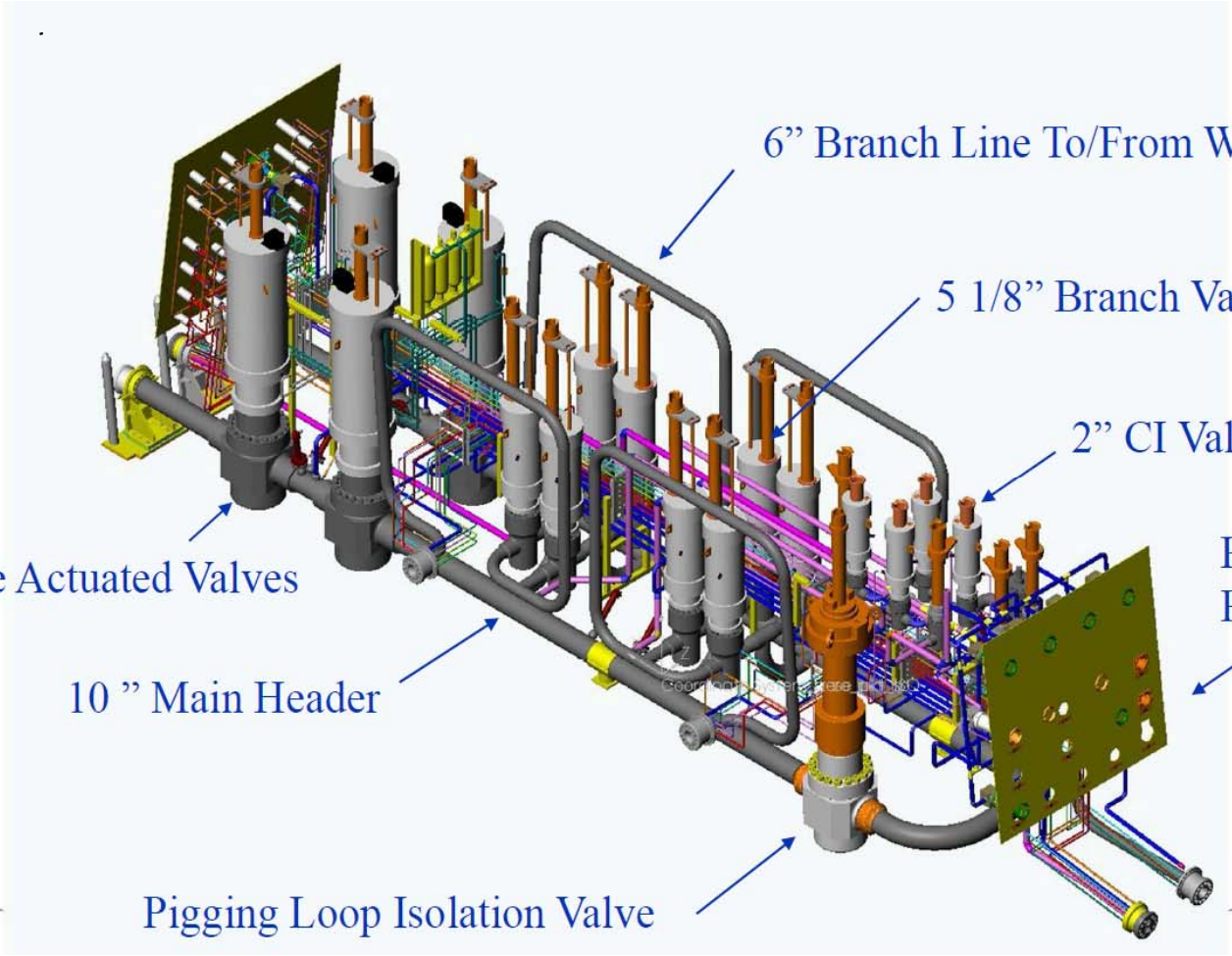
platform wells are very deviated
subsea wells are less deviated (usually)

focusing on subsea systems.

- the production manifold has another function : allow for pigging.

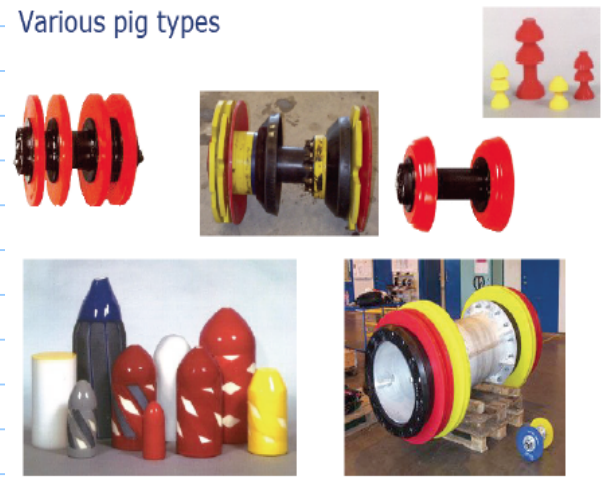


4-well Template



Pigging: Send a "pig" through the pipe to execute different tasks

Various pig types

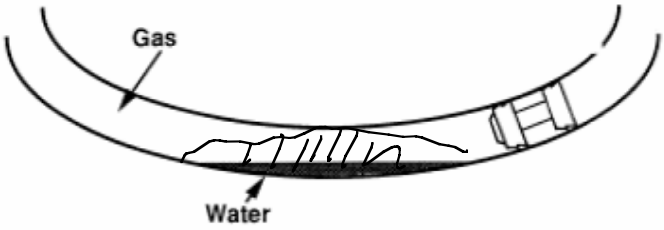


Wax plug-North Sea line pigging

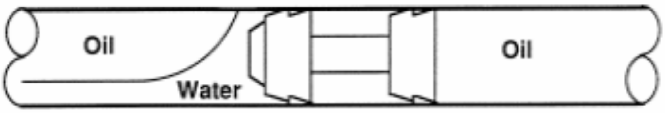
wax: at a particular P and T heavy hydrocarbon chains precipitate out of the liquid and form waxes

Pig animation: https://www.youtube.com/watch?v=CDHtL-J1Xxo

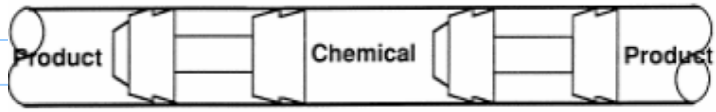
Removing water in a gas flow system



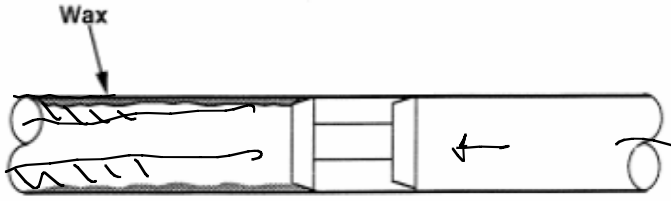
Removing water in a oil system



Treating by chemicals



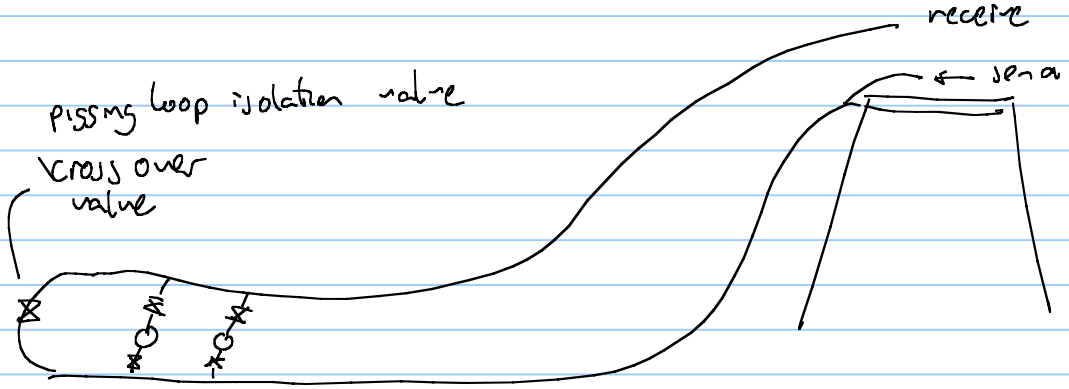
Removal of Wax



↓↓ big pressure drop
~ reduced production

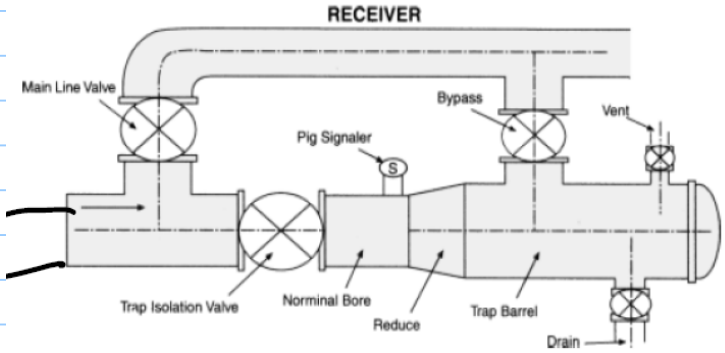
high pressure fluid

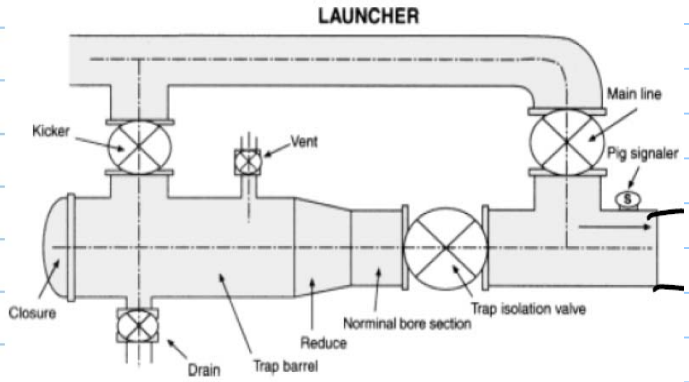
In systems with oil prone to generate wax piggings is done regularly



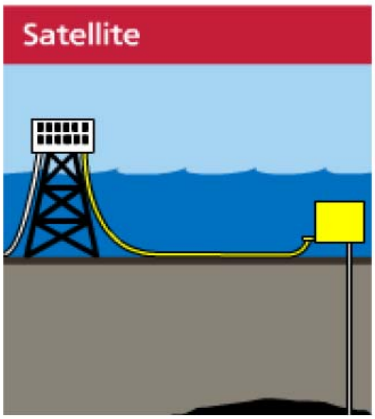
Pig receiver

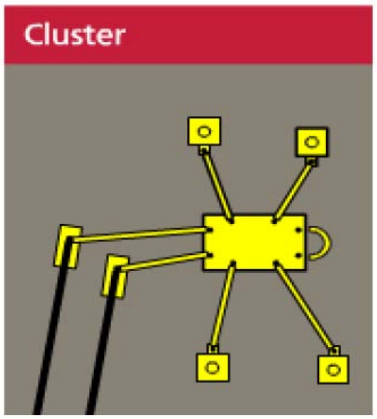
pig launcher

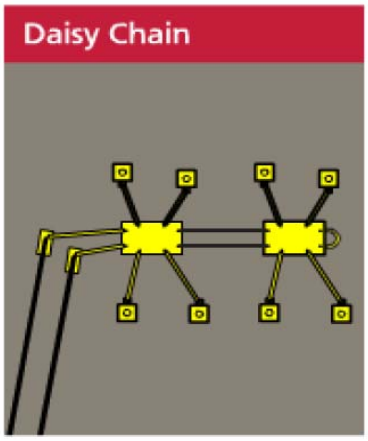


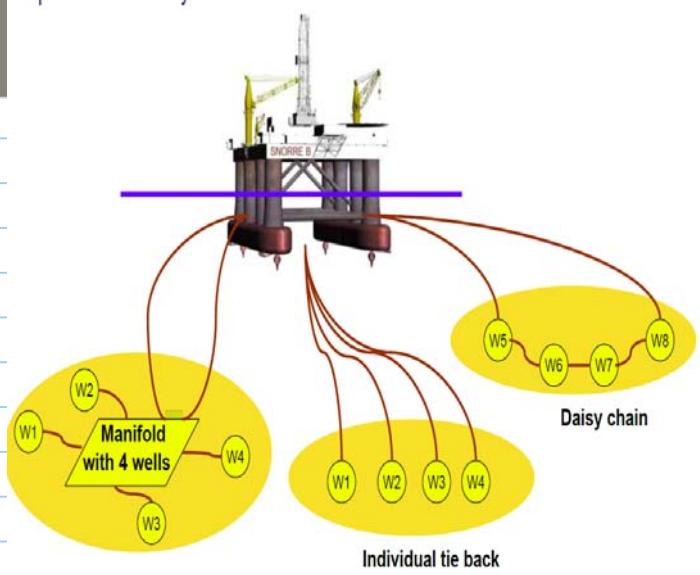


Some other subsea field architectures:



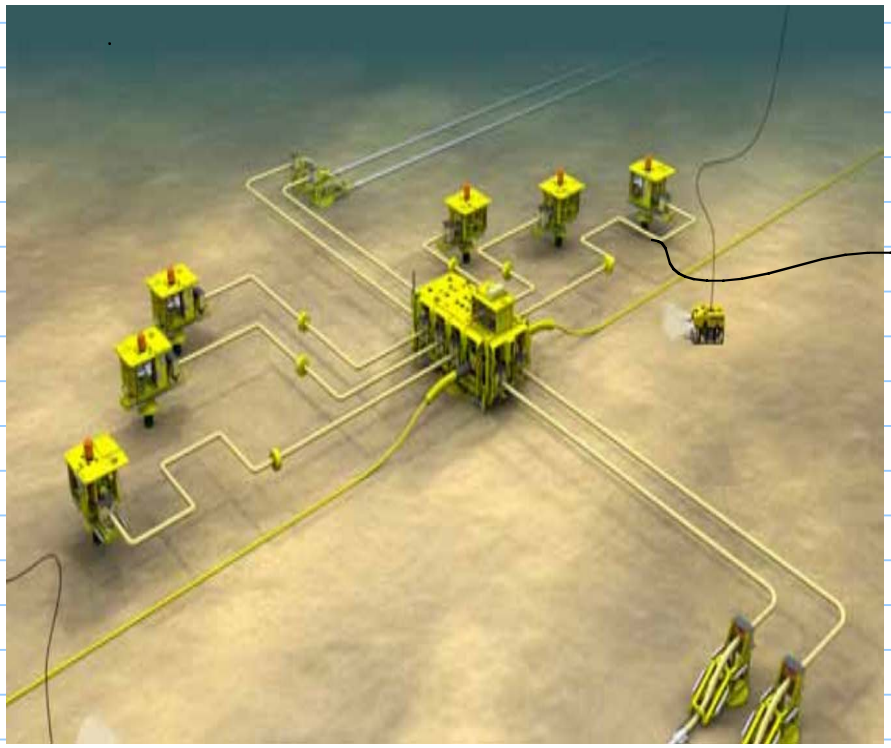






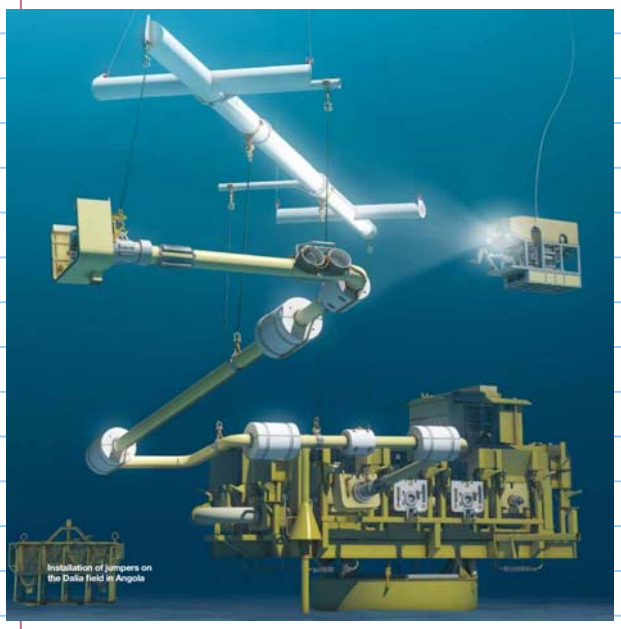
template, well + manifold
- manifold
- subsea separation
- subsea boosting.

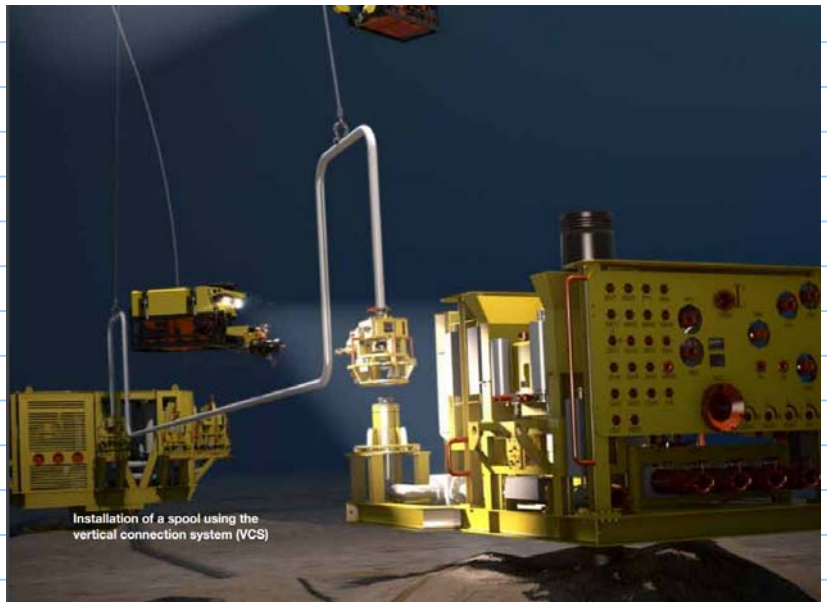
wells and manifold are not in the same template



connection between templates well and manifold is called jumper

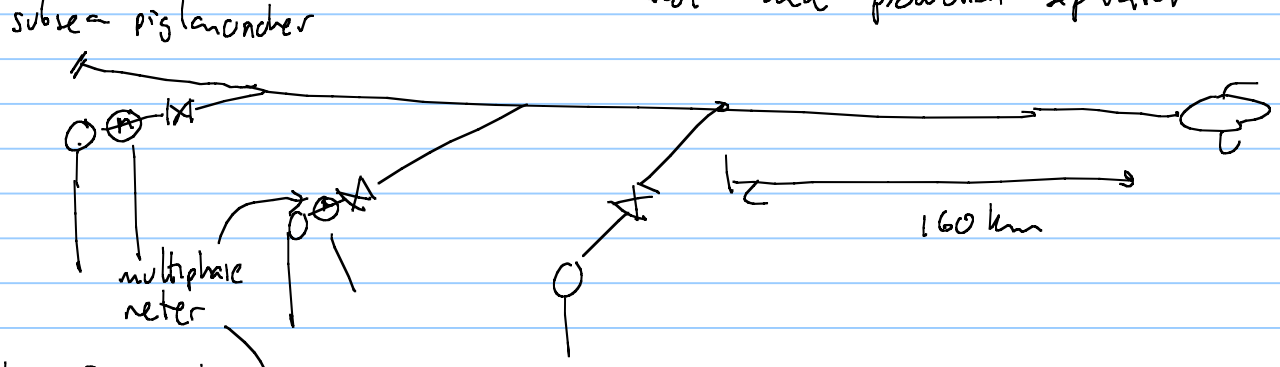
rigid piece of pipe





how do we test subsea systems
or
onshore systems

where I dont have two separate lines that go to test and production separator



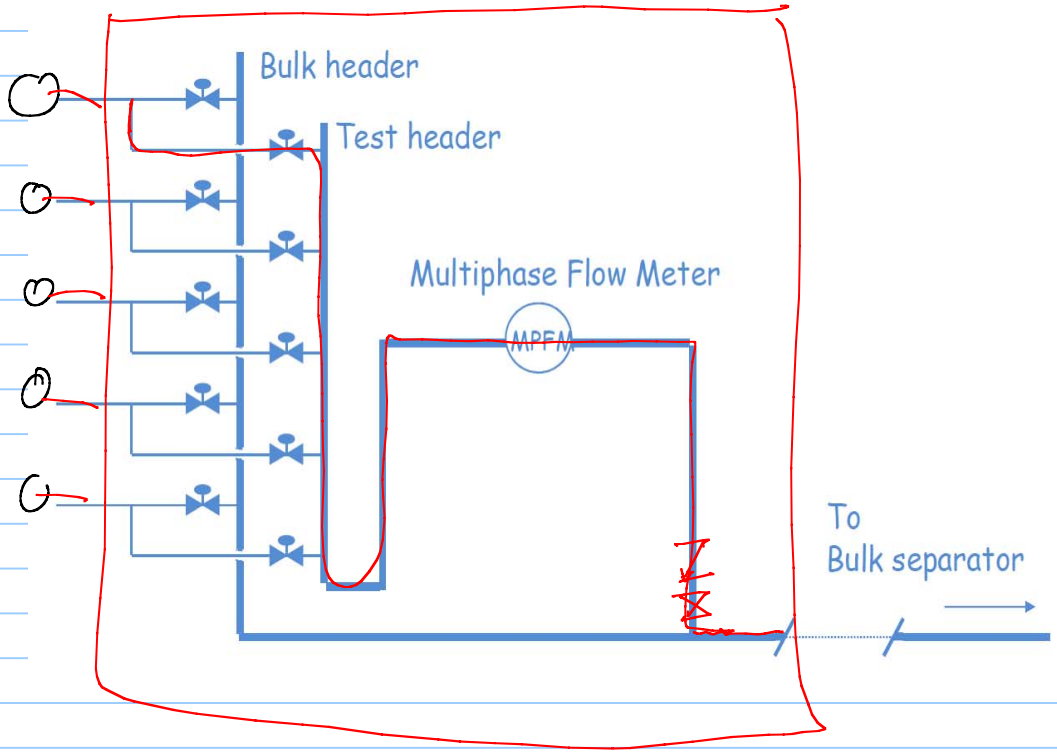
Sophvit Snowhite

→ measuring oil, gas, water rates while flowing simultaneously

- place multiphase meters on each well
- place a subsea pig launcher
- Use a multiphase meter for a group of wells. $ $ $

Use a manifold to route the well production through the MPM

multiphase meter



In onshore systems a portable test separator (see below) is often used in this arrangement instead of the multiphase meter.