

A large offshore oil rig is silhouetted against a bright sunset over the ocean. The sun is low on the horizon, creating a strong glow and reflecting on the water. The rig's structure, including cranes and towers, is clearly visible against the dark sky.

Introduction to **Drilling**

SPE LONDON

2025

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Content



- History & Well Types
- Phases of a Well
- Rig Types
- Costs & Values

It's ALL about Drilling!



Drilling Through Time

- 1000 BC salt drilling China, 800 ft by 300 AD
- 1264 mining oil seeps Baku
- 1594 oil wells hand dug (115 ft)
- 1859 1st oil well in USA (70 ft)
- 1989 vertical well : 40,230 ft (Kola, Russia)
- 2022 directional well : 50,001 ft (Abu Dhabi, UAE)



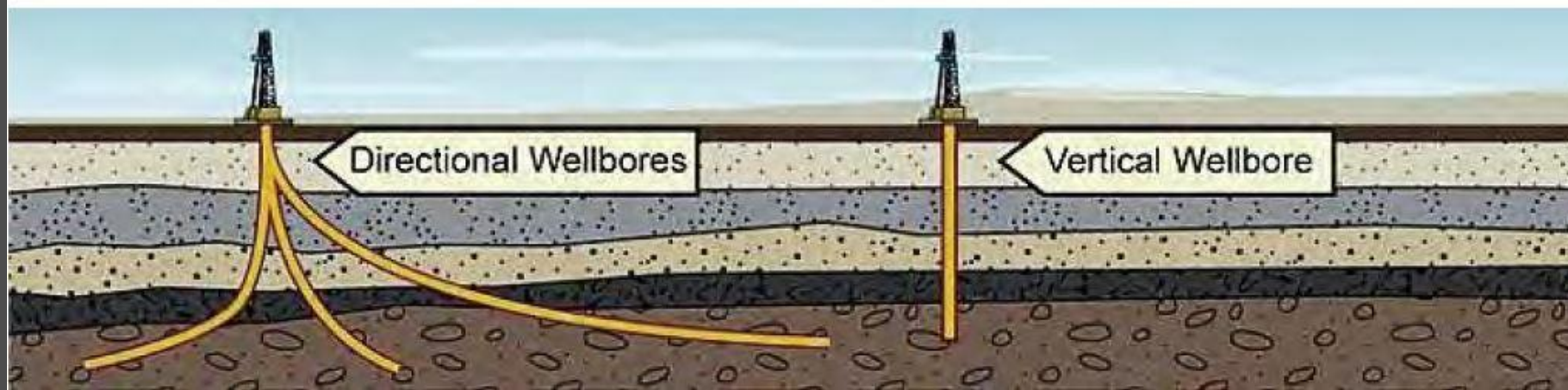
Well Types



- Exploration
 - Anything there? (success rate 1:5)
- Appraisal
 - How much is there?
- Development (**Hydrocarbon** / **Geothermal** / **CCS**)
 - Production : makes the money
 - Injection : keeps it coming

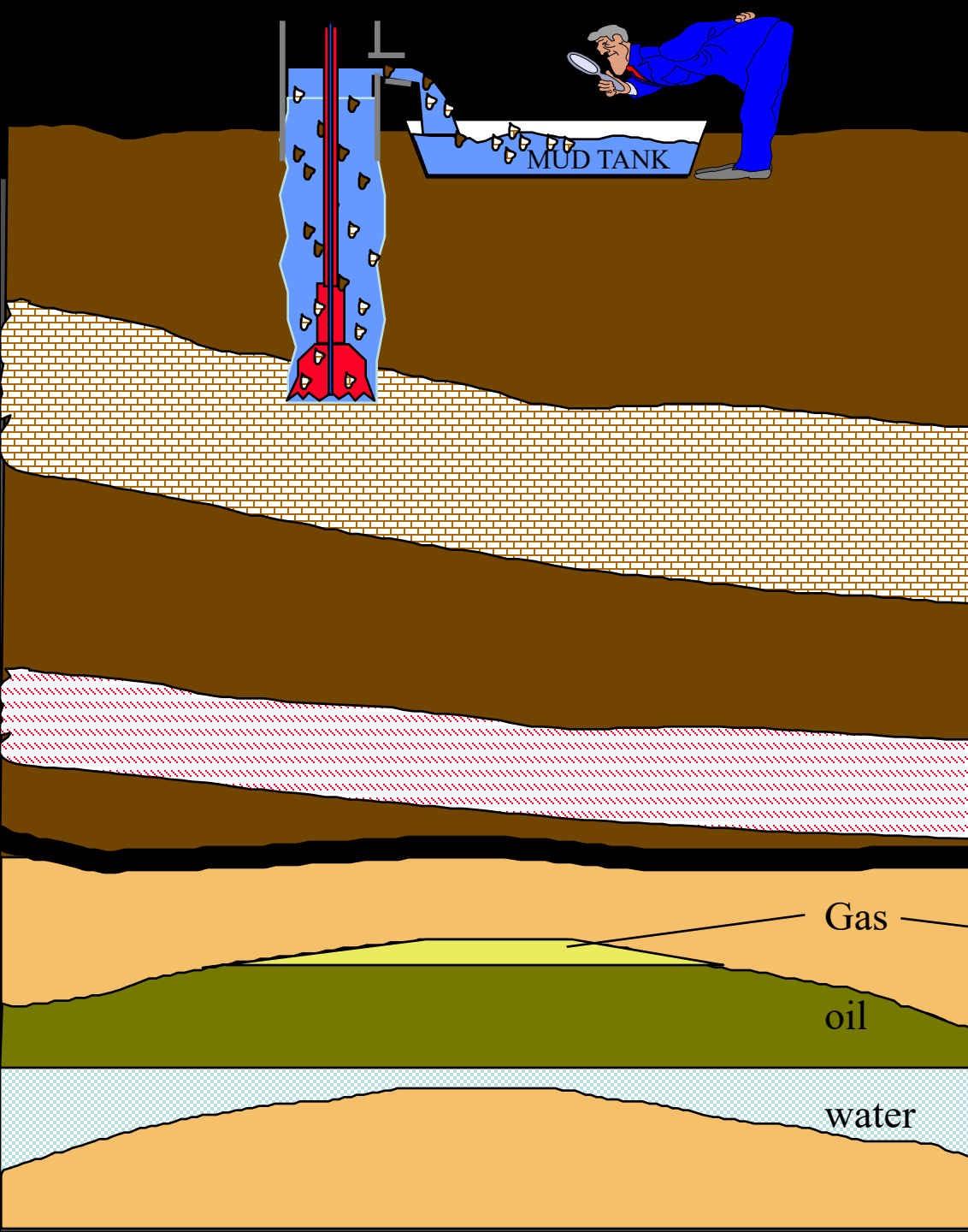


Vertical & Directional Wells



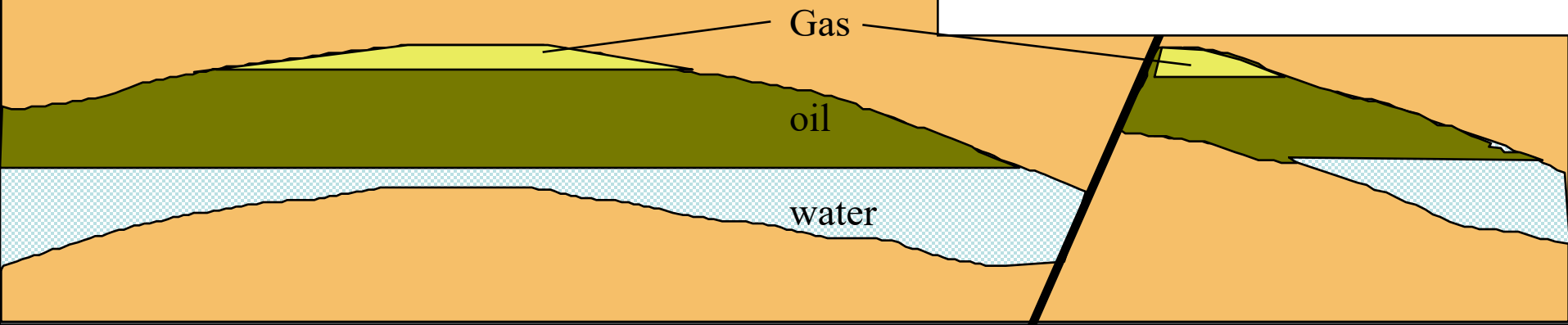
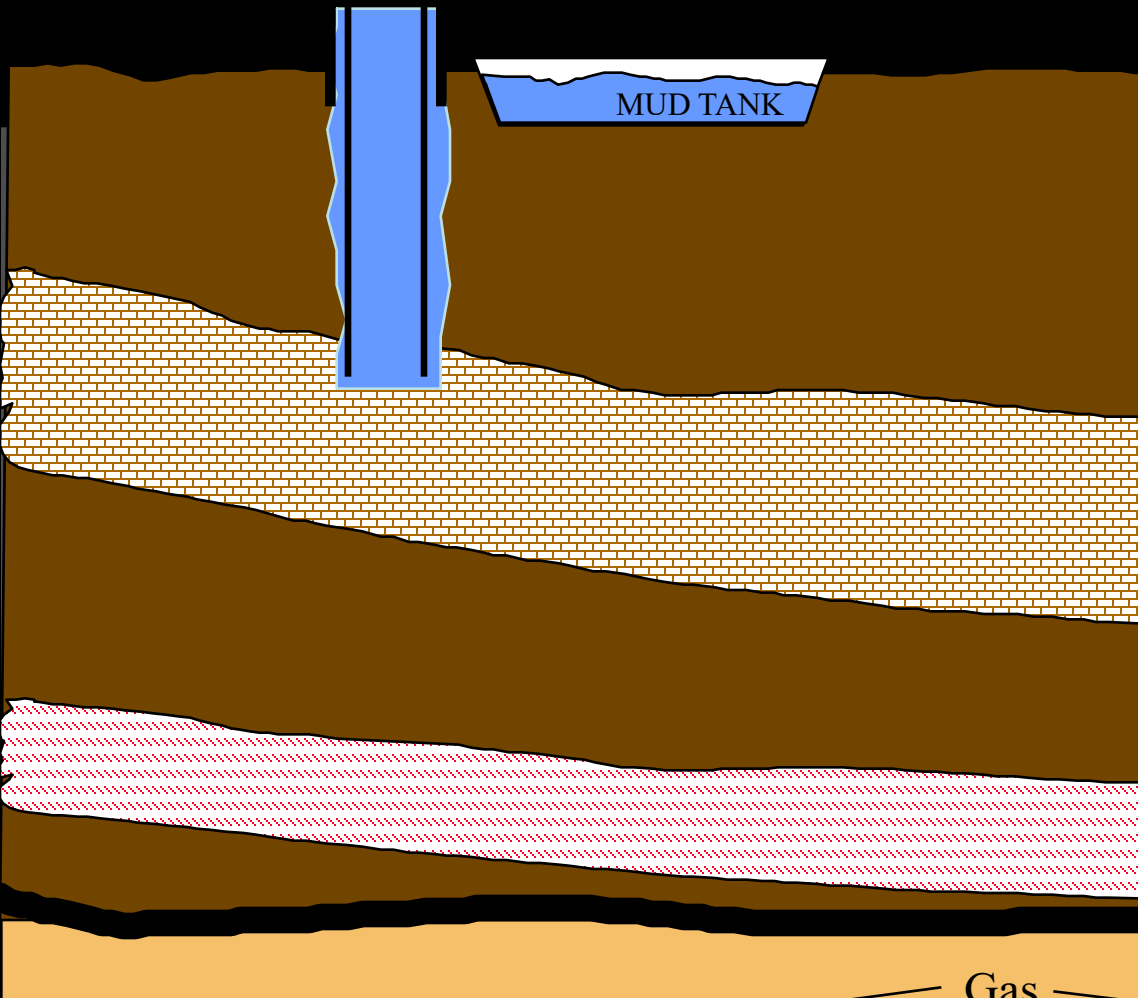
Phases of a well

1. Spud in
2. Drill ahead
3. Drill to first casing seat

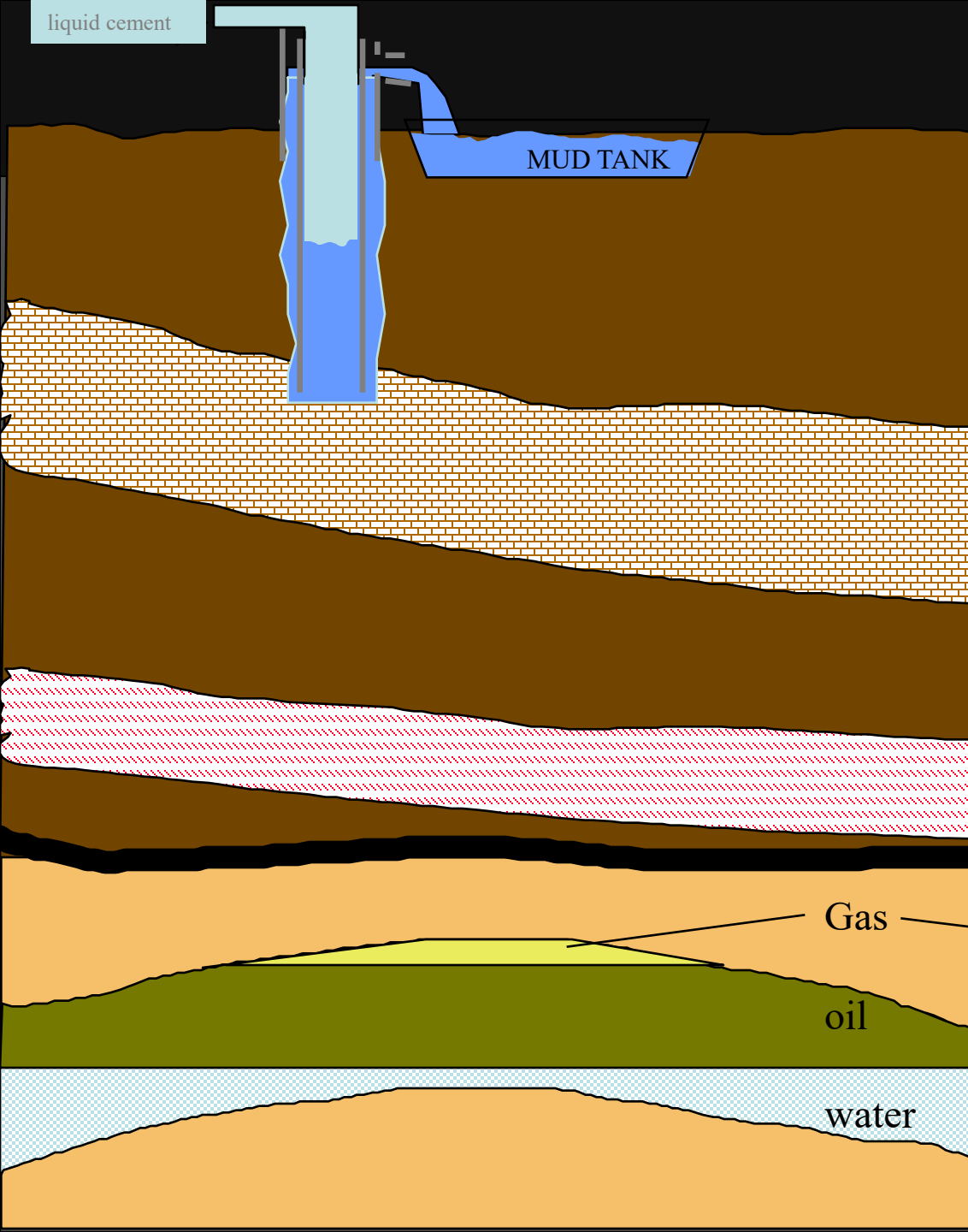


Phases of a well

1. Spud in
2. Drill ahead
3. Drill to first casing seat
4. Pull out of hole (trip)
5. Run first casing



liquid cement



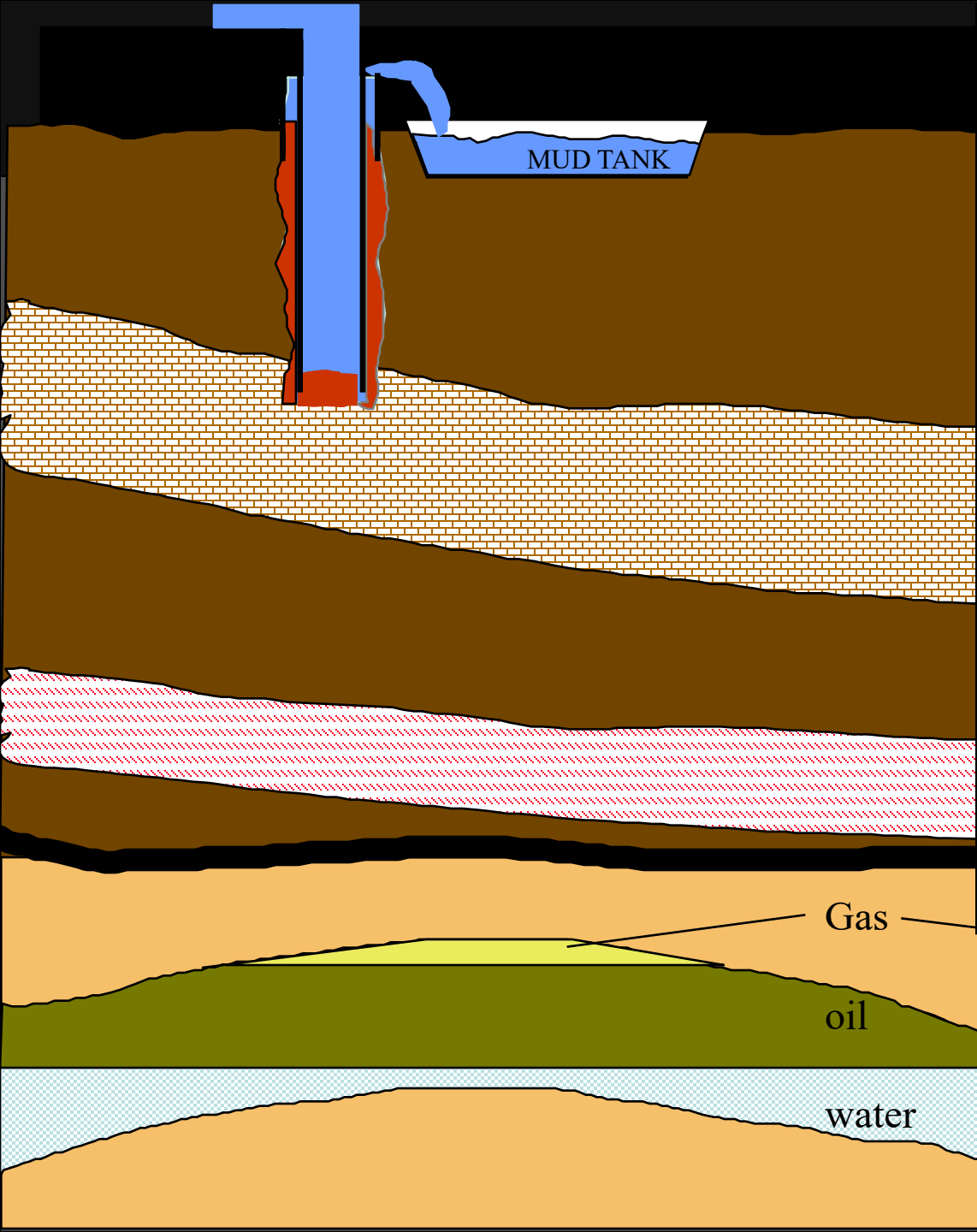
Phases of a well

1. Spud in
2. Drill ahead
3. Drill to first casing seat
4. Pull out of hole (trip)
5. Run first casing
6. Pump cement

Gas

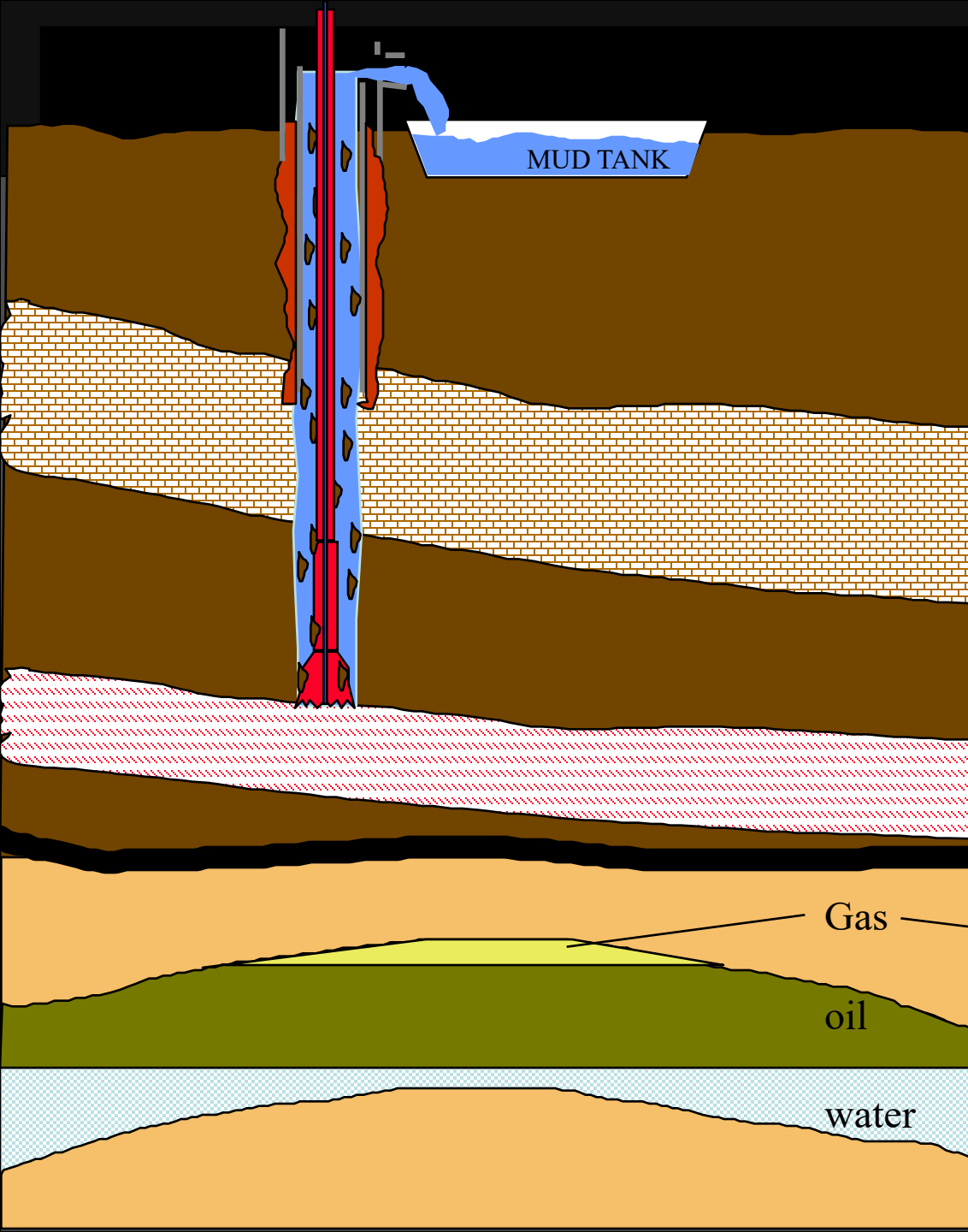
oil

water



Phases of a well

1. Spud in
2. Drill ahead
3. Drill to first casing seat
4. Pull out of hole (trip)
5. Run first casing
6. Pump cement
7. Displace cement "behind" casing



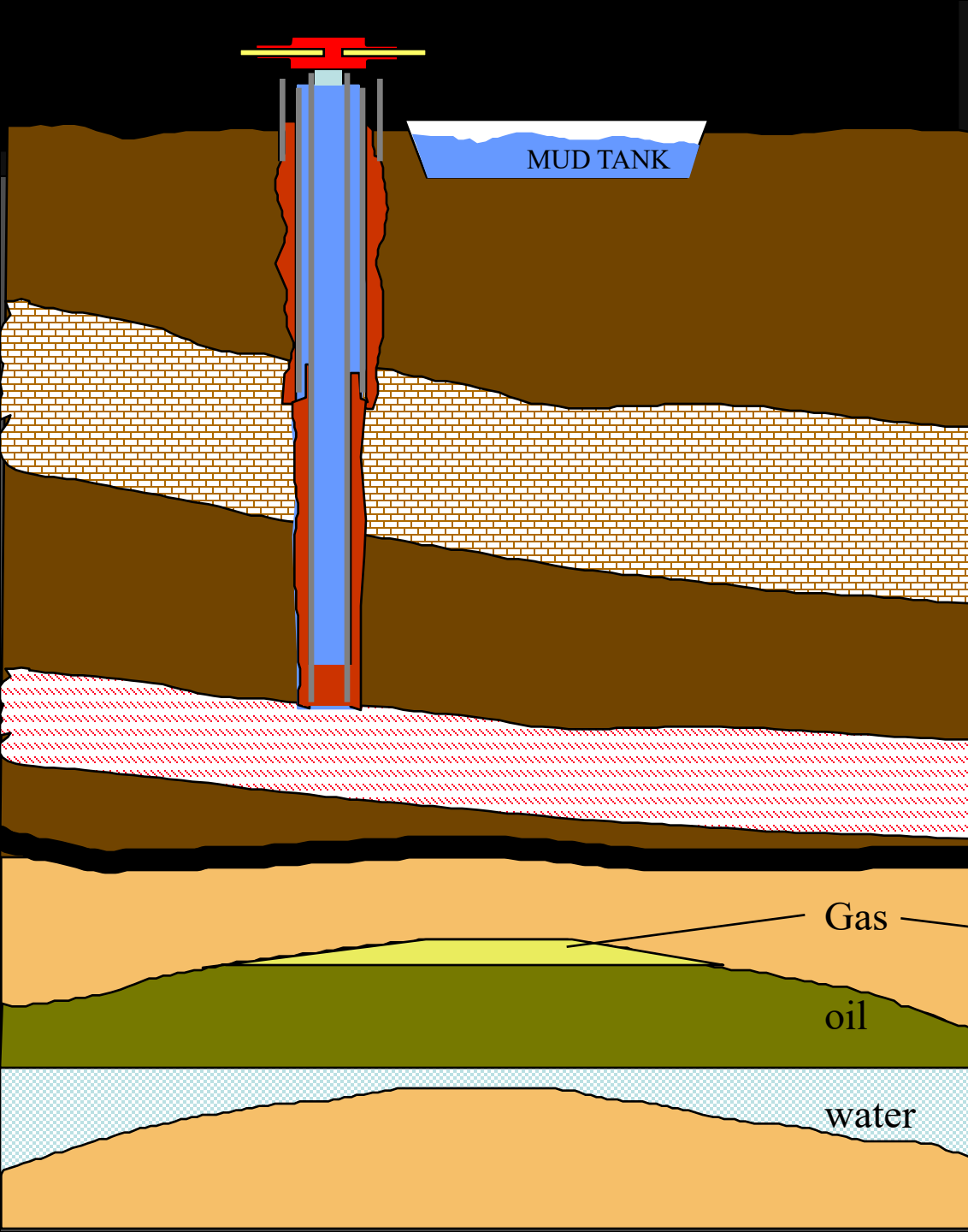
Phases of a well

1. Spud in
2. Drill ahead
3. Drill to first casing seat
4. Pull out of hole (trip)
5. Run first casing
6. Pump cement
7. Displace cement "behind" casing
8. Drill ahead to 2nd casing seat

Gas

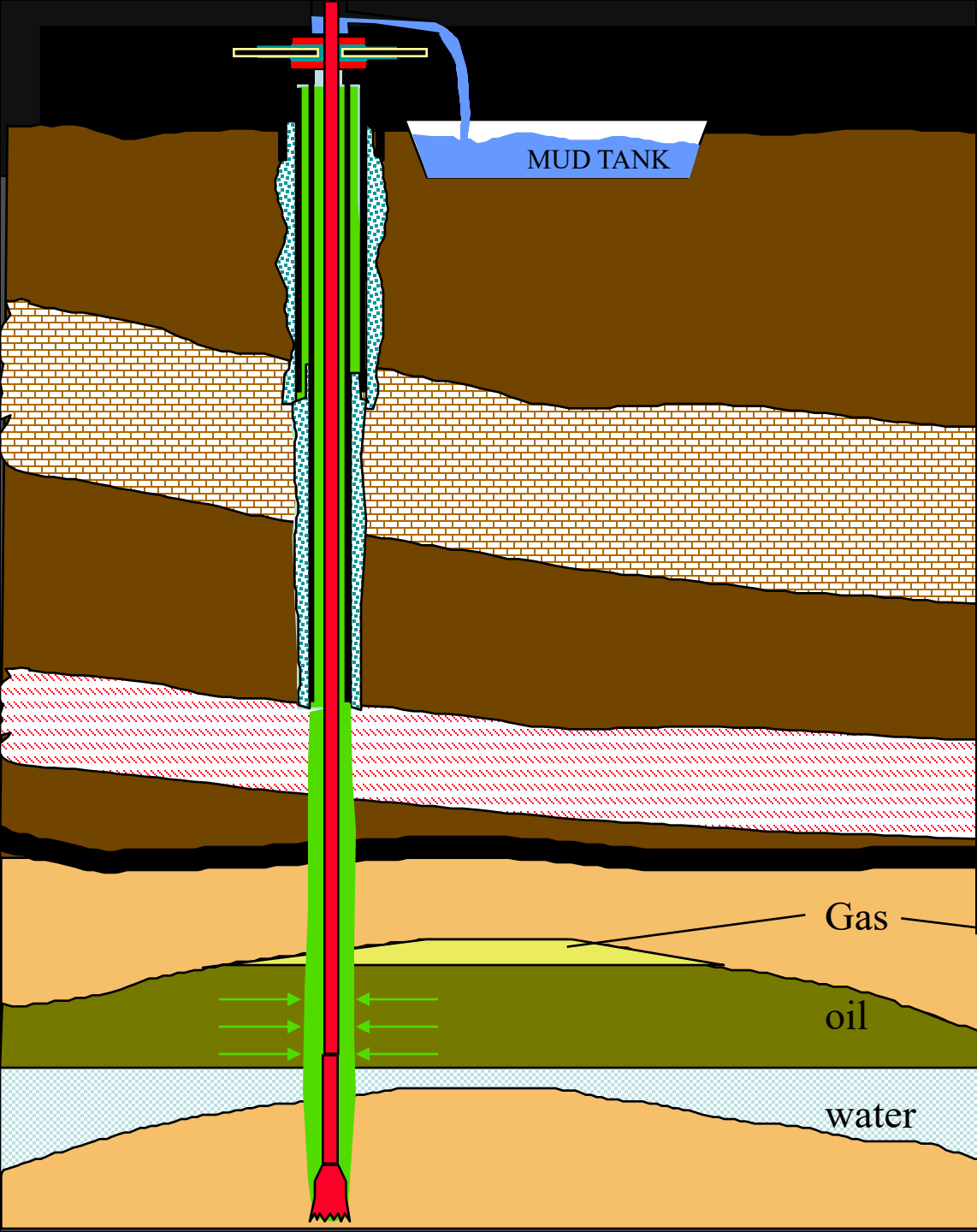
oil

water



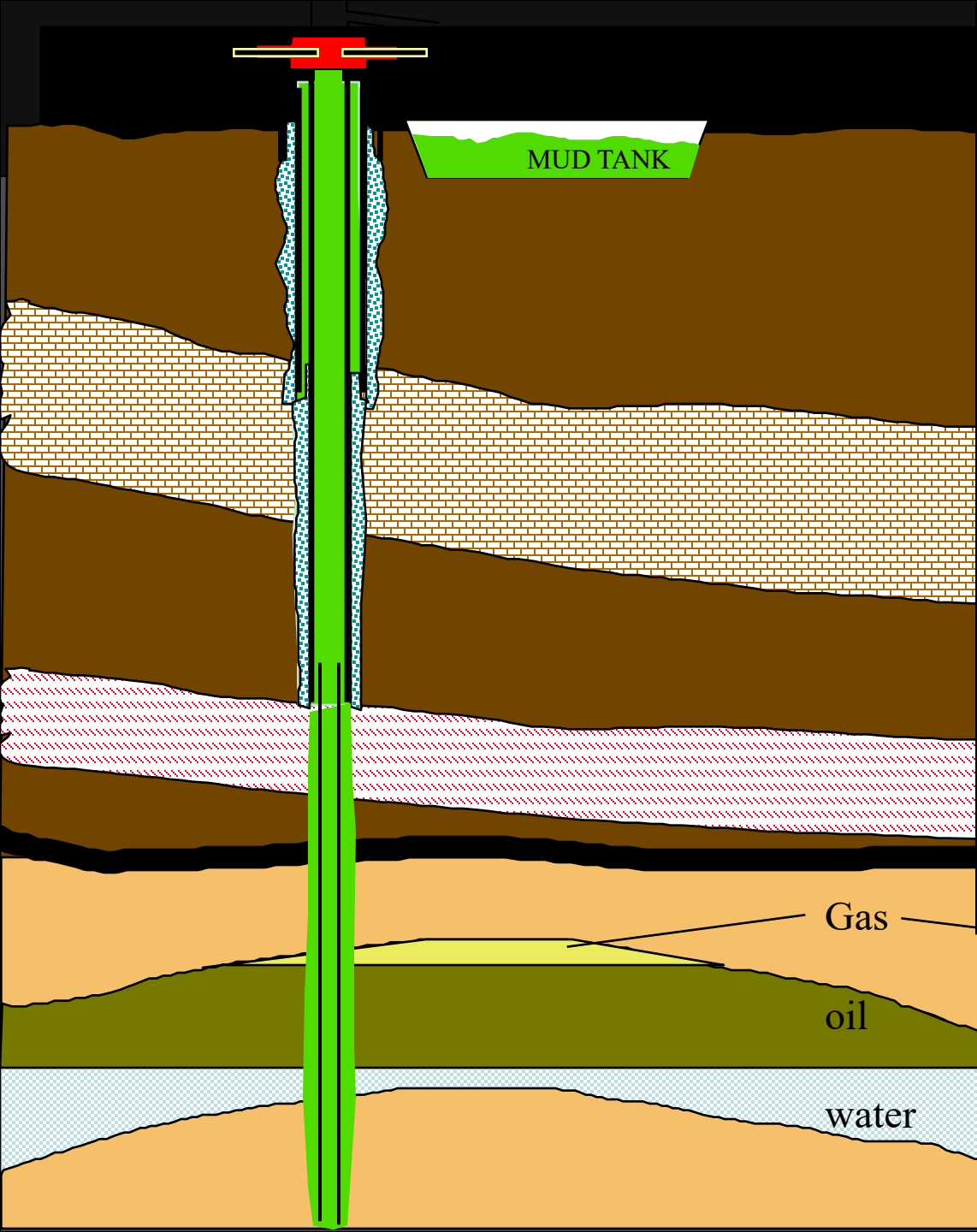
Phases of a well

1. Spud in
2. Drill ahead
3. Drill to first casing seat
4. Pull out of hole (trip)
5. Run first casing
6. Pump cement
7. Displace cement "behind" casing
8. Drill ahead to 2nd casing seat
9. Run 2nd casing string
10. Pump and displace cement "behind" casing and install Blow Out Preventer (BOP)



Phases of a well

1. Spud in
2. Drill ahead
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6. Pump cement
7. Displace cement "behind" casing
8. Drill ahead to 2nd casing seat
9. Run 2nd casing string
10. Pump and displace cement "behind" casing and install Blow Out Preventer (BOP)
11. Drill through the reservoir to TOTAL DEPTH (TD)



Phases of a well

1. Spud in
2. Drill ahead
3. Drill to first casing seat
4. Pull out of hole (trip)
5. Run first casing
6. Pump cement
7. Displace cement "behind" casing
8. Drill ahead to 2nd casing seat
9. Run 2nd casing string
10. Pump and displace cement "behind" casing and install Blow Out Preventer (BOP)
11. Drill to TOTAL DEPTH (TD)
12. POOH, and run electric logs
13. Run Production "liner"
14. Test the well
15. Complete the well
16. Plug and abandon (P&A) the well

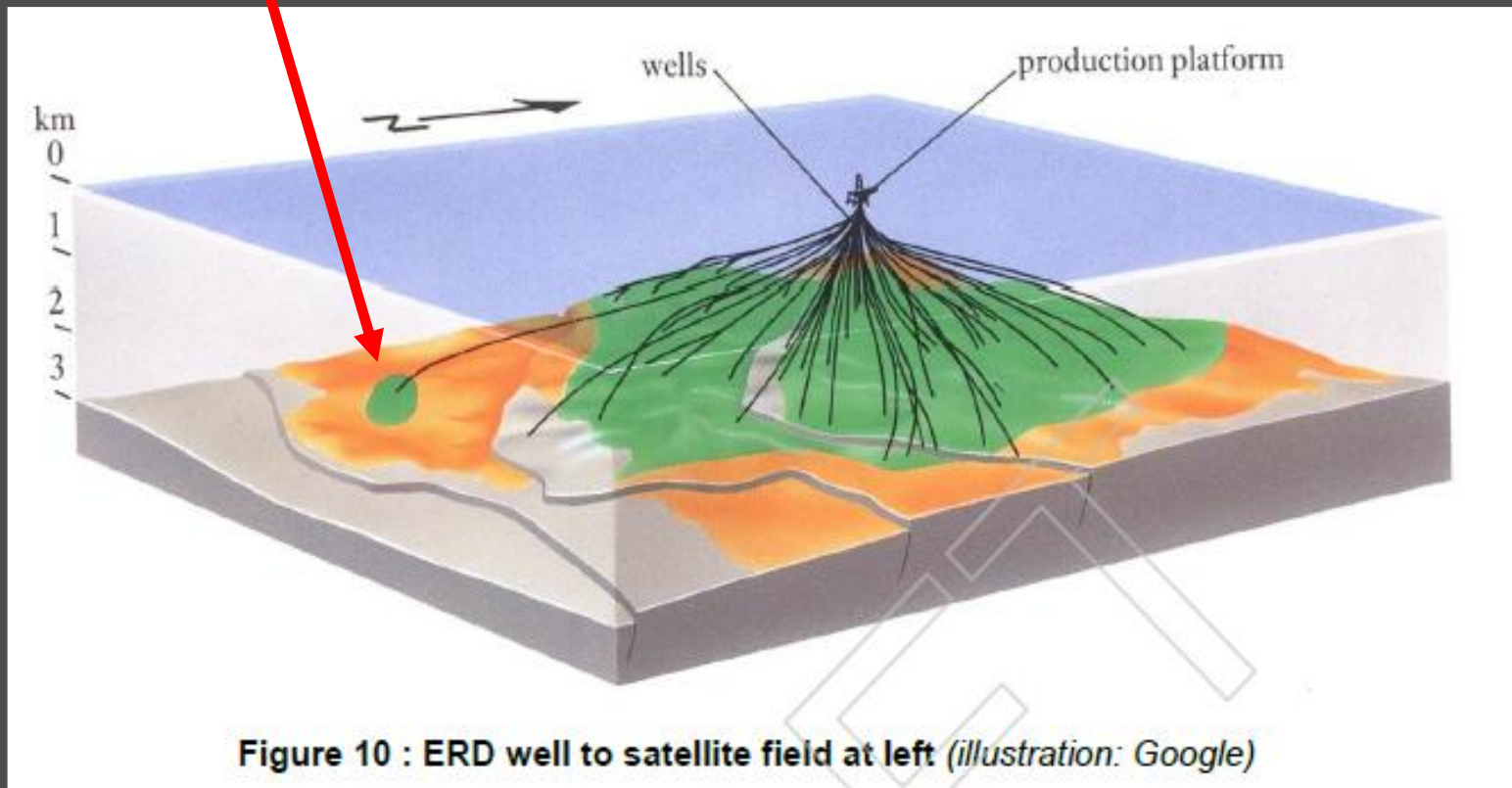
Gas

oil

water

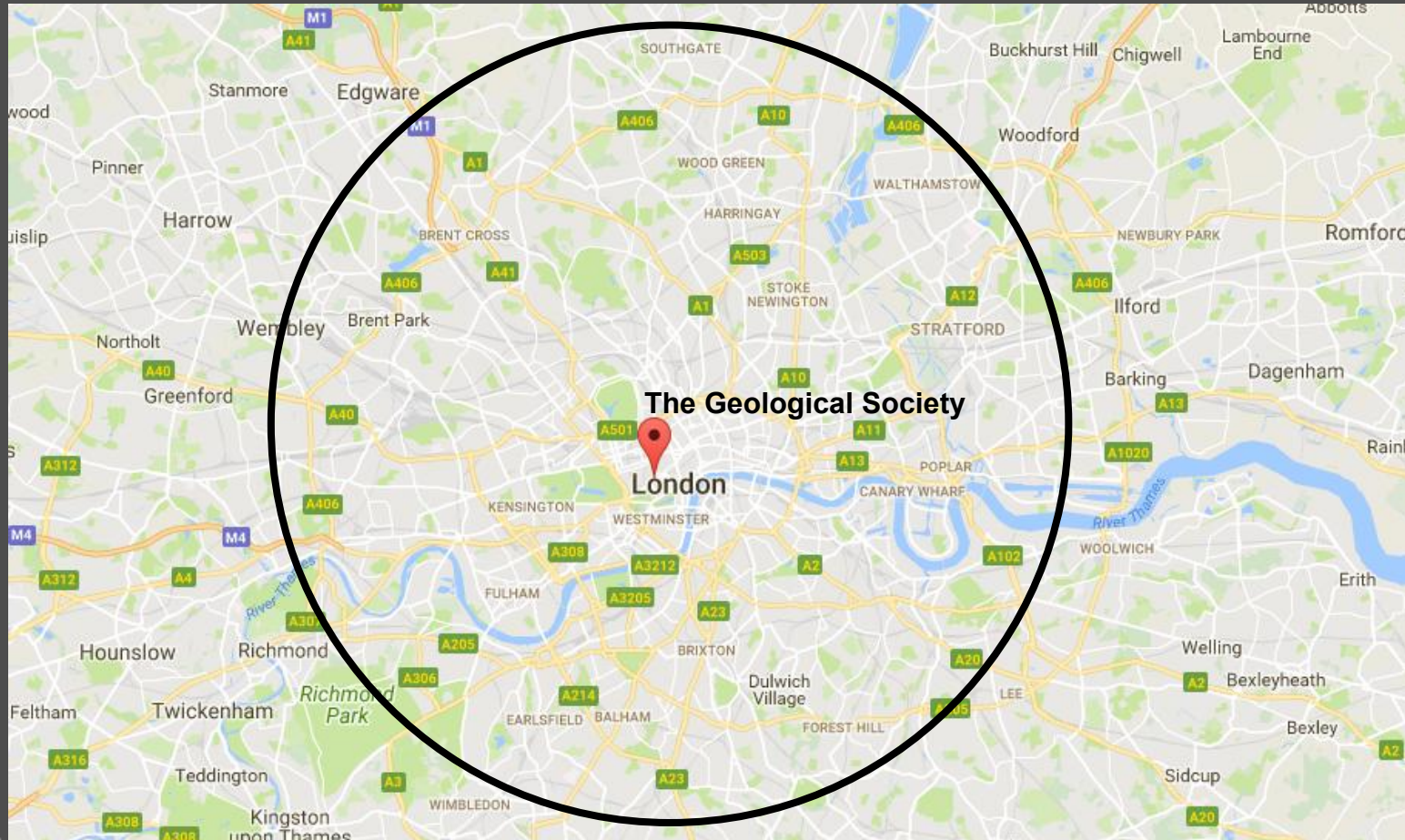
Extended Reach Drilling (ERD)

Access distant targets

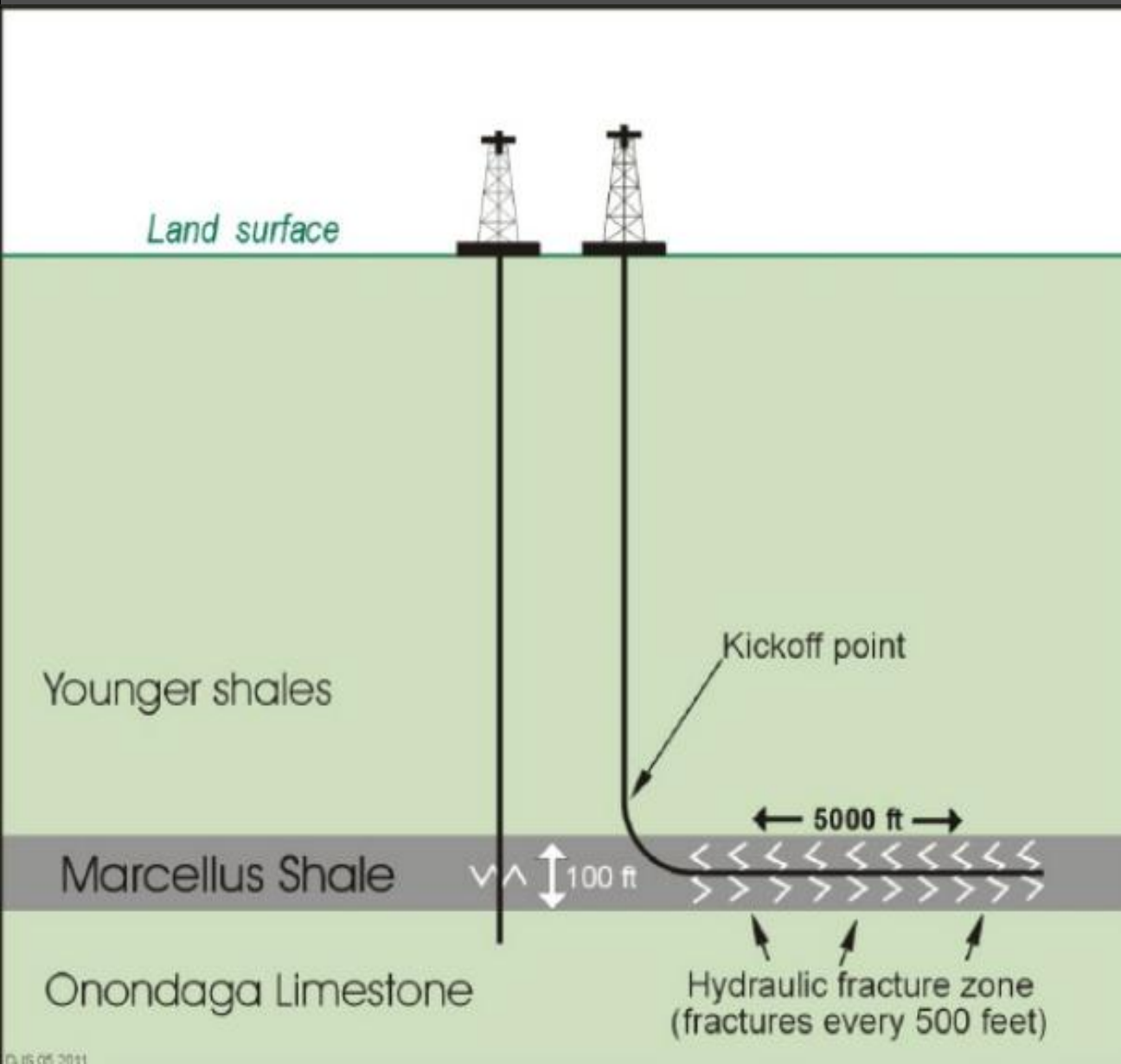


Drainage Radius

ERD Record: 50.001ft (15.2 km)



Vertical Vs Horizontal Wells



Production gains

- Hydrocarbon
- Geothermal

Drilling Rigs - Land



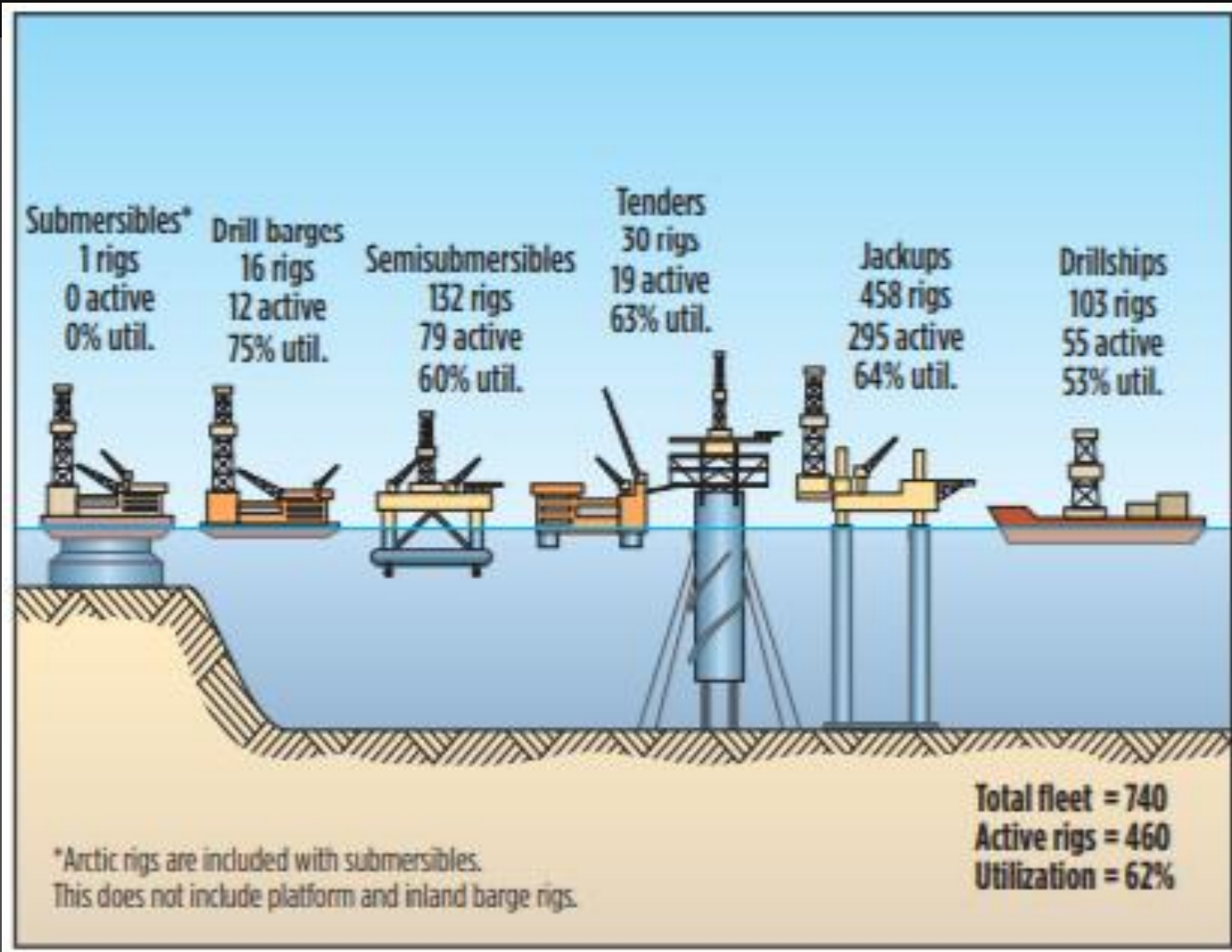
Drilling Rigs - Offshore



Drilling Rigs - Offshore



Drilling Rigs - Offshore



Well Time & Costs



- Drilling times
 - 5 to 500 days
 - Typical 20 – 50 days
- Drilling costs
 - US\$100k – US\$1Mn per day
 - Well : US\$2Mn to US\$100's Mn
 - Typical onshore US\$5Mn / offshore US\$30Mn
 - \approx 80% of costs are time dependent



Value of Drilling Quickly!

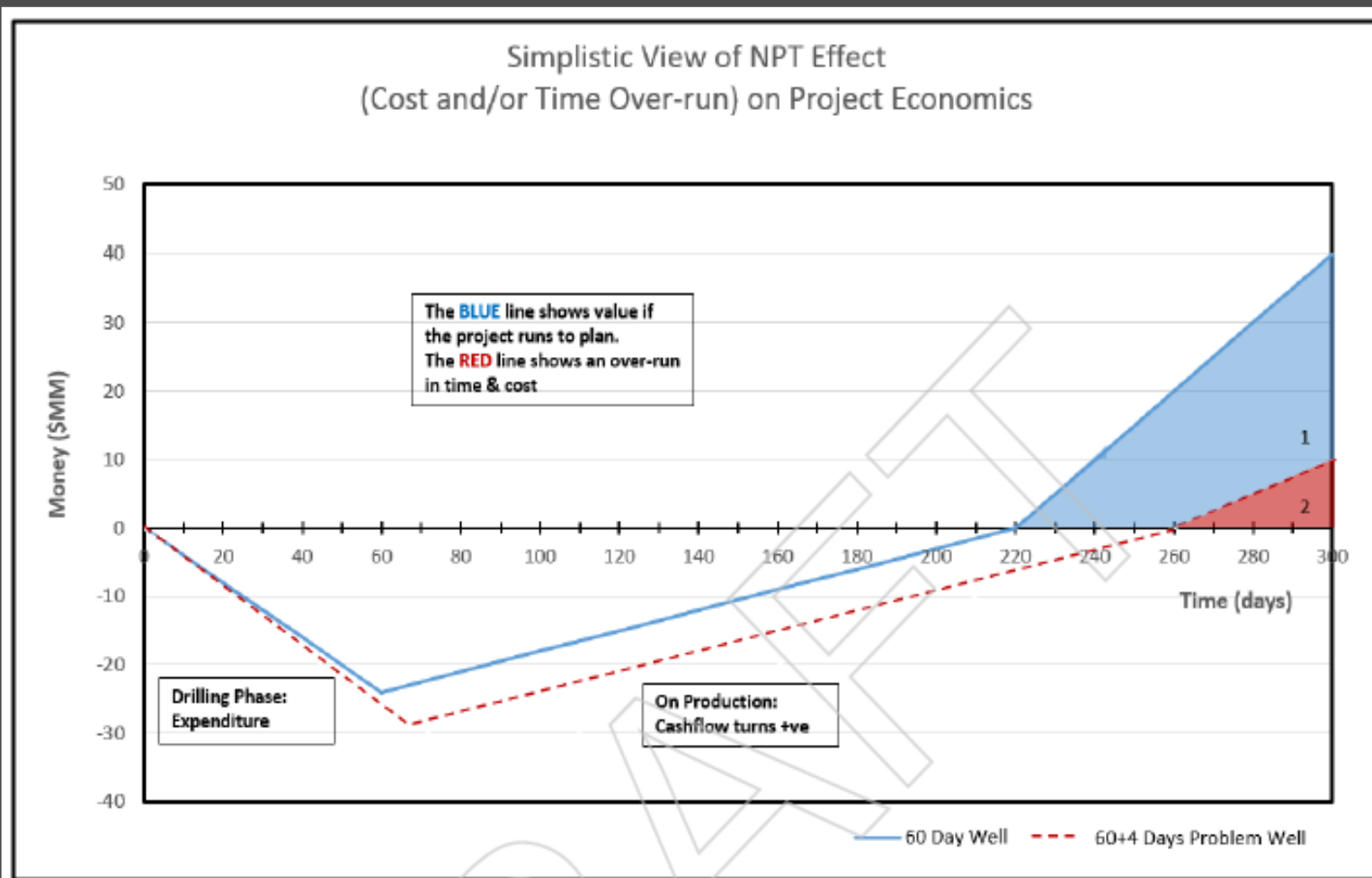


Figure 12 : Impact of Non Productive Time on Project Economics (Merlin ERD Ltd)



In Summary



Summary



- Wells
- Costs
- Phases of a Well
- Rigs

All Prospects look good on paper – need to drill



If we always do what we've always done, we'll only get what we've always had!