Radiotracers Applications in Oil Fields: "Enhancing the Recovery of Oil"

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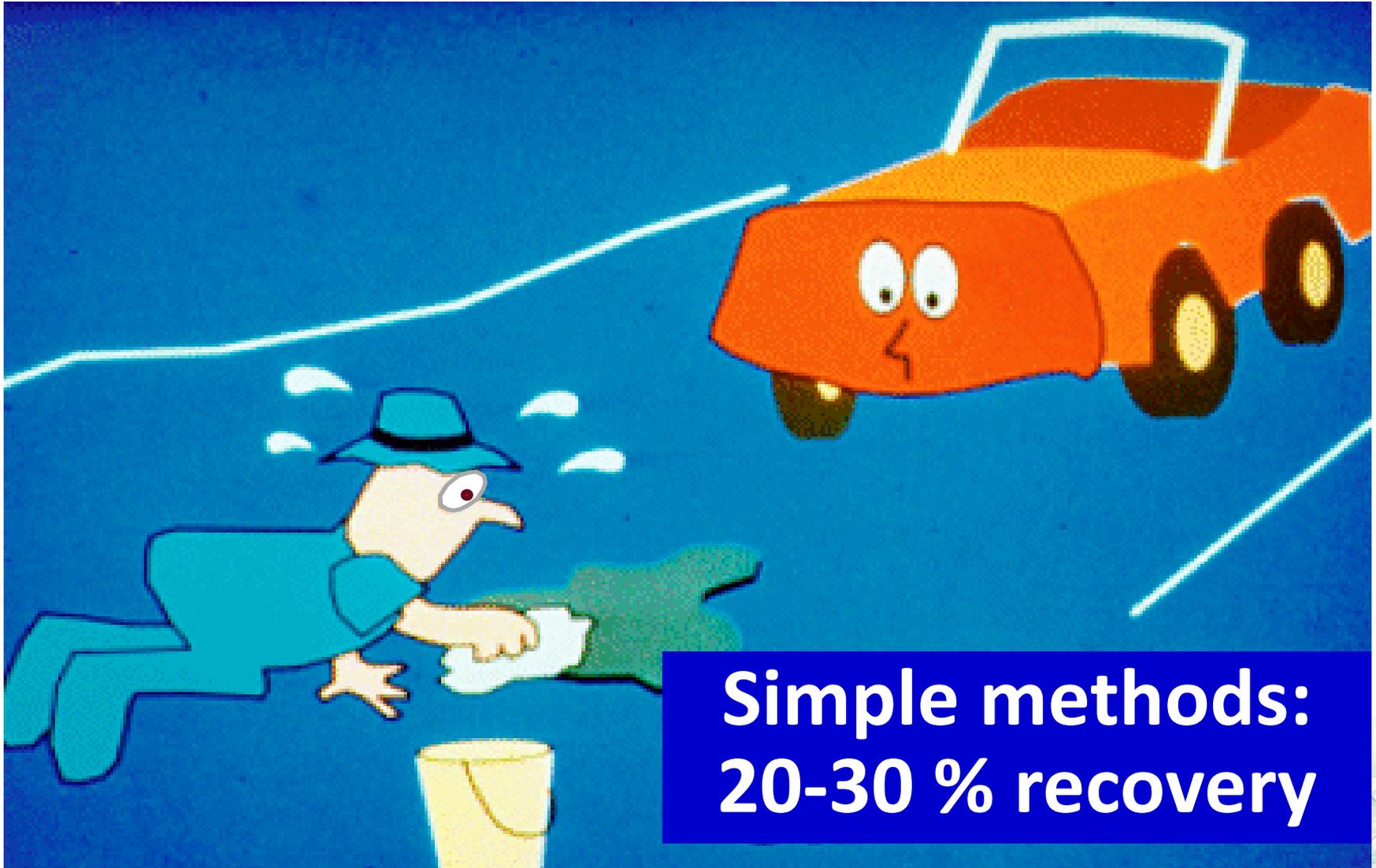# Visionary thinking
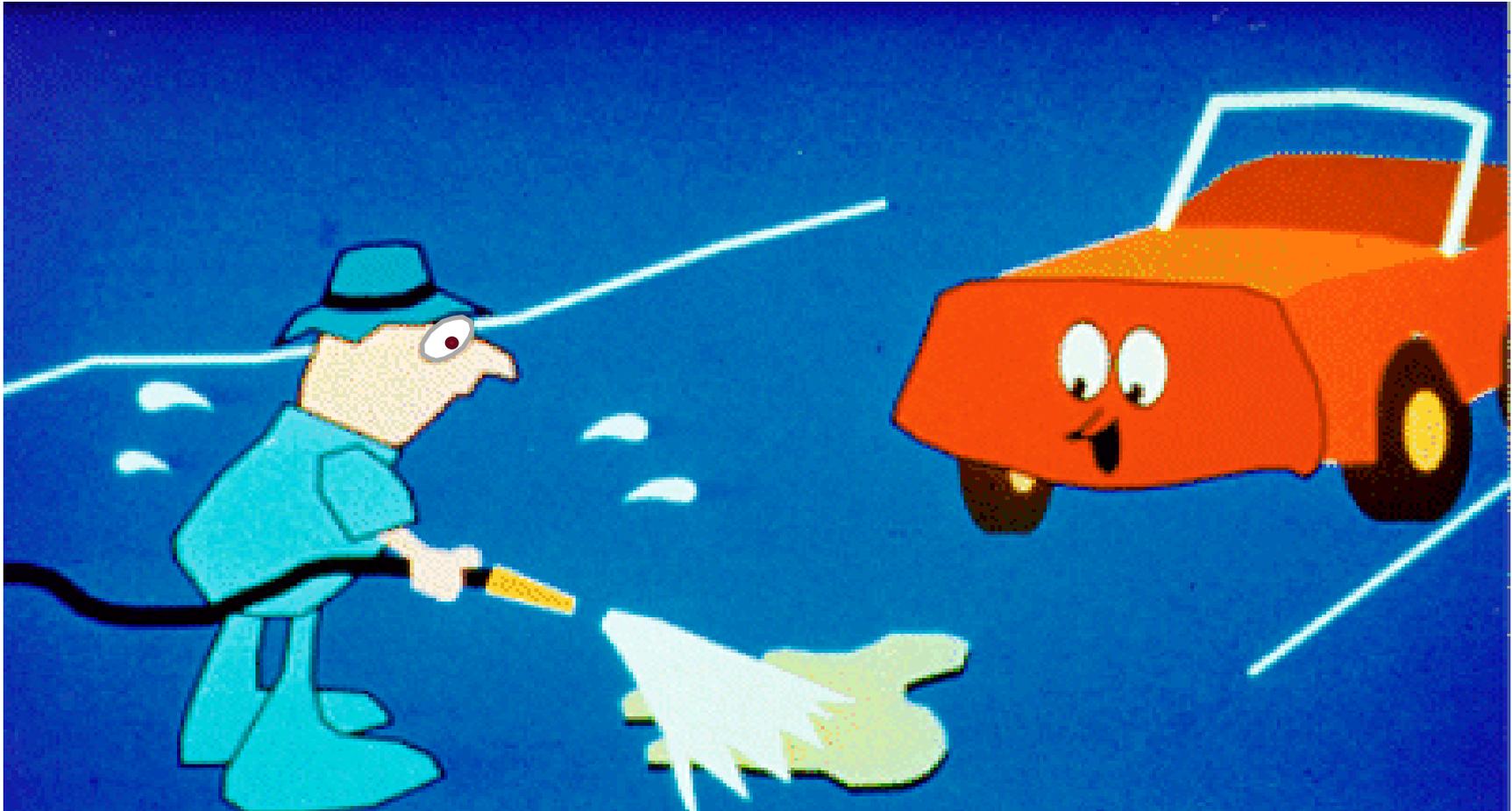

From www.dilbert.com:

Given an oil deposit….

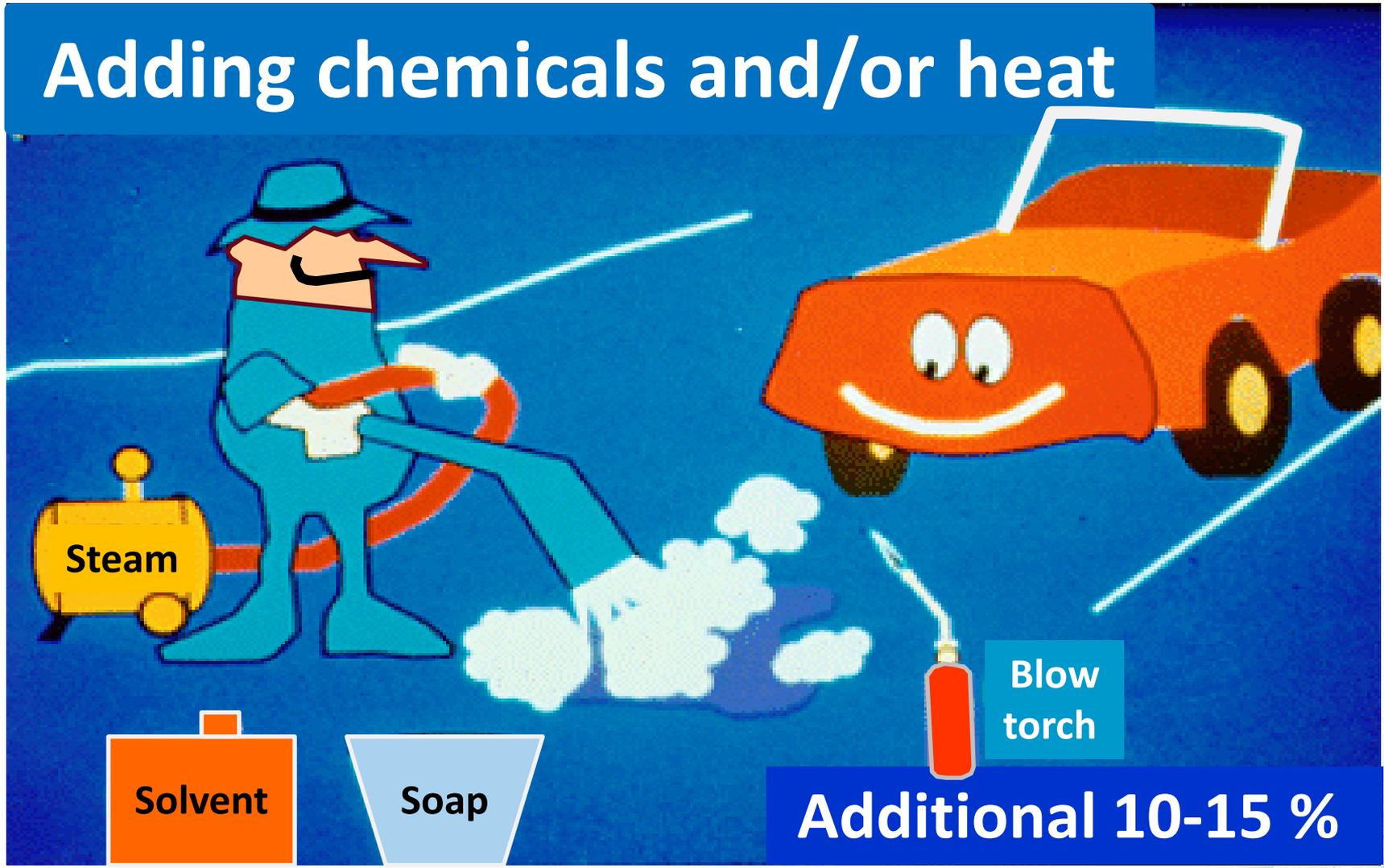# Primary oil recovery

Simple methods: 20-30 % recovery

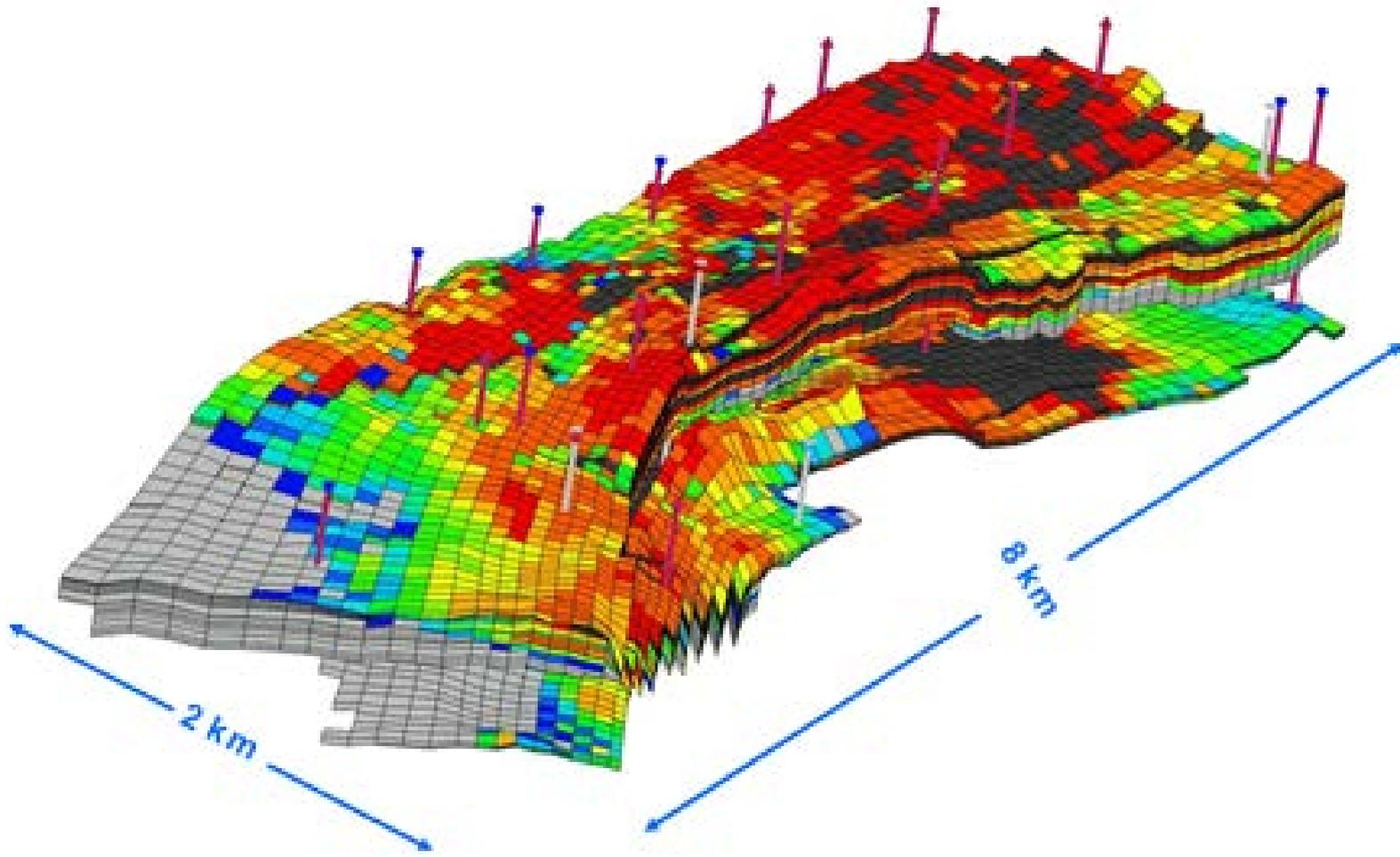# Secondary oil recovery

Water or gas injection: + 20-30 %

Tertiary oil recovery

Adding chemicals and/or heat

Steam
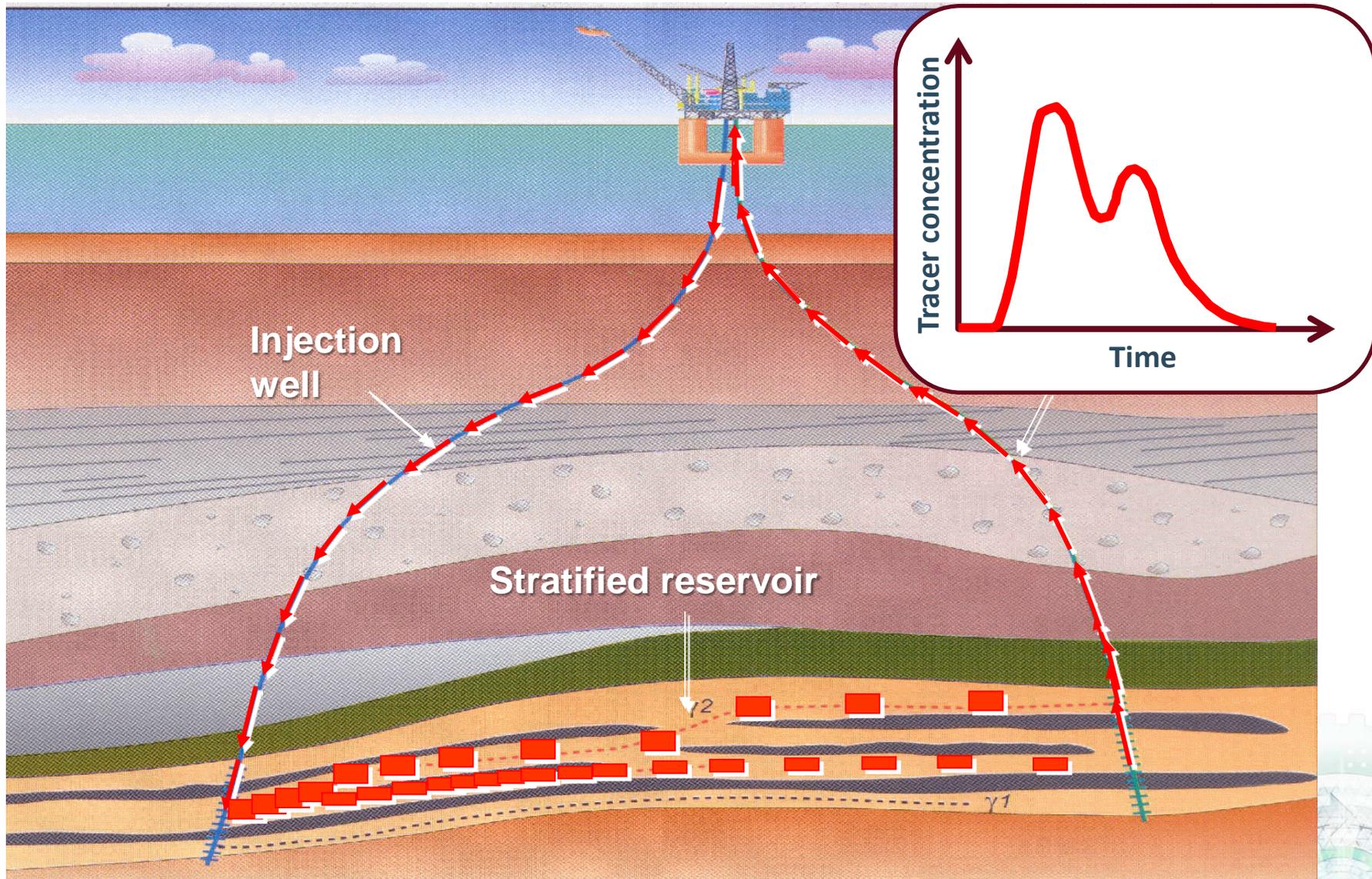
Solvent

Soap

Blow torch

Additional 10-15 %

Water expelling oil may be traced with suitable radioactive compounds

Tracing of injection fluids…

…in offshore North Sea reservoirs

IFE personnel

Tracer injection pump

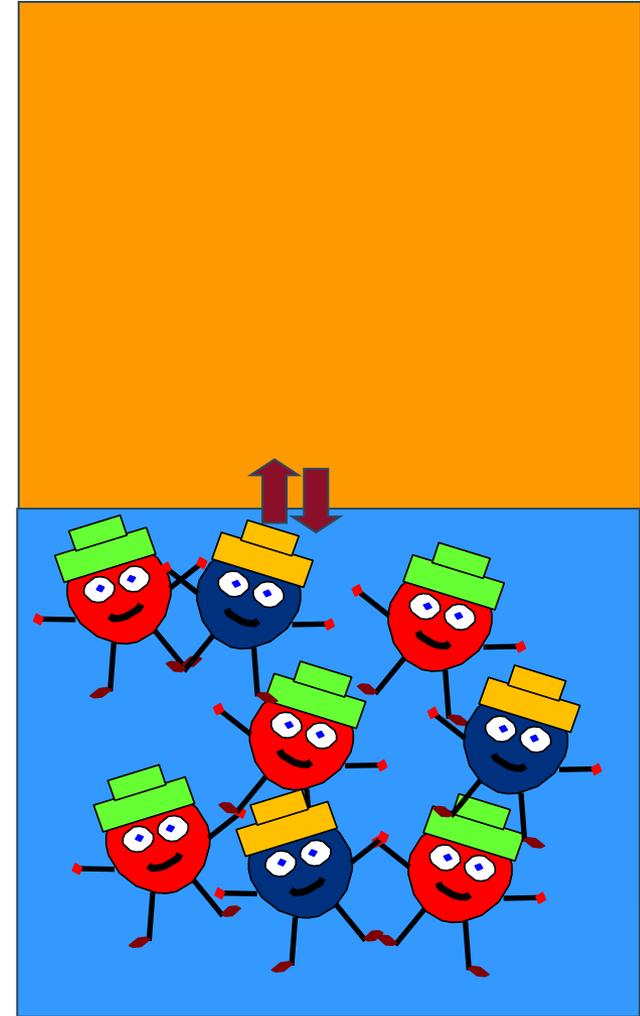# …and in onshore Algerian desert fields

«Dirty» water samples…

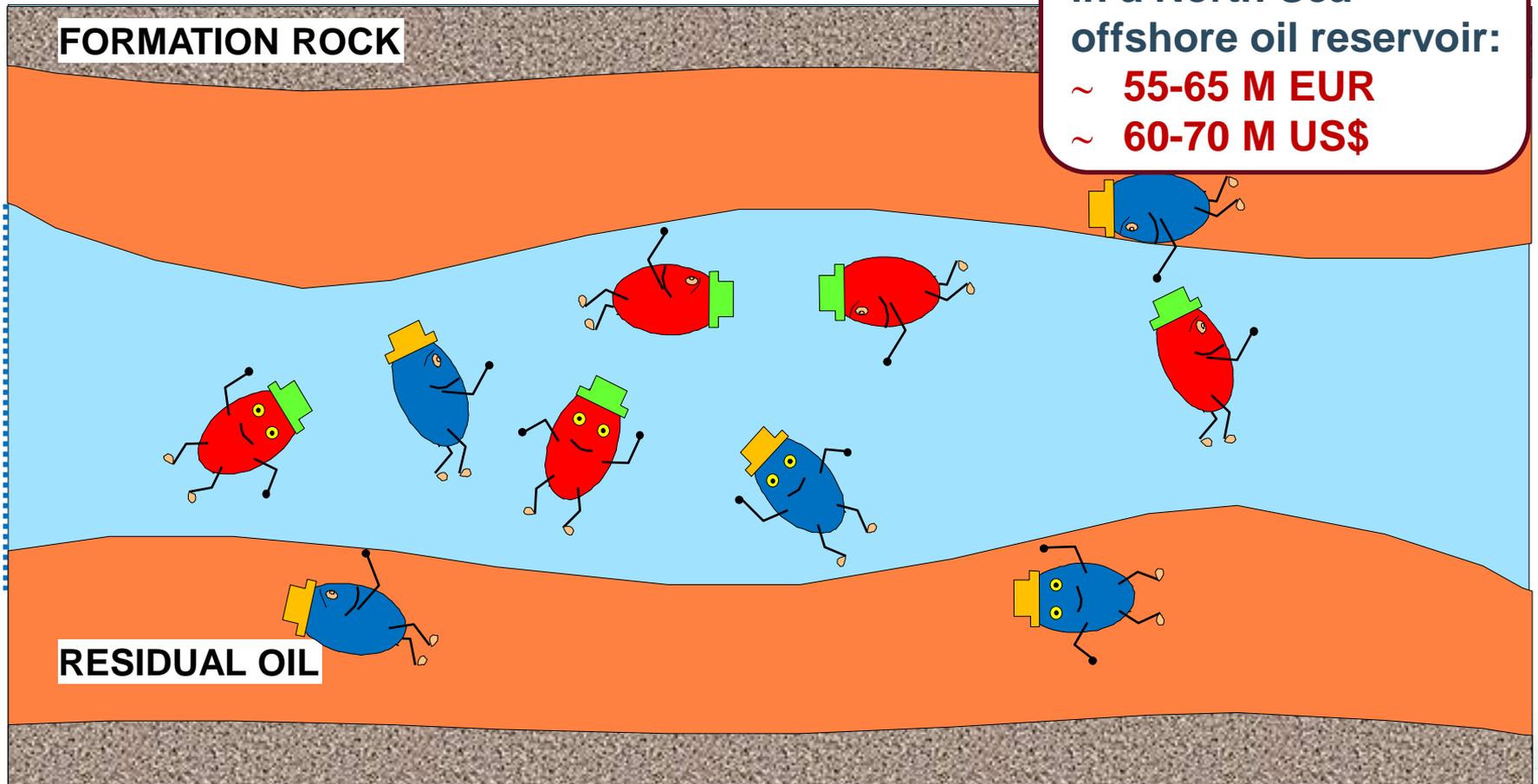**Analysing for the radioactive tracer is like finding the «needle in a haystack»**

Passive and partitioning tracers…

- Partitioning tracer distri-butes in water and oil
- Non-partitioning tracer exists only in water
- Water moves, oil is (close to) stagnant

$$K = (C_{Tr})_o / (C_{Tr})_w$$

…move at different speed between wells…

Cost of one well in a North Sea offshore oil reservoir:
~ **55-65 M EUR**
~ **60-70 M US$**

FORMATION ROCK

RESIDUAL OIL

Great simple formulas…

$$K = ma \quad \text{(Newton)}$$

$$E = mc^2 \quad \text{(Einstein)}$$

$$IOR = \text{☺} = (m^2c^2) \times f(x,y,..)$$

Efficiency = **m**anpower **x** **m**ethod **x** **c**o-operation **x** **c**o-ordination

Thank you!