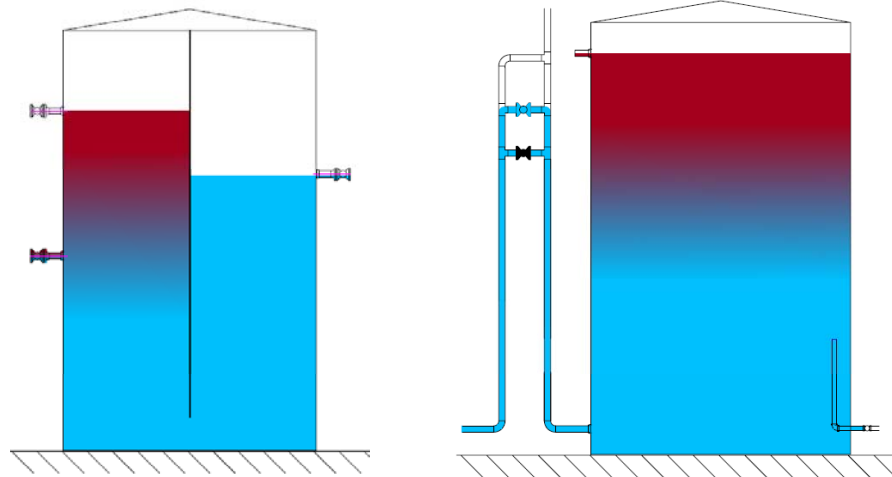


Site-Entry Facilities

- Solids can be difficult for pumps and injection wells
 - Filters and strainers require monitoring
 - Filters designed for water tend to fail in oil
- Oil causes a problem with any sort of produced water facilities
 - Surface discharge limited by regulation to 35 mg/L
 - Oil in downhole injection wells will shorten the injection life of the well
 - Oil in an evaporation pond will reduce evaporation rate and is a hazard for birds

Dealing with Oil

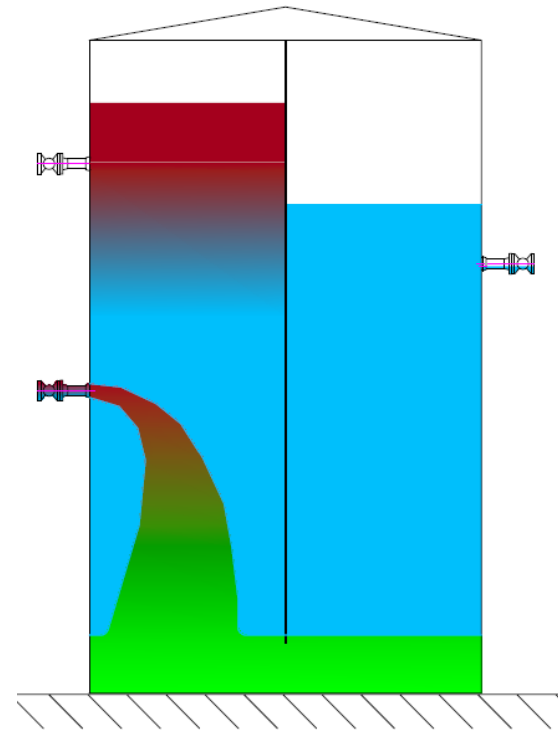
- Gun barrels are the typical solution to oil in gas fields



- When the fluids are exactly at design conditions:
 - Oil level is at the oil-outlet
 - Water level is at the water outlet
 - If a quart of liquid comes in, a quart must go out

Gun Barrels

- Example design conditions
 - 160°F
 - Water SG 0.96
 - Oil SG 0.75
- Fluid from truck
 - Fluid temp 35°F
 - 78 bbl water, 1.07 SG
 - 2 bbl oil, 0.98 SG
 - Empty truck in 15 minutes (7,600 bbl/day rate)
 - Incoming fluid drops like a stone
 - Treated fluid leaves
 - Oil finds its way to the water side



Gun Barrel

- Problem can be fixed by converting from batch to continuous:
 - Trucks unload into heated pre-treat tank
 - Throttle valve controls flow rate of warm liquid into gun barrel
 - Set throttle valve at about twice the normal daily in-flow rate

