



Welcome to
Nedre Romerike Vannverk IKS

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About NRV

- DWTP opened in 1982
- NRV supplies water to roughly 140 000 inhabitants with on average 1800-1900 m³/hour
- Runs 24/7 (process control system and guard)
- 50 m³/hour to Coca Cola and Ringnes





Raw water source; Glomma

- Norway's longest river (604 km)
- Basin: 42 000 km², 13 % of Norway's area





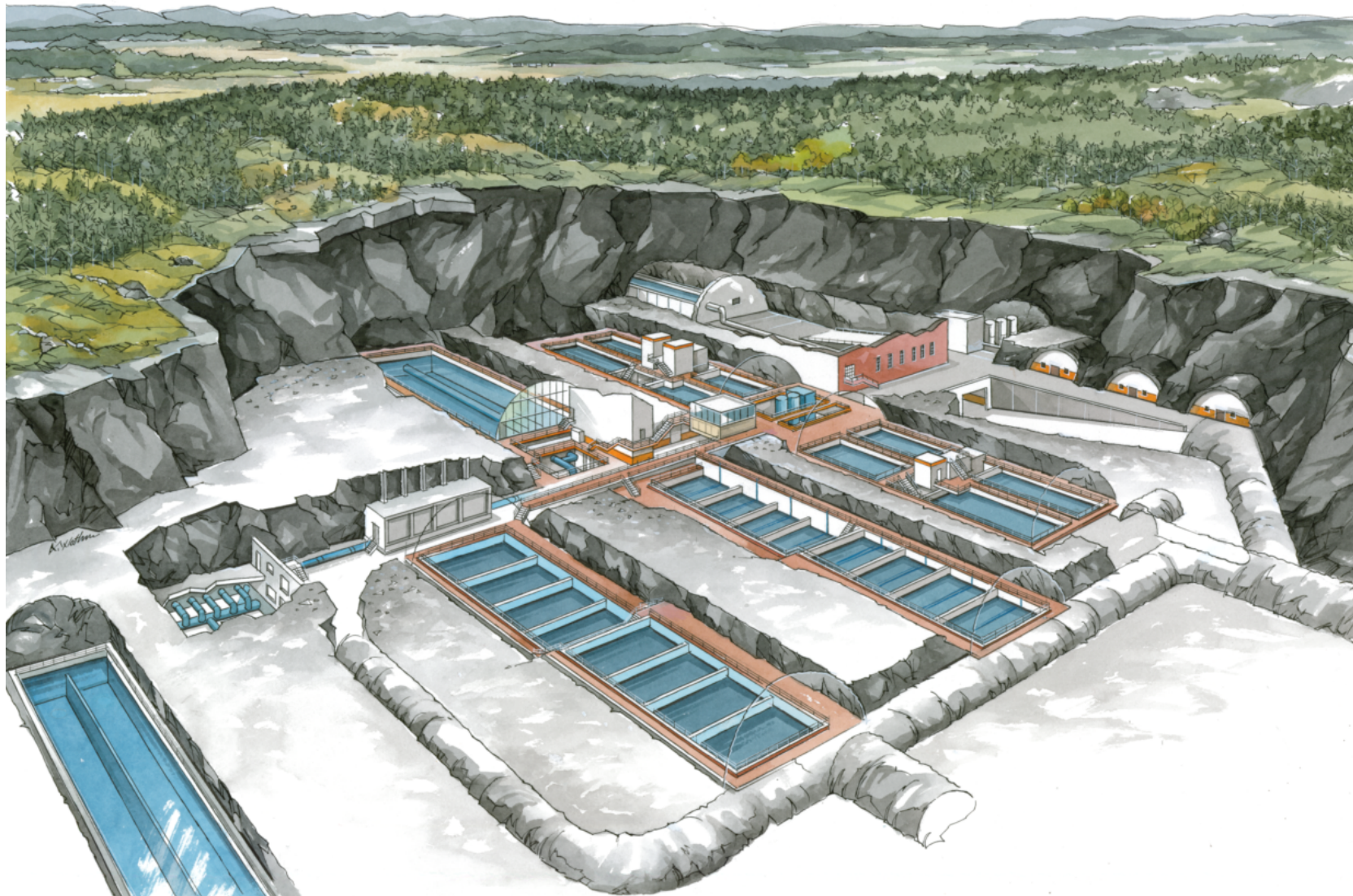
From Glomma to Hauglifjell

- Coarse filter: removal of sticks, fish etc (light opening: 5 x 8 mm)
- The water is then pumped up ca 120 m
- Ca 5 km long tunnel to the DWTP



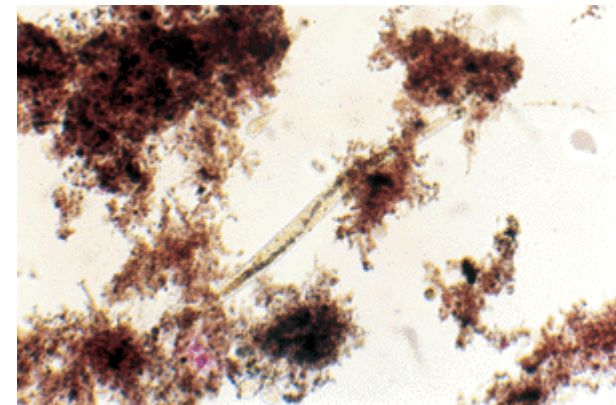
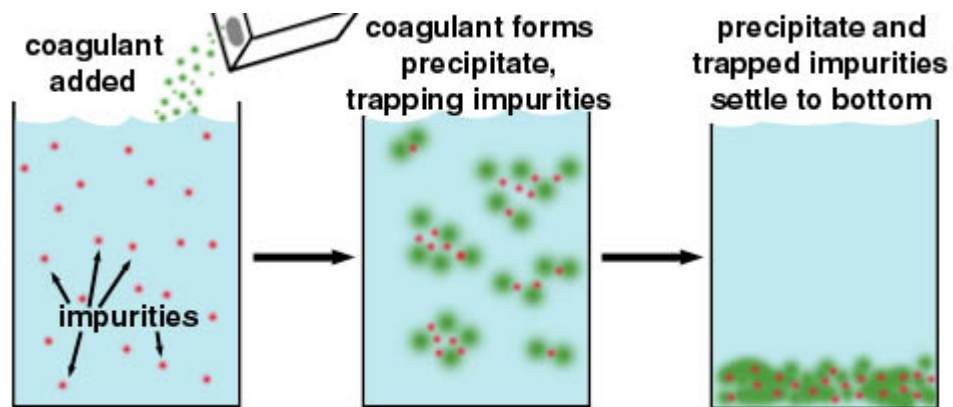
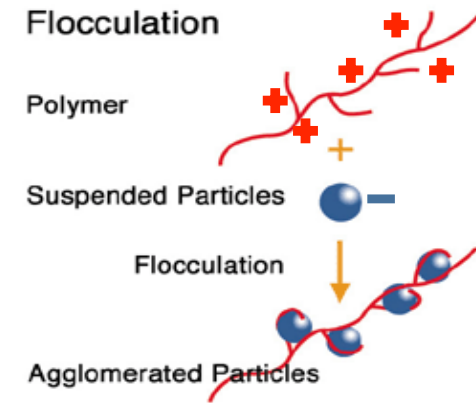
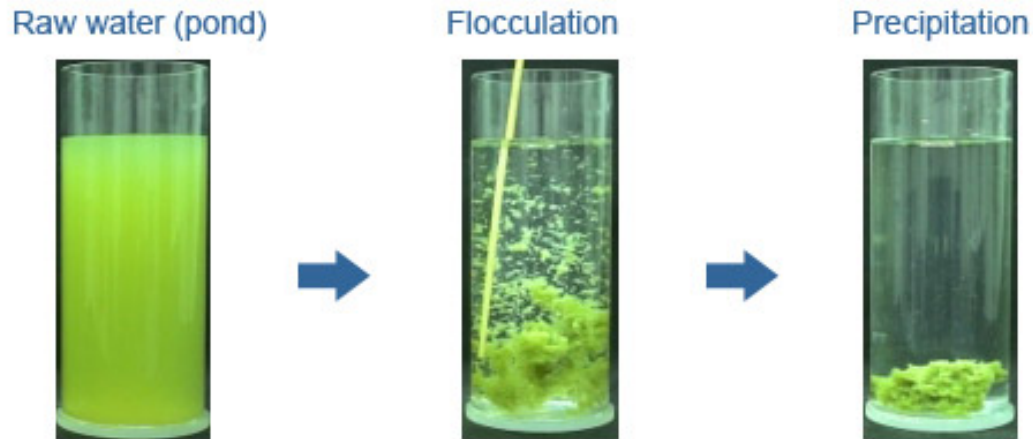


Drinking water treatment plant in Hauglifjell



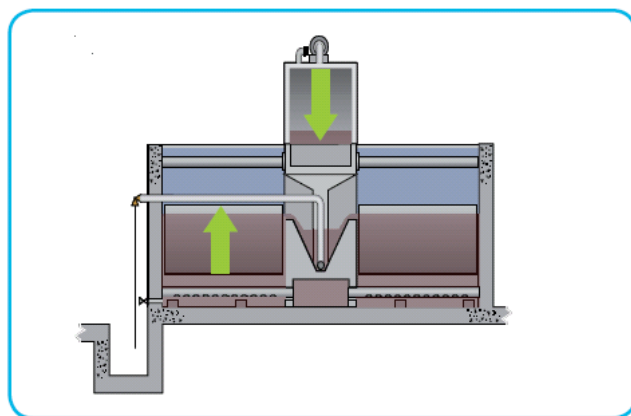
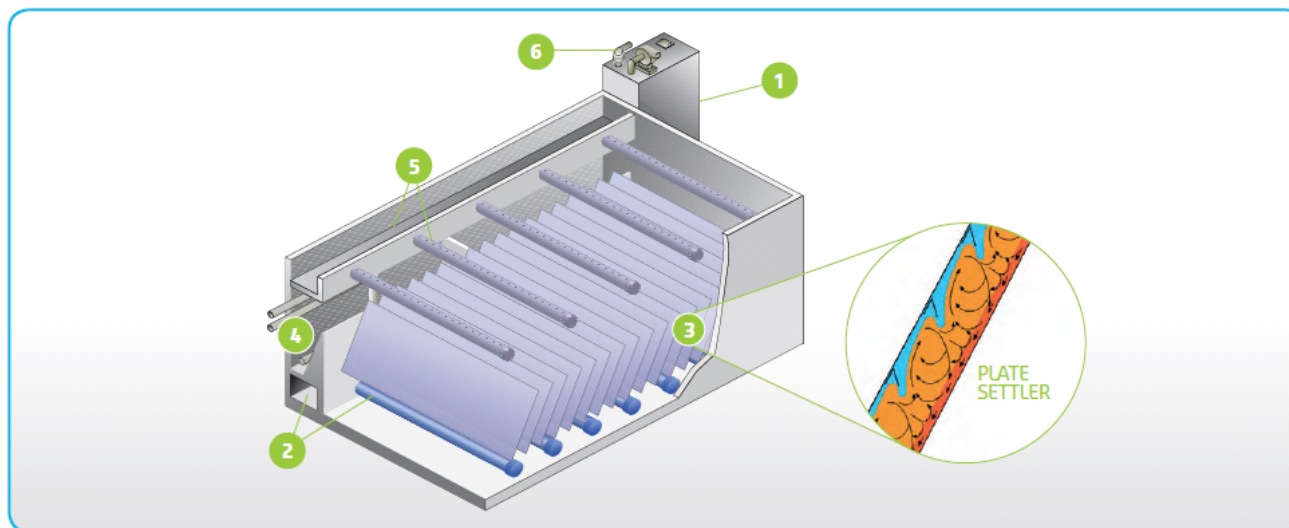


Chemical purification step and flocculation

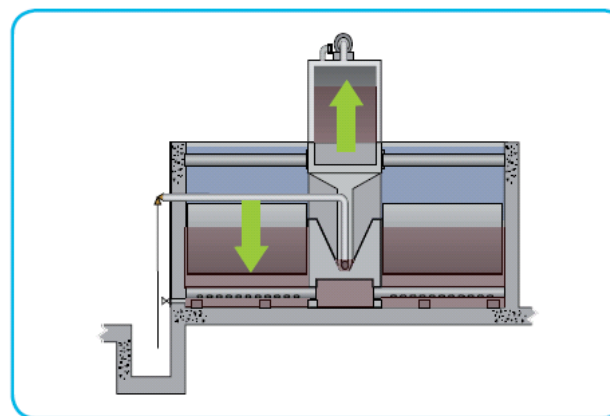




SuperPulsator – (Degrémont)



VACUUM
BLANKET EXPANSION



VACUUM
BLANKET CONTRACTION



Two-media filtre – Filtralite (Leca) and sand

- Downstream filter – downwards water flow

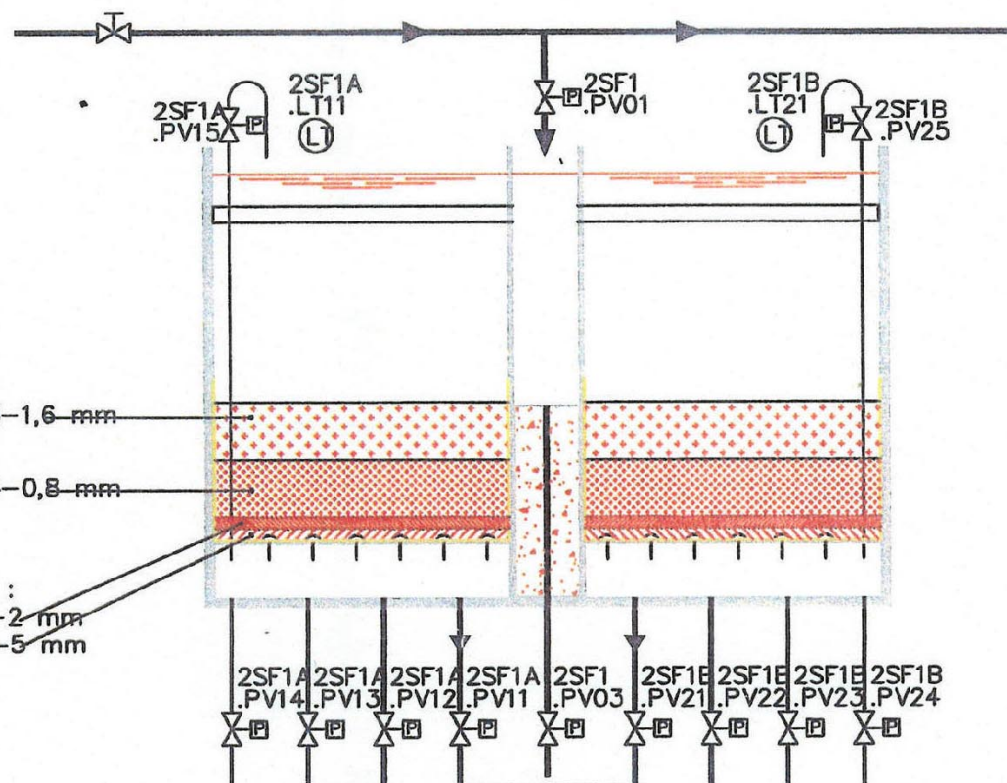
- More smaller flocs and particles are captured and removed from the water

- Backflushing ~ every 32 hours (air, water)

Filtralite :
50 cm 0,8–1,6 mm

Sand :
50 cm 0,4–0,8 mm

Støttesjikt :
10 cm 1–2 mm
10 cm 3–5 mm





Carbon filter

- Large surface area for chemical adsorption and activated with a positive charge
- Removal of contaminants and impurities, agents that may cause colour, odour and flavour





Chlorination

- Disinfection:
 - Effective against bacteria and most viruses (there are exceptions)
 - Parasites (like *Giardia* and *Cryptosporidium*), bacterial spores and some viruses (for example Poliovirus) require a another disinfectant

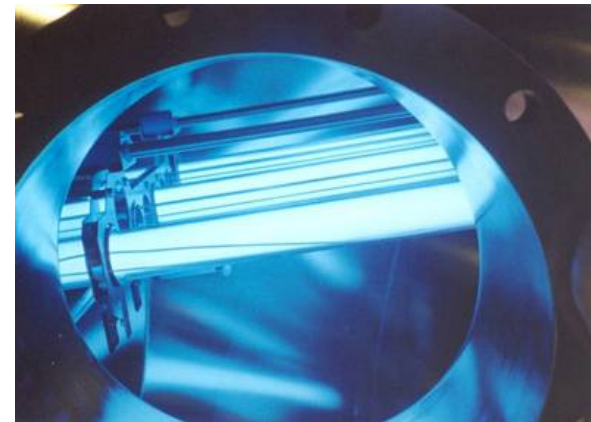
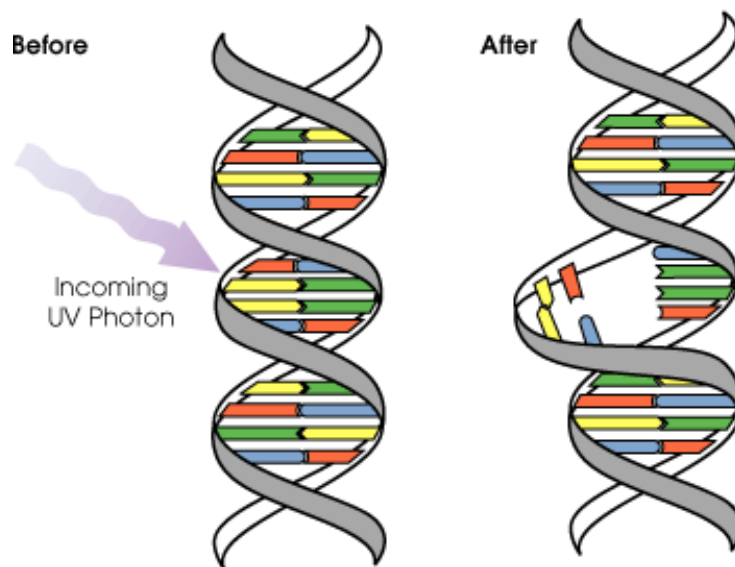
- Chlorine requirement in the purified water: 0,05 mg/l after 30 min. contact time





UV-disinfection

- Operative winter 2012
- Inactivation of parasites, bacteria and (most) viruses





Raw water quality vs. purified water

Parameter	Råvann	Rentvann	Endring	Grenseverdier
Color	35	3,4	90 %	20 mg/l Pt
Turbidity	3,7	0,1	97 %	1 FNU
pH *	7,0	8,3		6,5 – 9,5
<i>E. coli</i>	49	0	100 %	0 antall/100 ml
CFU	1650	3	99,8 %	< 100 /ml

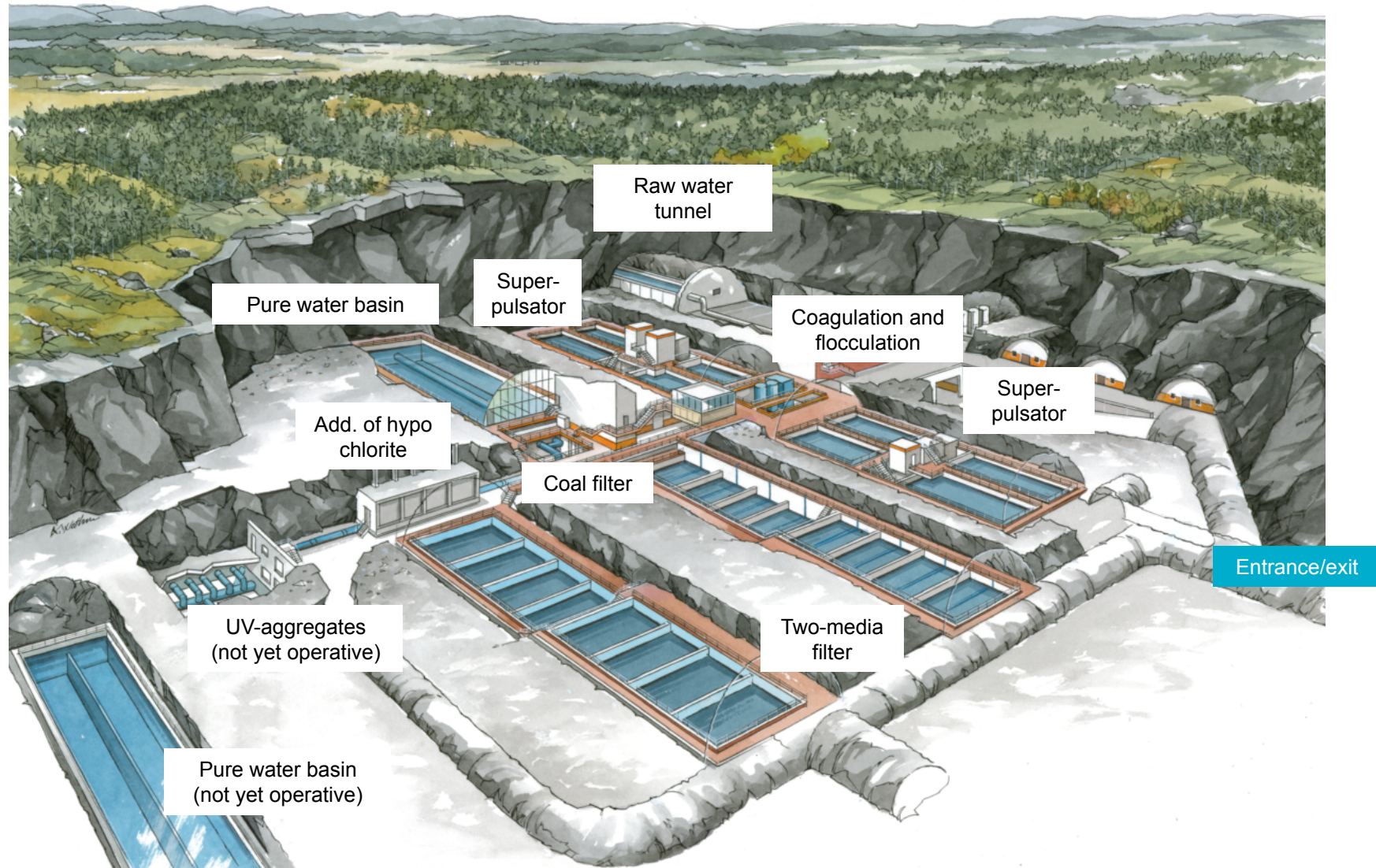
(Data from 2009)

*pH is adjusted with NaOH





Drinking water treatment plant in Hauglifjell





What can potentially make you sick in water?

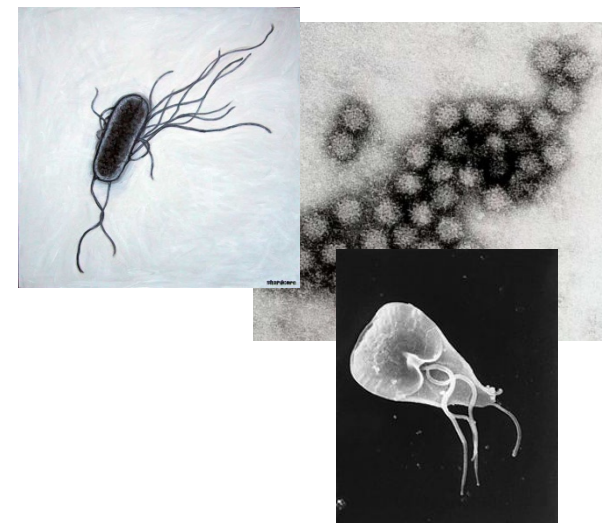
- Viruses
- Bacteria
- Protozoa (parasites, like *Giardia intestinalis*)

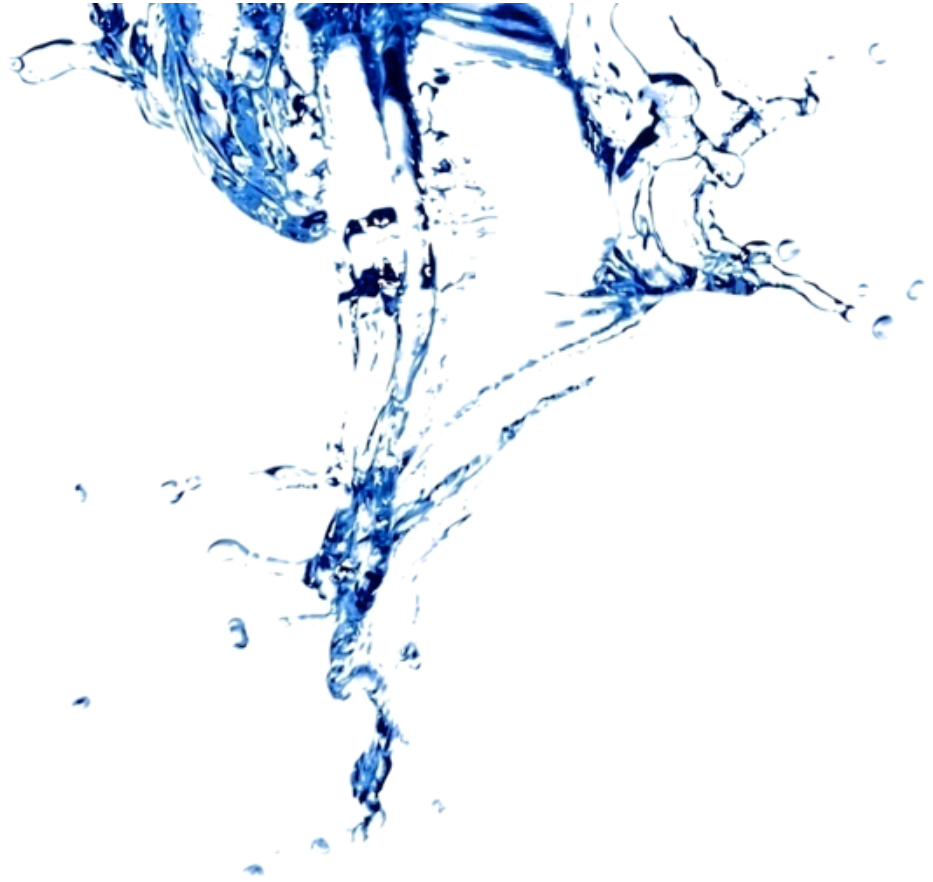
Where do they come from?

- Sewage, animal faeces etc.

How do we guard ourselves against them?

- Protect the raw water source (by regulations)
- Good purification process dependent on raw water source (ground water well, river, lake).
- Travelling: your immune system plays a role!





Thank you for your attention!