



New water treatment plant in Oslo

The new Oset water treatment plant is Europe's – and Scandinavia's - largest plant located in a mountain cavern. Norwegian Drinking Water Regulations require that there are a minimum of two hygienic barriers in the water treatment. Previously, chlorination was the only barrier. Now coagulation and filtration is the first barrier and UV-disinfection is the second barrier. The new plant uses a trace residual of chlorine and will maintain the old plant with the micro-strainers and chlorination as back-up treatment. The new plant has been slowly phased in since May 2008 and will meet EU requirements for drinking water quality.

PLANT CAPACITY

- 390,000 m³ of drinking water produced per day
- 4,500 litres per second
- Total capacity for raw water pumping stations (from both water sources) are 11,800 litres per second
- Supplies approximately 90% of the city population
- Could under normal conditions supply the entire city with drinking water



Sand filtration basin

RAW WATER

To increase the reliability of the drinking water supply, the plant is constructed to access two different water sources; the main source is Maridalen Lake while the back-up source being planned is Langlia Lake. The new Oset water treatment plant consists of two identical yet mutually independent plants that can operate separately in case of operational or water source problems.

MARIDAL LAK

- Catchment area 252 km²
- Yearly average inflow of 184 million m³
- 90 million m³ for the production of drinking water
- Good quality inflow & slow rate of flow in the lake
- High quality raw water
- Raw water intake is at 30 metres depth



TREATMENT PROCESS

Step A. Coagulation: Carbon dioxide (CO₂) and lime are added. An aluminium-based coagulant is then added, which binds itself to humic matter (loose organic matter).

Step B. Flocs formed: Micro-sand is added (grain size approx.0.1 mm). The aluminium flocs and micro-sand are mixed.

Step C. Polymer added: Attracts the aluminium and sand, which forms larger, stronger and heavier flocs.

Step D. Flocs removed: Sludge contains micro-sand that sinks to the bottom of the sedimentation reservoir in the Actiflo treatment process. The sludge is led to hydro-cyclones where the micro-sand is recycled while the remaining sludge is taken out for sludge thickening. This sludge is further de-watered in a centrifuge. The reject water from the centrifuge is treated in a separate reject water treatment facility. Treated reject water is led to the sewage pipeline. The filters in the water treatment process are cleaned with compressed air and water. The sludge from the filters is led directly back to the raw water and is reused.

Step E. UV-disinfection: UV-disinfection is the second hygienic barrier at Oset. The UV-light penetrates the micro-organisms' cells and damages their DNA so that the organisms cannot reproduce. UV-disinfection is effective against bacteria, virus, parasites, and spores.

Step F. Lime: Lime is added so that the water will reach a pH of 8.0. The drinking water is then less corrosive to metals such as copper and iron, which increases the lifespan of municipal and private pipes.

DISTRIBUTION

- Drinking water led through four reservoirs totalling 50,000 m³
- High pressure pumping station with eight pumps at 2,600 litres/second
- 110 metres to Årvoll reservoir supplies north-eastern and southeastern city
- Water conducted via gravity to remaining city regions

COSTS

- 170 employees, national and international, working on project implementation, planning, building, and control
- 65 work on-site at Oset
- Total project cost 90 million €



Lime container

TIMELINE

Pre-construction

City Council approves extension of Oset, March 2002
Consortium AFS-Krüger awarded the total delivery contract (turn key)
Oslo Water and Sewerage Works is project owner and project manager

Initial building phase

November 2003 – February 2004

Portables established
Platforms constructed
Construction road constructed

Blasting work

Spring 2004 – January 2005

Blasting of new mountain caverns and rock removal
140,000 m³ of solid rock removed
Max. 13 trucks per hour

Cement work

Winter 2005 – Autumn 2006

Ground work for pipes of various dimensions, spring 2005
Mounting ceiling tiles in both caverns to keep out groundwater; 1.5 football fields of tiles, winter 2005- 2006
Concrete structures for reservoirs and walls built; walls are 5-10 metres high (2,000 m³ concrete poured every month), March 2005– summer 2006

Installation work

Autumn 2006 – Autumn 2007

Installation of 15-20 tanks and silos, start fall 2006
All installation works conducted, throughout 2007

Testing and start-up

Autumn 2007 – summer 2008

Official opening

Autumn 2008

The new Oset water treatment plant will be officially opened by The Crown Prince Haakon of Norway on the 18th of September 2008.