

## CASE HISTORY

SEMICONDUCTOR

SOLAR

PHARMA

**POWER GENERATION**

FOOD & BEVERAGE

PULP AND PAPER

CHEMICAL

OIL AND GAS

MINING

AEROSPACE AND TRANSPORT



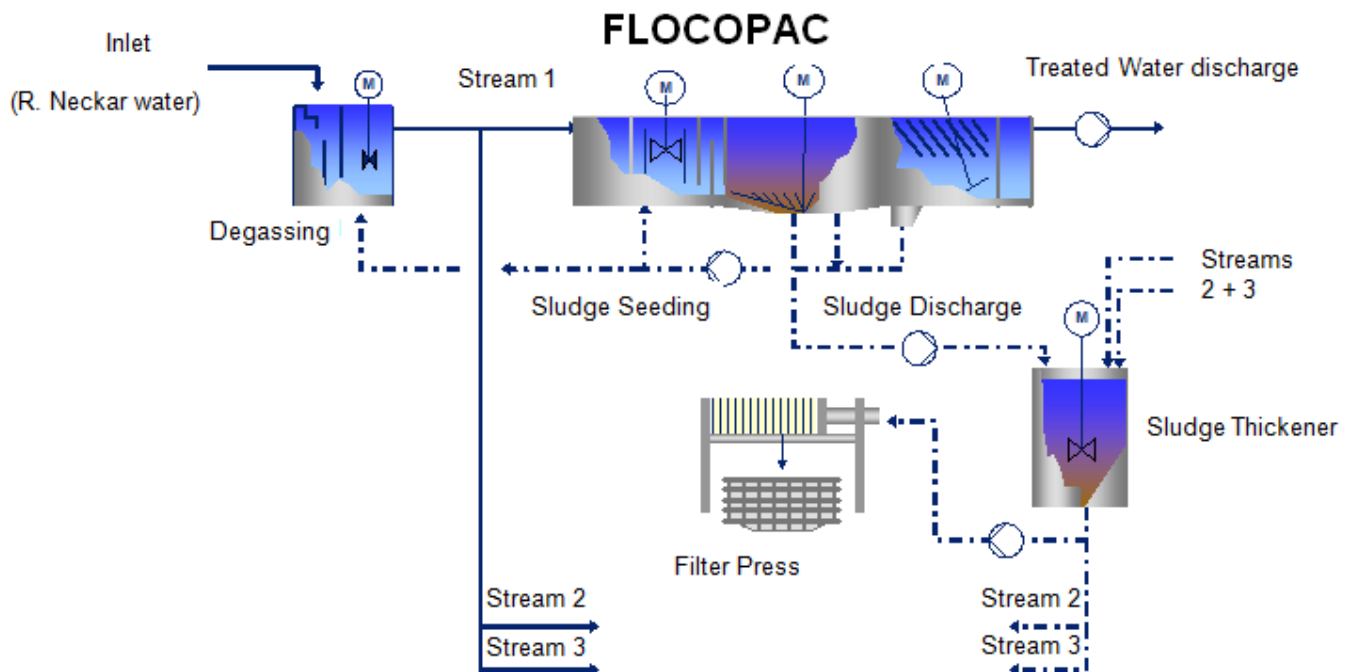
An **aquarion** Group Company

# Additional Cooling Tower

## For a Nuclear Power Plant



Evaporation and spraying losses in open cooling systems lead to the concentration of salts and the risk of hardness, precipitation and scale formation. In order to avoid this, the water losses must be replaced with decarbonised water.



### What were the treatment goals?

The target was to install a process to treat the required additional water for the cooling tower in an economical, reliable and safe manner, but at minimal investment cost.

### Specification for treated water:

Additional water: 4,680 m<sup>3</sup>/h  
 Treatment Streams: 3  
 Temperature: 3 – 35°C  
 SS (norm/max): 5/10 mg/l  
 CO<sub>3</sub> hardness: 0.8–1 mval/l  
 Total Fe (norm/max): 1.0 – 1.5mg/l

The three treatment streams provide 50% spare capacity.

## Treatment method selection

The treated water quality required and the fact that the water from the River Neckar is known to be difficult to treat indicated that a 3-stage slow decarbonisation with flocculation and settlement would be appropriate and therefore a FLOCOPAC system was selected.

The installed system consists of:

- Degassing via an inlet cascade
- Coagulation with  $\text{FeCl}_3$  to deal with the organic content of the river water.
- Precipitation and flocculation stage: Decarbonisation is achieved with lime slurry and use of sludge seeding.
- Sludge sedimentation with integrated thickening: during this stage approximately 90% of the solids are removed and the secondary downstream clarifier loading is significantly reduced. Simultaneously, the contact and surplus sludge is stored and concentrated.
- High-efficiency lamella clarifier: in which the solids remaining after the primary clarifier are removed by the counter-current principle in  $60^\circ$  inclined "honeycomb" modules, which creates laminar flow conditions, permitting high speed solids separation. The settled sludge is removed with the assistance of longitudinal circular scrapers.
- Treated water conditioning: in which sulphuric acid & hardness stabilisers are added before the water is introduced into the cooling circuit.
- Sludge handling: the thickened sludge is dewatered in a filter press, and the resulting filtrate is re-treated in the main treatment system.

## Why was the FLOCOPAC chosen?

Coagulant addition takes place before precipitation. Therefore, low residual iron content is ensured. The contact sludge (seeding) principle significantly enhances the precipitation of calcium carbonate. The secondary lamella clarifier with thickener ensures that the discharge water quality is maintained during significant fluctuations in raw water quality and quantity. Sludge thickening, including a rake, achieves high solid concentration values. The patented process is characterised by its compact footprint, high specific separation efficiency and reliable degree of separation.

## Was the target achieved?

The system installed at the GKN Neckarwestheim facility includes the FLOCOPAC process that was developed by Hager + Elsässer. The make-up water quality including remaining carbonate hardness and solids is reliably ensured.

**The target treated water quality is consistently achieved.**

**H+E** ranks among the world's leading suppliers in the fields of: water & wastewater treatment, and energy efficiency. Based on its global presence, the **H+E GROUP** has completed projects in over 50 countries.



HAGER+ELSASSER

An aquarion Group Company

Tel: +44 1403 272772

[sales@he-water.co.uk](mailto:sales@he-water.co.uk)  
[www.he-water.co.uk](http://www.he-water.co.uk)