

CASE STUDY SUMMARY

Industry : Coke production
Location : China
Problem : Final effluent quality
Products : BFL 4400AN, BFL 5400GC, BFL 5500HC, BFL 5600SS, BFL 5900PH

BACKGROUND

The plant was an integrated steel mill with coke production. The wastewater plant was the standard anaerobic/anoxic/oxic (aerobic), A₂O configuration in this industry. While the plant worked quite well the final effluent COD was never better than 180 – 200mg/L. The limit set by the State Environmental Protection Agency (SEPA) was COD <100mg/L.

PROBLEM

The plant was failing to achieve final effluent COD standards. It was also prone to upsets from time to time which had a detrimental effect on the biomass in the system.

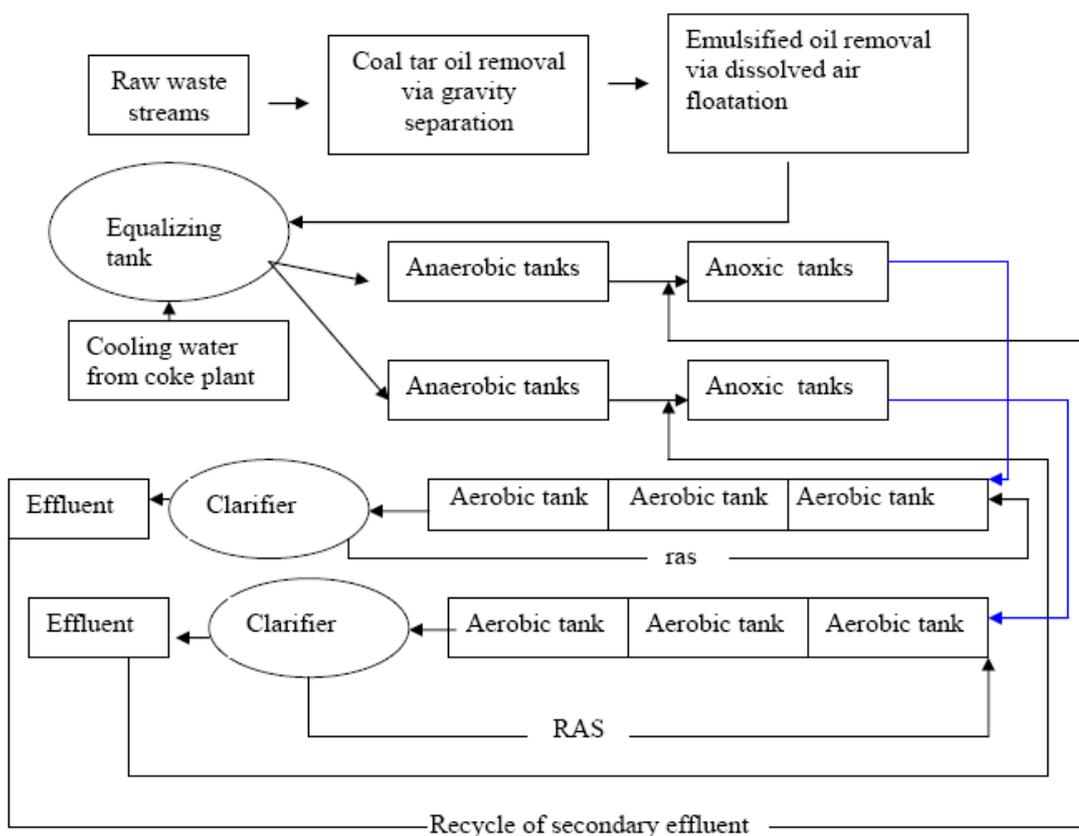
TREATMENT OBJECTIVES

The objective of the biological treatment programme was to increase the degradation of recalcitrant COD and thus help to achieve the final effluent limit of <100mg/L COD. It was also necessary to make the biomass more robust and resistant to upsets. It was also desired to produce a better floc quality and promote good settling of the biomass.



WASTEWATER TREATMENT SYSTEM

The wastewater plant deals with an inflow of 120m³ per hour. The removal of oils is achieved by use of gravity separation followed by dissolved air floatation (DAF). The flow from the balance tanks is split to feed the two sides of the plant. The flow first enters the anaerobic tanks (capacity 2 x 600m³) and then the anoxic tanks (capacity 2 x 2,000m³) and then to aerobic tanks (capacity 2 x 4,400m³). The aerobic tanks are divided into 3 tanks in series. The anaerobic and anoxic tanks have media so that they are attached growth systems. The aerobic tanks are suspended growth systems and operate as an activated sludge system. The flow from the aerobic tanks goes to two separate secondary clarifiers and part of the final effluent is recycled back to the anoxic tanks as a source of nitrate.



BIOLOGICAL TREATMENT PROGRAMME

Following a detailed audit of the plant an agreed treatment programme was initiated which involved optimising the various stages of the treatment process. The sludge age was too long so a gradual sludge wasting programme was introduced to remove some of the old, inefficient biomass. This was followed by an intensive bioaugmentation programme where highly efficient microbial cultures were added following a process of activation and acclimation. This was achieved using on-site activation units where the required products were prepared so that they were highly active and producing the required degradative enzymes and biosurfactants before being dosed to the system in order to maximise their beneficial effect.

The products used were:-

- ◆ BFL 4400AN in anaerobic tanks
- ◆ BFL 5500HC and BFL 5900PH in anoxic tanks
- ◆ BFL 5900PH, BFL 5600SS and BFL 5400GC in aerobic tanks.

The intensive dosing of the first week was replaced by a maintenance dosing programme in order to maintain the suitable biomass in the system and help to overcome any shocks to the system.

RESULTS

Over a period of 1 month biological treatment the following results were obtained:-

- Final effluent COD reduced to 80 – 90mg/L.
- Better floc formation and settlement.
- More robust biomass and resistance to shocks.
- Better nitrification and denitrification.
- Improvement in final effluent colour.
- Improve respiration rate of biomass.
- Elimination of foaming in aeration tanks.

