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CASE HISTORY

Zeon Chemicals, South Wales

End User Zeon Chemical
Process Aerobic treatment
Application Industrial Effluent Treatment

View of the removable tubular fine bubble aeration system within the Aeration tank

Introduction

ACWA Services Ltd was awarded a turnkey design and build contract from Zeon Chemical Europe Ltd, to supply an industrial effluent treatment system at Sully, South Wales. The purpose of the treatment plant was to improve the quality and reduce the toxicity of the effluent discharged into a local watercourse.

Zeon Chemicals manufactures latex products and due to the unusual nature of the effluent an extensive site treatability study was undertaken. The six month study determined the removal efficiencies and operating parameters that would be expected for a full size plant. The study demonstrated that a 50 – 60% reduction in the chemical oxygen demand (COD) of the latex effluent was achievable using an activated sludge system, together with modifications to the company's existing dissolved air flotation (DAF) pre-treatment system.

Design Information

The following table indicates the influent quality and final effluent quality achieved from the plant.

Description	Influent Characteristics Average	Effluent Quality Requirements
Flow m^3/day	3600	
Suspended Solids mg/l	100	< 50
BOD mg/l		< 20 (95 percentile)
COD mg/l	1100	
COD removed		50 – 60%

It should be noted that the design of the effluent treatment plant was based on the results obtained from the treatability study.

Description

Effluent from the processing facility flows into a collection chamber where calcium chloride, hydrochloric acid and antifoam agents are added. The pH corrected effluent is pumped to a new balance tank through a new run-down screen to remove any latex. In addition a manual divert system was added utilising the existing balance tank and screen.

The balanced effluent is pumped to the existing DAF tank for primary treatment. The DAF system was modified to improve the performance and efficiency of the process. Modifications included automation of the chemical dosing, re-positioning of the chemical injection points and modification to the white water injection points. Sludge produced from the DAF process is pumped to a new sludge holding tank.

Primary treated effluent is transferred to a transfer tank where a nutrient solution is added. The effluent is then transferred to the activated sludge system. This is a completely mixed system with the air supplied by fine bubble diffusers. Instrumentation utilised includes dissolved oxygen monitors for controlling air requirements and a mixed liquor suspended solids (MLSS) monitor for trending suspended solids level. Activated sludge from the aerobic stage gravitates via a degassing vessel to remove any entrained air prior to entry to the settlement stage.

Within the settlement tank solids settle to the base of the tank with clarified treated effluent gravitating over a launder to a final effluent monitoring tank for discharge to an existing treated effluent lagoon prior to discharge to the watercourse. Solids collected at the base of the tank are returned to the aeration tank as Return Activated Sludge (RAS). Periodically a proportion of these solids are removed from the tank as surplus activated sludge and directed to the sludge holding tank where it is mixed with the DAF sludge.

The combined primary DAF and surplus activated sludge is stored in a new sludge holding tank fitted with a decant system to remove excess water prior to pressing. The sludge is further dewatered using a new belt press system complete with polymer addition. Thickened sludge at 15 – 20 % is disposed of off-site.