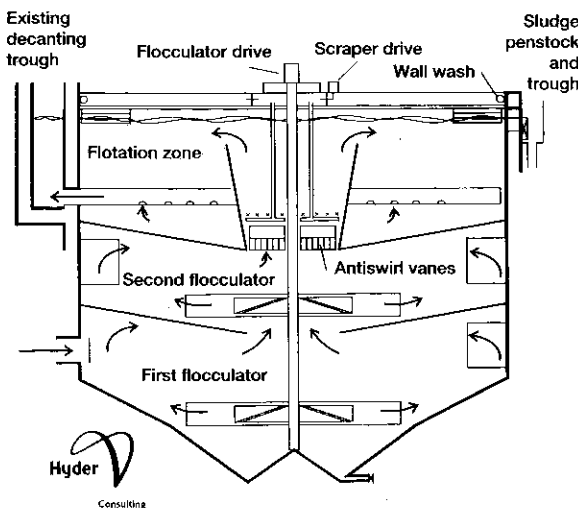


Triple-deck design combines two flocculation stages and DAF in existing tanks

An innovative design of water treatment plant has saved space, cost and construction time at Welsh Water's Cantref work near Merthyr Tydfil in South Wales. Existing concrete clarifiers have been converted to dissolved air flotation tanks with two stages of flocculation on different levels directly beneath the DAF section, creating a novel triple-deck configuration. This reduced the overall ground area to

by shallow conical floors of thin stainless steel. A 2m diameter hole at the centre of the lower steel floor lets water flow upwards from the bottom zone without undue mixing between the stages. The upper floor is the base of the flotation stage and carries a central conical collar that forms the DAF riser.

Mechanical flocculation is provided by a motor / gearbox unit on a bridge across the tank top. This turns a shaft carrying eight radial blades which direct flow to the corners of the flocculation zones and give the required shear at modest tip velocity. Four fixed blades on the walls prevent the contents from simply rotating in the tank.



Triple-Deck DAF configuration at Cantref Water Works, designed by Hyder Consulting for Welsh Water

about one third of that needed for a traditional DAF layout but also gave a unit which is simple to construct, operate and maintain.

Two of the triple-deck units have run successfully at 11m³/h/m² since commissioning late in 1996 and together they treat up to 31,000 m³/day. According to the designer, Welsh Water company Hyder Consulting, the concept can easily be adapted to new and many existing cylindrical structures of steel or concrete at water treatment plants worldwide.

Hyder was asked to develop a means of updating and upgrading the plant, making best use of available structures and including a second stage of filtration to deal with manganese. Two concrete tangential-inlet settlement tanks, 9.15m in diameter and 6m high, were available and standard potable water parameters of 25 minutes flocculation and 10m/h surface rating allowed a safe design output of 31,000m³/day with the full surface area of both tanks devoted to flotation.

Each tank is divided into three zones separated

antiswirl vanes straighten the flow as it passes upwards into the DAF zone. Just above the vanes, semicircular removable aeration grids fitted with nozzles are mounted 2m below water level.

Radial flow carries sludge to the outer wall for removal by a slow-speed paddle several times an hour. The blades penetrate the sludge blanket near the tank side and gently rotate the complete mass without disturbing the clean water underneath. Rotation is aided by a water curtain fed down the tank side to lubricate the blanket as it moves around the wall to exit at a weir only 1m long.

A zone of clear water is left at the centre and treated water is constantly decanted through two perforated pipes that cross the DAF zone just above the floor.

The process can be scaled up or down without changing the depth. Also, traditional combined flotation/filtration units are usually limited by the filtration area and the surface rate for flotation may be rather conservative. In this design it is the maximum flotation rate that governs the area occupied. The mechanical complexity is somewhat less than most flotation plants in that there are only two major rotating components. Also, the sludge removal system has proven to be effective: the scum scraper operates against virtually zero resistance and maintenance requirements are likely to be low.

Reader Enquiry No. 535

PROCESS OZONE ProMinent Fluid Controls is offering the new BONA series of ozone generators for treatment of process water. Available in capacities ranging from 10-1000g/h ozone, the BONA systems have a reduced electrical consumption and is smaller than its predecessors.

Stored programme control protects against tampering during the operating cycle and monitors operating parameters. A mimic diagram indicates the operational status of the unit and immediately warns if any faults develop. An automatic shutdown facility is also provided.

Reader Enquiry No. 536

CRYPTO-SCAN US company Clearwater Diagnostics has developed a system Cryptoscan, which it is heralding as a major breakthrough in testing for Cryptosporidia. Cryptoscan is designed for use on-line at the treatment works where it can continuously sample the main flow 24 hours a day. It is also claimed to be significantly more accurate and reliable than old methods, with oocyst recoveries routinely above 50% on high turbidity waters.

The analytical stage separating and concentrating the oocysts from background debris is very fast, taking 2.5 hours. This allows results to be available in under 5 hours, including microscope enumeration, a time factor which can be critical in drinking water supply. UK-based Adreck Marketing has signed an agreement to distribute the system.

Reader Enquiry No. 537

WELSH CONTROL A 16Ml/day water treatment plant has been completed at Maerdy for Welsh Water by Purac Ltd and features a highly advanced process control system, linking to the existing sludge treatment plant and to Welsh Water's regional telemetry system for remote monitoring.

The control system is based on a Moores Distributed Control System using two DEC workstations and four dual redundant pairs of APACS Advanced Controller Modules for process control. The DEC workstations run the Moores APACS Process Supervisor real-time graphics control system based on Hewlett-Packard's R/TAP software. Each pair of redundant ACM's is responsible for controlling separate areas of the plant. The state-of-the-art DCS provides simple mechanisms for re-using modules of programme code and graphical building blocks and is said to represent another step towards truly reusable software within the industrial control environment.

Reader Enquiry No. 538