Impressive Test performance

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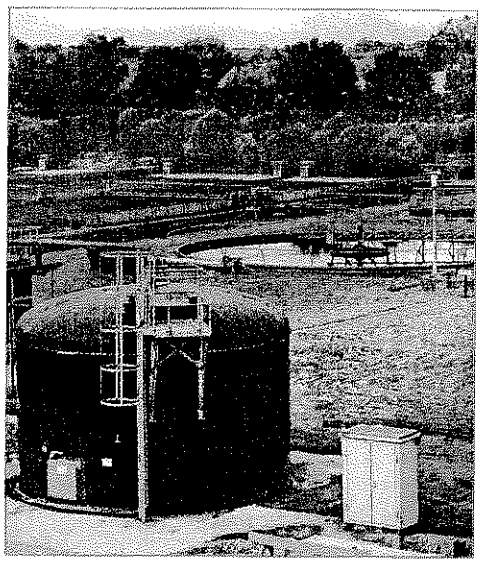


Isco-Stip has proved valuable at Fullerton STW

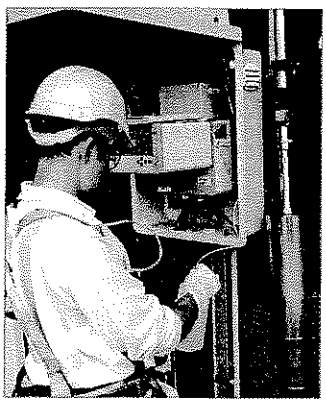
The Environment Agency (EA) recently issued Southern Water's Fullerton STW near Andover with an ammonia discharge consent of 5mg/l. The consent was issued in order to protect the River Test, one of the best trout fishing rivers in southern England.

The system Southern eventually chose is of German design, and called the Isco-Stip process buoy. The buoy has been designed specifically for STWs and can be immersed directly in treatment tanks, although at Fullerton it has been set up to monitor the final effluent. According to John Brown of Envitech who supplied the system: "The ideal situation here would be to have two buoys, one in the treatment tanks and one on the final effluent." The system needs a maintenance visit every five to eight weeks and on one of these visits it was possible to see exactly how the device worked. The electronics are housed in a secure control cabinet linked to the central control room. The actual data are not transmitted to the control room, but an alarm is set to remotely alert the plant operators if ammonia levels exceed 5mg/l.

Sampling and analysis takes place inside a chamber submerged in the effluent. The sampling chamber is filled by the hydrostatic pressure of the water and emptied by an air pump housed in the control cabinet. Once inside the chamber, the wastewater is separated from the sludge and solids by settling before it is fed into the measurement cell. It is then automatically tested using a gas-sensing electrode and a standardised reagent. During ammonia measurement, caustic soda is added and controlled with the aid of a pH sensor to ensure high-accuracy measurement and low reagent consumption. A sample pH of around 11.5 must be achieved for effective ammonia measurement. The system can also be set up for nitrate measurement, in which case the ionic strength is controlled via a conductivity probe. Automatic calibration is completed using the standard addition method, which compensates for variability in the wastewater. The reagents need replacing every five to eight weeks.

"The real difference with this system is that it takes measurements in-situ"

The results are displayed on an LCD screen with a graph plotting the data over the last 10 days. If required the data can be downloaded onto a disk every 10 days to create a continuous record of plant performance. This is not the case at Fullerton because bottled samples are also taken for laboratory analysis. Although the ammonia results from each system are not directly compared as a standard procedure, they should in theory be very similar. Mr Brown said: "We are now looking at the possibility of developing a version of the buoy which can measure several other parameters, not just ammonia and nitrate." As the market for this type of technology is generally led by legislation, it makes sense to develop technology for the most critical parameters. According to Brown, it may soon be possible to develop a BOD-sensing version, which if reliable enough to replace lab tests could save a great deal of money.



Electronics are housed in a secure cabinet

Two Isco buoys can be linked-to one controller box, in this way one can record ammonia and the other nitrate levels. Sampling and analysis is said to be accurate even in the highly dynamic environment of an activated sludge tank. Most ammonia-sensing systems only work effectively in sample streams with virtually no solids, i.e the final effluent, but the Isco-Stip can be submerged in almost any kind of wastewater treatment tank. According to Brown: "There are other ammonia monitoring systems on the market, but the real difference with this system is that it takes measurements in-situ." Whether in-situ measurements will replace lab-based analyses remains to be seen. Until continuous, multi-parameter in-situ monitoring is available at a reasonable price, water companies will probably continue to depend on lab tests. But continuous monitoring for a few critical parameters can provide the plant operator with a great deal of peace of mind, even if it is not a legal obligation.

RELIABLE RESULTS

Many rivers into which effluent passes from Southern's STWs are protected chalk streams and ammonia discharge consents are becomingly increasingly strict. The reliability of the Isco-Stip has given Southern the confidence to purchase 12 more devices, which will now be installed at a number of STWs across southern England. At nearly all STWs, ammonia and nitrate measurements are important, as they give a clear indication of biological nutrient removal rates.

Most STWs are given biological oxygen demand (BOD) and chemical oxygen demand (COD) consents of around 20 and 30mg/l respectively. If the treatment process fails, for instance if the bacteria in an activated sludge tank die because of system overloading, inadequate aeration or the entry of a highly toxic industrial effluent, ammonia will stop being converted to nitrates and then into harmless forms of nitrogen. An increase in ammonia levels is therefore bad news for the treatment process and the environment.

In summer, rivers such as the Test often suffer from inadequate flow due to low rainfall and as a greater proportion of the flow is treated effluent, quality problems will have a more severe effect on wildlife. Ammonia is more toxic with increasing temperature and high nitrate and phosphate levels can also contribute to the risk of eutrophication when effluent is released

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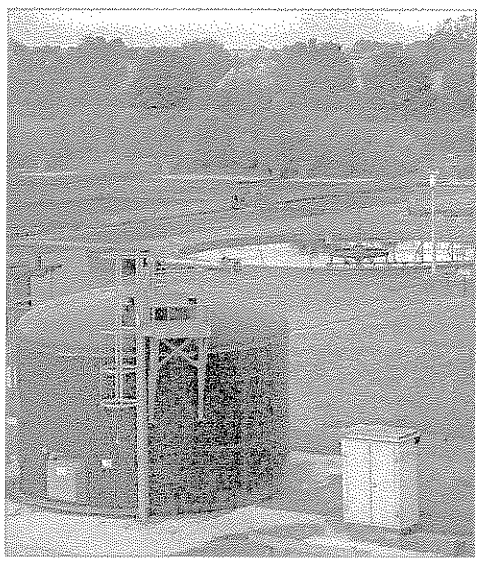

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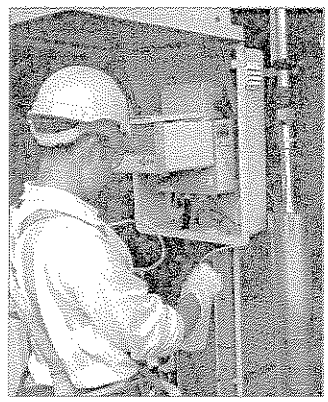

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