



Testing

Tight regulations, diverse technologies, and a range of processes and issues across different industries: water and waste treatment plant presents some interesting challenges, as Steed Webzell discovers

No one likes being overburdened with regulations, and plant engineers are no exception – fact. However, in a world forced into a rather late, reactionary effort to clean up its act, pollution in the waste water and effluent sector was always going to be fair game, and we have had to adjust to living in a tightly regulated climate where awareness is all.

A key piece of regulation, the EU's IPPC Directive (integrated pollution prevention and control), has been subject to a transitional period of enforcement that culminates on 30 October this year. IPPC imposes a requirement on plants with a high pollution potential to obtain a permit to operate – and that can only be issued if certain mandatory environmental management conditions are met. At the top level, these include: the use of all appropriate pollution-prevention measures; prevention of all large-scale pollution; and the

prevention, recycling or disposal of waste in the least polluting manner.

Also, because some industrial activities put water resources under a great deal of pressure, the decision to issue a permit is dependent on a number of individual requirements being met. Examples include: emission limit values not being exceeded for all polluting substances; specific water protection measures being in place; and ditto waste management measures – all backed up by certified emission-monitoring instrumentation.

In generic terms, adopting best practice goes a very long way towards meeting the requirements laid out in IPPC. But for those that find the area challenging, help is at hand, particularly in terms of process monitoring. Elga Process Water, for example, has introduced Aquatrend, a plant monitoring service that effectively puts a virtual water treatment expert right on the process user's

engineering and maintenance management team.

Elga says that, in its experience, water treatment is still seen by many plant engineers as somewhat arcane. It's all very well being able to log data, but, unless you know how to interpret the results and identify when to take action, the information is not much use.

So its Aquatrend service starts with a detailed audit of your water treatment plant, followed by identification of relevant KPIs (key performance indicators), such as raw water quality, treated water quality, treated water volume output, waste water per unit of treated water, resin regeneration and membrane cleaning frequency. For each KPI, Elga's team will set a normal or target value, an early warning level and an action level.

Monitoring can take a variety of forms, depending on user preference: electronic data logging, traditional log sheets or SPC (statistical process control) charts. An Elga specialist reviews and reports regularly on trends and provides explanations of technical issues, as well as recommendations of actions required to stay within the regulations. Already around a dozen major production sites have signed up – including RWE npower, with a paper-based data collection system,

maintenance crews slicker, but it gets accurate and timely records. In its first year of operation, SNWS is expecting to save about \$17,000 in work order processing and \$33,000 in admin.

Meanwhile, the construction sector, although not often cited as an exemplar for waste water processing, has been the proving ground for technology aimed at separating suspended solids from liquids before discharge to water courses. One of its main problems relates to materials not settling quickly enough, so silt removal specialist Siltbuster has developed a range of liquid/solid separation devices designed for temporary use on construction sites.

Clear benefits

They are aimed at removing suspended solids and oils from water pumped from holes, excavations or surface run-off – and, in particular, handle fine silt, clay and colloidal particles that normally settle very slowly, if at all. Siltbuster does its job using chemical conditioning techniques such as flocculation, coagulation or pH adjustment, using Watson-Marlow 400/500 series peristaltic pumps to facilitate the process. The company makes the point that, with these pumps, nothing but the hose



**Left: Watson Marlow peristaltic pumps in action
Above: remote water data collection, using Hach Lange mobile computer systems**

the waters

and both Scottish & Southern Energy and Corus, each with on-line data collection.

However, for those more interested in doing it themselves, but concerned that best practice data collection and record keeping are notoriously time-consuming and inaccurate, technology is available to ease that specific burden, particularly at large plants.

A case in point is Southern Nevada Water System (SNWS), which manages treatment of 900 million gallons of water every day via 30 pumping stations and 163 miles of pipeline. When SNWS learned that control systems giant Invensys was offering an Avantis maintenance management planning and scheduling system interface to run on PDAs (personal digital assistants), the company saw the opportunity to free field technicians once and for all from paper record-keeping.

It also found that reduced paperwork means more hands-on time for its plant engineers. So instead of receiving a stack of paper work orders for the day, technicians now get their PDAs, already docked to the company network and pre-loaded with daily work assignments. SNWS now has 12 technicians armed with PDAs; the company says that not only do they make the scheduling of field

Maintaining an advantage

The life of an instrument service engineer in the water and waste treatment industry has changed enormously in recent years. No longer, for example, is a service engineer's status reflected by the size of his wrench, but more by the 3G connectivity of his laptop computer!

"Customers now expect a faster service with longer service intervals and it is technological progress that has driven this expectation," says water analysis specialist Hach Lange's service manager Terry Bailey. "For example, for over 50 years it was necessary to service and recalibrate polarographic or galvanic dissolved oxygen sensors as often as every two weeks. But the launch of an optical sensor, the LDO, has meant that recalibration is no longer necessary. We simply change the sensor cap every two years."

Bailey's newest recruit, graduate engineer James Davie, is currently busy on a service contract with Southern Water that began in May 2007 and relates to instruments at around 250 Southern Water waste water treatment works. Most of the service contract relates to Hach Lange's Solitax turbidity monitors.

Its sensors are deployed at the outfalls of waste water treatment works and provide Southern Water with a continuous indication of water quality in its effluent, flagging alarms where necessary. The Solitax probes record the date of the last service internally. However, after each visit, Davie logs a web-based report that is provided to Southern Water by email.

Hence the importance of laptops with 3G Internet communications – and their new dominance over screwdrivers for servicing and calibrating plant and equipment. Looking back over the past 20 years, Bailey concludes: "Today's analysers run unattended for longer periods, which means service and calibration staff do not have to revisit the same sites so frequently. With 250 sewage treatment works to service, I am sure that James is thankful for that!"



Process pointers

- Today, there is a wide range of chemical products not only for water treatment, but for improving the efficiency of industrial and process waste water and effluent system operations
- Look for a provider, such as Acepta, able to offer advice and the full spread, from antifoams and defoamers, to inorganic and organic coagulants, dry anionic polymers, dry cationic polymers, enzymes and microbes, anionic flocculants, cationic flocculants, liquid anionic polymers, liquid cationic polymers and fluids for odour control

or tube touches the fluid, so eliminating any risk of the pump contaminating the fluid or the fluid contaminating the pump.

Sticking with pumps, it's worth remembering the value of choosing the technology, not just to match the duty, but to minimise maintenance issues in water treatment generally. The United Utilities site at Davyhulme in Manchester, one of the largest treatment works in the UK, reckons it has saved in excess of £200,000 over five years on maintenance alone, as a result of retrofitting Netzsch feed pumps on its gravity belt thickeners.

This unit has been using five SY long-coupled feed pumps and four BO open-hopper discharge pumps to feed sewage sludge, containing up to 8% dry solids content at pressures around 3 bar, through gravity belt thickeners. By installing a larger capacity, long-coupled pump, the plant was able to decrease rubbing velocity to less than 0.8m/sec,

while maintaining a high flow rate. This, combined with two-stage 'D' rotor geometry, ensured a much-reduced level of wear, which, in turn, led to the reduction in maintenance and downtime.

Scaled to size

Finally, as a general aside, scale build-up is a common and sometimes costly problem in many industrial processes – and water treatment plant is no exception. Helping provide a 21st century answer to this age-old problem with a new process that can treat and reverse limescale deposits is WaterMatic's KalGuard+ electrolytic scale inhibitor. The system doses water with dissolved zinc, quantities being tailored to each individual site, thus permanently preventing the build-up of scale.

Similarly, next to scale, corrosion is probably the oldest and most common foe of plant engineers working with water. Best to look at solutions for direct and indirect cooling plant, where corrosion within pipework is known to contribute to reductions in efficiency.

That was the problem at the Jordan Steel factory near Amman, thanks largely to the accumulation of sulphate-reducing bacteria, iron oxides and scale build-up. The company turned to Hydropath and its AquaKlear P120 water-conditioning system, and ran an eight-month trial. Hydropath technology works by inducing coaxial electromagnetic fields in the fluids passing through the pipe.

A 'wave' is generated from the unit, which is carried throughout the system, and Hydropath says that this charge helps to prevent the electromechanical process of corrosion. Certainly, its results indicated a reduction of iron oxide percentages in the eight-month period, from 65% to 49%. **PE**

Certain about MCERTS

The Environment Agency's Monitoring Certification Scheme, MCERTS, is designed to ensure that the equipment and systems that are supposed to report on the quality and quantity of industrial discharges are doing their job properly. The scheme is well established in a number of sectors, but it is at a relatively early stage of being applied within the process sector.

"For process companies discharging effluent, MCERTS provides extra confidence that they are keeping on top of their obligations under IPPC regulations and other relevant legislation," says Gareth Dean, general manager of supplier ABB Instrumentation Products. "Similarly, the Environment Agency can be confident that companies are complying with their permits, allowing them to encourage more self-monitoring within the industry," he adds.

MCERTS is an issue for any processes that fall under IPPC, processes making consented discharges regulated through the Water Resources Act and sites falling under the Urban Wastewater Treatment Directive. Hach Lange is one company in the UK's water sector to receive an MCERTS certificate recently for its range of stationary samplers.