

Dairy Crest Puts Emphasis on Environmental Credentials

Throughout the food and beverage industries, there is a constant requirement to monitor and control wastewater and effluent before discharge from the plant in order to comply with environmental regulations. In addition to this, process plants must also recognise that unless close control is exercised over all stages of waste treatment, the process itself can become ineffective.

At the Dairy Crest Davidstow cheese processing plant in Cornwall, considerable effort is made to ensure that all wastewater and effluent associated with the manufacturing process is treated and analysed before being discharged into the River Inny. During 2003, the Davidstow creamery underwent a multi-million pound expansion programme, which included an upgrade of the effluent treatment plant located approximately half-a-mile from the main site. The upgrade included the installation of an MBR system and an additional aeration tank (AT3) which provides the feed to the MBR system. These

operate in parallel with the DAF (Dissolved Air Flotation) and AT2 aeration tank which feeds into the settlement and lockertex filter plant.

The effluent treatment plant has to accommodate an inflow of around 1,800 to 2,200m³ per day of wastewater and has the capability to discharge up to 2,600m³ per day, this being the maximum consent to the river. The wastewater consists mainly of washes from vats and tankers and includes a relatively high level of fat, COD and pH. EA discharge consent levels that have to be complied with include suspended solids up to 20ppm, ammonia at 7ppm and TOC at 30ppm, with pH being monitored at 6 - 9pH. The total flow of the incoming effluent stream is recorded daily, with an accumulative sample being taken every 15-20 minutes for the Company's laboratory to analyse and provide daily COD readings. Turbidity, pH levels and temperature are also monitored at the inflow to the balance tank and divert tanks.

The monitoring of suspended solids or turbidity in wastewater from dairies and dairy food processing plants is a key parameter for assessing the quality of the effluent in respect of meeting consent levels. The results can be used as an aid for minimising waste, as well as indicating if there is any significant product loss through operator error. Nowhere is monitoring more important than at the final stages of the treatment process and at the point of discharge.

"Within the dairy industry, biological treatment plants are at constant risk from excessive quantities of milk and waste liquid from production processes finding their way into the biological treatment plant," comments Angus Fosten of Partech Instruments. "The problem is that dairy product residues can contain relatively high levels of BOD and these can upset the delicate balance of the biological treatment plant. Re-establishing the correct balance in the treatment plant can be expensive and lengthy, resulting in plant downtime and loss of production."

Partech's instruments play key roles at various stages throughout the treatment processes at the Davidstow plant. On the aeration tank (AT3), Partech's OxyGuard DO monitor is employed to measure the level of dissolved oxygen and ensure that the treatment process maintains the correct levels for effective treatment.

In the event of the DO dropping below the required level, the instrument will bring the standby blower into action to increase the DO content. Once the correct level has been re-established, the instrument shuts down the standby blower. With 0.5 million gallons of activated sludge in this tank, keeping the DO level at the optimum point is critical as it determines the quality of the outflow to the next stage of the process.

The Partech DO Monitor enables plant operators to maintain optimum levels of biological activity and run the plant as effectively and efficiently as possible. Too little DO can lead to biological inactivity, whilst too much wastes energy and can cause unnecessary wear to the aeration system.

The Partech OxyGuard sensor is mounted into the tank using the Pioneer Mounting System, which protects the probe from excessive fouling and maintains a fixed position 18 to 20 inches below the surface. The sensor combines an electrolyte, anode and cathode within a robust housing and the internal sensor design means that the electrolyte and anode are not consumed. The membrane only needs replacing if damaged and there is no internal drift.



Figure 1: On the aeration tank (AT3), Partech's OxyGuard DO monitor is employed to measure the level of dissolved oxygen and ensure that the treatment process maintains the correct levels for effective treatment.



Figure 2: The treated effluent from AT3 tank passes via a settlement tank into the lockertex filter system, which is equipped with a Partech Turbi-Tech 2000LS turbidity monitoring system prior to point of discharge.

When it comes to measuring the quality of the outflow from both aeration tanks, whereas the treated effluent from the AT3 tank passes to the MBR system, the treated effluent from the AT2 tank passes via a settlement tank into the lockertex filter system, which is equipped with a Partech Turbi-Tech 2000LS turbidity monitoring system prior to the point of discharge. At this point of the process, monitoring for pH, temperature, TOC and ammonia is also undertaken. A sample is taken every 20 minutes and should a problem be detected, then an alarm signal is transmitted to the control room where the discharge flow can be diverted for retreatment. Where the flows from both aeration tanks merge prior to discharge, another Turbi-Tech LS turbidity monitor takes a final reading to ensure that the discharge consent level is not exceeded and that the health of the River Inny is not compromised.



Figure 3: Where the flows from both aeration tanks merge prior to discharge, another Turbi-Tech LS turbidity monitor takes a final reading to ensure that the discharge consent level is not exceeded

Employing continuous turbidity monitoring within the treatment process provides a reliable and effective approach to identifying when a problem has occurred, allowing plant operators to take prompt remedial action. It also has the added benefit of indicating the performance of the treatment plant by measuring the presence of undissolved solids prior to discharge. Turbidity is widely used within the food industry on both final effluent and crude effluent. On the crude effluent a turbidity monitoring system can provide a reliable method of

on-line measurement to alarm or divert high strength wastewater into a separate holding tank for onward processing.

Partech Instruments has a long history of providing solutions for determining turbidity and levels of suspended solids in effluent treatment plants within the dairy industry. A well used and proven approach involves the installation of its Turbi-Tech 2000 Sensor and 7200 Monitor, which together provide operators with a constant indicator of the levels of suspended solids and turbidity at given points within the treatment process.

Available in two versions, the LS and LA, Partech's Turbi-Tech 2000 sensor uses Infrared 90° Light Scatter or Light Attenuation as its measuring principle. The LS version is designed to monitor low levels of solids or turbidity and is typically installed at the final effluent discharge point. The Turbi-Tech LA has an operating range suitable for use in aeration systems and may be used to monitor mixed liquor suspended solids (MLSS) and returned activated sludge (RAS). Both versions of the Turbi-Tech 2000 feature a self-cleaning system, which means that the sensor's optical

surfaces cannot be contaminated causing performance to be adversely affected.

"The self-cleaning capability is essential for dairy plants," says Angus Fosten, "as there are always a high proportion of fatty milk deposits contained within manufacturing residues. Apart from enhancing the instrument's performance, it means that maintenance is minimised resulting in low ownership costs."

"Employing turbidity monitoring systems that operate 24/7 means that plant operatives are able to watch over the performance of the treatment process and be warned of any problem immediately it occurs," says Angus Fosten. "Breaching discharge consent levels can be very expensive in terms of fines levied. Equally as expensive can be accidental discharge of products into the effluent treatment process. By measuring turbidity, plant management can achieve savings in terms of reducing product wastage and ensure that consent levels are not inadvertently breached."

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New Rapid Toxicity Measurement Systems for Wastewater Customers

SciTOX (New Zealand) announces that they have shipped their first commercial orders for their ALPHA toxicity analyser.

The first four units have been shipped to countries in Europe and Asia as a result of a series of introductory seminars given May through July in those regions, according to Ralph Wattinger, the CEO of SciTOX. "In addition to a total of five orders that we have processed, there have been commitments for further orders given by customers in the Americas, Asia, and Europe," he said. The customers included government agency labs looking at wastewater and universities running wastewater treatment training programs.

Rapid Toxicity Measurement Systems (RTMS) provide wastewater customers with an early warning of potential upsets to their treatment systems, reducing the risk of non-compliant discharges and higher operating costs. The toxic response measured by the ALPHA applies to organic and inorganic toxins. The ALPHA, and future platforms marketed by SciTOX will be employed in laboratories, in-process, and in field applications.

Reader Reply Card no 57



Colorimeter for Chlorine Measurements

Thermo Fisher Scientific (USA) announce the release of the second Orion AQUAfast AQIII series meters for colorimetry and turbidity measurements.

The new Orion AQ3070 AQUAfast Chlorine meter offers simple operation with multiple test options. The meter is designed for use with the EPA-approved Orion AQUAfast AC4P71 Free Chlorine and AC4P72 Total Chlorine Methods for drinking water and wastewater reporting. The meter will read up to 4.0 mg/L for chlorine with a single reagent pack. Although EPA reporting is from 0.02 to 2.00 mg/L, the additional range gives the user a quantitative status of his process - without re-sampling or retesting. Chlorine Dioxide, Cyanuric Acid, and pH calibration curves are also programmed into this meter. This offers users flexibility and cost savings by using just one meter if these tests could also be needed. The AQ3070 chlorine meter is supplied in a field carrying case along with test vials, a vial cleaning brush, tablet-tamping stir rod and 100 each of AC4P71 and AC4P72 powder reagent packets.

Reader Reply Card no 59

New Infrared Version of Signet Turbidimeter



GF Piping Systems (UK) has added the new Signet 4150 Turbidimeter to its extensive line of analytical instrumentation. The new instrument provides accurate and reliable water quality monitoring that in two-versions is compliant to either ISO 7027 or U.S. EPA 180.1 making it ideal for both municipal and industrial applications. With its integral pressure regulator, the 4150 features easy single unit installation and setup. Typical applications include monitoring distribution of potable water, raw or filtered water, wastewater reclamation effluent, and aquatic life support systems.

Turbidity measurement in the 4150 is accomplished with a 90 degree light which reflects particles as they flow through the cuvette, providing continuous and accurate on-line measurement. The unit's replaceable desiccant pack assures a dry stable environment for accurate measurement and a built-in backpressure valve can be adjusted to eliminate bubbles that may cause erroneous reading. Available in two measurement ranges, the 0-100 NTU/FNU unit is intended for low range applications such as potable water. The 0-1000 NTU/FNU unit can be used for higher range applications such as raw water and wastewater reclamation.

Not requiring that the instrument be taken offline, calibration can be completed easily in less than five minutes. The premixed stable standards allow for multiple system calibrations without chemical mixing. After calibration, the 4150 can be back on-line once the measuring glass cuvette is placed back into the measuring chamber.

"What our Turbidimeter offers that others on the market do not is the capability for multiple instrumentation calibration with the same kit, making it more affordable," points out James Chandler, GF Piping Systems Product Manager.

"And, by not having to take the unit offline for calibration, there is no delay, improving additional time and cost-saving efficiencies."

Other features of the 4150 include sensing humidity levels and displaying a desiccant replacement warning and cleaning required indicator, a fully spannable 4-20 mA output signal, two user programmable alarm relays, and a bright backlit display for easy reading. The ultrasonic cleaning option provides for a more accurate and extended on-line measurement.

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