Dupont Environmental Treatment (DET) Uses Isco/Stip On-line BOD Analyzer for Monitoring and Control of WasteWater Treatment

Dupont Environmental Treatment (DET) operates one of the world's largest commercial industrial wastewater treatment facilities at its Chambers Works site in Deepwater, NJ, where a wide range of aqueous waste is accepted for treatment. DET also offers an array of pretreatment options for the removal or neutralization of targeted waste stream constituents as well as for the recycling of valuable organic components of process wastewater streams.

Treatment Capabilities

In order to better monitor and control the organic makeup of the wastewater influent to the treatment plant, Dupont made a decision to purchase an Isco/Stip BIOX 1000 continuous on-line BOD analyzer, which was put in service in January of 1989.

Dupont has since then purchased a second generation Model BIOX 1010 BOD analyzer from Isco Inc. in Lincoln Nebraska through the local Isco Sales Representative, Hartco Environmental, Kennet Square PA.

The second system was installed in April of 1999. Mr. Frank Distefano of Dupont commented "the BIOX 1010 is currently in use 24 hours a day, 7 days a week. In November 2000 it was switched from high ammonia blending to the primary clarifier."

{Caption} Mr. Bob Cousar (left) and Mr. Frank Distefano (right) with Isco / Stip BIOX 1010 continuous on-line BOD Analyzer

The treatment plant has BOD levels that range from 400 mg/L to 550 mg/L of BOD while the average in the fiscal year 2000 was approximately 489 mg/L. The average daily load for the fiscal year 2000 was

seventy thousand (70,000) lbs. Although the plant was originally designed to handle forty-seven (47) MGD (million gallons/day) of wastewater, it currently handles approximately sixteen (16) MGD.

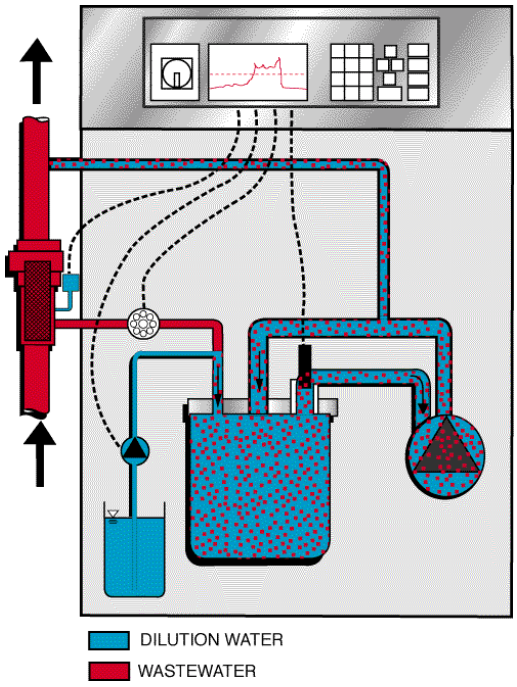
{Sidebar} Continuous BOD analysis with BIOX 1010 analyzer

Wastewater is continuously pumped through a sample bypass PA2. The peristaltic pump built into the BIOX 1010 continuously feeds a small stream of wastewater from the bypass into a reactor. Before it reaches the reactor, this wastewater stream is diluted with oxygen saturated dilution water supplied by a built in gear pump.

Inside the bioreactor, microorganisms naturally adapt and grown inside small plastic cylinders where they are protected against mechanical abrasion caused by turbulent mixing. The respiration rate of the microbial population is automatically maintained at a constant level by the on board computing system that varies the dilution ratio. The mixing ratio of wastewater and dilution water is used to calculate the BOD parameter using the Michaelis Menten Kinetics model.

The analyzer is supplied as a complete package. Basic tap water and power are generally the only requirements for installation. The unique coarse filtration system built into the cabinet eliminates the need for costly external ultrafiltration devices. The sample bypass system with a self-cleaning screen and programmable automatic backwash requires minimal maintenance even in wastewater with solids up to two- (2) cm in diameter.

In addition to controlling the chemical analysis and parameter measurement, the onboard computer with its graphical user interface handles the operational control of all maintenance and test routines. Multitasking capability allows simultaneous handling of special and routine operations. For example, the operator can recall and view or print the stored parameter charts and maintenance data of the last fourteen- (14) days without interrupting the ongoing analysis and data acquisition. The built- in floppy disc drive allows storage of ninety- (90) days of data on a single diskette. Data can be easily imported into popular spreadsheet programs like Excel. A 4-20 ma output is also provided for interfacing to in house SCADA (supervisory control and data acquisition) system.



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Mr. Bob Cousar further commented, " the 4-20 ma output from the Isco/Stip BOD analyzer is currently being monitored by a Dupont data historian system known as Vantage. The system tracks and archives data from the process every 1-2 minutes. “

"We use the Isco/Stip BIOX 1010 BOD analyzer to monitor the influent to our plant. This load may vary daily depending upon the types and volumes of wastewater received from our customers. In addition we treat the normal wastewater discharge from the manufacturing areas located on site. If the BOD level remains high for long periods we will discontinue the unloading of tank trucks or railcars until the BOD levels return to normal operating range."

"The BOD analyzer has allowed us to maximize throughput of the wastewater being treated in our plant while also allowing us to optimize handling of railcar and tank truck business from outside customers. "

When asked about the maintenance requirements Bob said "Maintenance consists of a simple weekly cleaning of the coarse filter screen, DO (dissolved oxygen) probe and pump calibration. Although the manufacturer recommends that the pump tube be replaced once every eight weeks, we also replace this weekly. On a quarterly basis we clean all the pipework, filter and circulation pump. We have found that when routine maintenance is carried out on a regular basis, the analyzer functions extremely reliably with very little down time. "

When asked how DuPont would compare the Isco/Stip BIOX 1010 BOD analyzer to other on line analyzer they had experience with Mr. Frank Distefano replied. " Our experience with other instruments such as TOC analyzers, DO probes, pH probes, etc. has indicated that these devices require a very high level of maintenance, typically daily. Although we monitor the BOD analyzer via our process data tracking system daily, we have found a simple weekly maintenance routine coupled with quarterly maintenance is generally all that in required to ensure reliable operation."

"We also review the analyzer data on a monthly basis and compare the results with routine laboratory BOD5 data for the same time period. We have found there to be an excellent correlation between the lab and the analyzer results."

"We also like the design of the coarse filtration (PA2) bypass system. The piping system is large enough to pass particulate without plugging and provides us with rapid response to changes in our process with very little lag time. The filter screen is also very easy to clean.

Summary

In conclusion, treatment plant performance will improve and costs will decrease when on line instruments such as the Isco/Stip Model BIOX 1010, continuous, on line BOD analyzer are used to both minimize short term load variability and adjust the plant to actual conditions.

The rate of learning and depth of understanding of the treatment plant processes by all involved in waste water treatment will rapidly increase when on line data is made available. This will directly result in improved management and lower discharge levels from WasteWater Treatment Plants.

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