TOTAL KJELDAHL NITROGEN: *SIMPLIFIED* WITH s-TKN™

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A Valuable Process Control Test that is Quick, Easy, and Accurate

The Dallas County Water and Sewer Authority (DCWSA) in Selma, Alabama recently found itself in a tough spot: under the scrutiny of the Alabama Department of Environmental Management (ADEM). The wastewater treatment system needed better means for control. Ammonia, TSS, cBOD, and TKN readings were out of compliance. Then they discovered a new testing method known as *simplified-TKN* (s-TKN)*,* and with it, better process control to achieve regulatory compliance.

Dallas County meets *simplified*-TKN

In 2011 things weren't running according to plan at DCWSA. The facility, a 6MGD, grade three conventional wastewater treatment plant serving a population of approx. 43,000, was under an order of consent from the ADEM for continually exceeding a number of NPDES permit limits. The operators needed a better way to monitor and control their system to maintain compliance. After learning about and adopting Hach's s-TKN method, they found that they could use up-to-date information to make adjustments to their processes that significantly reduced effluent ammonia and TKN levels while saving their facility nearly $25 per TKN test.

The Importance of TKN

Total Kjeldahl Nitrogen (TKN) is the total concentration of organic nitrogen and ammonia in a sample. It's used an indicator for wastewater treatment performance and can be found on certain NPDES permits. The traditional TKN method requires more than three hours of digestion and distillation at high temperatures using hazardous acid and catalysts, expensive equipment, and a large lab space—none of which DCWSA had or could readily afford.

Challenges from the State

In 2011, DCWSA was under strict scrutiny from the ADEM for exceeding a number of regulatory reporting limits; primarily Ammonia and Nitrogen. DCWSA couldn't access real-time information describing plant performance, leading to non-compliance.

For years, DCWSA outsourced its tests to a centralized lab. According to one operator, "we were out of compliance because it would take over a month to get results back from the lab. You can't make adjustments to your system based on month-old results." Faced with fines and regulatory oversight, DCWSA needed an in-house test that would yield valuable information for process control.

One of the best known process control parameters in the industry is TKN. A DCWSA operator, Robert Newton, was no stranger to the traditional TKN testing method and knew how difficult it would be to bring TKN in house.

"With the old method, between distilling, digesting, and testing, it took multiple people about four to six hours to run the entire test." Not to mention, the traditional test is very expensive and dangerous to run. For Robert and the DCWSA, bringing the old TKN testing method in house wasn't an option, but now TKN was on the facility's most recent NPDES permit as a "report-only" parameter.

s-TKN: TKN, *Simplified*
Luckily for DCWSA, Julie Dawson, a Hach Sales Manager in Alabama, was holding a regional training class in Robert's area. He attended and learned about one of Hach's innovative new products; Simplified TKN (s-TKN).

Hach's *simplified*-TKN transforms the complex, traditional method of testing TKN into a quick, accurate, and inexpensive test that minimizes training and equipment requirements. The method takes approximately one hour from start to finish (as compared to a four- to six-hour procedure with the traditional method).

The Hach method removes hazardous mercury and large volumes of acid, offering users peace of mind and improving safety. It produces the results of three tests (TKN, Total Nitrogen, and NO_3^- + NO_2^-) in one method, providing valuable, timely data for process control at a price of less than $5/test (as compared to an average price of $40/test for outsourcing).

The New and Improved DCWSA
The Dallas County Water and Sewer Authority improved operations dramatically. By running s-TKN in house, the operators at DCWSA can now gather important data on TKN, Total Nitrogen, and NO_3^- + NO_2^-. The staff uses these results to adjust activated sludge and solids wasting rates—giving them an opportunity to make knowledgeable weekly or seasonal adjustments to their system, and when necessary, to react quickly to major fluctuations in the external environment in order to remain compliant.

Before DCWSA used s-TKN, the TKN results it received from the centralized lab were around 10 mg/L. After switching to s-TKN and making informed process adjustments, DCWSA's TKN level dropped to a steady state level of ~0.4 mg/L. According to one operator, "due to these process control tests, we've been able to modify those adjustments to get the results we want." DCWSA now keeps historical records on TKN levels so it can proactively anticipate and adjust for seasonal factors, a big improvement for the facility in just a few years.

The operators at DCWSA drastically improved their system and saved their township plenty of money in the process. The s-TKN instrument bundle they purchased "paid for itself in just a couple of months." They also hope to use the new method for reporting results on the monthly Discharge Monitoring Report.

Opportunity for Optimization
According to DCWSA operators, performing a low-cost, safer TKN method provides operators an improved tool for process control. Timely results also eliminate the delay created by outsourcing, creating a more effective tool for making process adjustments.

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