

# Scientists and Alternative *in situ* Technology

## Working to Protect Seminole County Water Quality



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YSI Continuous Monitoring System  
Application Note A519-02

Seminole County, Florida, dotted with hundreds of lakes and traversed by numerous streams, is rich in native landscape and wildlife. Situated between the cities of Orlando and Daytona, the county is experiencing the pressure of a burgeoning population on its valuable resources. To protect and restore its resources, Seminole County Storm Water and Water Quality Section employs water resource engineers and limnologists. Among them are Kim Ornberg, an environmental engineer, and limnologists and benthic ecologists. Together they comprise a team that operates the county's lake and stream monitoring and studies programs. Their responsibilities include monitoring 53 lake and stream sites, maintaining NPDES and TMDL programs, illicit discharge investigation, biological reconnoitering, lake condition index development, lake (bathymetry) and lake vegetation mapping, and evaluation of water quality improvement projects.

The Seminole County team is a state leader in water quality monitoring and studies. The most efficient and accurate technology and tools has enabled Seminole County to address its ever-increasing water quality and water resource issues, plus the demand for larger volumes of accurate data, while working within budget constraints facing most natural resources agencies at this time.

Seminole County, a participant in the US EPA EMPACT program, added several YSI Data Acquisition Systems (DAS) remote water quality data acquisition stations to its monitoring program. Seminole County installed its first YSI station in 2002 (Figure 1).

Sandi Hanlon-Breuer (limnologist) reports that **"the YSI station is great. We can collect accurate water quality data continuously, in the amounts that we need to support our various programs, and do so with minimal maintenance."**

For routine manual monitoring, as well as periodic unattended deployments, Seminole County uses YSI multiparameter sondes. The YSI sondes were chosen for deployment on the DAS stations



**Figure 1**  
YSI Data Acquisition System  
deployed on Bear Lake near Semi-  
nole County, Florida

due to their unprecedented stability and calibration longevity even in high-fouling environments. All sondes are equipped with sensors for measuring dissolved oxygen, pH, temperature, conductivity and turbidity.

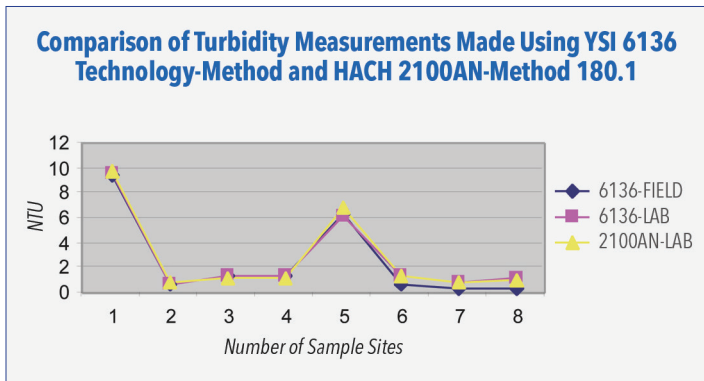
### Establishing YSI Equivalency to Accepted EPA Method

The YSI 6136 turbidity sensor technology and methodology has been empirically proven to be an accurate alternative to US EPA Method 180.1, the accepted method for turbidity measurement in litigable waters. For this reason, Seminole County requested to use the turbidity data collected with YSI 6136 sensors for all of its monitoring programs and studies, rather than continuing the labor intensive and expensive process of collecting volumes of water samples for laboratory analysis. In response, the Florida Department of Environmental Protection (FL

DEP) instructed the county to demonstrate the equivalency of the YSI technology and methodology to that of the approved US EPA method. (Newer sondes like the EXO1 and EXO 2 utilize a different turbidity sensor than the 6136 which are used on all 6-series sondes from YSI).

Kim Ornberg contacted YSI Integrated Systems & Services for assistance. The US EPA has specific protocol with which to determine if a proposed method can be approved as an alternate to a currently accepted EPA method. These protocol are set forth in the US EPA document, Protocol for EPA Approval of Alternate Test Procedures for Organic and Inorganic Analytes in Wastewater and Drinking Water (Publication EPA-821-B-98-002, 1999). Applied Environmental Science (AES) of Gainesville, FL was contracted on behalf of Seminole County to perform Alternate Test Procedure (ATP) studies. AES and Seminole County performed two ATP studies involving seven lakes in the county's jurisdiction. US EPA ATP protocol were strictly adhered to and even more stringent statistical analyses than those required by the EPA were employed.

The YSI 6136 technology and methodology were compared to the Hach 2100AN for turbidity measurements. The study *continued*



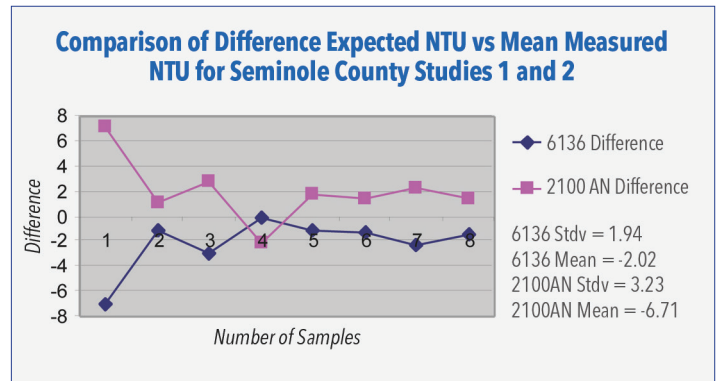
**Figure 2** Turbidity measurements made in the field and lab using the YSI 6136 compared with measurements made in the lab using the Hach 2100AN, which employs US EPA Method 180.1.

was designed to satisfy Tier 1 analyses of the 6136 method/technology, which requires that equivalency must be first demonstrated in the matrix and within the environmental context (i.e., natural range of turbidities for that matrix). Ambient, or natural, turbidities range from less than 1 to near 10 NTU. The ATP also requires that samples and sample duplicates be spiked with a known standard and analyzed with the accepted method as well as with the proposed alternate method (YSI 6136).

Spiked sample analysis is a critical component of the ATP because it allows for the evaluation of performance of the proposed method at wider ranges, and provides part of the quality control for the method of the study and analyses. Spiked sample turbidities ranged from 82 to near 100 NTU.

As expected, the Hach technology performed according to specification. Researchers also found that the YSI 6136 performed equally as well (Figure 2), and, at times, more closely measured turbidity in spiked dilution water, spiked lake samples, and spiked duplicate samples (Figure 3).

To date, four studies conducted at Miami River, OH, Seminole County lakes, and Cypress Creek, FL have revealed strong (>98% confidence) evidence that the YSI 6136 is equivalent to the currently accepted methodology for the measurement of turbidity in ambient water: lakes, streams, groundwater, and near-coastal water.



**Figure 3** Comparison of the differences between expected and measured turbidities by the YSI 6136 and the Hach 2100AN.

Hanlon-Breuer comments, “The [YSI] method is clearly equivalent to the [US EPA 180.1] lab method...[It] will be a real cost-saver and means that we can acquire the data we need to meet our program goals.”

The US EPA sets forth criteria designed to “...expedite the approval of ATPs, encourage the development of innovative technologies, and enhance the overall utility of the EPA-approved methods...” The YSI 6136 technology and methodology have been demonstrated, through EPA ATP protocol, to be equivalent to the currently accepted Method 180.1. Although this does not constitute formal EPA approval, it is the essential precursor to EPA acceptance as an alternate method.

**References**

U.S. Environmental Protection Agency. EPA-821-B-98-002 Protocol for EPA Approval of Alternate Test Procedures for Organic and Inorganic Analytes in Wastewater and Drinking Water . ONLINE. 1996. Office of Water. Available: <http://www.epa.gov/waterscience/methods/index.html> [1 Dec. 2005].

**For additional information regarding Seminole County Water:** [seminolecountyfl.gov](http://seminolecountyfl.gov)

**For additional information please contact:**  
 YSI, a Xylem brand  
 Tel: +1 937 767 7241 | US 800 897 415  
[info@ysi.com](mailto:info@ysi.com) | [ysi.com](http://ysi.com)