Remote Sampling Technology: Proactive Management of Surface Water and Development of Comprehensive Data Sets for "Early Warning" Applications

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Biographical Sketch of Author

Mr. Owen is Founder, President and Chief Operations/Technical Officer for Apprise Technologies Inc. Apprise produces opto-electroic sensors and data acquisition and telemetry systems. Prior to founding Apprise, Mr. Owen was with the University of Minnesota as a Research Associate, were he was issued 10 patents related to sensor development and environmental monitoring and published extensively in peer reviewed journals in the fields of optical physics, aquatic toxicology, limnology, fresh water chemistry and biology. Mr. Owen has recently presented to committee members of the US Congress and Senate on near-term solutions for early warning system to protect vulnerable surface water resources.

Abstract

New advances in technology for obtaining high-resolution vertical chemical and biological characterization of reservoir water quality parameters has demonstrated significant cost savings in the operation costs of drinking water treatment plant operations as well as obtaining time relevant date of in-reservoir dynamics. The Remote Underwater Sampling Station (RUSS) technology has been used successfully to monitor a number of critical parameters, important to managers and operators. At the core of this technology is the RUSS Dynamic Profiler. The Dynamic Profiler moves up and down the water column using variable buoyancy and carries a suite of sensors to measure the parameters of specific interest to the customer. Movement of the profiler, data acquisition and data retrieval are remotely controlled by the customer using the embedded CPU, which controls the Dynamic Profiler movement, data acquisition and telemetry functions on the buoy platform.

The system has been used for early identification of turbidity plumes and algal blooms that would have not been identified by the standard infrequent sampling programs. In addition, the effects of watershed events, such as rainfall events and watershed disturbances due to such activity as construction, may be monitored by operators and managers 24 hours a day, 7 days a week throughout the entire water column, remotely. The system has been used to monitor suites of chemical and biological parameters simultaneously, delivering a single sensor package to user programmed depths, including Dissolved Oxygen, pH, Conductivity, Temperature, ReDox, Turbidity, Chlorophyll, Cl-, Light Attenuation and Total Dissolved Gas. Surface sensors integrated into the system have included metrological stations measuring wind speed and direction, barometric pressure, air temperature, relative humidity and surface light and current profiler (ADCP) systems.

Operators are not only using this data as an early warning system, but also to validate and verify management models. Pilot studies on currently installed for use of this system as an Early Warning System for reservoir managers, examples of wish will be discussed. In addition, case studies of the application of RUSS technology will be presented.