

Advanced Septic System Nitrogen Sensor Challenge, Phase II: Prototype Testing



Background Information

Timeline for the Prototype Testing:

December 18, 2017

Webinar on the draft T/QAP, the testing and verification process and the application procedure

January 31, 2018

Deadline for submission of testing applications

March 26 -April 3, 2018

One week preliminary screening test at MASSTC

May 23 – November 26, 2018

Six month field performance testing at MASSTC for selected sensors

Mid-February, 2019

EPA prize: ISO 14034 ETV verification reports and statements

EPA selected Battelle Memorial Institute (Battelle) to support Phase II: Prototype Testing and the development of a Test/Quality Assurance Plan (T/QAP) and Verification Plan and oversee the testing of the sensors. The T/QAP will be based on the International Organization for Standardization Environmental Technology Verification (ETV) Standard - ISO 14034. Funding for the testing program is from the US EPA Office of Research and Development and the Office of Water/Wastewater Management.

Sensor testing will be completed at the Massachusetts Alternative Septic System Test Center (MASSTC), a National Sanitation Foundation (NSF) certified test facility in Barnstable, Massachusetts in 2018. Developers whose sensors are judged to be capable of meeting minimum performance goals during the one-week long preliminary screening will be invited to participate in an extensive 6-month field performance test.

Battelle will verify the results of the field performance tests based on the VerifiGlobal Performance Verification Protocol and the requirements of the ISO 14034 ETV standard. EPA will award up to 3 ISO ETV verification reports and statements for sensors that complete the six month field testing.

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Note: This project is being conducted by Battelle for the US EPA under contract #EP-C-16-014

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Advanced Septic System Nitrogen Sensor Performance Goals

Attribute	Attribute Description	Performance Goals		
		Minimum	Almost Ideal	Ideal
Parameter ¹	What is being measured	NO ₃ ⁻ , NH ₄ ⁺	NO ₃ ⁻ , NH ₄ ⁺ , TOC	Total nitrogen (TN) ²
Installation Price	Price to the homeowner to install	\$1,500	\$1,250	\$1,000
Data Management	Ability to record and transmit data (i.e., telemetry) for real-time access by practitioners, regulators, and interested stakeholders	Record and automatically transmit data to designated server or cloud	Record and automatically transmit data to designated server or cloud	Record and automatically transmit data to designated server or cloud
Applicability & Accessibility	Applicability of sensor(s) to various innovative/alternative system designs and ease of access to OWTS for installation and maintenance	Located in-situ to provide performance information on the OWTS; must be accessible for maintenance	Located in-situ to provide performance information on the OWTS; must be accessible for maintenance	Located in-situ to provide performance information on the OWTS; must be accessible for maintenance
Frequency of Sensor System Maintenance	How often the sensor(s) need to be maintained	No more than quarterly	No more than semi-annually	No more than annually
Accuracy	Accuracy of sensor measurements to the true measurement	Within 20% of true value ³	Within 20% of true value ³	Within 20% of true value ³
Precision	Repeatability of sensor measurements	≤30% RSD	≤20-30% RSD	≤20% RSD
Range ⁴	Range of the detection	2-60 mg N/L	2-60 mg N/L 2-60 mg/L TOC	2-60 mg N/L
Sensor Operating Temperature Range	Temperature range in which the sensor can operate	4° C to 35° C	4° C to 35° C	4° C to 35° C
Deployment	Period of deployment	Continuous	Continuous	Continuous
System Lifetime	Expected life of sensor	5 years	5 to 10 years	10 years

¹ Refer to Section B1.4 of the T/QAP for information on the sources of NO₃⁻, NH₄⁺, and TOC.

² Total Nitrogen (TN) is defined as the sum of total kjeldahl nitrogen (ammonia, organic and reduced nitrogen) and nitrate-nitrite.

³ True value is defined as the certified laboratory result for the parameter using approved test methods.

⁴ The sensors must be capable of alerting about or otherwise notifying of an over range value.

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2019 Market Stimulation Opportunity

Following the release of the verification reports and statements in early 2019, an external technical panel and The Nature Conservancy (TNC) will review the results. TNC and others are seeking funding for an order of 200 units, not to exceed a total cost of \$300,000. The order would be presented in the summer of 2019 to the best performing sensor/s that completes the 6-month field performance test and meets or exceeds the performance goals.

For more information, email Amy Dindal at: sensorchallenge@battelle.org

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