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

2018-19 Testing Schedule

Background Information

Timeline for the Prototype Testing:

July 16, 2018
Webinar on the T/QAP, the testing and verification process and the application procedure

August 31, 2018
Application deadline for the October test

October 1-November 2, 2018
One-month test at MASSTC

December 19, 2018
Application deadline for the February test

February 25 – March 28, 2019
One-month test at MASSTC

March 29, 2019
Notification of acceptance for the six-month test

May 13 – November 15, 2019
Six-month field performance testing at MASSTC for selected sensors

Mid-February 2020
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 to oversee the testing of the sensors. The T/QAP is 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 in 2018-19 at the Massachusetts Alternative Septic System Test Center (MASSTC), a National Sanitation Foundation (NSF) certified test facility in Barnstable, Massachusetts. Developers are invited to participate in the two one-month no-risk tests offered in October 2018 and February 2019. Each one-month test will include the one-week screening test during the first 7 days. Developers whose sensors meet basic performance goals during the first seven days will be invited to participate in the 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 ISO ETV verification reports and statements for sensors that complete the six-month field testing and meet the minimum performance goals.

For more information email Gail DeRuzzo at:
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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; include remote capability of programming variable sampling frequencies.
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
Frequency of Sensor Readings[5]	Capability of the sensor to provide parameter concentrations at time frequencies of:	Every hour	Every 15 minutes	Nearly continuous
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 for information on the sources of nitrate (NO_3^-), ammonia (NH_4^+), and total organic carbon (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.
[5] Frequency of sensor readings during the preliminary and 6-month testing are detailed in Section B1.2. For deployment in an actual application, sensor frequency readings will depend on end user needs and may vary.

2020 Market Stimulation Opportunity

Following the release of the verification reports and statements in early 2020, an external technical panel and The Nature Conservancy (TNC) will review the results. TNC and others are seeking funding for an order of 200 deployable septic sensor units, not to exceed a total cost of $300,000. The order would be presented in the summer of 2020 to the best performing sensor/s that completes the 6-month field performance test and meets or exceeds the performance goals.

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