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**U.S. EPA Environmental Technology Verification (ETV) Program**  
Advanced Monitoring Systems (AMS) Center  
Water Stakeholder Committee Teleconference  
Thursday, November 12, 2009

**Attendees**

**Stakeholder Committee Members:**

Joel Allen, EPA  
Tom Gargan, U.S. Army Center for Environmental Health Research  
Doug Grosse, EPA  
Max Lee, Dow Chemical  
Marty Link, Nebraska Department of Environmental Quality  
Alan Mearns, Hazardous Materials Response Division, National Oceanic and  
Atmospheric Administration (NOAA)  
Vito Minei, Suffolk County Department of Health Services  
Stuart Nagourney, New Jersey Department of Environmental Protection (NJ DEP)  
Glenn Sabadosa, Bayer Material Science  
Rick Sakaji, East Bay Municipal Utility District  
Geoff Scott, NOAA  
Peter Tennant, Ohio River Valley Sanitation Commission (ORSANCO)  
Ken Wood, DuPont Corporate Environmental Engineering Group

**ETV AMS Center Staff:**

Amy Dindal, Battelle  
Maria Gordon, Battelle  
Ryan James, Battelle  
Rachel Sell, Battelle  
John McKernan, EPA AMS Center Project Officer

**Welcome**

Rachel Sell, Battelle AMS Center Stakeholder Coordinator, welcomed committee stakeholders and AMS Center staff, took roll call of the participants in the teleconference, and provided an overview of the agenda.

**Future Directions for ETV**

Dr. John McKernan, AMS Center EPA Project Officer, presented an overview of future directions for ETV in place of Teresa Harten, ETV Program Director, who was overseas.

The ETV program lost base funding in FY2007 and since then has been relying on non-base funds from within the National Risk Management Research Laboratory (NRMRL) in the Office of Research and Development (ORD). Although there were 11 verifications for the ETV program in 2008, the number of verifications rose to 17 in 2009, and is projected to reach 30 in

fiscal year 2010. This upswing is largely due to collaborations bringing in 80-90% of funding over the last two years.

Notably for the AMS Center, the portfolio of active technology categories was expanded from 11 to 16 (FY2009) and is now up to 20+ (FY2010). During 2008 and 2009, EPA competed and put in place new cooperative agreements for four ETV centers, and recently added a fifth. EPA just issued a solicitation for competing the AMS Center for two more years. It will likely be established in mid-2010, and will end on September 30, 2012. The competition was notable in that EPA solicited the AMS Center with a range of potential funding from \$0 - 1 M/yr for two years. While EPA overall has seen budget increases, ETV has not had a change in the budget under the new administration. There is concern that without base funding for the Program, the values that ETV holds of fairness, transparency, QA, and the stakeholder process cannot be upheld.

As a result, EPA NRMRL Laboratory Director Sally Gutierrez informed the ETV cooperative agreement partners (by letter) that if ETV does not receive base funding by the FY 2011 budget, EPA does not plan to re-compete the agreements. In other words, the cooperative agreement part of ETV, all five of the Centers, would sunset within three years (ranging from 2011 to 2012). Director Gutierrez committed to provide all of the EPA support currently provided in finishing out the terms of the current agreements.

Director Gutierrez plans to continue part of the ETV program to serve the verifications needs of the EPA program offices and regions where they have funding to support them. It will be an in-house program run directly by the Laboratory to do verifications as needed for the EPA program offices and regions. She also committed to maintain the ETV web site and other outreach for the program. And there would still be a stakeholder process, which is one of the hallmarks of ETV and what has made it relevant and technically sound.

EPA believes the stakeholders for the centers have been essential in producing the many impacts to public health and the environment that we cite in our outcomes reports. EPA also cites significant financial gain to vendors and cost savings to purchasers and permittees of environmental technology. The center stakeholders have been key to all of this. The efforts of the stakeholders are appreciated, including the work done in recent years to find collaborative funding for verifications. It is the hope of the EPA ETV staff that stakeholders stay involved. The EPA ETV staff has worked very hard with the centers to make ETV a success, and would regret very much if the Centers do not continue on.

**Discussion:** Joel Allen asked whether there are stimulus funds available to small business for them for testing. Amy Dindal replied that there are SBIRs available to them through the EPA, and we have encouraged small vendors to apply. Over the years, ETV has gone from 65-70% small business participation to just 35% last year. Our aim is to stimulate new technology and to provide results that are as comprehensive as possible for how technology performs in the categories we verify, regardless of the size of the business. Phase I funds the development of the technology, and Phase II funds testing, including ETV verification. Amy also mentioned that one approach is to look for co-funding right away, which increases the likelihood that a small business can participate in the ETV program. John McKernan added that, when ETV gets internal funding, all vendors applying for verification testing get equal funding, which helps smaller companies.

## AMS Center Updates

Amy Dindal, Battelle, pointed out that we have as much going on in the AMS Center as we ever have, despite not having core funding support. More than 19 verifications are currently in process, and 135 verifications and 33 test/QA plans have been completed to date. The two stakeholder committees, in air and in water, are very active, and additional ad hoc technical panels are convened as necessary for special technologies. The AMS Center is also engaged in international verification testing with groups in Canada and Europe.

On the air monitoring side of the house, the AMS Center is currently pursuing testing of the following technologies:

- Leak detection and repair (preparing two verification reports)
- Cavity ringdown spectroscopy for coal-fired power plant emissions (with funding from EPRI at a Tennessee plant)
- Ozone indicator cards (with funding support from Breathe California of Los Angeles, and in-kind support from the South Coast Air Quality Management District)
- Airborne leak detection for pipelines (working with ETV Canada; currently firming up collaboration with pipelines for testing in the spring of 2010)
- Carbon sequestration monitoring (funding from EPA Advanced Monitoring Initiative; currently trying to get a site secured where active sequestration is ongoing).

In land/waste technology areas, the AMS Center is currently pursuing testing in five technology categories:

- Alternatives to radiography cameras and to nuclear gauges. The EPA Office of Air and Radiation has interest in verified technologies that can provide better protection of the environment by removing radiological sources.
- Leak detection for underground storage tanks. The National Working Group for Leak Detection Evaluations, EPA Office of Underground Storage Tanks, American Petroleum Institute, and others is looking to reexamine current testing methods for underground storage tank leak detectors; the current methods were written for traditional fuels, not bio-based fuels. Emphasis is currently on automated tank gauging systems.
- Vapor intrusion. We are working on getting support from the Navy, which is interested in testing characterization technologies for discerning vapor intrusion from contaminant sources in indoor air.
- Asbestos soil samplers. We are in the process of getting under way with the EPA Office of Solid Waste and Emergency Response to test alternatives to soil samplers for asbestos.

## Update on Current Verification Tests

Dr. Ryan James, Battelle, provided an update on the technology categories of microcystin test kits and coliforms in drinking water. The stakeholders followed along with the presentation on slides received before the teleconference. Dr. James covered:

- **Microcystin Test Kits**  
Microcystins are algal toxins produced by cyanobacteria; there are 80 different structural variants with differing abundance and toxicity in nature. Exposure may produce skin rashes, eye irritation, respiratory symptoms, and liver damage in humans, livestock, and pets. AMS Center stakeholders provided concurrence that microcystins was a priority area in 2005,

emerging from recreational water concerns in Nebraska and Klamath River blooms. It is an issue in recreational water in many parts of the country. Beacon Analytical Systems, Inc. and Abraxis are participating vendors with five kits (three ELISA and two single sample analysis kits) undergoing verification. EPA's Advanced Monitoring Initiative is providing funding for the verification.

**Current Status and Test Design.** The test/QA plan is being finalized. The plan is to collect spiked deionized water samples with three microcystin variants (LR, LA, RR) individually in deionized water. Nine recreational water samples will be provided by the Nebraska Department of Environmental Quality and the Suffolk County (NY) Department of Health Services. Both the deionized water and recreational water samples will be analyzed by test kits and LC-MS-MS reference analysis (Loftin-USGS).

**Tentative Schedule:**

The test/QA plan will go out for a second round of peer review in November/December 2009. Testing will potentially start in January/February 2010. Verification reports should be available by Summer 2010. Peer reviewers: Keith Loftin-USGS, Andy Lincoff-EPA Region 9, Robert Waters-Suffolk County (NY) Dept of Health Services, Jim Sinclair-EPA.

**Discussion:** Geoff Scott stated that if additional analytical assistance was needed, his group can help.

### **Coliforms in Drinking Water**

Funding was provided by EPA's Advanced Monitoring Initiative to evaluate *E. coli* and total coliforms detection methods in a variety of water matrices. In the May teleconference, ETV AMS Center stakeholders encouraged focusing the verification test on drinking water rather than recreational water, so we have had discussions with the EPA Office of Water (OGWDW) to engage in planning for verification testing. Ryan will attend a workshop in Seattle at the Water Quality Technology Conference on coliform detection.

**Current Status and Next Steps:** A vendor solicitation has been posted and three vendors are interested. A draft test/QA plan will be developed, with testing slated for Spring 2010.

**Discussion:** A stakeholder asked whether there will be evaluation of alternative test procedures for microbiological methods and added that the EPA has a protocol for evaluating alternative test procedures titled:

- EPA Microbiological Alternate Test Procedure (ATP) Protocol for Drinking Water, Ambient Water, and Wastewater Monitoring Methods. This protocol was published in April 2004 and is used to validate microbiological test methods in order to ascertain their equivalency to accepted test methods or a "gold" standard. The protocol for testing the *E. coli* and total coliform should be at least as rigorous as the EPA protocol, if the manufacturers are planning to have their products be used for regulatory compliance in the drinking water arena. Ryan replied that the EPA Office of Water is looking at how ETV works. They are serving as peer reviewers for this test. Rick Sakaji suggested using committee members working on the revisions to the Total Coliform Rule. Geoff Scott said there are other areas to explore where these technologies could be helpful including shellfish harvest areas and where there is fecal matter in the water. This is a good time to engage the shellfish community. Geoff offered to send contact information.

Amy Dindal continued the presentation on current verification tests and addressed:

▪ **Nitrate Sensors for In-Situ Groundwater Monitoring**

We are collaborating with the Sensors Pilot Study (SPS) to demonstrate the utility of real-time sensors as an alternative to conventional sampling/lab analysis techniques for long-term monitoring. The SPS Project Team consists of EPA/Office of Chief Financial Officer, NJ DEP and, Oklahoma Department of Agriculture. EPA's Advanced Monitoring Initiative is providing funding. Multi-sensor arrays will be deployed, with nitrate being of primary interest. Also under consideration for verification testing are such parameters as conductivity, temperature, and pH.

**Current Status:** Site selection is under way. We were originally looking at confined animal feeding operation (CAFO) in Oklahoma, but this fell through. About 4-6 weeks ago, Battelle contacted USDA, who expressed an interest in supporting the verification test. A vendor agreement was signed by Instrumentation Northwest.

**Proposed Lab Testing:**

- Simulated wells: 2-in. diameter, 4-ft long PVC pipe.
- Bottom of simulated wells is capped, with top open to atmosphere.
- Two sensor arrays are deployed in simulated wells.
- Identical testing allows for evaluation of inter-unit reproducibility, as well as accuracy, precision, range, etc.
- Stock solutions of concentrations over the full dynamic (observed) range will be used for verification testing of nitrate and other parameters.
- Concentration range will be determined based on an evaluation of field analytical data.
- Known sensor interferences such as chloride (above, at, and below 1,000 mg/L) and temperature will be evaluated.

**Proposed Field Testing:**

- Perform concurrent field testing using conventional sampling methods and nitrate sensors.
- Collect samples from multiple monitoring wells over 1 month or more of continuous sampling.
- Collect monitoring data every 15 minutes using sensors.
- Collect hourly reference samples using conventional sampling techniques (8 samples per day) for one week for each of well.
- Collect conventional samples with a peristaltic pump with dedicated tubing in each well.
- Make inlet depth of dedicated tubing correspond to sensor depth –midpoint of screened interval.
- Set pumping rate at lowest operable setting to minimize agitation in well.

**Tentative Schedule:**

- November-December: Site selection and test/QA plan development.
- January-June: Field and laboratory testing.
- Late FY2010: Reports.
- Late CY2010: Conference presentations.

**Discussion:** Stu Nagourney said we should look at sensor technology as an alternative to periodic monitoring. Are there diurnal, seasonal patterns? Are there spikes due to natural or other conditions? Could we catch the episodes if we monitored more frequently? Stu stated it was great to know we'll be partnering with USDA. We can demonstrate the efficacy of the technology and, more generally, sensors to monitor the environment. Vito Minei and Ken Wood agreed to serve as peer reviewers.

- **ELISA Test Kits for Endocrine Disrupting Compounds (EDCs)**

One vendor, Abraxis, provided four kits. Testing was performed with EPA and USGS laboratory support and Battelle technical/QA oversight. Testing proceeded in four phases:

--Phase I: DI water

--Phase II: Surface water (South Hasha Tributary to Eastfork Lake in Clermont County, OH)

--Phase III: Wastewater treatment plant (WWTP) effluent

--Phase IV: WWTP influent.

Verifications for three of the four kits were completed at the end of September and are posted on the ETV web site. The fourth report is being drafted and will be sent for peer review soon. Lisa Olsen and Paul Pennington will serve as reviewers.

***Summary of Verification Results:***

--Test kit results were evaluated against the expected spike concentrations and the reference measurements of the same samples made using GC-MS.

--Percent bias was calculated relative to the GC-MS reference method results. WWTP phases generally had the highest bias of all of the phases.

--Average percent recoveries (compared to spike values) were generally 100 - 200%.

Most were within the range of acceptable recoveries for the GC-MS reference method (60 - 130%).

--No false negatives were observed for any of the kits.

--Operational concerns or issues were not reported from any of the participating laboratories.

--Sample throughput was 2 to 4 hours per sample batch.

--Cost comparison to traditional laboratory methods: Test kits: \$350-\$700 for ~100 tests.

GC-MS: \$500-\$900 per sample.

- **International ETV: Passive Groundwater Samplers**

Joint verification with the Nordic Water Technology Center (NOWATECH) for the Sorbisense GWS40. The technology combines the principles of passive sampling with a patented tracer-based calculation of the amount of water that the sampler has been exposed to.

***Verification Test:***

--Testing completed January–April

--AMS Center Technical Systems Audit—February

--Lab tests: Direct application of target chemicals; dispenser testing; standpipe test (controlled well simulation).

--Field tests: Deployments in five groundwater wells.

--Target compounds: Chloroethene, 1,1-dichloroethene, 1,2-dichloroethenes, trichloroethene, tetrachloroethene, benzene, toluene, ethylbenzene, xylenes, MTBE.

***Current Status:*** A joint verification report and statement have been drafted. Verification parameters include limit of detection, precision, trueness, robustness, and false positives/negatives. U.S. peer reviewers are Mike Sherrier (DuPont) and Cindy Paul (EPA). We expect the report to be published in early 2010. This will be the first ETV international joint verification.

***Discussion:*** Amy Dindal remarked that NOWATECH has a different approach: testing is separate from verification. Often separate groups do the testing and verification in order to avoid conflict of interest.

- International ETV: Wastewater Rapid Toxicity Testing**  
 Current methods are time consuming, costly, and subject to variability. Shorter duration assays will provide wastewater managers with early warning compared to conventional tests. We are currently pursuing this technology category as joint international verification tests with:
  - DHI DANETV Water Test Centre, which operates a Danish verification scheme, DANETV, supported by the Danish Ministry for Science, Technology and Innovation
  - Ontario Centre for Environmental Technology Advancement (OCETA) through ETV Canada, which operates the Canadian ETV Program on behalf of Environment Canada.

***Two Parallel Verification Tests:***

- Test #1:** Modified test design of AMS Center drinking water rapid toxicity testing (e.g., focus on performance related to wastewater analytes of interest; includes comparison to toxicity methods such as Microtox). Testing will be performed in Denmark using the Hach-Lange LUMISTox300 bench top luminometer and ECLOX Bio handheld luminometer. A test/QA plan is in development, and testing is expected to begin in January 2010.
- Test #2:** Rapid water quality determination resulting in earlier warning for water treatment processing (e.g., comparison of results to traditional water quality parameters such as BOD, COD, TOC, pH, etc.). There are at least three prospective vendors. Testing would be performed in the U.S. (possibly in collaboration with the Massachusetts Water Resources Authority). Vendor and collaborator commitments are being secured. Peer reviewers will be an “expert panel” composed of representatives from each participating country. The U.S. representative is Joel Allen, EPA/ORD/NRMRL.

**Discussion:** Joel Allen referred to aquatic toxicology (academic interest) and on-line toxicology monitors (on the job), now used in Upper Mississippi and EPA Regions 5 and 7.

- EPA SBIR Phase II Projects: *Cryptosporidium* Monitor**  
 Rheonix (formally SBIR Phase II vendor Innovative Biotechnologies International) has developed *CryptoDetect*<sup>TM</sup>, which is based on molecular methods and signal amplification. With less than \$1,000 in capital investment, *CryptoDetect*<sup>TM</sup> allows for \$25/test and 4-6 hr per test vs. EPA Method 1622, which requires 7-10 days, \$350-650 per sample. The company merger will allow “Sample in-Results out” capabilities with no “hands-on” efforts required.
 

**Current Status:** With stakeholder concurrence and a signed Vendor Agreement, the vendor applied for SBIR Verification Funds in January 2009. The vendor is now proceeding with commercialization, and anticipates being ready for verification testing in early 2010. We expect a technical panel discussion will occur in the next 2-3 months. Rick Sakaji, Lisa Olsen, Peter Tennant, and Geoff Scott expressed interest in participating.
- EPA SBIR Phase II Projects: Remote Sensing of Mixing Zones**  
 MixZon has designed a light-weight sensor technology that attaches to a tethered helium balloon to create a remote sensing platform for aquatic thermal mixing zones.
 

**Current Status:** With stakeholder concurrence and a signed Vendor Agreement, the vendor applied for SBIR Verification Funds in February 2009. The vendor is now proceeding with commercialization, and anticipates being ready for verification testing in the summer of

2010. We expect a technical panel discussion will occur in the next 4-6 months. Lisa Olsen and Peter Tennant expressed interest in participating.

### **Stakeholders: What's on Your Radar Screen?**

Max Lee said that Dow will be testing a chemical oxygen demand instrument from Aqua Diagnostics. Testing will be done in Germany in the 1<sup>st</sup> quarter of 2010.

Geoff Scott said there is a need to explore rapid diagnostics for antibody resistance.

Rachel Sell asked whether the stimulus money has trickled down to stakeholder organizations. Stu Nagourney responded that it is top-down decision process.

Vito Minei asked whether there is a strategy to interest the EPA in maintaining the ETV program. Vito commented that this is a unique program in this economic climate, a good stimulus to small companies.

Geoff Scott asked whether there was any way that the program could be recast, becoming a composite of technology programs across agencies, rather than just one agency. In the areas of energy and climate change, innovation will be critical and technology testing will be critical. John McKernan replied that the EPA has been working with the Department of Commerce, and maybe can partner with them. Geoff Scott said since NIST develops standards, there might be synergy with NIST.

Stu Nagourney explored the possibility of interesting the Interstate Technology and Regulatory Council (ITRC), which produces documents on innovative technologies, site cleanup, etc. Theoretically it is a state-driven organization, about 10 years old. It could perhaps serve as a model.

### **Recap of Priorities, Action Items, and Next Meeting**

- Geoff Scott—provide contact information regarding shellfish community and polluted waters
  - Rick Sakaji—provide names of prospective peer reviewers for coliforms test
  - Vito Minei and Ken Wood—serve as peer reviewers for nitrate sensor test
  - Next meeting—Spring 2010.
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- Immediately following the meeting, the AMS Center received an inquiry from Inficon about a new technology they are interested in having tested. The technology is a water sampling and analysis instrument for VOCs.

### **Adjourn**