



U.S. EPA Environmental Technology Verification (ETV) Program
Advanced Monitoring Systems (AMS) Center
Air Stakeholder Committee Teleconference
Thursday, November 5, 2009

Attendees

Sean Avery, Ontario Ministry of the Environment
John Bosch, Environmental Consultant
Todd DeLelle, U.S. Department of Commerce
Chuck Dene, EPRI
Rudy Eden, South Coast Air Quality Management District (SCAQMD)
Philip Galvin, New York State Department of Environmental Conservation
Doug Grosse, EPA
Will Ollison, American Petroleum Institute (API)
Roy Owens, Owens Corning
Lindene Patton, Zurich North America
John Powell, Ontario Ministry of the Environment
Larry Smet, Ontario Ministry of the Environment

ETV AMS Center Staff:

Amy Dindal, Battelle
Maria Gordon, Battelle
Tom Kelly, Battelle
Rachel Sell, Battelle
Teresa Harten, EPA ETV Program Director
Michelle Henderson, EPA AMS Center Quality Manager
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

Teresa Harten, ETV Program Director, presented an update on the ETV program and future plans for ETV.

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: Lindene Patton serves on a technical advisory panel to the EPA (Environmental Financial Advisory Board – EFAB) and recently challenged the Agency during a meeting when the Agency proposed doing work that Lindene knew was being done by the ETV program. She asked them why they were prepared to spend the money to develop a new program when they already had a program in place. Lindene suggested making a more formal statement to the EFAB. Teresa Harten will link Lindene with Sally Gutierrez.

John Bosch commented that there was not enough connection with the demand side externally. ETV reports need to be better tied to specific legislative areas and program offices.

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 water monitoring side of the house, the AMS Center is currently pursuing testing in six technology categories:

- Test Kits for Endocrine Disrupting Compounds
- Microcystins Test Kits
- Nitrate In-Situ Groundwater Sensors
- Coliforms in Drinking Water
- Passive Groundwater Samplers (international, with Denmark)
- Wastewater Toxicity Testing (international, with Denmark and Canada).

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 are 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. Tom Kelly, Battelle, presented a comprehensive review of the current verification tests. The stakeholders were able to follow the presentation on slides received before the teleconference. More detailed information is available by contacting the Verification Test Coordinators listed below directly:

- LDAR Devices at Petroleum Refineries and Chemical Plants
Brian Boczek, 614-424-7946, boczekb@battelle.org
- Cavity Ringdown Spectroscopy for Ammonia Emissions from Coal-Fired Power Plants
Ken Cowen, 614-424-5547, cowenk@battelle.org
- Ozone Indicator Cards
Tom Kelly, 614-424-3495, kellyt@battelle.org

- Airborne Leak Detection for Pipelines
Ken Cowen, 614-424-5547, cowenk@battelle.org
- Carbon Sequestration Monitoring
Ann Louise Sumner, 614-424-3793, sumnera@battelle.org.

- **Leak Detection and Repair (LDAR) Devices at Petroleum Refineries and Chemical Plants**
 These passive infrared cameras allow visualization of leaks from valves, flanges, seals, etc. in industrial facilities. They are an alternative to current U.S. monitoring programs, based on U.S. EPA Method 21, which requires individual testing of thousands of such components in a facility with a handheld organic vapor analyzer. With the infrared cameras, operators can monitor components from a distance and instantaneously identify leaking components within the line of sight of the optical imager. Funding for the verification test of the LDAR cameras was provided by the Texas Chemical Council (TCC) and the American Chemistry Council (ACC), with in-kind support from Dow and BP. Two vendors are participating in the verification: GasFindIR (both MidWave and LongWave versions) by FLIR and Sherlock VOC by Pacific Advanced Technology (marketed by Industrial Scientific Corporation).
Laboratory Testing. In October 2008, laboratory testing was completed to determine the minimum leak rate observable by users of the cameras under different simulated environmental conditions and for various chemicals. Varying controlled confounding factors were used (e.g., standoff distance, wind speed, and background) during testing.
Field Testing. Chemical plant testing was completed in December 2008. Cameras were field tested in order to evaluate leak detection under “real world” conditions. Leak rates were quantified by bagging per “Protocol for Equipment Leak Emission Estimates (EPA-453/R-95-017) coupled with U.S. EPA Method 18 analyses. The petrochemical plant test was originally scheduled for April 2009, but repeated requests to the plant by Battelle and TCC failed to establish a schedule and the petrochemical field test was cancelled.
Reporting. Verification reports are currently being prepared, and will cover the laboratory testing and one field test. The verification reports/statements are expected by early 2010. Peer reviewers are: Eben Thoma and Dave Williams (EPA), Julie Woodard (Dow); Dave Fashimpaur (BP); Christina Wisdom (TCC); Jim Griffin (ACC).

- **Cavity Ringdown Spectroscopy (CRDS) Instruments**
 A CRDS instrument is a continuous monitor based on optical absorption using laser source and very long path length. Its operating premise is that decay of the laser pulse injected into a mirrored path occurs more rapidly with an absorbing species present. It is promoted as highly selective, sensitive, and fast (microsecond decline).
Field Testing. With funding provided by EPRI, field testing was started at the TVA Kingston Plant (Knoxville, TN) that uses a Selective Catalytic Reduction (SCR) technology. After preliminary testing showed a very low ammonia slip (not detected by reference method), field testing was moved to the TVA John Sevier Fossil Plant (Rogersville, TN). Selective Non-Catalytic Reduction (SNCR) technology produced a higher slip (5 to ~20 ppm ammonia). The CRDS analyzer sampled from a dilution/extraction system (\approx 100:1 dilution). The duration of the testing lasted about 3 months. Picarro was the only vendor to participate. Reference samples (EPA CTM027) were collected in late October at a dilution probe location. Preliminary results show that CRDS readings are somewhat lower than the

reference samples, indicating possible losses in the sampling line. Comparison of CRDS and reference measurements are in progress.

Reporting. A draft verification report is currently being prepared. The final verification report should be completed in early 2010.

Discussion. John Bosch pointed out that the shroud probe approach might help NH₃ losses. Tom Kelly replied that NH₃ is sticky, so we think it's a surface problem. We saw very slow equilibration; however the real-time readings did not reach the concentrations reported for the reference samples collected. It may be possible to develop an equation to transform real-time to reference sample results, as the real-time results appeared to approach a constant fraction of the reference sample results. More analysis and regression is required to determine the actual relationships present.

▪ **Ozone Detector Card**

Ozone detector cards have reagent spots that, when exposed to ambient ozone, result in a color change that can be read visually. Co-funding was received from Breathe California of Los Angeles (BCLA) for test/QA plan preparation, and in-kind support was received from BCLA and SCAQMD (Rudy Eden). Laboratory testing has been assigned to Battelle, and field testing to SCAQMD and BCLA. One vendor, EnviroScan Inc., is participating.

Testing. Ozone indicator cards have been distributed to Battelle, SCAQMD, and BCLA. Laboratory testing will take place November/December 2009; field testing is scheduled for November/December 2009 and the main field test in May/June 2010 timeframe. We will assess the following performance parameters:

- Accuracy relative to ambient ozone monitoring data (SCAQMD), and delivered ozone challenges (Battelle)
- Duplication (between cards, and between users making visual readings) (Battelle/SCAQMD/BCLA)
- Variability of readings at constant ozone (Battelle)
- Effect of temperature, RH, wind speed (SCAQMD); light intensity (Battelle)
- Operational factors, acceptance as a personal monitor (BCLA/Battelle/SCAQMD).

Reporting. A draft test/QA plan has been prepared, and peer/EPA/QA reviews have been completed and revisions made. The Test/QA plan is now awaiting EPA approval. The final verification report is due by September 2010.

▪ **Airborne Leak Detection for Pipelines**

There are safety, environmental, economic, and regulatory reasons for monitoring gas leaks. Approximately 18% of anthropogenic methane emissions come from fugitive losses in oil and natural gas systems. The natural gas pipeline industry is responsible for checking its pipelines to ensure that leaks are detected. Airborne detection sensors have the potential to provide real-time quantitative detection of natural gas leaks in miles of pipeline in a relatively short period of time.

ETV verification testing is needed to demonstrate that these infrared sensors can detect gas leaks and thus mitigate greenhouse gas emissions. We have formed a technical panel of EPA, Environment Canada, TransCanada Pipelines, El Paso Pipeline, and AMS Center stakeholders (Eben Thoma, Phil Galvin, John Bosch, Don Stedman). We anticipate testing in

collaboration with one or more pipeline companies using existing stretches of pipeline as the testing locations.

Testing. The following performance parameters will be evaluated:

- Leak location mapping capabilities
- Leak rate determination
- Pipeline inspection rate
- Methane/ethane speciation
- Data processing time between runs.

A vendor meeting was conducted in July. Four technology vendors expressed interest in testing, and their commitments will be confirmed in November. The AMS Center submitted a proposal to EPA for funding support, but it was not funded. We are preparing the test/QA plan, exploring testing at two pipeline locations, and seeking collaborations. Testing is tentatively set to begin in Spring 2010.

▪ **Carbon Sequestration Monitoring**

With proper site selection and management, geologic sequestration of CO₂ through well injection could play a major role in reducing emissions of CO₂. Leakage of injected CO₂ to surface air or groundwater is a potential hazard of sequestration. Funding support from EPA's Advanced Monitoring Initiative was provided to the AMS Center to verify the performance of sensors to generate analytical monitoring data at the surface. Cavity ringdown spectroscopy analyzers are capable of measuring isotopic ratios of carbon in CO₂, and are expected to be useful in detecting CO₂ leaks over background levels.

Current Status. There are at least three possible CRDS technology vendors with isotopic instruments. We are currently pursuing access to the site of an ongoing Battelle CO₂ capture and storage project. Testing is expected to span 3-6 months and include gas standard challenges, as well as evaluation during a controlled release. We expect testing to occur in Spring 2010.

Update on Developing Verification Tests

Dr. Tom Kelly, Battelle, presented a review of the following technology categories. The stakeholders were able to follow the presentation on slides received before the teleconference.

▪ **Particulate Emission Monitors for Black Carbon**

Particulate monitors (PMs) to monitor carbon black emissions were proposed at the previous stakeholder discussion. These efforts will leverage existing ETV test/QA plans for particulate monitoring. The AMS Center submitted a proposal for co-funding to EPA's Environmental Monitoring Technology Support Initiative for Sensors; AMS Center stakeholder Joann Rice provided verbal support for this proposal. It is one of the top five submissions under final consideration for funding. We responded to the final questions, and are expecting a funding decision by about November 15. There are several potential vendors.

- **Multi-Metals Continuous Emission Monitors**

Continuous emission monitors at manufacturing facilities can support the proposed greenhouse gas (GHG) reporting rule. This would leverage existing ETV test/QA plans for stack emission devices and ambient monitoring.

We have held collaborative discussions about these monitors with EPA Region 5 and Office of Air Quality Planning and Standards (OAQPS). The AMS Center submitted a proposal for co-funding to EPA's Environmental Monitoring Technology Support Initiative for Sensors, and is one of the top five submissions under final consideration for funding. We responded to the final questions, and are expecting a funding decision by about November 15. There are several potential vendors.

- **Field Monitoring for Aerosols and Gases (Round 2)**

Applikon's Monitor for Aerosols and Gases in Air (MARGA[®]), a gas/aerosol sampler and ion chromatograph, was verified a year ago. EPA's Clean Air Markets Division (CAMD) has expressed interest in supporting a second round of testing.

Stakeholder Input – What's on Your Radar Screen?

John Bosch cited work done 5-7 years ago on multi-metals monitoring. A stakeholder commented that a Cooper Xact XRF was installed in the Lilly facility. There are three different versions of it—we're interested in the ambient version. Region 5 is interested in air toxic metals. A stakeholder asked about in-stack measurement compared with XRF.

John Powell of Ontario Ministry of the Environment referred to field tests completed at steel plant coke ovens under the responsibility of Larry Smet and Sean Avery. Three technologies (UV-DOAS, OP-FTIR and DIAL) to study fugitive emissions were tested side by side. They are also interested in our work on natural gas pipelines. Tom Kelly will have Battelle's LDAR Verification Test Coordinator follow-up with Larry.

Recap of Priorities, Action Items, and Next Meeting by Rachel Sell

- John McKernan thanked the stakeholders again, and hoped to keep their level of interest and commitment in the AMS Center.
- Teresa Harten will get Sally Gutierrez and Lindene Patton connected.
- The next teleconference will take place Spring 2010.

Adjourn