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Teleconference Meeting Minutes

U.S. EPA Environmental Technology Verification (ETV) Program
Advanced Monitoring Systems (AMS) Center

Air Stakeholder Committee Teleconference

Thursday, September 11, 2008
1:00 pm – 3:00 pm *EDT*

AGENDA

Welcome, Agenda, and Meeting Objectives	Rachel Sell, Battelle
Introduction of New Stakeholder Steve Ward and Observers	Rachel Sell
ETV Updates and AMS Center News • ETV/SBIR/R2 Workshop – October 7-8 • Soil Rapid Toxicity Technologies International Protocol	Doug Grosse, EPA/ Amy Dindal, Battelle
Update on Technology Categories • Leak Detection and Repair (LDAR) Devices at Petroleum Refineries and Chemical Plants • Field Deployable Ion Chromatograph • Odor Management System	Tom Kelly, Battelle
Test/QA Plan Discussion: Cavity Ringdown Spectroscopy Instruments	Ann Louise Sumner, Battelle
Fungal Contamination Field Monitors	Amy Dindal
Discussion of Evolving Technology Categories • Selected Ion Flow Tube Mass Spectrometers • Multi-Metal Emission Monitors • Opacity Monitors • Ozone Detector Card	Ann Louise Sumner
Discussion of Vapor Intrusion	Doug Grosse

Vendor Inquiries and *Hot Topics* Rachel Sell

- PM2.5 Monitoring
- Carbon Sequestration Monitoring Technologies
- Leak Detection for Ammonia-Based Refrigeration Units

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

Adjourn

ATTENDEES

Stakeholder Committee Members:
Ernest Bouffard, Connecticut Department of Environmental Protection
Chuck Dene, EPRI
Rudy Eden, South Coast Air Quality Management District (AQMD)
Philip Galvin, New York State Dept. of Environmental Conservation
Cliff Glowacki, Covenent Associates
Dennis Mikel, EPA
Will Ollison, American Petroleum Institute (API)
Roy Owens, Owens Corning
Steve Priebe, Idaho National Laboratory
Joann Rice, EPA
Don Stedman, University of Denver

Participant:
Madeleine Nawar, EPA
Eben Thoma, EPA

ETV AMS Center Staff:
Amy Dindal, Battelle
Doug Grosse, EPA
Tom Kelly, Battelle
Rachel Sell, Battelle
Ann Louise Sumner, Battelle

Welcome, Agenda, and Meeting Objectives
Rachel Sell, Battelle AMS Center Stakeholder Coordinator, welcomed committee stakeholders and AMS Center staff, then took roll call of the participants in the teleconference. Ms. Sell proceeded with an overview of the agenda, noting the focus of the call would be on upcoming ETV events, updates on technology categories moving forward, updates on evolving technology categories, and identifying priority technology categories for verification.

Introduction of New Stakeholder Steve Ward and Observers
Ms. Sell provided an introduction to new stakeholder, Steve Ward, who works in the Regulatory Affairs section of Bayer MaterialScience Health, Safety and Environment (HSE). Mr. Ward was unable to participate in the conference call because of an evacuation due to Hurricane Ike.

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Ms. Sell indicated that Mr. Ward would provide a formal introduction during a future stakeholder conference call.

ETV Updates and AMS Center News

Doug Grosse, the EPA project officer for the AMS Center, provided an update on recent ETV and AMS Center activities. The ETV/Region 2/Small Business Innovative Research (SBIR) Workshop is being planned for New York City, October 7-8. It will be public workshop largely attended by EPA R2, state agencies (NY Department of Environmental Conversation (DEC), NY State Energy Research and Development Agency), and vendors. 100-200 attendees are expected to participate. The workshop is organized by Center areas (e.g., air monitoring session, water monitoring session, etc.). Stakeholders participating and co-presenting with the AMS Center include water stakeholder Vito Minei from Suffolk Co Department of Health Services and air stakeholder Phil Galvin from NY DEC. The agenda is provided at the workshop website: http://www.scgcorp.com/etvsbir08/. ETV Team members will gather the day before the workshop begins to discuss future directions that might be taken to expand or refine the program. The ETV team will also be working towards better integration with EPA divisions.

Mr. Grosse noted that the AMS Center participated in the EPA National Risk Management Research Laboratory's Drinking Water Workshop in August. Mr. Grosse and AMS Center Director Amy Dindal presented a poster that was well-received by the participants.

Of international interest, the AMS Center completed the first international verification protocol with ETV Canada on soil rapid toxicity testing. This is significant since the ETV program is putting effort into international harmonization with other country's ETV programs.

Update on Technology Categories

Tom Kelly provided an update on three technology categories and reviewed slides from a PowerPoint presentation distributed to stakeholders before the teleconference.

Leak Detection and Repair (LDAR) Devices at Petroleum Refineries and Chemical Plants

Dr. Kelly reviewed the upcoming verification of portable infrared devices for leak detection of hydrocarbons at petroleum refineries and chemical plants. Infrared technologies allow visualization of leaks and offer a potentially cost-effective solution to Method 21 that relies on "sniffing" every pipeline component with an organic vapor analyzer to monitor for leaks at industrial component interfaces such as flanges, couplings, and valves.

This verification originated through EPA's Environmental and Sustainable Technology Evaluations (ESTE) program. Three vendors have signed vendor agreements: FLIR, Pacific Advanced Technologies, and Electrophysics. (After the teleconference, Electrophysics elected to withdraw from the verification test, citing resources issues that would preclude them from participating.) TELOPS is a Canadian company that is interested, but their technology is not applicable for this application and may participate in a separate verification. Verification includes laboratory testing at a BP facility in Naperville, Illinois expected in October 2008 and field testing at two industrial facilities (one chemical plant and one petrochemical plant) in Texas. Field testing is expected to occur in December 2008 and in the spring 2009. The Texas Chemical Council and American Chemistry Council are providing co-funding for the test. Rudy

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Eden asked whether the LDAR technologies relied upon chemical or thermal imaging to detect leaks. Dr. Kelly noted that the technologies used thermal imaging.

Field Deployable Ion Chromatograph
Dr. Kelly provided background on the technology category. He described EPA's Clean Air Markets Division's (CAMD) interest in verification of a field sampling/ion chromatograph system that would provide automated near-real-time measurements of aerosol ionic species and soluble gases (i.e., nitrate, sulfate, chloride, ammonium, nitric and nitrous acids, ammonia, sulfur dioxide, etc.) in air. CAMD has promoted development of such systems to replace integrated sampling in Clean Air Status and Trends Network (CASTNET).

The only system identified during the open call for vendors in this category which will provide this type of data was the Applikon MARGA (or Monitor for AeRosols and Gases in Air) system. Another ion chromatograph system was identified, but is not believed to be as automated in operation or as complete in data acquisition and transfer. The MARGA system is a field-deployable ion chromatograph that provides hourly measurements for soluble gases and aerosol ionic components.

EPA's CAMD has provided co-funding to support a 30-day field ETV verification of two MARGA systems. The verification will include a comparison to duplicate filter/denuder reference measurements, which are the integrated sampling methods that EPA is interested in replacing. In addition to EPA's CAMD, collaborators include North Carolina State University and EPA's Office of Air Quality Planning and Standards (OAQPS).

Dr. Kelly said that CAMD had defined a set of performance goals for accuracy (slope, intercept, and relative percent difference relative to the reference results), precision (relative percent difference between paired measurements), completeness (percent of valid data for entire field period and for periods covered by reference measurements), and reliability (percent time in operation, tolerance of power failure, extent of operator attendance needed).

Chuck Dene noted that Dan Bivens (EPA) is working with Tom Baldwin and DRI on dilution sampling of some of the same species for flue gas sampling.

Dr. Kelly said the test/QA plan will be ready towards the end of September 2008 and peer reviewers would need to provide a rapid review of the plan in about one week. The following stakeholders were confirmed as peer reviewers for this test: JoAnn Rice, Cliff Glowacki, Dennis Mikel, and Rudy Eden. The field test of the MARGA system is planned to start in October 2008.

Odor Management System
Dr. Kelly provided an update on the odor management system. A Canadian company, OdoTech, contacted the AMS Center regarding potential interest in ETV verification of the OdoWatch™ System, a network of sensor heads with a meteorological package that characterizes odors at various facilities such as concentrated animal feeding operations (CAFOs) or wastewater treatment plants). Each sensor head consists of 16 semiconductor sensors for various gases (e.g., NH_3, H_2S). OdoTech wants the entire system to undergo verification testing, not just the sensor

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heads. Dr. Kelly described how one or more sensor heads could be tested in laboratory and field settings.

The OdoWatch™ System is calibrated by comparison to a human odor panel, using whole air samples from the target facility. Output is reported as odor intensity, in "odor units", not as a chemical measurement. Two systems are currently in place in the U.S. at water treatment facilities.

A potential verification approach is to compare the OdoTech olfactometry results to those of two other human olfactometry laboratories on the same air samples from the field site. The test would determine the variability and consistency of the OdoWatch calibration and response over time.

The OdoWatch™ System is expected to be installed at an Arizona wastewater treatment plant in November 2008. There is potential for collaborative evaluation through ETV; however, the AMS Center is awaiting further information from OdoTech before pursuing further.

Will Ollison asked about sample stability and whether you could sample immediately (on-site) as well as off-site. Dr. Kelly indicated that the odor panels can only make the odor intensity assessment from an off-site facility. It was not believed that the odor could be stored in a bag and sampled later.

Cliff Glowacki mentioned a portable odor detecting and measuring device called the Nasal Ranger. He noted the device had problems with construction and that people are "falling back to Teflon" as a better bag material for collecting odor compounds than Tedlar.

Test/QA Plan Discussion: Cavity Ring Down Spectroscopy Instruments

Ann Louise Sumner provided an update on Cavity Ring Down Spectroscopy (CRDS) instruments, another technology category currently in-progress. Stakeholders provided concurrence on pursuing a verification test for this technology category on the last call. Dr. Sumner said that a vendor of this technology, Picarro, Inc. claims that the analyzer offers parts-per-trillion level detection sensitivity, high selectivity, very low drift, and fast response time. Picarro has analyzers for greenhouse gases, methane, ammonia, hydrogen sulfide, CO_2, and other gases. In addition to Picarro, other potential vendors include Tiger Optics (Warrington, PA) and Los Gatos Research, Inc. (Mountainview, CA).

CRDS has applicability to many industrial process applications, ambient air monitoring, and other applications. During the May stakeholder call, Chuck Dene said that EPRI would have an interest in supporting a stationary source test for coal-fired power plants. Since the May call, the AMS Center had discussions with EPA Region 5 regarding a verification test of CRDS instruments for ambient hydrogen sulfide monitoring. There is also interest from API in a roadside monitoring application, as indicated by Will Ollison after the call. Dr. Sumner explained that the AMS Center was proceeding with testing in a power plant application in collaboration with EPRI, and testing in other areas would continue to be investigated.

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For the test in collaboration with EPRI, a test site at a coal-fired power plant would need to be determined. The duration of the test is expected to last 3-6 months and will include intensive periods of testing at the start and end of test as well as routine monitoring. Tentative analytes to be measured include NH_3, CO_2, and CO, which are known constituents of flue gas in a sufficient enough concentration to measure; other analytes might be possible as well, depending upon the site. The verification will include a side-by-side comparison with conventional instrumental methods sampling flue gas and gas standards of known concentrations. Performance parameters include accuracy, linearity, precision, response time, drift (zero and calibration), interference effects, comparability to conventional methods, data completeness, and operational factors. Dennis Mikel and Will Ollison volunteered to serve as peer reviewers for the test/QA plan. The group noted that condensates on the mirrors may be an issue to consider, especially given the elevated temperature of the flue gas.

Stakeholders mentioned that other applications and analytes, such as acrolein and formaldehyde, should be considered for future verifications. Mr. Mikel offered to contact Mike Jones with EPA's National Air Toxics Trends Stations (NATTS) regarding ambient monitoring applications for CRDS.

Fungal Contamination Field Monitors

Ms. Dindal noted that the stakeholders provided concurrence for proceeding with this technology category on the last call and so the AMS Center wanted to provide an update of the activities since the last meeting. The technology, the Mycometer®-test, is a versatile tool for investigating mold in buildings allowing analysis of air, surface, and bulk samples. The field portable system allows users to determine total fungal biomass on-site in less than one hour. It is largely used for documenting the presence of mold, delineating the contamination, and monitoring the remediation process.

The vendor provided a proposed test plan design that was presented to the stakeholders for input. The vendor has some concerns regarding the lack of a good reference method for comparison. Gravimetric determination is a conventional method in microbiology. However, it may be possible to use in practice for comparison purposes for spiked samples, since fungal biomass is only a fraction of what is present in environmental samples. Direct microscopy is currently the most common method used to quantify fungal biomass in both surface samples (tape lifts) and air samples (spore traps). Therefore, it would seem natural to compare the enzyme activity to fungal biomass determined by microscopy. ASTM is drafting standard methodology for the collection and analysis of tape lift and spore trap samples by direct microscopy. The key difference between microscopy and the Mycometer method is an effort to count and classify spores by genus. However, it has been shown that spores are only a very minor part of the fungal biomass while 95-100% is hyphal fragments. Mycometer measures both hyphae and spores. One alternative reference method could be to measure ergosterol which would measure total fungal biomass including spores and fragments. The drawback here is that ergosterol testing and analysis is time consuming and very expensive. However, it may be useful as a quality control measure on a more limited scale. The vendor would like to see laboratory-prepared samples and field samples evaluated for both surface and air monitoring. When asked for their input to the test design, Will Ollison suggested homeland security agencies as possible collaborators for the test.

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Mary Schrock is the Battelle verification test coordinator for this test; Mary should be contacted directly with any questions.

Discussion of Evolving Technology Categories

Dr. Sumner provided an update on four technology categories still under development, and reviewed slides from a PowerPoint presentation distributed to stakeholders before the teleconference.

Selected Ion Flow Tube Mass Spectrometers

Dr. Sumner said that Syft Technologies of New Zealand is interested in verification of its Selected Ion Flow Tube Mass Spectrometer (SIFT-MS) technology, the Voice200. Syft described the technology as utilizing precisely controlled chemical ionization reactions to detect and quantify trace amounts of volatile organic compounds (VOCs). It is applicable to alkane, alkene, and aromatic hydrocarbons, and oxygen-, sulfur-, and halogen-containing organics, as well as ammonia, hydrogen cyanide, hydrogen sulfide, nitrogen dioxide, and phosphine.

Syft is interested in a "high-impact" verification for ambient air, indoor/industrial hygiene, food safety, or other markets. Syft requested a cost estimate for an AMS Center laboratory-based verification test using TO-15 compounds. The test would compare the Voice200 to a GC-MS reference method at known concentrations. The AMS Center plans to provide an estimate to Syft in November.

Multi-Metal Emission Monitors

During the last call, stakeholders discussed whether a continuous metals analyzer existed other than Cooper Environmental Services monitors. It was noted that X-Ray Optical offered a continuous XRF instrument participating in Phase II of the EPA's SBIR program. Dr. Sumner said that vendors are still being contacted about interest in ETV verification. Mr. Dene said that John Cooper of Cooper Environmental Services is participating in an EPRI field test at a power plant. Mr. Mikel said they have a unit that has generated 2 years worth of hazardous waste incinerator stack data. Mr. Mikel offered to discuss potential opportunities with Mike Jones (NATTS program). Stakeholders provided concurrence on this technology category.

Opacity Monitors

Dr. Sumner described the digital opacity compliance system (or DOCS), a potential alternative to EPA Method 9 for the visual determination of the opacity of emissions for stationary sources. The DOCS uses standard digital photography using a proprietary software package. The system compares the color in an emissions plume to the background color. Previous evaluations have shown favorable comparisons to human estimates of opacity, particularly for clear days.

NYDEC is interested in ETV verification of DOCS. Bob Waterfall with the New York State Department of Environmental Conservation (NYDEC) was asked to investigate episodes of sporadic emissions at a remote plant on Canadian border. Phil Galvin said if it is a good system it will replace Method 9. A suggestion was made to check SERDP work with this technology.

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Chuck Dene noted that with wet stacks becoming more common, outside opacity rather than in-stack opacity is more important. Don Stedman suggested use of an opacity source such as used in opacity "smoke school" would be useful for testing.

Eben Thomas felt there has been previous testing of this system that has been done already by SERDP since it is an Air Force developed product. He also suggested contacting Mark Rood at the University of Illinois-Urbana as he has worked with DOCS and generated comparisons to Method 9.

An Australian company, OPAL Environmental, offers transmissometer systems for in-situ continuous measurement of particulate emissions from industrial stacks with measured outputs for opacity (or visual emissions) and optical density (mass emissions).

Mr. Owens said that in-stack opacity doesn't exist yet. Considerations outside of stack would remove human judgment.

In order to provide concurrence on this technology category, stakeholders will need to engage in further discussion, but that this would be a different technology category than DOCS.

Ozone Detector Card
For the sake of time, this technology category was not discussed during the conference call; however, as noted on the previous call, stakeholders were quick to provide concurrence on pursuing a verification test for ozone detector cards. Enviroscan has interest in ETV verification of their semi-quantitative ozone detector cards, but doesn't have the funding to support a test but could provide in-kind support. The AMS Center could test these cards very efficiently, if there is an organization with an interest and funding. Potential collaborators being sought include the America Lung Association or AQMD air monitoring stations. Considerations for testing include humidity, wind speed, and direct sunlight.

Discussion of Vapor Intrusion
Mr. Grosse presented some general background information on indoor air vapor intrusion. Typical contaminants are chlorinated volatile organics (e.g., 1,1-dichloroethane, 1,1-dichloroethylene, 1,2-dichloroethane, cis-1,2-dichloroethylene, tetrachloroethylene, trans-1.2-dichloroethylene, trichloroethylene, trichloroethylene, vinyl chloride). Analytical options for addressing vapor intrusion include active and passive soil gas and groundwater sampling. Temporal and spatial variability play an important role in these sampling activities. Mr. Grosse reviewed a number of considerations for vapor intrusion, including the use of radon as a tracer and the impact of seasonal variations. Mr. Grosse also presented two examples of vapor intrusion data which shows the variation of sub-slab vapor concentrations that can be observed.
Mr. Grosse's presentation concluded with a brief discussion of vapor intrusion and ETV.
Mr. Grosse indicated that there is widespread interest across EPA of pursing an ETV test that involves vapor intrusion, including the Office of Solid Waste and Emergency Response and several EPA Regions (2, 3, and 9). The AMS Center is targeting coordination with Midwestern States Risk Assessment Symposium to be held in Indianapolis in August 2009. Time was running short during the meeting so the stakeholders were asked to direct any questions/ comments regarding a vapor intrusion ETV test to Mr. Grosse or Ms. Dindal.

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Vendor Inquiries and *Hot Topics*

Ms. Sell indicated that the AMS Center had received vendor inquiries on a variety of categories including $PM_{2.5}$ monitoring, carbon sequestration monitoring technologies, and leak detection for ammonia-based refrigeration units. Lindene Patton, who was unable to participate in the call, is interested in carbon sequestration monitoring technologies.

Time was running short, so in terms of other technologies on the horizon, stakeholders were asked to forward any ideas to Ms. Sell.

Recap of Priorities, Action Items, and Next Meeting

Ms. Sell restated that stakeholder concurrence had been received for the multi-metal emission monitors, and with some further discussion, stakeholders may provide concurrence on the opacity monitors. Regarding opacity monitors, Phil Galvin said he doesn't believe the technology could replace Method 9 and others noted that a lot of work has been done by SERDP already.

Ms. Sell reviewed the action items brought forth on the call:

1. Mr. Mikel will contact Mike Jones (EPA/NATTS) regarding ambient monitoring applications for CRDS and multi-metals monitors. (Action completed after teleconference.)
2. Ms. Sell to follow up with Gretchen Hund to see if there is a homeland security application for the fungal contamination field monitor.
3. Per Mr. Thoma's suggestion, the AMS Center (Ken Cowen) will follow up with Mark Rood (University of Illinois-Urbana) about the testing he's done related to opacity monitoring.

Ms. Sell thanked all of the stakeholders for attending the meeting and for their continued input and contributions to the ETV program. She said that she would distribute meeting minutes to review and said the next stakeholder teleconference would be planned for the January timeframe. The call adjourned at 3:00 pm *EDT*.

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