

**U.S. EPA Environmental Technology Verification Program
Advanced Monitoring Systems Center**

Water Stakeholder Committee Meeting

**August 11, 2005
Portland, Maine**

Meeting Minutes

ATTENDEES

STAKEHOLDER COMMITTEE MEMBERS:

Marty Link, Nebraska Department of Environmental Quality, Lincoln, NE
Vito Minei, P.E., Division of Environmental Quality Suffolk County Department of Health Services, Yaphank, NY
Richard Sakaji, Ph.D., California Department of Health Services, Richmond, CA
Jeff Schloss, New Hampshire Lakes Lay Monitoring Program, Durham, NH
Peter Tennant, Ohio River Valley Water Sanitation Commission (ORSANCO), Cincinnati, OH
Kenneth Wood, DuPont, Wilmington, DE

OBSERVERS:

Michael Koza, Portland Water District, Standish, ME
Kalle Matso, Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET), Durham, NH
Lisa Olsen, U.S. Geological Survey (USGS), Sacramento, CA
Kent Peterson, Fluid Imaging Technologies, Edgecomb, ME
Stuart Rose, Maine Department of Environmental Protection, Portland, ME
Thomas Schneider, Ohio Environmental Protection Agency (OEPA), Dayton, OH
Tom Shyka, Gulf of Maine Ocean Observing System (GoMOOS), Portland, ME
Charles Spies, GoMOOS, Portland, ME
Maggie Theroux, U.S. EPA Region 1, Boston, MA
Marianna Vulli, New England Interstate Water Pollution Control Commission (NEIWPC), Lowell, MA

BATTELLE AMS CENTER STAFF:

Judith Bradbury, Battelle, Alexandria, VA
Karen Riggs, Battelle, Columbus, OH
Ann Louise Sumner, Battelle, Columbus, OH

OPENING SESSION: WELCOME, AGENDA, AND MEETING OBJECTIVES

Karen Riggs, Battelle's ETV program manager, opened the meeting by welcoming the committee stakeholders and observers. Ms. Riggs then introduced Judith Bradbury, who reviewed the agenda and the meeting objectives:

- Update the committee on the status of the beach monitoring and nutrient monitor verification tests.
- Identify next technologies to consider for verification.
- Inform the committee about: state-led efforts for innovative technology, emerging technologies and issues in estuarine and coastal water quality monitoring, and in vivo fluorescence measurements.

STAKEHOLDER INTRODUCTIONS AND INSIGHTS

Dr. Bradbury invited the stakeholders as well as other observers to introduce themselves, provide any background of what they have been working on, and briefly describe any recent water quality monitoring activities, needs, or concerns.

Lisa Olsen of USGS stated that her focus is on real-time water quality monitoring. She is about to take a new job with USGS Water Science Center in California.

Peter Tennant is with ORSANCO, an interstate commission that does almost all of the monitoring on the Ohio River. They have been increasingly involved with biological monitoring in the last two years. Most recently, they developed a mobile bacteria monitoring capability.

Tom Schneider works at the Ohio Environmental Protection Agency but today is representing the Interstate Technology and Regulatory Council (ITRC).

Ken Wood of DuPont works on water and wastewater facility projects within DuPont and has been involved in environmental activities at numerous locations. He is involved in monitoring, permitting, and compliance on the wastewater side looking at a wide range of parameters.

Marty Link of the Nebraska Department of Environmental Quality (NDEQ) stated she previously focused primarily on groundwater and is now involved in a broader spectrum of water quality activities. She said her division deals with a variety of issues, namely groundwater and surface water monitoring, TMDLs, USTs, and NPDES permits. She also noted NDEQ used the atrazine ETV verification reports to help them make purchasing decisions.

Vito Minei is the Director of the Division of Environmental Quality Suffolk County Department of Health Services. He described several activities his group is working on such as groundwater investigations for deep wells and private wells, wastewater management, and toxic chemical storage. He said his group has an interest in the measurement of pesticides and pharmaceuticals. He expressed interest in field monitoring techniques and laboratory techniques.

Rick Sakaji of the California Department of Health Services drinking water program said that they are responsible for safe drinking water and water recycling requirements. He expressed

interest in online water quality monitoring and alternative filtration technologies.

Jeff Schloss of the University of New Hampshire (UNH) has a joint appointment at the Center for Freshwater Biology and is also a Water Resources Specialist at UNH's Cooperative Extension. He coordinates a volunteer lake monitoring program and they are currently looking at freshwater cyanobacteria toxins.

Mike Koza from the Portland Water District is interested in distribution system monitoring in Maine.

Kent Peterson from Fluid Imaging Technologies is interested in hearing about the beach monitoring update. He briefly described the technology that Fluid Imaging Technologies offers for beach monitoring applications.

Stuart Rose, from the Maine Department of Environmental Protection, works in the areas of pollutant discharge and water quality monitoring.

ETV PROGRAM AND AMS CENTER UPDATE

Ms. Riggs provided background on the ETV Program. ETV was established in 1995 by the U.S. Environmental Protection Agency (EPA) to verify the performance of innovative environmental technologies. ETV provides third-party, quality-assured performance data so the buyers and users of these technologies can make informed purchase and application decisions. ETV now operates through six verification centers. Battelle, a nonprofit research organization based in Columbus, Ohio, is EPA's partner in the Advanced Monitoring Systems (AMS) Center. Battelle has been operating the AMS Center since 1997. The ETV AMS Center verifies the performance of commercially-available environmental monitoring technologies that monitor natural species and contaminants in air, water, and soil.

Ms. Riggs stated that two stakeholder groups, one focused on water monitoring and a second on air monitoring, drive the verification process. Stakeholders represent the buyer and user community and help set priority technologies and technology categories for testing; identify commercially available technologies within priority technology categories; provide technical guidance and input to experimental design of verification tests; serve as technical peer reviewers for test/QA plans, verification reports, and verification statements; and serve as testing partners, providing critical elements of the testing such as test sites, operators, and reference analyses. The stakeholder committees are also part of the extensive outreach the ETV Program provides.

Ms. Riggs noted several key facts about the ETV Program as a whole:

- 318 verification reports, 82 protocols.
- Stakeholder participation: 805 stakeholders in 21 groups.
- Increasing funding from vendors and other partners.
- Over 50% from others (30% cash and 20% in-kind).
- Website activity: more than one million hits per year.

She noted that there was an ETV International Forum on July 13-14, 2005 in Washington DC that attracted nearly 200 participants from 15 countries. Ms. Riggs noted that there are two other water related technology categories of other ETV Centers: a Drinking Water Systems Center and a Water Quality Protection Center. She noted a new aspect of the ETV program in 2005 is the Environmental and Sustainable Technology Evaluation (ESTE), which is targeted to high priority EPA needs (ESTE website is <http://www.epa.gov/etv/este.html>). In this program, EPA initiates and directly manages verifications; it is scoped to include all environmental technologies except remediation technologies. To date, there have not been any ESTE proposals in the area of water. She encouraged stakeholders to encourage EPA staff to submit proposals.

Ms. Riggs highlighted the following aspects of the AMS Center, which has verified a total of 94 monitoring technologies to date:

- 48 air technologies
 - 6 in progress (2 hydrogen sulfide monitors; 3 dioxin emission monitoring systems; 1 personal cascade impactor sampler)
- 22 water technologies
 - 2 in progress (nutrient monitors for industrial applications)
- 24 water security technologies
 - 18 in progress (5 multi-parameter water monitors for distribution systems; 2 enzymatic test kits; 2 mobile mass spectrometers; 6 rapid toxicity technologies; 3 immunoassay test kits for biotoxins)

Ms. Riggs discussed the progress since the November 4, 2004 ETV Water Stakeholder meeting. She noted that the nutrient monitors test at an industrial facility is currently in the reporting stage, and that the arsenic round 3 (R3) and beach monitoring have recently completed vendor recruitment. The ballast water monitors and nutrient monitors' evaluation at an environmental location have recently undergone partner recruitment.

STATE LED EFFORT FOR INNOVATIVE TECHNOLOGY ACCEPTANCE

Tom Schneider is a Team Leader for the ITRC, a network organization made up of states and stakeholders including representatives from environmental activist groups, Federal agencies, and academia. The aim of ITRC is to support innovative technologies. ITRC goes beyond the ETV Program in that it is actually developing tools for taking these innovative technologies to broader applications. The funding is from the U.S. Department of Energy with some funding by EPA and the U.S. Department of Defense.

Mr. Schneider briefly discussed the consensus-based tools and resources produced by their technical teams, including technology overviews, case studies, regulatory and technical guidelines, peer exchange/network, technology advocates, classroom training courses, and Internet-based training courses. Mr. Schneider noted that the 2005 ITRC Teams are as follows, and that the largest team (in terms of number of states participating) is Vapor Intrusion:

- Alternative Landfill Technologies
- Brownfields
- Diffusion Samplers

- MTBE & other Fuel Oxygenates
- Radionuclides
- Remediation Process Optimization
- Risk Assessment Resources
- Sampling, Monitoring, Characterization
- Unexploded Ordnance (UXO)
- Arsenic in Groundwater
- Bioremediation of DNAPLs
- Ecological Enhancements
- Natural Attenuation & Passive Bioremediation
- Perchlorate
- Vapor Intrusion (Indoor Air)

Although ITRC's primary audience is the state regulator, the broader environmental community is a key audience and takes advantage of ITRC resources. The consultants and engineers like the "free" training courses because there is no downtime to travel to a training location, plus they get to learn what the regulators are saying about new approaches and technologies.

Mr. Schneider discussed ITRC's strategic planning initiative, noting that they are looking to maintain core competencies as a state led organization focused on innovation while looking for new opportunities to expand on their success. Mr. Schneider then described the Radionuclide Team which is made up of regulators and stakeholders from DOE sites and facilitates communication and experience sharing among sites. Following this, Mr. Schneider described the Sampling, Monitoring, Characterization Team and its products. He noted that sensors may provide one area that ETV and ITRC can work together, and described the Team's planned sampling activities. He also described the Diffusion Sampler Team, which has the goal to disseminate information on polyethylene diffusion bags and complete a technology overview of passive sampling methods.

Finally Mr. Schneider discussed opportunities for collaboration between ITRC and ETV. He highlighted common technology, contaminant, and environmental media interests. He suggested a dialogue on priorities and shared experiences. Finally, he referred attendees to the ITRC website at www.itrcweb.org for more information.

VERIFICATION STATUS: NUTRIENT MONITORS

Ann Louise Sumner, Battelle AMS Center Verification Test Coordinator, described the status of the tests of nutrient monitors. Testing of nutrient monitors has two apparent applications, which include environmental and industrial monitoring. Dr. Sumner noted that the nutrients under consideration are nitrogen (ammonia, nitrate, nitrite, and total nitrogen) and phosphorus (inorganic phosphate and total phosphorus). She described some of the sources of nutrient pollution problem ranging from fertilizers and sewage treatment to atmospheric deposition.

Mr. Wood commented on nutrient water quality criteria, noting that most of plants at DuPont have some kind of nutrient limitation. Historically these were ammonia limitations, but in the past few years EPA has introduced nutrient water quality criteria based on eco-regions. States

are now adopting these criteria or developing regional criteria, and DuPont is starting to see them in their water quality permits. The total phosphorus and total nitrogen limits are relatively stringent, and because DuPont's goal is 100% compliance, they are interested in online monitors.

Dr. Sumner described the uses for nutrient monitors and the associated testing. For monitoring and industrial waste processing, ETV testing was conducted in May through June of 2005 in collaboration with DuPont; for monitoring natural water systems, ETV testing is planned for spring/summer of 2006 with potential partnering opportunities with USGS and OEPA and Illinois Environmental Protection Agency (IEPA); for monitoring municipal water supplies Water Environment Research Foundation (WERF) testing of nitrogen analyzers will take place at the Blue Plains wastewater treatment facility. Nutrient monitors consist of online monitors, online/in-line probes, and in-situ analyzers.

Dr. Sumner discussed the industrial wastewater treatment plant application at DuPont in which the nutrient analyzers (Shimadzu TNPC-4110(C) for total nitrogen and total phosphorus and ZAPS Technologies MP-1 for nitrate) were tested. The site tested is the DuPont Spruance Wastewater Treatment Plant. Dr. Sumner described the test parameters for off-line testing and on-line monitoring, along with overall evaluation of ease-of-use and waste generation. Preliminary results were presented as follows:

Performance Parameter	Method of Evaluation	Range of Results
Accuracy	Percent Recovery	nitrate/phosphate: 98% to 251% non-nitrate N: 31% to 129% organic phosphate: 103% to 110%
Bias	Average %D	+18 to +57%
Linearity	Linear regression	Slope 1.10 to 1.34 Intercept 0.03 to 0.19 r2 0.957 to 0.999
LOD	Average blank +3(SD)	0.000 to 0.232
Reproducibility	Percent relative standard deviation	1% to 14%

Dr. Sumner stated that the schedule for completion was targeted at publications/posting to the ETV website around September 30, 2005.

Next, Dr. Sumner addressed the second application, environmental nutrient monitoring which involves natural water applications for surface water monitoring. She noted that based on interest from partners, the tests will focus on rivers and streams. She discussed the potential design for the EPA Region 5 co-funded verification test as follows:

- Off-line testing
 - Test parameters similar to industrial wastewater with lower ranges

- Possibly conducted at Battelle
- On-line monitoring, up to 4 weeks per site
 - Ohio
 - IEPA at USGS gage stations
- Reference samples analyzed by OEPA and IEPA laboratories
- Other potential interferences
 - Humic/fulvic acid
 - Others?

Ms. Olsen suggested that a potential interference to consider is water that may have some optical brighteners, which could be an issue in rivers and streams. The group discussion indicated that a substance such as detergent with an optical brightener (e.g., Tide with color safe bleach) is an example of this. Consideration would have to be given to the response range of the nutrient monitoring technologies.

Mr. Schloss asked about the rationale for spiking with chlorophyll, and pointed out that the presence of separated chlorophyll *a* does not occur in the real world and that a dissolved organic carbon standard would be more realistic.

Another comment was made about dissolved oxygen and water temperature, since warming of water samples during analysis may liberate oxygen gas and interfere with the measurement. Ms. Olsen responded that an appropriate way to address this may be to have a typical matrix and then vary the temperature. It was suggested that it may be worth including in the report the temperature at the sample collection site compared to the temperature as it passes through the analyzer.

Dr. Sumner presented a list of potential vendors and a schedule for completion through September of 2006, at which time report writing would occur. Dr. Sumner concluded by thanking Ken Wood and DuPont, and asked for volunteers for the environmental monitoring nutrient analyzer verification test, including peer reviewers and test collaborators.

A stakeholder noted the high price of equipment and relatively short duration of testing, and asked whether consideration had been given to donation of the equipment following the testing.

Dr. Sumner noted that they may still be in a position of needing funding and asked for suggestions. Ms. Link noted that EPA has money that is earmarked for “new monitoring” and that this may be a potential source of funding. A participant suggested collaborating with the Alliance for Coastal Technologies (ACT). This is a very similar initiative and they have performed a needs assessment and plan to look at online monitoring. Another stakeholder suggested that the United States Department of Agriculture (USDA) may be interested due to their involvement in Best Management Practices (BMPs). Charlie Patton from the USGS was suggested as a potential peer reviewer; Mr. Wood and Mr. Minei also volunteered.

EMERGING TECHNOLOGIES AND ISSUES IN ESTUARINE AND COASTAL WATER QUALITY MONITORING

Kalle Matso began his presentation by giving some background on CICEET (available at <http://ciceet.unh.edu>). CICEET was established as a partnership between the National Oceanic Atmospheric Administration (NOAA) and UNH in 1997 and is located on the UNH campus in Durham, New Hampshire. CICEET uses the capabilities of UNH, the private sector, academic and public research institutions throughout the U.S., as well as the 26 reserves in the National Estuarine Research Reserve System (NERRS), to develop and apply new environmental technologies and techniques. The organization's goals are specifically to develop innovative technologies, transfer technology to the user, and provide enhanced technology capabilities for the NERRS. Program activities include providing research support, technology demonstrations, partnerships and other initiatives, and workshops/conferences. CICEET focus areas are toxic contaminants, nutrients and eutrophication, microbial pathogens, and habitat restoration.

CICEET conducted a needs assessment based on 1994 and 2004 Coastal States Organization Surveys, regional surveys and workshops, and networking/informal surveys. Mr. Matso presented an overview of the 2004 survey. Land use was ranked as a very important or important management topic by 97% of respondents, followed by habitat, nutrient enrichment, environmental contamination, sediment management, and nonindigenous species. Mr. Matso also identified research needs, information needs, and technology needs. For environmental contamination, the top ranked technology need was improved treatment or removal technologies, although another common response was rapid detection. The results of the informal needs assessment were presented as follows:

- Low-cost, continuous dissolved oxygen sensor.
- Septic tank system automated sensors.
- Stormwater event, automated sampler, sensor (volume).
- Habitat mapping.
- Distinguishing human from non-human microbial events.
- *In situ* red tide detection.
- Nutrient criteria establishment.
- Rapid detection of enterococcus on beaches (and what indicators or organisms should be looked at).
- Measuring bioavailability (potential mobility to food chain).
- Sediment quality under salmon pens.
- Broader, more synoptic perspectives on water quality (remote sensing).
- Data processing, interfacing with various databases.
- Simpler, more appropriate water clarity sensors (for eelgrass-related work).

Mr. Matso then described CICEET monitoring projects. He noted that CICEET is a cosponsor of the Southern California Coastal Water Research Project (SCCWRP) Rapid Assessment Study, and described a number of mature and less mature projects being conducted. Next he described nutrient-related monitoring projects and toxic contaminants monitoring. In his closing comments, Mr. Matso discussed new developments regarding NERRS and the Integrated Ocean

Observing System (IOOS) including helping estuarine reserves, improving telemetry, and real-time data access.

VERIFICATION STATUS: BEACH MONITORING

Ms. Riggs noted that many stakeholders have said they need a quick way to detect beach contamination. Ms. Riggs stated that she would discuss activities since the last meeting and planned future activities. Ms. Riggs noted that the application focus was for rapid detection technologies (less than eight hours). She indicated that vendor agreements have been distributed to nine vendors (listed on the table below). In terms of vendor recruitment, the goal is to be finished by the end of August and have partner commitments/in-kind contributions secured.

Vendor	Technology
Fluid Imaging Technology *	Portable FlowCAM
Gen-Probe	Transcription Mediated Amplification
Silver Lake Research	Immunoassay Dipstick for <i>E. coli</i>
OBIE International	Portable incubator/spectrophotometry
QROS Ltd.	<i>Enterococci</i> test kit
B2P Limited *	<i>E. coli</i> test kit
Advanced Analytical Technology Inc.	Flow cytometry
Idaho Technology	Polymerase chain reaction (PCR)
Colifast	<i>E. coli</i> test kit

The test/QA plan will be drafted based on prototype testing conducted by SCCWRP. Ms. Riggs stated that Battelle has been in contact with SCCWRP because they are doing good work in this area and Battelle wants to avoid “reinventing the wheel.” Ms. Riggs noted that the following potential partners have been identified:

- SCCWRP
- Alabama Department of Environmental Management (ADEM)
- Barnstable County (Cape Cod) Dept. of Public Health
- Others to be investigated (FDA National Shellfish Sanitation Program, Interstate Shellfish Sanitation Conference, NOAA’s Mussel Watch Project, USGS)

Stakeholders discussed the importance of including both marine (ocean) and freshwater beaches.

Ms. Riggs described the tentative schedule beginning with vendor recruitment in August and ending with reports in February through May of 2006. She asked for stakeholder volunteers for peer reviews and other suggestions for partners.

Ms. Riggs also raised the question of the appropriate testing season and noted that it may be dependent upon location. Stakeholders commented that the testing season is definitely important and that warm water is where organisms of interest thrive.

Ms. Olsen noted a study by USGS had examined pathogens in shallow groundwater at the beach, and that when beaches are closed the visitors on the beach are actually being exposed to higher pathogen concentrations through shallow groundwater. Ms. Olsen asked whether this should be considered in the test design using shallow bore holes to reach groundwater.

One stakeholder suggested that many of the questions regarding the timing of testing will be addressed in the SCCWRP test plan. Several stakeholders noted that the testing should be conducted during “beach season” including spring and summer. Stuart Rose noted that, in Maine, there is a surfing season in January, February, and March, and conditions during this time should be considered.

Ms. Link said that she personally could not serve as a peer reviewer, but some of her staff probably could. Dr. Sakaji said that he could ask someone who works with shellfish from his department to serve as a peer reviewer.

Ms. Theroux commented on funding possibilities for a beach monitoring test under ETV. In enforcement actions, EPA’s Office of Enforcement and Compliance Assessments (OECA) often negotiates Supplemental Environmental Projects with violators. One stakeholder noted that discussions with OECA had concluded that a Supplemental Environmental Project could involve water monitoring technologies as long as the money does not go back to EPA.

IN VIVO FLUORESCENCE MEASUREMENTS – THE GOOD, THE BAD, AND THE ALGAE

Mr. Schloss began by reviewing the outline of his presentation, as follows:

- Review methods of estimating phytoplankton biomass in environmental water.
- Describe *in vivo* chlorophyll monitoring and its advantages.
- Discuss potential accuracy limitations of *in vivo* technology/techniques.
- Provide an overview of pre and post calibration methods.
- Show some data from NH Lakes.

He noted that the methods to measure chlorophyll are extractive analysis in the laboratory or *in vivo* fluorometry in the field. Mr. Schloss reviewed some of the limitations of extractive analysis including the time and transportation required, the need for an experienced analyst, and the difficulties for continuous monitoring applications.

Mr. Schloss then reviewed the basic principles of fluorescence. He noted the types of fluorimeters are flow-through, integrated package *in situ*, and *in situ*. He described some of the *in vivo* advantages, and said that it is a relatively simple measurement: readings are obtained in real-time, there is the ability for continuous monitoring of chlorophyll, the ability to observe

trends in phytoplankton, and the reduction in the number of water samples required. Mr. Schloss also described some of the in vivo limitations, specifically the effect of cell structure, particle size, and condition and organism type on readings. He also noted that the time of day for measurement may affect fluorescence intensity.

Mr. Schloss stated that diurnal cycles in fluorescence are commonly observed in many field applications. He discussed calibration and observations related to this phenomena. He presented the following summary:

- In vivo sampling can complement extractive analysis by limiting labor, expense, and/or number of samples.
- In vivo spot sampling can determine points of interest in real-time and indicate where to take point samples for extractive analysis.
- Continuous monitoring can determine trends and predict whether chlorophyll is increasing or decreasing and can be useful in understanding water quality between grab samples.

Mr. Schloss noted that there is not a standard available for blue-green algae.

NEXT WATER TECHNOLOGY CATEGORIES

Dr. Bradbury then turned the discussion to next technology categories to verify. She reminded stakeholders that in order to proceed with a new water monitoring technology category, information such as the vendor names (and their commercial technologies), potential partner names (and their organization and point of contact), and names of stakeholders to support test were needed. Dr. Bradbury also stated that, for new technology categories, risk outcomes should be considered (i.e., what benefits will the technology have on the environmental conditions and human health in the long term).

Ms. Riggs noted that risk outcomes are important, and that the ETV program has to prove what it will do to improve the environment or human health. Ms. Theroux noted that the Office of Budget requires metrics for evaluating outcomes as part of funding decisions.

Dr. Bradbury asked stakeholders to review the priority for verification of past recommendations and to provide new recommendations. Past recommendations (*and stakeholder comments*) included:

- *Microcystin ELISA test kits*

Ms. Link noted that this is a very narrow category in that only one analyte is being tested with one technique. There was discussion about variation between different batches of kits, and Mr. Schloss suggested that perhaps it would be useful to take more time and get several batches of kits. Other stakeholders agreed that it is important for all tests (e.g., for monitors, sensors) to test inter-unit or inter-batch variability.

In terms of funding partners, stakeholders suggested state agencies because they have to conduct this testing. New Hampshire and Nebraska were raised as two examples.

This is an emerging issue in surface water for water quality municipalities. Ms. Link noted that on September 6, 2005 Nebraska's environmental trust will be taking grant proposals and this would be a great project.

Ms. Riggs summarized that this test should move forward because four or five vendors have already been identified and as well as suggestions for potential funding partners. Potential peer reviewers include Ms. Link and Mr. Schloss. Mr. Schloss added that he might have additional vendors to add to the list.

- *Pesticide (alachlor, heptachlor) immunoassays*

Ms. Link noted that Nebraska is currently using the microcystin test kits and pesticide immunoassays, so information on these technologies would be particularly useful.

Mr. Matso asked why immunoassays are being tested. Stakeholders replied that they are cost effective, sensitive, and accurate; however, Ms. Olsen questioned the reliability of them.

Several companies were mentioned that sell ELISA kits such as Abraxis and Strategic Diagnostics.

Stakeholders discussed that the samples tested would be from surface water. Ms. Olsen noted that they are considering testing shallow groundwater. Stakeholders agreed that both surface water and groundwater would be appropriate for testing, and potentially drinking water if it is tying its source from contaminated surface or groundwater. A comment was made that there is concern in agricultural fields that pesticides may interfere with the ecosystem and encourage microcystin growth. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) list of four pesticides may fall into this category. Once EPA finalizes this FIFRA rule, states will then be required to develop pesticide-specific rules.

In terms of potential funding partners, stakeholders mentioned a variety of collaborators including pesticide manufacturers, Croplife America (a trade association), SCCWRP, and Bayer Crop Science. Mr. Shyka also suggested the U.S. Army Corps of Engineers. Ms. Olsen noted that if any of the sites selected for ETV testing are USGS sites, then USGS would share the data they already have collected on pesticides for the site.

Mr. Matso noted that he knew a woman on the California Water Resources Board who may be interested in this topic.

One stakeholder commented that this test should be relatively easy since it would be similar to the atrazine test and the same vendors would be involved.

- ***In-situ Algal Monitors***

A comment was made that, while fluorometers are not quite commercially available technologies ready now, it is an appropriate time to start planning for this.

Mr. Matso raised the possibility of a red tide connection for microbial contamination. Another stakeholder noted that there is a “dipstick” test for shellfish that is commercially available (Gillette) and noted that it would be helpful to have information about red tide and algal blooms in the source water to help understand the fluorometer results to head off management decisions.

Mr. Shyka noted that the ACT held workshops on fluorometers for coastal applications and that a report will soon be available or may already be available. He also noted that the Alliance is conducting fluorometer testing at five or six coastal locations this summer. One stakeholder suggested coordinating with the ACT to see what they’ve done to avoid duplicating effort.

Ms. Riggs asked for confirmation on how this category could be split up, between freshwater, source water, red tide, estuarine environments, brackish saltwater, etc. Mr. Schloss replied that we will start to see fluorometers that are targeted for specific analyses such as blue-green algae.

Mr. Matso noted that CICEET is funding three proposals for DNA-based methods to detect specific proteins and toxic constituents.

The group agreed that the next step is for Battelle to research what ACT is doing on this issue and send out a summary to the stakeholders, including a path forward, if possible. Mr. Shyka said to contact Dr. Mario Tamburri at ACT.

Ms. Olsen suggested that if drinking water sources are being considered, then the American Water Works Association (AWWA) should be considered as a potential funding source.

- ***On-line perchlorate monitors***

Ms. Olsen noted that perchlorate legislation is in development. Another stakeholder questioned whether there are commercially technologies available since laboratory methods are still being perfected. One stakeholder noted that there are probes available but not online monitors. A stakeholder noted that perchlorate contamination is common in the aerospace industry and that he thought he knew of a commercially available online monitor. Lisa Olsen noted that perchlorate has been found in 2% of tested water supplies, so it is a fairly widespread contaminant.

Another stakeholder noted that there is a technology under development by Dr. Stephen Strauss at University of Colorado (or possibly Colorado State University) that is able to detect perchlorate.

Mr. Koza suggested that a company called Astoria markets an ion chromatography technology that he thinks monitors perchlorate. Dr. Sakaji would like to see the Dionex system tested since perchlorate monitoring is a requirement for biological treatment processes in California.

Mr. Schneider indicated that he would make connections with the ITRC perchlorate team as they have investigated many of these issues.

Mr. Wood asked why dissolved oxygen probes, particularly the luminescence type, are not on the list as they were discussed at previous meetings.

Ms. Theroux suggested that a method for finding technologies could be posted on the Technology Connection which is on EPA's Environmental Technology Opportunities Portal (ETOP) website. Ms. Theroux also suggested the Department of Defense as a potential partner.

Mr. Minei noted that there is contamination associated with many agricultural operations due to contaminated pesticides and fertilizers, and that USDA may be another potential partner. Another stakeholder suggested that there may be some interest in Southern California water districts, and that the Strategic Environmental Research and Development Program (SERDP) had provided grants to study this problem in that region. Mr. Minei asked about how much funding is required, and Ms. Riggs replied \$75,000 – 100,000 of support from one or many sources. It was agreed that the next steps to move forward include looking for test collaborators, confirm vendors, and make contact with the ITRC perchlorate group.

Dr. Bradbury also asked whether there were any objections to moving forward and none were stated.

- *Dissolved oxygen probes*

Dr. Bradbury brought up hand-held turbidimeters and dissolved oxygen monitors, and asked whether these are priority categories and whether there are technology vendors. Ms. Riggs reviewed the comments made at the ETV Water Stakeholder November 2004 meeting and stated the consensus then was that there was a need for a better dissolved oxygen probe. Mr. Shyka noted that ACT has conducted an evaluation of dissolved oxygen probes in coastal settings and that a report is available on their website giving information for each probe tested. Mr. Minei asked whether they looked at the sediment water column interface, and Mr. Shyka replied that he did not know. Ms. Riggs posed the question of whether testing in coastal applications is sufficient. Stakeholders agreed that measuring dissolved oxygen in freshwater is also important.

The group also discussed the use of dissolved oxygen probes for a municipal wastewater. Stakeholders noted that it would be of interest for the both ends of the treatment plant because it could be used for process controls (e.g., aeration equipment).

One stakeholder noted that they would like to see the claims of certain companies because some claim that, even with biofouling, the probe still functions.

In terms of potential partners, Ms. Olsen noted that she is a potentially interested stakeholder. Mr. Wood also suggested WERF for potential collaboration and noted that they issue RFPs twice per year. Mr. Minei agreed to check around for an interested facility in New York with which they could work. It was suggested that Battelle try to invite a speaker from ACT to talk about

testing of dissolved oxygen probes at the next stakeholder meeting.

- ***Other New Technology Verification Needs***

Finally Dr. Bradbury asked for stakeholder recommendations for other technology categories to consider that address water monitoring needs.

A comment was made to consider hyperspectral remote sensing; Mr. Matso mentioned that CICEET has needs for the verification of remote sensing and acoustic technologies for red tides and similar issues. He also inquired about whether mapping would be covered by the AMS Center.

Ms. Theroux noted that the Environmental Technology Council *Top 10* included arsenic in drinking water (which ETV is already working on) and microbial contamination. The big issues in Region 1 are beach closures and storm water monitoring (determining the source of contamination).

NEXT STEPS/NEXT MEETING

The next steps for the various priority technology categories were identified as follows:

- Mictocystin ELISA test kits
 - Submit a proposal with Ms. Link to the State of Nebraska for co-funding
 - Potentially implement an ETV test in summer 2006
- Pesticide test kits
 - Close to ready to proceed
 - Find co-funding and test collaborators
 - If a good opportunity is found, cycle back to stakeholders for recommendation on how to proceed
- *In situ* algal monitors
 - Check the ACT reports for available verification information
 - Determine whether there are gaps in the performance data
 - Cycle back to stakeholders for recommendation on how to proceed
- Perchlorate monitors
 - Look for co-funding/test collaborators
 - Confirm vendors
 - Make contact with the ITRC perchlorate group
- Dissolved oxygen probes
 - Discuss opportunities for collaboration with Vito Minei
 - Review ACT testing
 - Invite ACT speaker to next stakeholder meeting

Ms. Riggs also noted that consideration is being given to adding stakeholders to the official committee, and requested suggestions of additional stakeholders on the evaluation forms. Dr. Bradbury thanked stakeholders and observers for attending the meeting. A potential time for the next meeting in late April or early May 2006 was discussed, somewhere on the West Coast.