CONFERENCE PROGRAM

AIR QUALITY MEASUREMENT
METHODS AND TECHNOLOGY
MARCH 8-9, 2022 • SAN DIEGO, CA

Sponsored by:
CONFERENCE PROGRAM

GENERAL INFORMATION

CONFERENCE OVERVIEW

One of our most popular specialty conferences, the Air Quality Measurement Methods and Technology Conference returns in person in 2022 with its extensive coverage of all aspects of air measurement methodologies, including associated quality assurance protocols and how to use and interpret data. Sessions will also focus on the assessment of key substances of concern for humans and the environment, including criteria pollutants and greenhouse gases, air toxics, and emerging pollutants such as PFAS and ethylene oxide.

REGISTRATION

Register online at www.awma.org/measurements. Your registration will not be processed without payment. Conference check-in and badge pickup will be held at The Westin San Diego during the following hours:

Tuesday, March 8  7:30 am - 5:00 pm
Wednesday, March 9  7:30 am - 12:00 pm

LOCATION AND LODGING

The Westin San Diego
400 West Broadway
San Diego, CA 92101
Phone: 619-239-4500

CONFERENCE COMMITTEE

Conference Chair:
Eric Winegar, Sonoma Technology, Inc.

Technical Program Committee:
Sara Head, Yorke Engineering
Ian MacGregor, Battelle
Ray Merrill, EPA
Ned Shappley, EPA

PRESENTERS’ MEETING

Presenters and Session Chairs will meet on the day of their session involvement in the room in which their session will be held (Crystal Ballroom 1, Crystal Ballroom 2, or Opal) to review program details. Presenters should bring their presentations on a memory stick/USB to this meeting, as well as a brief biography.

CONFERENCE PROCEEDINGS

Conference proceedings will be accessible to all full conference registrants for viewing and download for a limited time following the conference. Attendees will be notified by email when the presentations are available.

CONTINUING EDUCATION UNITS

Conference attendees may be eligible for continuing education credits and can apply to receive a Certificate of Participation for the sessions attended. For more information, please contact Gloria Henning at +1-412-904-6021 or ghlenning@awma.org.

SPECIAL ACCOMMODATIONS

The Air & Waste Management Association supports the Americans with Disabilities Act (ADA). Attendees requiring specific equipment, food, or services should contact Cindy Fontanesi at cfontanesi@awma.org to make those needs known in advance. A&WMA will make every reasonable effort to accommodate them.

ABOUT THE AIR & WASTE MANAGEMENT ASSOCIATION

A&WMA is a non-profit, nonpartisan professional organization that enhances knowledge and expertise by providing a neutral forum for technology exchange, professional development, networking opportunities, public education, and outreach to more than 5,000 environmental professionals in 65 countries. A&WMA also promotes global environmental responsibility and increases the effectiveness of organizations to make critical decisions that benefit society. For more information, please visit www.awma.org.
As a VOC monitoring expert, TricornTech offers a wide product range from portable precision instruments to online systems and comprehensive air quality monitoring software applications. In addition to our superior gas analysis technology used for monitoring airborne molecular contamination (AMC) in semiconductor applications and volatile organic compounds (VOCs) in the surrounding environment, complete solutions for detecting LNAPL/DNAPL (light/dense non-aqueous phase liquid) contaminants are also available. We are committed in offering solutions and services to our clients which are critical in the achievement of their success.

Please stop by our booth to find out more about how we can create the perfect monitoring package tailored to your specific budget and testing requirements. www.tricornech.com

Dealing with the logistics and implications of environmental issues is vital. Typically, however, it’s also complicated, time-consuming, and expensive. At Montrose, we know there’s a better way. Employing 1,400 employees in over 60 locations, our innovative business model, focus on environmental solutions, and integrated approach to design, engineering, and operations can put you well ahead of the curve by applying the latest technologies in practical ways to solve difficult environmental challenges today – and prepare for what’s coming tomorrow. From lab services to stack testing to regulatory compliance, we’re helping clients blaze new trails. www.montrose-env.com

ENMET manufactures a wide array of environmental and industrial health and safety monitoring instruments. Our new GC based products offer a new cost effective approach to benzene trace level detection (sub ppb) at the Fenceline and in the workplace with the ability to provide specific gas analysis in complex mixtures. www.enmet.com

Teledyne API designs and builds a complete line of precision air quality monitoring instrumentation at its headquarters and factory in San Diego, California. These instruments utilize proven measurement principles and comply with the U.S. Environmental Protection Agency, European Union and other requirements for ambient air quality monitoring, continuous emissions monitoring, and a number of other applications. www.teledyne-api.com

Magee Scientific is the originator of the Aethalometer®; the Total Carbon Analyzer; and other instruments for measuring carbonaceous aerosols. Our equipment is rugged, reliable and designed for real-world monitoring applications. Performance may be validated in the field by NIST-traceable standards kits. www.mageesci.com

Clarity Movement is transforming how governments, campuses, businesses, and communities understand and respond to air pollution. Clarity provides the most complete, scalable air monitoring solution, with unmatched hardware, software, and expert services. Used in more than 60 countries around the world, Clarity solutions empower our customers with continuous monitoring, for accurate data in a fully supported, worry-free environment. www.clarity.io
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BRONZE SPONSORS

AethLabs, located in San Francisco, California, designs and manufactures small, mobile Black Carbon particulate matter monitors. AethLabs is focused on the development of high quality portable environmental and personal exposure monitoring instruments. The microAeth® MA series of Black Carbon particulate matter monitors consists of continuous, unattended, multi-wavelength instruments that can be used to distinguish between diesel and biomass emissions. The microAeth® MA series boasts many advanced measurement features integrated into battery powered, lightweight and compact form factors that are small enough to fly on UAVs. www.aethlabs.com

Met One Instruments Inc. provides reliable, affordable, precision instrumentation for monitoring ambient & indoor air quality and controlled environments. We also have a full Meteorological line of precision instrumentation. We engineer and manufacture products from our facilities located in Oregon, New York, and Maryland. Our customer service, including ongoing after-the-sale service support, is the best in the industry. All our products are made in the USA. We are an ISO9001:2015 certified company. www.metone.com

ECOMESURE is a technology development company specialized in instrumentation and connected systems for environmental and operational data monitoring and analysis, and as such, develops, manufactures and distributes on worldwide basis, IoT gateways for any kind of sensors, low-cost connected stations for outdoor and indoor air quality monitoring and associated services on web platform in SaaS mode for controlling sensors and manage data. The technology is patented in Europe and the USA and distinguishes itself by the high level of security in relation to the transfer of data, which is a critical issue for sensitive infrastructures. ECOMESURE’s solutions are simple, effective, affordable and therefore ideal for industrialists, local authorities, QHSE monitoring suppliers and engineering companies who are looking for easy-to-use and qualified solutions. ECOMESURE is already heavily involved in various Smart City and Smart Factory projects and works with several major stakeholders. www.ecomesure.com

DR DAS LTD is the pioneer in digital data collection. Learn about innovative data acquisition and control solutions for air quality, emissions and property line monitoring. Envidas Ultimate DAS, EnvistaARM and public information products (Websites, Kiosks, Telephony, Mobile Apps) will be on display. Learn why 40+ agencies rely on DRDAS. www.dr-das.com

URG is helping to ensure the air we breathe is the best it can be by creating the Ambient Ion Monitor (AIM) for the time-resolved, direct measurement of gas (hydrogen chloride, nitric acid, nitrous acid, sulfur dioxide, ammonia) and artifact free particulate matter (nitrate, sulfate, nitrite, phosphate, chloride ammonium, sodium, calcium, potassium, magnesium) air pollutants. We specialize in Teflon coated cyclones with various cut-points and flow rates, and stainless steel cyclones for diesel emissions. www.urgcorp.com
### TECHNICAL PROGRAM – Tuesday, March 8

**7:30 am - 5:00 pm**
Conference Registration  
Ballroom Foyer

**7:30 am - 8:30 am**  
Continental Breakfast and Presenters’ Meeting  
Emerald Ballroom and Session Rooms

**7:30 am - 6:00 pm**  
Exhibition Viewing  
Emerald Ballroom

**8:30 am - 10:00 am**
Crystal Ballrooms 1 & 2

**Opening Remarks** – Eric Winegar, Conference Chair

**Keynote Presentations**
Matthew Lakin, Deputy Director, Air and Radiation Division, EPA Region 9  
Joseph Lyou, President & CEO, California Coalition for Clean Air

**10:00 am - 10:30 am**
Networking Break and Exhibition Viewing (Emerald Ballroom)

#### Session 1A: Sensors/Next Generation Monitoring 1
[concurrent with Session 1B and 1C]  
Crystal Ballroom 1

**Chair:** Nick Spada, University of California, Davis

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<thead>
<tr>
<th>Time</th>
<th>Session 1A: Sensors/Next Generation Monitoring 1</th>
<th>Session 1B: Measurement Performance 1</th>
<th>Session 1C: Fugitive VOC Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 am – 10:55 am</td>
<td>ME25 Advancing Air Quality Monitoring in Environmental Justice Communities of the South Coast Air Basin, CA: Design and Development of a Novel Multi-metal Mobile Platform Mohammad H. Sowlat, Sina Hasheminassab, Steven Boddeker, Avi Lavi, Christopher Lim, Pami Mukherjee, Payam Pakbin, Andrea Polidori, South Coast Air Quality Management District, Diamond Bar, CA; Jamie Berg, Cooper Environmental Services, LLC., Portland, OR</td>
<td>ME15 Evaluation of Continuous Ambient FRM and FEM NO2 Instruments in the Athabasca Oil Sands Region, Alberta, Canada and the Potential Impact on Ambient Regulatory Compliance Matthew Landis, Integrated Atmospheric Solutions, LLC, Cary, NC; Eric S. Edgerton, Atmospheric Research &amp; Analysis, Inc., Cary, NC</td>
<td>ME48 Next Generation Air Monitoring Methods to Provide Baseline Emissions from Refineries Johan Mellqvist, Chalmers University of Technology, Gothenburg, Sweden; Jerker Samuelsson, Brian Offerle, Samuel Brohede, Pontus Andersson, Oscar Isoz, Marianne Ericsson, FluxSense Inc., San Diego, CA</td>
</tr>
<tr>
<td>11:20 am – 11:45 am</td>
<td>ME23 ASCENT-A New Ground Based High Time Resolution Air Quality Monitoring Network Ann Dillner, University of California, Davis, CA</td>
<td>ME53 Studying the impact of COVID-19 on Air Quality in Toronto, Ontario Priya Patel, Matthew Adams, University of Toronto Mississauga, Ontario, Canada</td>
<td>ME71 The DART by ERG Scott Sholar, Eastern Research Group, Inc., Raleigh, NC</td>
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**12:10 pm – 1:20 pm**  
Lunch for all sessions  
Outside Pool Deck
Session 2A: Sensors/Next Generation Monitoring 2
(concurrent with Session 2B and 2C)
Crystal Ballroom 1
Chair: Nick Spada, University of California, Davis

1:20 pm – 1:45 pm
ME34
A Paradigm Shift of Air Quality Monitoring, Requirements for the Next Generation Optical Particle Sensor and its Applications
Aaron Soh, Vincent Ratford, Raj Seelam, Piera Systems Inc, Mississauga, ON, Canada

1:45 pm – 2:10 pm
ME58
Distributed Air Quality Sensing for Monitoring and Characterizing Combustion Sources
Julien Caubel, Troy Cados, Distributed Sensing Technologies, San Francisco, CA; Xiaoliang, Wong, John Watson, Judith Chow, Desert Research Institute, Reno, NV

2:10 pm – 2:35 pm
ME26
How to Get Accurate Measurements from Micro-sensors
Julie Pelletier, Ecomesure, Massachusetts

2:35 pm - 3:00 pm
ME66
Distributed Network of Sensors for Real Time Air and Water Monitoring
Radu Motisan, uRADMonitor Network, Magnasci SRL Romania

Session 2B: Measurement Performance 2
(concurrent with Session 2A and 2C)
Crystal Ballroom 2
Chair: Ian MacGregor, Battelle

1:20 pm – 1:45 pm
ME43
Determination of Industrial Influences on the Neighboring Antioch Dunes National Wildlife Refuge
Nicholas Spada, Alison McNally, Travis Longcore, University of California, Davis, CA

1:45 pm - 2:10 pm
ME30
Agilent PAMS AutoGC Data: Review and Validation of 2019 Data
Andrea Connelly, Carol J. Meyer, Orsat, LLC, Pasadena, TX

2:10 pm - 2:35 pm
ME74
Experts Panel Review of Solar Occultation Flux and Other Measurements to Determine Emission Factors from the Oil and Gas Refinery Sector
Peter G. Zemek, Montrose Environmental Group; Robert T. Menzies, Jet Propulsion Laboratory, California Institute of Technology (retired); Mark Yocke, Exponent; John Watson, Desert Research Group; Curtis T. Laush, Geosyntec Consultants, CA

Session 2C: Fugitives and Odor
(concurrent with Session 2A and 2B)
Opal
Chair: Greg Wolffe, Yorke Engineering, LLC

1:20 pm – 1:45 pm
ME47
Using Mobile ORS Based Flux Measurements for Agricultural Measurements
Johan Mellqvist, Chalmers University of Technology, Gothenburg, Sweden; Jerker Samuelsson, Brian Offerle, Samuel Brohede, Pontus Andersson, Oscar Isoz, Marianne Ericsson, FluxSense Inc., San Diego, CA

1:45 pm - 2:10 pm
ME07
Particulate Matter Annual Emission Factors for Dairy Facilities and Cattle Feedlots of Texas
Mohammad Ruzlan Habib, Sergio Capareda, Texas A&M University, College Station, TX

2:10 pm - 2:35 pm
ME56
Application of an Odor Attribution Study to Evaluate the Odors Produced from Different Nuisance Odor Sources
Yuge (Gloria) Bian, Zhihang (Peter) Yin, Bart Kraakman, Scott Cowden, Mel Suffet, University of California Los Angeles, CA

2:35 pm - 3:00 pm
ME68
Real-Time Nuisance Odor Monitoring and Notification System
Greg Wolffe, Yorke Engineering, LLC, San Juan Capistrano, CA

Networking Break and Exhibition Viewing
Emerald Ballroom

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### TECHNICAL PROGRAM – Tuesday, March 8, cont.’

| Session 3A: Sensors/Next Generation Monitoring 3  
[concurrent with Session 3B and 3C]  
Crystal Ballroom 1 | Session 3B: Community Monitoring  
[concurrent with Session 3A and 3C]  
Crystal Ballroom 2 | Session 3C: National Monitoring Programs  
[concurrent with Session 3A and 3B]  
Opal |
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<td><strong>Chair:</strong> Nick Spada, University of California, Davis</td>
<td><strong>Chair:</strong> Olivia Ryder, Sonoma Technology</td>
<td><strong>Chair:</strong> James Westbrook, BlueScape</td>
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<tr>
<th>Time</th>
<th><strong>Session 3A</strong></th>
<th><strong>Session 3B</strong></th>
<th><strong>Session 3C</strong></th>
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</table>
| 3:30 pm – 3:55 pm | ME11 titled “Advanced Online Monitoring Management of NGEM Automatic Field-GC for HAPs Source Tracking and Emission Reduction at Industrial Complexes”  
by Allen Chou, Tricorn Tech, San Jose, CA; Chung-Laiing Tai, Taiwan EPA | ME81 titled “Air Sensors for Education and Community Engagement”  
by Olivia S. Ryder, Sonoma Technology, Petaluma, CA; Sensor Loan Programs; Sensor Maker Kits; Steve G. Brown, Sonoma Technology, Petaluma, CA; Sensor Loan Programs; Rachelle M. Duval, U.S. EPA, Office of Research and Development, Research Triangle Park, NC; Sensor Loan Programs; Andrea L. Clements, U.S. EPA, Office of Research and Development, Research Triangle Park, NC; Sensor Loan Programs | ME44 titled “Organic and Elemental Carbon, Inorganic Ions, Elements and Organic Matter Composition Measured at Federal Reference Method Sites Determined by Non-destructive Spectrometry”  
by Anahita Amiri-Farahani, Andrew T. Weakley, Ann M. Dillner, University of California, Davis, CA |
| 3:55 pm – 4:20 pm | ME03 titled “Field Demonstration of Novel Sensor-based GC Technologies to Detect Fugitive VOC Emissions in Dallas, TX”  
by Ingrid George, Eben Thoma, Rachelle Duvall, EPA ORD CEMM, RTP, NC; Michael Miller, Mark Sather, Suzanne Apodaco, EPA Region 6, Dallas, TX; Parikshit Deshmukh, Alexia Scott, Jacobs Technology, RTP, NC; Geoff Henshaw, Aeroqual Ltd, Auckland, New Zealand | ME57 titled “Implementing Flow Control in the IMPROVE Network using Variable Speed Pumps”  
by Christopher D. Wallis, UC Davis Air Quality Research Center, Davis, CA | ME57 titled “Implementing Flow Control in the IMPROVE Network using Variable Speed Pumps”  
by Christopher D. Wallis, UC Davis Air Quality Research Center, Davis, CA |
| 4:20 pm – 4:45 pm | ME75 titled “IoT VOC Monitoring using a fully Autonomous & Hermetically Sealed MEMS Based uGC”  
by Nabil Saad, Sassan Teymouri, Omniscent, Inc., San Jose, CA | ME04 titled “Building Effective Local Air Quality Monitoring Capacity with Sensor Network”  
by David Lu, Clarity Movement Co., Berkeley, CA | ME22 titled “Towards Organic Sulfur Measurement in IMPROVE Network Samples”  
by Marife B. Anunciado, Ann M. Dillner, Air Quality Research Center, University of California, Davis, CA; Tracy Dombek, Miranda De Boskey, Laura Haines, Katarina Lindskog, Research Triangle Institute, Research Triangle Park, NC |

**Networking Reception in the Exhibit Hall**  
Emerald Ballroom  
Explore our exhibits, learn about their services, and make connections with all conference attendees!
**Session 4A: PFAS Measurement 1**  
[concurrent with Sessions 4B and 4C]  
Crystal Ballroom 1  
Chair: Gary Hunt, TRC Companies

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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>8:30 am – 8:55 am</td>
<td>ME20 Progress in Development of Stack Sampling Methods to Measure PFAS in Air Emissions from Stationary Sources</td>
<td>Wesley Fritz, Weston Solutions, Inc., West Chester, PA</td>
</tr>
<tr>
<td>8:55 am – 9:20 am</td>
<td>ME51 Determination of PFAS Removal Efficiency by a Non-Destructive Solids Treatment Unit</td>
<td>Michael Kroll, Montrose Air Quality Services, LLC, New Braunfels, TX; Bryan Vining, Enthalpy Analytical LLC, Wilmington, NC</td>
</tr>
<tr>
<td>9:20 am – 9:45 am</td>
<td>ME62 Development of a Thermal Desorption Cavity Ring Down Spectroscopy Analyzer to Detect PFAS Compounds in Ambient Air</td>
<td>Jake Margolis, Michael Armen, Aurelie Maricotte, Anthony Miller, Entanglement Technologies, Inc., San Bruno, CA</td>
</tr>
<tr>
<td>9:45 am – 10:10 am</td>
<td>ME67 Exposure to PFAS from Indoor Air</td>
<td>Thomas Webster, Boston University School of Public Health, Boston, MA</td>
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**Session 4B: Point Source Methods**  
[concurrent with Sessions 4A and 4C]  
Crystal Ballroom 2  
Chair: Tony Wong, AirKinetics, Inc.

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<tr>
<td>8:55 am – 9:20 am</td>
<td>ME12 EPA ALT-100: A Safe and Viable Tool for Flare Testing and BTU Calculations</td>
<td>Taylor Gross, Enthalpy Analytical, Durham, NCC</td>
</tr>
<tr>
<td>9:20 am – 9:45 am</td>
<td>ME59 Verifying Alternative Gaseous Fuels Composition to Prevent Hazardous Air Pollutant Emissions During Combustion</td>
<td>David Elam, TRC Companies, Highlands, NC</td>
</tr>
<tr>
<td>9:45 am – 10:10 am</td>
<td>ME42 Using TDLS &amp; UVDOAS Integrated Path Analyzers to Monitor O2, CO, CO2, NO, NO2, NOx, H2O, SO2, H2S, HCl, HF, NH3 for Compliance CEMS and Process Monitoring</td>
<td>Gary Cacciatore, CEMTEK KVB-Enertec, Santa Ana, CA</td>
</tr>
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**Session 4C: Optical Sensing for Fenceline Monitoring 1**  
[concurrent with Sessions 4A and 4B]  
Opal  
Chair: Steve Schill, Sonoma Technology

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<tr>
<td>8:30 am – 8:55 am</td>
<td>ME19 Refinery Fenceline Open Path Monitoring Rule 1180, Lessons Learned Detection Limits and QA</td>
<td>Gilad Shpitzer, Steve LaZar, Atmosfi Optics, Ltd., Elizabeth, CO</td>
</tr>
<tr>
<td>8:55 am – 9:20 am</td>
<td>ME72 Lessons Learned from Two Years of Refinery Fenceline Monitoring in California</td>
<td>Josette E. Marrero, Steven R. Schill, Clinton MacDonald, Sonoma Technology, Petaluma, CA</td>
</tr>
<tr>
<td>9:20 am – 9:45 am</td>
<td>ME55 Fence-line Monitoring Provisions</td>
<td>Eric Stevenson, Argos, Camas, WA</td>
</tr>
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10:10 am - 10:40 am  
Networking Break and Exhibition Viewing  
Emerald Ballroom  
Sponsored By:
**Session 5A: PFAS Measurement 2**  
(concurrent with Sessions 5B and 5C)  
Crystal Ballroom 1  
**Chair:** Gary Hunt, TRC Companies  
10:40 am – 11:05 am  
ME77  
EPA PFAS Emissions Measurement Method OTM-45  
Jeffrey Ryan, EPA Office of Research and Development Center for Environmental Measurement and Modeling, Chapel Hill, NC  
11:05 am – 11:30 am  
ME78  
PFAS PIC Assessment in Source Air and Ambient Air Background Measurements  
Eric Redman, Taryn McKnight, Eurofins Environment Testing America, West Sacramento, CA  
11:30 am – 11:55 am  
ME80  
Measurement of Fluorinated and other Volatile Compounds from Incomplete PFAS Destruction in Incineration Using FTIR Spectroscopy  
Tom Dunder, TRC Companies, Raleigh, NC; Jonathan Krug, William Roberson, EPA/ORD, Research Triangle Park, NC

**Session 5B: New Methods Innovations 1**  
(concurrent with Sessions 5A and 5C)  
Crystal Ballroom 2  
**Chair:** Glenn England, Ramboll  
10:40 am – 11:05 am  
ME14  
Real-time VOC Analysis: Highlights from the Syft Clean Air Roadshow  
Leslie P. Silva, Anthony Qualley, Rafael Acosta, Barry Prince, Paul Wilson, Damien Fischer, Syft Technologies, Inc., San Francisco, CA  
11:05 am – 11:30 am  
ME24  
Innovative Solvent-based Sampling Method for Collecting and Conducting Compound-specific Isotope Analysis (CSIA) on Gas-phase VOC  
Daniel Bouchard, Contam-i-sotopes, inc., St-Bruno, Qc, Canada; Orfan Shouakar-Stash, Isotope Tracer Technologies Inc., Waterloo, Ontario, Canada  
11:30 am – 11:55 am  
ME36  
Ambient Air Monitoring and Monitoring Network Assessments  
Bryan Bibeau, Teledyne Advanced Pollution Instruments, Fort Collins, CO

**Session 5C: Optical Sensing for Fenceline Monitoring 2**  
(concurrent with Sessions 5A and 5B)  
Opal  
**Chair:** Steve Schill, Sonoma Technology  
10:40 am – 11:05 am  
ME4  
BTEX Monitoring Inside a Refinery Using UCLA’s Optical Tent: Lessons Learned from 18 Months of Continuous Operation  
Jochen Stutz, Fedele Colosimo, Sol Cooperdock, Olga Pikelnaya, Andrea Polidor, University of California Los Angeles, CA  
11:05 am – 11:30 am  
ME76  
The NASA TEMPO Mission: Unprecedented Remote Sensing Data for AQ Management Applications  
Aaron Naeger, Mike Newchurch, University of Alabama, Hunstville, AL; Tom Moore, Western States Air Resources Council, Fort Collins, CO; Dan Welsh, Department of Public Health & Environment, Denver, CO; Xiong Liu, Kelly Chance, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA

12:00 pm – 1:10 pm  
Lunch for all sessions  
Outside Pool Deck

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## TECHNICAL PROGRAM – Wednesday, March 9, con’t.

### Session 6A: Ethylene Oxide (EtO) Measurement Advances 1
[concurrent with Sessions 6B and 6C]
Crystal Ballroom 1

**Chair:** Julie Swift, ERG

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<tr>
<td>1:10 pm – 1:35 pm</td>
<td>ME65</td>
<td>Development of GMACS Calibration Standards for Trace Ethylene Oxide</td>
<td>Stephen Miller, Robert J. Grasmeder, James L. McHale, John C. Fitz, Donna M. McClain, Jenna A. Vonnahme, Airgas Exploratory Products, Doylestown, PA</td>
</tr>
<tr>
<td>1:35 pm – 2:00 pm</td>
<td>ME27</td>
<td>Analysis of Ethylene Oxide by EPA Method TO-15 and Revised EPA Method TO-15A</td>
<td>Mitchell Howell, Kyle Rasmus, Julie L. Swift, Donna Tedder, Eastern Research Group, Inc., Morrisville, NC</td>
</tr>
<tr>
<td>2:00 pm – 2:25 pm</td>
<td>ME63</td>
<td>AROMA-ETO Part per trillion sensitive, Realtime Ethylene Oxide Measurements in Ambient Air</td>
<td>Anthony Miller, Jake Margolis, Michael Armen, Aurelie Marotte, Entanglement Technologies, Inc., San Bruno, CA</td>
</tr>
<tr>
<td>2:25 pm – 2:50 pm</td>
<td>ME38</td>
<td>Monitored and Modeled Ambient Air Concentrations of Ethylene Oxide: Contextualizing Health Risk for Potentially Exposed Populations</td>
<td>R.C. Lewis, C.G. DesAutels, H.N. Watson, P.J. Sheehan, Exponent Inc., Oakland, CA</td>
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### Session 6B: New Methods Innovations 2
[concurrent with Sessions 6A and 6C]
Crystal Ballroom 2

**Chair:** Glenn England, Ramboll

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<tr>
<td>1:10 pm – 1:35 pm</td>
<td>ME10</td>
<td>Robust and Low-Cost Drag-Based Anemometer</td>
<td>Lawrence Tsai, Antara Das, University of California, Davis, CA</td>
</tr>
<tr>
<td>1:35 pm – 2:00 pm</td>
<td>ME29</td>
<td>Next Generation Automated Filter Light Absorption Instrument</td>
<td>Ilia Potanin, University of California, Davis, CA</td>
</tr>
<tr>
<td>2:00 pm – 2:25 pm</td>
<td>ME16</td>
<td>Exploring Organic Matter and Functional Groups in Particulate Matter Using FT-IR Spectrometry</td>
<td>Dominique Young, Andrew Weakley, Sean Raffuse, Ann Dillner, University of California, Davis, CA</td>
</tr>
<tr>
<td>2:25 pm – 2:50 pm</td>
<td>ME37</td>
<td>Advances in Continuous Monitoring of Trace Level Air Toxics by FTIR</td>
<td>Kelly McPartland, Martin L. Spartz, Max Analytical Technologies, East Windsor, CT</td>
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### Session 6C: Oil and Gas — Methane/GHG Assessment 1
[concurrent with Sessions 6A and 6B]
Opal

**Chair:** Ken Underwood, T&B Systems

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<tr>
<td>1:35 pm – 2:00 pm</td>
<td>ME06</td>
<td>Single Photon Infrared Lidar Imagers for Long Range, Continuous and Autonomous Methane Monitoring</td>
<td>Aaron Van Pelt, Murray Reed, Xiao Ai, James Titchener, Doug Millington-Smith, QLM Technology Ltd., UK</td>
</tr>
<tr>
<td>2:00 pm – 2:25 pm</td>
<td>ME52</td>
<td>Detection, Identification, and Quantification of Fugitive Methane Emissions Using Thermal Infrared Hyperspectral Imaging</td>
<td>Benjamin Saute, Jean-Phillipe Gagnon, Martin Lariviere-Bastien, Martin Chamberland, Telops, Quebec City, Canada</td>
</tr>
<tr>
<td>2:25 pm – 2:50 pm</td>
<td>ME39</td>
<td>Characterizing Emissions from California Biomethane Facilities</td>
<td>Stephanie Shaw, Electric Power Research Institute (EPRI), Palo Alto, CA; Eladio Knipping, EPRI, Washington, DC; Femi Peter Alege, Hamed El Mashad, Frank Mitloehner, Ramin Yazdani, Yongqing Zhao, University of California, Davis, CA; Grant Avizian, Michael Thorpe, Bridger Photonics, Bozeman, MIT; Paul Imhoff, University of Delaware, Newark, DE</td>
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### Networking Break and Exhibition Viewing
Emerald Ballroom

Sponsored By:
**Session 7A: EtO Measurement Advances 2**  
[concurrent with Session 7C]  
Crystal Ballroom 1  
Chair: Julie Swift, ERG

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<tr>
<th>Time</th>
<th>Session</th>
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<th>Presenters</th>
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<tr>
<td>3:20 pm – 3:45 pm</td>
<td>ME18</td>
<td>Advanced Technologies for Real Time Ethylene Oxide Fence-Line Perimeter Monitoring</td>
<td>Gilad Shpitzer, Steve LaZar, Atmosfir Optics, Ltd., Elizabeth, CO</td>
</tr>
<tr>
<td>3:45 pm – 4:10 pm</td>
<td>ME41</td>
<td>Real-time Ethylene Oxide and VOC Measurements in Source and Ambient Applications</td>
<td>Gregor Lucic, Kai Skog, Chris Rella, Picarro, Inc., Santa Clara, CA</td>
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<tr>
<td>4:10 pm – 4:35 pm</td>
<td>ME69</td>
<td>CRDS Validation and OTM Development Specific to Ethylene Oxide</td>
<td>Josh Childers, Volker Schmid, Clean Air Engineering, Inc., Pittsburgh, PA; Don Allen, Clean Air Engineering, Inc., Palatine, IL; Gregor Lucic, Dave Miller, Picarro, Inc., Santa Clara, CA</td>
</tr>
<tr>
<td>4:35 pm – 5:00 pm</td>
<td>ME45</td>
<td>Intercomparison of Ethylene Oxide Measurement Methods Under Controlled and Relevant Atmospheric Conditions</td>
<td>Alireza Gitipour, Ingrid George, Tiffany Yelverton, Michael Lewandowski, Eben Thoma, Kathy Loftis, Gustavo Queiro, EPA, Cincinnati, OH</td>
</tr>
</tbody>
</table>

**Session 7C: Oil and Gas — Methane/GHG Assessment 2**  
[concurrent with Session 7A]  
Opal  
Chair: Ken Underwood, T&B Systems

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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<th>Presenters</th>
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<tbody>
<tr>
<td>3:20 pm – 3:45 pm</td>
<td>ME46</td>
<td>Using Mobile ORS Based Flux Measurements to Assess GHG from Large Scale Oil and Gas Production</td>
<td>Johan Mellqvist, Chalmers University of Technology, Gothenburg, Sweden; Jerker Samuelsson, Brian Offerle, Samuel Brohede, Pontus Andersson, Oscar Isoz, Marianne Ericsson, FluxSense Inc., San Diego, CA</td>
</tr>
<tr>
<td>3:45 pm – 4:10 pm</td>
<td>ME40</td>
<td>Multi-Tiered GHG Emissions from Natural Gas Powered Industrial and Fueling Infrastructure</td>
<td>Stephanie Shaw, Benjamin Kaldunski, Electric Power Research Institute (EPRI); Markus Bill, Mark Conrad, Marc Fischer, Seongeun Jeong, Lawrence Berkeley National Laboratory, Berkeley CA; Christopher Moore, Gerry Bong, formerly of Gas Technology Institute, Des Plaines, IL; Steve Conley, Mackenzie Smith, Scientific Aviation, Boulder, CO; Kevin Crosby, Montrose Incorporated, Playa Del Rey, CA</td>
</tr>
<tr>
<td>4:10 pm – 4:35 pm</td>
<td>ME05</td>
<td>Mapping Historic 1860’s Oil Wells using UAV-Based High-Resolution LiDAR Along Pioneer Run in Oil Creek State Park, Pennsylvania</td>
<td>Mumbi Mundia-Howe, James I. Sams, Patricia Saint Vincent, Matthew D. Reeder, Natalie J. Pekney, National Energy Technology Laboratory (NETL), Pittsburgh, PA</td>
</tr>
<tr>
<td>4:35 pm - 5:00 pm</td>
<td>ME32</td>
<td>Using Python to Process Large Datasets of Ambient Methane Levels to Comply with CARB Requirements for Natural Gas Underground Storage Facilities</td>
<td>Katy Muirhead, Burns &amp; McDonnell, Los Angeles, CA</td>
</tr>
</tbody>
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**CONFERENCE ADJOURNS**  
5:00 pm
2B Technologies Inc.  
www.twobtech.com

2B Technologies is dedicated to the development and commercialization of new analytical instruments for atmospheric and environmental measurements. We specialize in miniaturized instruments for measurements of ozone (O3), nitric oxide (NO), nitrogen dioxide (NO2), mercury (Hg), black carbon, PM2.5, and other chemical species in air. Our AQSync Complete Air Monitoring Package provides measurements of all the most important air pollutants by utilizing a combination of FEM ozone and NO2 measurements with proven near reference grade techniques for measuring CO and PM.

AethLabs  
www.aethlabs.com

AethLabs, located in San Francisco, California, designs and manufactures small, mobile Black Carbon particulate matter monitors. AethLabs is focused on the development of high quality portable environmental and personal exposure monitoring instruments. The microAeth® MA series of Black Carbon particulate matter monitors consists of continuous, unattended, multi-wavelength instruments that can be used to distinguish between diesel and biomass emissions. The microAeth® MA series boasts many advanced measurement features integrated into battery powered, lightweight and compact form factors that are small enough to fly on UAVs.

Air Resource Specialists, Inc.  
www.air-resource.com

Air Resource Specialists, Inc. (ARS) has nationally recognized expertise in operating air quality, meteorology and visibility monitoring programs and conducting comprehensive special studies. Formed in 1981, ARS has successfully conducted a wide range of projects for federal, state, municipal and tribal agencies, as well as industrial clients. Areas of special expertise include: monitoring for criteria pollutants, volatile organic compounds (VOCs), meteorology and visibility; data analysis; research, audit, and instrument services; air quality and visibility modeling; and environmental compliance services. Our staff of scientists, field specialists, data analysts and support personnel operate over 100 monitoring sites nationwide, including large and small networks in urban, rural, and remote locations.

Alliance  
www.alliancetechnicalgroup.com

Alliance is the national leader in air emissions monitoring, testing, and analytical services nationwide. Alliance continues to expand its footprint in all air-related services, strengthening the company, providing a career path for its more than 700 employees, and offering its customers unmatched service, quality results, and competitive pricing.

Ambilabs  
www.ambilabs.com

Ambilabs specializes in supplying innovative ambient air monitoring technology solutions. Our experienced staff provide instrumentation, systems and solutions for obtaining valid, accurate, and precise air quality data. We directly supply, install, and train on a broad range of gas and particulate monitoring instrumentation for our customers in Canada, USA, and the Caribbean. Please visit our booth to discuss the latest “Airpointer” which is an EPA FEM & FRM designated air monitoring “station in a suitcase”, and also the new AqMesh suite of pollutant monitoring sensors packaged together into a tiny pod that is no larger than a football. Also ask about our latest “2WIN” high precision particulate/haze/visibility monitoring sensor solution.

American EcoTech  
www.americaneotech.com

American Ecotech specializes in supplying state of the art instruments measuring specific gases, aerosols, and particulate airborne matter, including gas analyzers to measure NOx, CO, SO2, CO2, NH3, H2S, NOy, and/or ozone. We supply digital dataloggers, and advanced remote maintenance software for automated field data validation and reporting.

Atmosfir  
www.atmosfir.net

Atmosfir is a full service, air monitoring, systems integration company, specializing in advanced technology for open path, remote sensing, fence line and perimeter monitoring. We utilize the best available technology and hardware to provide clients with the best air monitoring solutions. Atmosfir continues to innovate, pushing the envelope of technology with many years of field experience, supporting multiple industries throughout the world. Our unique and proprietary spectral and spatial data fusion algorithms provide low level detection, positive identification, and source location. We provide the most innovative solutions to meet client needs.

Cooper Environmental/SCI  
www.sci-monitoring.com

Cooper Environmental is the recognized global leader in metals measurement technology. The company was the first to develop and commercialize near real time measurement of metals using X-ray fluorescence (XRF). Its ambient metals monitor, the Xact 625i, has demonstrated accuracy in numerous studies and peer reviewed journal articles and it is used by researchers, environmental agencies and metal producing industries throughout the world. In addition to its ambient metals monitor the company also makes instruments to measure metals in smoke stacks and water and it offers a complete line of sensor based measurements (Sold under the Sailbri Cooper Inc brand name) for criteria pollutants (SO2, CO, O3, NO2, PM10 and PM2.5), hazardous gases (HCl, Cl2, H2S, HF, NH3) and total VOCs.

DSTech  
www.dstech.io

DSTech develops uniquely flexible and reliable air quality sensing solutions. The ObservAir is a rugged handheld unit that simultaneously monitors black carbon and up to two gaseous pollutants. Patented technology maintains measurement accuracy in harsh operating conditions, and wireless modules provide real-time data to your phone and PC from nearly anywhere.

DR DAS LTD  
www.dr-das.com

DR DAS LTD is the pioneer in digital data collection. Learn about innovative data acquisition and control solutions for air quality, emissions and property line monitoring. Envidas Ultimate DAS, EnvistaARM and public information products (Websites, Kiosks, Telephony, Mobile Apps) will be on display. Learn why 40+ agencies rely on DRDAS.
ECOMESURE  
www.ecomesure.com

ECOMESURE is a technology development company specialized in instrumentation and connected systems for environmental and operational data monitoring and analysis, and as such, develops, manufactures and distributes on worldwide basis, IoT gateways for any kind of sensors, low-cost connected stations for outdoor and indoor air quality monitoring and associated services on web platform in SaaS mode for controlling sensors and manage data. The technology is patented in Europe and the USA and distinguishes itself by the high level of security in relation to the transfer of data, which is a critical issue for sensitive infrastructures. ECOMESURE’s solutions are simple, effective, affordable and therefore ideal for industrialists, local authorities, QHSE monitoring suppliers and engineering companies who are looking for easy-to-use and qualified solutions. ECOMESURE is already heavily involved in various Smart City and Smart Factory projects and works with several major stakeholders.

ELLONA  
www.ellona.io

Environmental Monitoring Technologies and Solutions with focus on process operations, remediation and/or prevention of environmental events (originated by gases, odors, particles, sounds, lights, liquids and vibration). We distribute a network of microsensors at the field that following an IoT (Internet of Things) architecture, feed the information into a Cloud based platform. At the platform, through powerful analytics, we re-create space/ temporal granularity by taking discrete data and processing it into actionable insights (situational intelligence). Through the effective online monitoring (every 10 seconds), service operators can for example effectively manage responses like odor control (activating scrubbers, dosing pumps, misting ramps), infrastructure actions (like open a valve, activating a fan, a siren), or re-design processes.

Entanglement Technologies  
www.entanglementtech.com

Entanglement Technologies is a chemical technology and engineering solutions manufacturer focused on designing intelligent analyzers which increase the accessibility and actionability of chemical data on our surroundings. Our flagship instrumentation platform, AROMA-VOC, is a thermal desorption, high-performance broadband cavity ringdown spectrometer (TD-CRDS) which provides parts-per-trillion (ppt) detection limits on hazardous air pollutants such as BTEX, 1,3-butadiene, ethylene oxide, TCE, H2S and HCN in ambient air and other complex matrices in the field or from any vehicle. No buildout or expert operator required. The high stability of the CRDS core facilitates operations for long-term, automated fixed-site deployments in remote locations without sacrificing data-quality or throughput.

HI-Q Environmental Products Company  
www.hi-q.net

HI-Q Environmental Products Company (HI-Q.net) has been a leading manufacturer of Air Sampling & Radiation Monitoring Equipment, Systems and Services to the nuclear and environmental monitoring industries since 1973. HI-Q’s product line ranges from complete stack sampling systems to complex ambient air sampling stations. HI-Q’s product catalog includes: High & Low Volume continuous duty TSP, PM-10 and PM-2.5 Air Samplers with manual or automatic flow control.

Magee Scientific  
www.mageescientific.com

Magee Scientific is the originator of the Aethalometer®; the Total Carbon Analyzer; and other instruments for measuring carbonaceous aerosols. Our equipment is rugged, reliable and designed for real-world monitoring applications. Performance may be validated in the field by NIST-traceable standards kits.

Met One Instruments, Inc.  
www.metone.com

Met One Instruments Inc. provides reliable, affordable, precision instrumentation for monitoring ambient & indoor air quality and controlled environments. We also have a full Meteorological line of precision instrumentation. We engineer and manufacture products from our facilities located in Oregon, New York, and Maryland. Our customer service, including ongoing after-the-sale service support, is the best in the industry. All our products are made in the USA. We are an ISO9001:2015 certified company.

Montrose Environmental Group  
www.montrose-env.com

Dealing with the logistics and implications of environmental issues is vital. Typically, however, it’s also complicated, time-consuming, and expensive. At Montrose, we know there’s a better way. Employing 1,400 employees in over 60 locations, our innovative business model, focus on environmental solutions, and integrated approach to design, engineering, and operations can put you well ahead of the curve by applying the latest technologies in practical ways to solve difficult environmental challenges today – and prepare for what’s coming tomorrow. From lab services to stack testing to regulatory compliance, we’re helping clients blaze new trails.

Orsat  
www.orsat.com

Since 1994, Orsat has customized the installation and maintenance of hardware and software to produce a robust application for continuous unattended field measurement of VOCs in ambient air for Photochemical Assessment Monitoring Stations (PAMS). Orsat’s services encompass all aspects of site operation and quality control from deployment to operator training.

Picarro  
www.picarro.com

Picarro is a leading provider of solutions to measure greenhouse gas (GHG) concentrations, criteria pollutants and hazardous air pollutants (HAPs) in many industrial and research applications. Picarro analyzers and systems are simple to deploy and operate, they deliver parts-per-trillion (ppt) sensitivity in real-time, and are designed for continuous monitoring with minimal maintenance. Visit our Air Quality and Ethylene Oxide Resource Centers to learn more about how our products are used to address indoor and outdoor air quality measurement needs.
CONFERENCE PROGRAM

EXHIBITORS, CON’T.

QuantAQ
www.quant-aq.com
QuantAQ helps customers obtain actionable air quality data via distributed networks of low-cost, professional-grade air quality sensors for a fraction of the cost of competitive technologies by bringing together modern IoT tech, scalable software solutions, and extensive domain expertise in air pollution and atmospheric chemistry.

Sonoma Technology, Inc.
www.sonomatech.com
Sonoma Technology, Inc. (STI) is an employee-owned firm that delivers innovative, science- and technology-based solutions for our clients’ environmental needs worldwide. Our services include air quality research, atmospheric measurements, air quality and smoke forecasting, atmospheric modeling and analysis, instrumentation and data system development, software development, decision support systems, and outreach.

Sunset Laboratory Inc.
www.sunlab.com
Sunset Laboratory has been leading the way for Organic/Elemental Carbon Aerosol (OCEC) measurements since 1984. We remain the market leader in OCEC instrumentation and analysis for filters with our Laboratory-based OCEC analyzer and in ambient monitoring with our Semi-Continuous OCEC aerosol analyzer. Our instrumentation has the ability to easily perform a variety of official analysis methods, such as NIOSH Method 5040, Improve-A, STN, EUSAAR2, as well as others.

Syft Technologies
www.syft.com
SIFT-MS is a groundbreaking technique that emerged out of investigations of ion chemistry in the Earth’s atmosphere, as well as other planetary atmospheres, and was developed further at the University of Canterbury in New Zealand. In 2002, Syft Technologies was founded and aimed to apply and develop this technique into multiple different commercial applications. Now 20 years later, Syft Technologies is the world leading provider of SIFT-MS solutions, which are revolutionizing the trace analysis world.

Teledyne API
www.teledyne-api.com
Teledyne API designs and builds a complete line of precision air quality monitoring instrumentation at its headquarters and factory in San Diego, California. These instruments utilize proven measurement principles and comply with the U.S. Environmental Protection Agency, European Union and other requirements for ambient air quality monitoring, continuous emissions monitoring, and a number of other applications.

Terra Applied Systems
www.tasysllc.com
The TAS mission is to be a premier bridge between manufacturers and end users of emerging and maturing technologies providing applications and integrated systems.

Tisch Environmental
www.tisch-env.com
Tisch Environmental is a family business founded to develop and manufacture air pollution monitoring instruments. The Tisch family have produced nearly half million devices for the air pollution monitoring community over the last 60 years. TEI is looking into the future needs of today’s air monitoring professionals.

TricornTech Corporation
www.tricorntech.com
As a VOC monitoring expert, TricornTech offers a wide product range from portable precision instruments to online systems and comprehensive air quality monitoring software applications. In addition to our superior gas analysis technology used for monitoring airborne molecular contamination (AMC) in semiconductor applications and volatile organic compounds (VOCs) in the surrounding environment, complete solutions for detecting LNAPL/DNAPL (light/dense non-aqueous phase liquid) contaminants are also available. We are committed in offering solutions and services to our clients which are critical in the achievement of their success. Please stop by our booth to find out more about how we can create the perfect monitoring package tailored to your specific budget and testing requirements.

TSI, Inc.
www.tsi.com
TSI, a world leader in particle measurements, offers a variety of outdoor air quality monitors for real-time, direct-reading results. The DustTrak™ Environmental Monitor measures PM1, PM2.5, respirable, PM10 and total PM size fractions, providing near-reference quality data. In addition, TSI offers a variety of aerosol and dust monitors, and indoor air quality monitors.

UC Davis Air Quality Research Center
www.airquality.ucdavis.edu
The UC Davis Air Quality Research Center (AQRC) enables stakeholders to characterize and improve air quality by providing high-quality, cost-effective particulate matter data, research, methods, and innovations. AQRC analyzes particulate matter samples for the United States National Park Service (NPS) Interagency Monitoring for Protected Visual Environments (IMPROVE) and the Environmental Protection Agency (EPA) Chemical Speciation Network (CSN).

URG Corporation
www.urgcorp.com
URG is helping to ensure the air we breathe is the best it can be by creating the Ambient Ion Monitor (AIM) for the time-resolved, direct measurement of gas (hydrogen chloride, nitric acid, nitrous acid, sulfur dioxide, ammonia) and artifact free particulate matter (nitrate, sulfate, nitrite, phosphate, chloride ammonium, sodium, calcium, potassium, magnesium) air pollutants. We specialize in Teflon coated cyclones with various cut-points and flow rates, and stainless steel cyclones for diesel emissions.
The Exhibit Hall has sold out in each of the last 6 live events. Register your booth space early to secure your position!

Thank You, Exhibitors!