



AIR & WASTE MANAGEMENT  
ASSOCIATION  
SINCE 1907

# PRELIMINARY PROGRAM

**AIR QUALITY MEASUREMENT**  
**METHODS AND TECHNOLOGY**  
APRIL 2 – 4, 2019 • DURHAM, NC

## PROFESSIONAL DEVELOPMENT COURSES

Monday, April 1

8:00 am - 12:00 pm **Quantitative Optical Gas Imaging**

1:00 pm - 5:00 pm **Low Cost Air Sensors**

[www.awma.org/measurements](http://www.awma.org/measurements)

# PRELIMINARY PROGRAM

## ABOUT THE CONFERENCE

One of our most popular specialty conferences, the Air Quality Measurement Methods and Technology Conference is back in 2019 with its extensive coverage of all aspects of air measurement methodologies including associated quality assurance protocols and how to use and interpret data.

In 2019, we will focus on current hot topics such as emerging pollutants—including PFAS, ethylene oxide, and chloroprene—low-cost sensors, next generation emissions monitoring (NGEM), and airborne measurements to assess impacts from wildfires.

## GENERAL INFORMATION

### REGISTRATION

Register online at [www.awma.org/measurements](http://www.awma.org/measurements). You can also complete the registration form and return it with your payment to:

Registrar, Air & Waste Management Association  
Koppers Building, Suite 2100  
436 Seventh Avenue  
Pittsburgh, PA 15219 USA  
Fax: 412-232-3450

Your registration will not be processed without payment.

### REFUND POLICY

If written notice of cancellation is received on or before October 16, 2017 payment will be refunded, less a \$75 cancellation fee. (Cancellation fees apply regardless of payment method). Substitutions may be made at any time; payment for any difference is due at the time of substitution. This refund policy applies to all occurrences, including weather-related events and other natural disasters. In the unlikely occurrence of event cancellation, the Association is not liable for any expenses incurred by the registrant other than the full refund of registration fee(s) paid.

### CONFERENCE PROCEEDINGS

Conference proceedings will include the extended abstracts and presentations with author permission and will be completed after the conference. Attendees will be notified via e-mail when the extended abstracts and presentations are available.

### CONTINUING EDUCATION CREDIT

Conference attendees may be eligible for continuing education credits. For more information, please contact Gloria Henning at +1-412-904-6021 or [glhenning@awma.org](mailto:glhenning@awma.org).

### ADA/SPECIAL REQUIREMENTS

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

### PRESENTERS' MEETING

Presenters and Session Chairs will meet on the day of their session involvement to review program details. Presenters should bring their presentations on a memory stick/USB to this meeting, as well as a brief biography.

### CONFERENCE COMMITTEE

#### Conference Co-Chairs:

Ray Merrill, U.S. EPA  
Ian MacGregor, Battelle

#### Technical Program Committee:

Ken Walsh, Leidos  
Eric Winegar, Exponent

### LOCATION AND LODGING

#### Sheraton Imperial Hotel

Raleigh-Durham Airport at Research Triangle Park  
4700 Emperor Blvd., Durham, NC 27703  
919.941.5050

A block of rooms has been reserved for conference attendees at the Sheraton Imperial Hotel for \$163.00 single. To ensure availability, reserve your room by March 4, 2019. After that date, the reserved hotel room block is released for general sale. Book via the direct link on our website or call the hotel and mention the A&WMA Measurements Conference block.

### ABOUT THE AIR & WASTE MANAGEMENT ASSOCIATION

A&WMA is a not-for-profit, nonpartisan professional organization that enhances knowledge and expertise by providing a neutral forum for technology exchange, professional development, networking, 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](http://www.awma.org).

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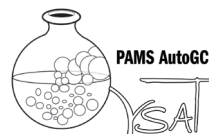
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## PROFESSIONAL DEVELOPMENT COURSES

### Advanced Topics in Quantitative Optical Gas Imaging (QOGI)

Monday, April 1 • 8:00 am - 12:00 pm

**Instructors:** Jon Morris, Yousheng Zeng, Providence Photonics

This workshop examines advanced topics related to quantitative optical gas imaging. Optical gas imaging (OGI) has been used as part of Leak Detection and Repair (LDAR) programs for many years as a qualitative technology. Recent advancements have enabled quantitative OGI (QOGI) methods to measure emission rates, transforming OGI from a qualitative technology to a quantitative technology. This workshop will discuss the technical basis for QOGI methods. It will also present recent studies examining the accuracy and applications for QOGI methods. Comparisons will be made to other quantitative methods (such as US EPA Method 21) in the context of an LDAR program. In addition, a thorough discussion of OGI detection limits will be examined with implications for both LDAR programs and emission inventories.

### Low Cost Air Sensors

Monday, April 1 • 1:00 –5:00 pm

**Instructors:**

Tim Dye, TD Environmental Services, LLC  
 Ron Williams, U.S. EPA  
 Andrea Clements, U.S. EPA  
 Mike Bergin, Duke University

During this workshop, participants learn about the fundamentals of low-cost air sensors, how they work, and their promises and pitfalls. Detailed topics will include quality assurance and evaluation protocols, 8+ example projects from around the world, and how to plan an air sensor study. Participants will also get an opportunity for hands-on interactions with a range of gas, particle, and VOC sensor systems. Each participant will leave with both general and specific knowledge of appropriate applications of low-cost sensors.

The Course will cover: Introduction and Background • How low-cost sensors work • Promise and pitfalls of low-cost air sensors • Planning a sensor study • Example projects from around the world • Plus, Hands-on interactions with a range of air sensors.

# PRELIMINARY PROGRAM

## TECHNICAL PROGRAM - Monday, April 1

### PROFESSIONAL DEVELOPMENT COURSES

8:00 am - 12:00 pm **Quantitative Optical Gas Imaging**

1:00 pm - 5:00 pm **Low Cost Air Sensors**

## TECHNICAL PROGRAM - Tuesday, April 2

7:30 am - 5:00 pm

Conference Registration

7:30 am - 8:30 am

Continental Breakfast and Presenters' Meeting

9:00 am - 6:00 pm

Exhibition Viewing

8:30 am - 9:45 am

**Introductory Welcome and Keynote Address**

9:45 am - 10:15 am

**Refreshment Break and Exhibition Viewing**

### Session 1A: OPTICAL GAS IMAGING METHODS

[concurrent with Session 2A and 3A]

**Chairs:** Jon Morris, Providence Photonics, and Jason Dewees, U.S. EPA

10:15 am - 10:40 am

ME12

**The Use of Optical Gas Imaging Cameras in Leak Detection – The Role of Method Development, Validation and Performance Assessment**

*Rod Robinson, Jon Helmore, NPL, Teddington, UK*

10:40 am - 11:05 am

ME39

**Comparisons of Aerial and Ground-Based Infrared Leak Detection Camera Surveys at Oil and Gas Wells**

*Seth Lyman, Trang Tran, Marc Mansfield, Utah State University, Vernal, UT; Arvind Ravikumar, Stanford University, Stanford, CA*

11:05 am - 11:30 am

ME70

**Optical Gas Imaging Sensitivity Study: Envelope of Sensitivity Performance**

*Ram A. Hashmonay, Omer Yanai, Opgal Optronics, Alberto Wahnon, Industries Ltd., Karmiel, Israel*

11:30 am - 11:55 am

ME93

**Detection Limits of Optical Gas Imaging and Their Impact to Emission Inventories**

*Jon Morris, Yousheng Zeng, PhD, Providence Photonics, LLC, Baton Rouge, Louisiana*

### Session 2A: ADVANCES IN VOC MEASUREMENT TECHNIQUES

[concurrent with Session 1A and 3A]

**Chairs:** Ingrid George, U.S. EPA and Eric Apel, University Corp. for Atmospheric Research

10:15 am - 10:40 am

ME68

**Lower Cost High Temporal Resolution Benzene Sensors by QCL-PAS**

*Peter Zemek, Ph.D, Montrose Environmental, Hollis, NH; David Berkowitz, Enthalpy Analytical, Durham, NC*

10:40 am - 11:05 am

ME30

**Field Demonstration of a Novel Portable Automated Gas Chromatograph for Speciated Air Toxic VOC Measurement in Louisville, KY**

*Ingrid George, Eben Thoma, Rachele Duvall, Tai Wu, 1EPA ORD NRMRL, RTP, NC; T-K Allen Chou, Sharon Liu, Daniel Chung, Tricornetech Corp., New Taipei City, Taiwan; Parikshit Deshmukh, Jacob Cansler, Jacobs Technology, RTP, NC; Andrea Cooley, Billy Dewitt, Bryan Paris, Louisville Metro APCD, Louisville, KY*

11:05 am - 11:30 am

ME18

**Prototype Coded Aperture Miniature Mass Spectrometer for Environmental Sensing**

*Jason J. Amsden, Philip J. Herr, Raul Vyas, Kathleen Horvath, Matthew P. Kirley, Xiaohan Li, Charles B. Parker, Brian R. Stoner, Michael E. Gehm, Jeffrey T. Glass, Duke University, Durham, NC; Adam D. Keil, Broadway Analytical, LLC Monmouth, IL; James B. Carlson, RTI International, Research Triangle Park, NC; Steven J. Edwards, Roger P. Sperline, M. Bonner Denton, University of Arizona, Tucson, AZ*

11:30 am - 11:55 am

ME100

**The NCAR Trace Organic Gas Analyzer for VOC Analysis**

*Eric C. Apel, Rebecca S. Hornbrook, Alan J. Hills, Lizzy Asher, Daniel D. Riemer, Siyuan Wang, National Center for Atmospheric Research, Boulder, CO*

### Session 3A: CITIZEN SCIENCE AND AIR SENSOR MEASUREMENTS

[concurrent with Session 1A and 2A]

**Chairs:** Kristen Benedict, U.S. EPA and Tim Dye, TD Environmental Services

10:15 am - 10:40 am

ME26

**Measurement of PM<sub>2.5</sub> in Kansas City, Kansas Using Low-cost Sensor Technologies**

*Rachele Duvall, Sue Kimbrough, U.S. Environmental Protection Agency, Research Triangle Park, NC; Stephen Krabbe, U.S. Environmental Protection Agency, Kansas City, KS; Parikshit Deshmukh, Jacobs Technology Inc., Research Triangle Park, NC; Geoff Henshaw, Aeroqual Ltd., Auckland, New Zealand*

10:40 am - 11:05 am

ME34

**Overview of the Kansas City Transportation and Local-scale Air Quality Study (KC-TRAQS)**

*Sue Kimbrough, Timothy Barzyk, Vlad Isakov, Carry Croghan, U.S. EPA, RTP, NC; Stephen Krabbe, Matthew Brown, Mike Davis, Shawn Henderson, U.S. EPA, Kansas City, KS; Steven Brown, Amy Shields U.S. EPA, Lenexa, KS; Stephen Feinberg, Richard Baldauf, Chad Bailey, U.S. EPA, RTP, NC; Tim McArthur, Science Systems and Applications, Inc., RTP, NC, Russell Logan, Parikshit Deshmukh, Jacobs Technology Inc., RTP, NC*

11:05 am - 11:30 am

ME73

**Calibration and Validation of a Network of Sensors Measuring Nitrogen Dioxide Across Los Angeles**

*Geoff Henshaw, Kyle Alberti, Elaine Miles, Aeroqual, Auckland, New Zealand; Georgia Miskell, David Williams, University of Auckland, Auckland, New Zealand; Brandon Feenstra, Vasileios Papapostolou, Andrea Polidori, South Coast Air Quality Management District, Diamond Bar, CA*

**Lunch for all sessions**

12:00 pm - 1:30 pm

# TECHNICAL PROGRAM - Tuesday, April 2 con't.

## Session 1B:

### OPTICAL GAS IMAGING METHODS

[concurrent with Session 2B and 3B]

**Chairs:** Jon Morris, Providence Photonics, and Jason Dewees, U.S. EPA

**1:30 pm – 1:55 pm**

ME09

#### Optical Gas Imaging Leak/No-Leak Emissions Factor Development Using Site-Specific Method 21 Leak Detection and Repair Data

Duane R. McGregor, J. Derek Reese, ExxonMobil Research & Engineering Co., Spring, TX

**1:55 pm – 2:20 pm**

ME33

#### Understanding Cooled vs Uncooled Optical Gas Imaging

Craig O'Neill, FLIR, Wilsonville, OR; Ron Lucier, Infrared Training Center, Nashua, NH

**2:20 pm – 2:45 pm**

ME50

#### Non-Thermal Multispectral IR Technology for Imaging & Quantification of Methane, VOCs and CO<sub>2</sub> Emissions

Allen Waxman, Jason Bylsma, Stefan Bokaemper, Ryan Aylward, Allan Vaites, Terry Jones, Thomas McArthur, Paola Massoli, MultiSensor Scientific Inc. Somerville, MA, USA

**2:45 pm - 3:10 pm**

ME83

#### New Quantitative Features Expand the Possibilities for Optical Gas Imaging

Craig O'Neill, FLIR, Wilsonville, OR; Håkan Nygren, FLIR, Taby, Sweden; Yousheng Zeng, Jon Morris

## Session 2B: ADVANCES IN VOC

### REMOTE SENSING

[concurrent with Session 1B and 3B]

**Chairs:** Ingrid George, U.S. EPA and Eric Apel, University Corporation for Atmospheric Research

**1:30 pm – 1:55 pm**

ME104

#### Monitoring of Fugitive Ship Emissions Using Optical Remote Sensing on Mobile Platforms

Catalina Tsai, Olga Pikel'naya, Andrea Polidori, South Coast Air Quality Management District, Diamond Bar, CA; Brian Offerle, Marianne Eriksson, Johan Mellqvist, Jerker Samuelsson, Fluxsense Inc., San Diego, CA

**1:55 pm - 2:20 pm**

ME47

#### Deployment of a Network of Weekly Whole Air Samplers (WAS) and a Mobile Measurement Platform to Monitor Changes

Arsineh Hecobian, Yong Zhou, Jeffrey L. Collett Jr., Department of Atmospheric Science, Fort Collins, CO

**2:20 pm - 2:45 pm**

ME103

#### Understanding Seasonal Variations in Refinery VOC Emissions Using Quarterly Optical Remote Sensing Mobile Surveys

Olga Pikel'naya, Andrea Polidori, Jack Porter, Ross Cheung, Catalina Tsai, South Coast Air Quality Management District, Diamond Bar, California; Johan Mellqvist, Jerker Samuelsson, Marianne Ericsson, FluxSense Inc., San Diego, California

**2:45 pm - 3:10 pm**

ME78

#### Remote Emission Measurements of Marine Vessels In Real Operation To Check Compliance With IMO Legislation And Investigate Influence On Air Quality

Johan Mellqvist, Vladimir Conde, Chalmers

## Session 3B: CITIZEN SCIENCE AND AIR

### SENSOR MEASUREMENTS

[concurrent with Session 1B and 2B]

**Chairs:** Kristen Benedict, U.S. EPA and Tim Dye, TD Environmental Services

**1:30 pm – 1:55 pm**

ME77

#### Data Quality Control System—The Key to Sensor Application in Air Quality Monitoring Network

Yi Li, Varun Yadav, John A. Cooper, Sunset CES Inc., Beaverton, OR, USA; Cui Houxin, Zhang Ling, Wu Mengxian, Feng Zhanbang, Zhang Ke, Wang Yueru, Chen Chen, Wang Chunying, Ma Jingjin, Sailhero Environmental Technology, Shi-Jia-Zhuang City, Hebei Province, China

**1:55 pm - 2:20 pm**

ME33

#### Dual-Cell FTIR Analyses of Semiconductor Point-of-Use Abatement Devices

Brian Adair, Geosyntec Consultants, Charlotte, NC; Curtis T. Laush, Geosyntec Consultants, Austin, TX

**2:20 pm - 2:45 pm**

ME110

#### The Sampling and Analysis Strategy for the Characterization of Selected Perfluorinated Alkyl Substances (PFAS) in Stack Gas

Hilary Hafner, Sonoma Technology

**2:45 pm - 3:10 pm**

ME111

#### Mobile PM Monitoring Study

Tim Dye, Dave Bush, TD Environmental Services

**Refreshment Break and Exhibition Viewing for all Sessions**

**3:10 pm - 3:40 pm**

# PRELIMINARY PROGRAM

## TECHNICAL PROGRAM - Tuesday, April 2 con't.

### Session 1C:

#### OPTICAL GAS IMAGING METHODS

[concurrent with Session 3C]

**Chair:** Jon Morris, Providence Photonics, and Jason Dewees, U.S. EPA

#### 3:40 pm – 4:05 pm

ME105

##### Optical Gas Imaging with LWIR Uncooled Microbolometer Cameras

*Matthew Schmidt, Kirk Johnson, Justin Sheard, Fluke Corporation, Everett, WA; Jon Morris, Providence Photonics, Baton Rouge, LA*

#### 4:05 pm – 4:30 pm

ME106

##### Inspection of Industrial Flares Using the Video Imaging Spectral Radiometry (VISR) Method

*Yousheng Zeng, PhD, PE, Jon Morris, Providence Photonics, LLC, Baton Rouge, LA*

#### 4:30 pm – 4:55pm

ME92

##### Precision and Accuracy of the VISR Method for Flare Monitoring

*Jon Morris, Yousheng Zeng, PhD, Providence Photonics, LLC, Baton Rouge, LA*

### Session 3C:

#### EMERGING SOURCE ISSUES AND APPROACHES

[concurrent with Session 1C]

**Chair:** Ned Shappley, U.S. EPA

#### 3:40 pm – 4:05 pm

ME67

##### Proton Transfer Reaction Mass Spectrometry (PTR-MS) for Ambient and (Compliance) Source Testing

*Peter Zemek, Ph.D, Montrose Environmental, Hollis, NH*

#### 4:05 pm – 4:30 pm

ME72

##### Optimization of EPA Method TO-15 for Analysis of ppt Levels of Ethylene Oxide in Ambient Air

*David Berkowitz, Denese Adcock, Enthalpy Analytical, LLC, Durham, NC*

#### 4:30 pm – 4:55pm

ME20

##### Sample Collection and Measurement of Ethylene Oxide at Parts-Per-Trillion

*Kelly R. McPartland, Martin L. Spartz, Max Analytical Technologies, East Windsor, CT*

### Networking Reception in the Exhibit Hall

5:00 pm – 6:00 pm

### Visit the booths of these exhibitors:

2B Technologies (#1)  
Advisian Digital (#4)  
Aeroqual (#11)  
AethLabs (#2)  
Ambilabs (#23)  
Atmosfir Optics (#9)  
Bruker Optics (#24)  
Chromatotec Inc. (#26)  
Dekati Ltd. (#12)  
DR DAS LTD (#5)  
ENMET (#21)  
Entech Instruments (#18)  
Global Analyzer Systems, Ltd. (#27)  
Health Consultants, Inc. (#19)  
HORIBA Instruments, Inc. (#13)  
M&C TechGroup North America (#6)

Magee Scientific, Co. (#14)  
Markes International (#22)  
MetOne Instruments, Inc. (Table #6)  
Micro Pulse LiDAR, part of Hexagon (#10)  
Montrose Air Quality Services (#28)  
Omniscient (#3)  
Orsat (#15)  
SCI/Cooper Environmental Services (#25)  
Sonoma Technology (#7)  
Sunset Laboratory, Inc. (Table #5)  
Teledyne API (#29)  
Tisch Environmental (#17)  
TricornTech Corporation (#20)  
TSI, Inc. (#8)  
U.S. EPA Air & Energy Research Program (#16)  
URG Corporation (#30)

# TECHNICAL PROGRAM - Wednesday, April 3

7:30 am – 5:00 pm  
Conference Registration

7:30am - 8:30 am  
Continental Breakfast and Presenters' Meeting

9:00 am - 4:00 pm  
Exhibition Viewing

## Session 4A: SOURCE TEST METHODS

[concurrent with Sessions 5A and 6A]

**Chair:** Jeff Ryan, U.S. EPA

8:30 am – 8:55 am

ME37

### Determining Particulate Matter Removal Efficiency on a Particle Size Basis

Michael J Krall, Tim Rios, Montrose Environmental Group, New Braunfels, TX

8:55 am – 9:20 am

ME84

### Advances in the Measurement of Particulate Matter from Stationary Sources: OTM-37 Field Testing

Triana Fleming, Beverly Coleman and Wes Beck, Chevron Products Company, Inc., Pascagoula, MS; Jim Barufaldi, David Elam, TRC Environmental Corporation, Austin, TX; Glenn C. England, Ramboll US Corporation, Irvine, CA

9:20 am – 9:45 am

ME108

### US EPA ORD Research for the Development of Industrial PFAS Emissions Measurement Methods

Jeffrey V. Ryan, US EPA Office of Research and Development

9:45 am – 10:10 am

ME109

### The Sampling and Analysis Strategy for the Characterization of Selected Perfluorinated Alkyl Substances (PFAS) in Stack Gas

William Anderson, Test America, Inc.

## Session 5A: AMBIENT AIR METHODS

[concurrent with Sessions 4A and 6A]

**Chairs:** Julie Swift, ERG and Doris Chen, U.S. EPA

8:30 am – 8:55 am

ME97

### Inter-comparison of Formaldehyde Measurement Methods in the Lewiston-Clarkston Formaldehyde Study

Julie Simpson, Mary Fauci, Nez Perce Tribe, Lewiston, ID; B Thomas Jobson, Yibo Huangfu, Miao Wen, Washington State University, Pullman, WA; Julie Swift, Laura VanEnwyck, Eastern Research Group, Research Triangle Park, NC

8:55 am – 9:20 am

ME76

### Traffic-Related Air Pollution Monitoring Laboratory with Computer Vision Based Traffic Count and Cloud Based Data Visualization Techniques

Asanga Wijesinghe, John Colvin and Mustapha Beydoun, Houston Advanced Research Center, The Woodlands, TX

9:20 am – 9:45 am

ME95

### Optimization of U.S. EPA Method TO-11A for the Measurement of Carbonyls in Ambient Air

Ian C. MacGregor, Brannon A. Seay, Nicholas D. Skomrock, Martha W. McCauley, Douglas J. Turner, Larry A. Mullins, Dennis J. Tomcik, Christina Saeger, David M. Shelow, Battelle, Columbus, OH

9:45 am – 10:10 am

ME27

### Field Applications of Portable Aeris MIR Laser-Based Gas Analyzers: Natural Gas Leak Detection and Real-Time Indoor/Outdoor Formaldehyde (HCHO) and Carbon Monoxide (CO) Monitoring

James J. Scherer, Joshua B. Paul, Jerome Thiebaud, Stephen So, Aeris Technologies, Hayward, CA

## Session 6A: FACILITY/FUGITIVE FENCELINE 1

[concurrent with Sessions 5A and 6A]

**Chairs:** Arvind Ravikumar, Harrisburg University, and Eben Thoma, U.S. EPA

8:30 am – 8:55 am

ME17

### A Sensor Network System for Process Unit Emissions Monitoring

Wenfeng Peng, Dave Massner, Lingying Lin, Alex Chernyshov, Molex, Lisle, IL; Barry Kelley, Mike Clausewitz, Koch Industries, Rosemount, MN; Deb Cartwright, Flint Hills Resources, Corpus Christi, TX

8:55 am – 9:20 am

ME102

### An Optical Tent as an Early Warning System for BTEX Releases Inside Refineries

Jochen Stutz, Fedele Colosimo, University of California Los Angeles, Los Angeles, CA; Olga Pikelnaya, Andrea Polidori, South Coast Air Quality Management District, Diamond Bar, CA

9:20 am – 9:45 am

ME44

### Cost Reduction for Leak Detection and Fence Line Monitoring Activities Through Automation

Dennis Prince, Airdar Inc, Edmonton, Alberta; Chris Madland, Golder Associates Ltd, Calgary, Alberta

9:45 am – 10:10 am

ME74

### IoT Cloud Portal for Environmental Measurements

Dr. David Johnsen, Dan Pearson, Scott Evans, Clean Air Engineering, Palatine, IL

Refreshment Break and Exhibition Viewing  
10:10 am – 10:40 am

# PRELIMINARY PROGRAM

## TECHNICAL PROGRAM - Wednesday, April 3 con't.

### Session 4B:

#### SOURCE TEST METHODS

[concurrent with Sessions 5B and 6B]

**Chair:** Jeff Ryan, U.S. EPA

**10:40 am – 11:05 am**

ME11

#### Assessment of NO<sub>2</sub>/NO<sub>x</sub> Ratios at Fossil Fuel Power Plants

*Stephanie Shaw, Electric Power Research Institute, Palo Alto, CA; Rich Hamel, Mike Sussman, Beth Barfield, Environmental Resources Management (ERM); Ana Alvarez, contractor*

**11:05 am – 11:30 am**

ME64

#### Measuring Emission Factors from Open Fires and Detonations

*Johanna Aurell, University of Dayton Research Institute, Dayton, OH; Bill Mitchell, Dale Greenwell, Amara Holder, Dennis Tabor, Brian Gullett U.S. EPA, Office of Research and Developing, Research Triangle Park, NC; Filimon Kiros, Oak Ridge Associated Universities, at U.S. EPA, Office of Research and Development, Research Triangle Park, NC*

**11:30 am – 11:55 am**

ME10

#### Development of a Long-Range, Open-Path Ammonia Analyzer Based on Novel, Mid-Infrared Laser Spectroscopy

*Graham Leggett, MIRICO Ltd., Oxford, United Kingdom; Arun Kannath, MIRICO Ltd., Oxford, United Kingdom*

### Session 5B: AMBIENT AIR METHODS

[concurrent with Sessions 4B and 6B]

**Chairs:** Julie Swift, ERG and Doris Chen, U.S. EPA

**10:40 am – 11:05 am**

ME71

#### Continuous Real-Time Monitoring and Validation of Ambient H<sub>2</sub>S to Odor Threshold Levels by Quantum Cascade Laser

*Curtis T. Laush, Ph.D., Geosyntec Consultants, Knoxville, TN*

**11:05 am – 11:30 am**

ME15

#### Harmonizing Environmental Methodologies for Air Toxics, Ozone Precursors and Polar Compounds Using One Cryogen-Free TD-GC-FID/MS

*Nicola Watson, Rui Li, Claire Keller, Jan Peter Mayser, Markes International, Sacramento, CA*

**11:30 am – 11:55 am**

ME01

#### Value-Added Data Validation for Ambient Air Measurements

*Yousaf Hameed, Clark County Department of Air Quality, Las Vegas, NV*

### Session 6B: FACILITY/FUGITIVE FENCELINE 2

[concurrent with Sessions 4B and 5B]

**Chairs:** Arvind Ravikumar, Harrisburg University and Eben Thoma, U.S. EPA

**10:40 am – 11:05 am**

ME53

#### The Development and Validation of a New Standardised Method For Monitoring Diffuse and Fugitive VOC Emissions From Oil and Gas Facilities

*Rod Robinson, Fabrizio Innocenti, NPL, Teddington, UK*

**11:05 am – 11:30 am**

ME80

#### Measurements of Fugitive Emissions of VOCs from Stationary Sources Using the SOF Method - Standardization Efforts and Results From Recent Studies in California

*Johan Mellqvist, Chalmers University of technology, Gothenburg Sweden; Jerker Samuelsson, Brian Offerle, Samuel Brohede, Pontuas Andersson, Oscar Isoz, Marianne Ericsson, FluxSense Inc., San Diego, CA; Olga Pikelnaya, Andrea Polidori, South Coast Air Quality Management District, Diamond Bar, CA*

**11:30 am – 11:55 am**

ME55

#### Advanced Remote Sensing Solutions Accommodating Petrochemical/Chemical Industrial Monitoring Needs and Challenges

*Gilad Shpitzer Yael Etzion, Robert Kagann, Atmosfir Optics Ltd.*

**LUNCH**  
12:00 pm – 1:30 pm



## TECHNICAL PROGRAM - Wednesday, April 3 con't.

### Session 4C:

#### SOURCE TEST METHODS

[concurrent with Sessions 5C and 6C]

**Chair:** Jeff Ryan, U.S. EPA

**1:30 pm – 1:55 pm**

ME38

#### Ammonia and Particulate Matter Concentrations in a Free-Range Layer House of US Southeast

*Lilong Chai, University of Georgia, Athens, GA*

**1:55 pm – 2:20 pm**

ME19

#### Real-Time Monitoring of Formaldehyde from Natural Gas Turbines

*Martin L. Spartz, Kelly R. McPartland, Max Analytical Technologies, East Windsor, CT*

**2:20 pm – 2:45 pm**

ME98

#### High Frequency Gaseous Instrumental Measurements to Characterize Industrial Facility Emissions During Startup, Shutdown, and Transient Operating Conditions

*Thomas A. Dunder, Ph.D., TRC Environmental Corporation, Raleigh, NC*

**2:45 pm – 3:10 pm**

ME06

#### EPA Protocol Gas Standards Update

*Andy Shurtleff, Refining & Petrochem, New Braunfels, TX; Phillip O. Midgett Environmental Products, Southport, NC*

### Session 5C: AMBIENT AIR APPLICATIONS

[concurrent with Sessions 4C and 6C]

**Chairs:** Julie Swift, ERG and Doris Chen, U.S. EPA

**1:30 pm – 1:55 pm**

ME16

#### Seasonal Variation of Endotoxin in the Ambient Air of a Sewage Treatment Plant (STP) in Delhi, India

*Arun Srivastava, Sunita Maharir, Jawaharlal Nehru University, New Delhi, India*

**1:55 pm – 2:20 pm**

ME21

#### Comparison of the Dispersion Of Air Pollutants Between the Cities of Chihuahua and Aldama, Mexico

*Eduardo F. Herrera, Martín Bojórquez, Julio Núñez, Marisol Bencomo, Elías Ramírez, Alfredo Campos, Jorge Carrillo, Ramón Gómez, Research Centre of Advanced Materials, Chihuahua, México; Michel Montelongo, Autonomous University of Chihuahua; Carmen Navarro, Municipal Board of Water and Sanitation, Chihuahua, México*

**2:20 pm – 2:45 pm**

ME22

#### Water and Air Contamination on Aquifer Meoqui-Delicias on Chihuahua, Chihuahua, Mexico

*Marisol Bencomo, Martín Bojórquez, Julio Núñez, Elías Ramírez, Jorge Carrillo, Alfredo Campos, Research Centre of Advanced Materials, Chihuahua, México; Michel Montelongo, Autonomous University of Chihuahua; Carmen Navarro, Municipal Board of Water and Sanitation, Chihuahua, Mexico*

### Session 6C: FACILITY/FUGITIVE FENCELINE 3

[concurrent with Sessions 4C and 5C]

**Chairs:** Arvind Ravikumar, Harrisburg University, and Eben Thoma, U.S. EPA

**1:30 pm – 1:55 pm**

ME4

#### Demonstration of Open Path UV-DOAS as an Alternative Method to Meet Fenceline Monitoring Provisions for Benzene Provided in 40 CFR 63.658

*Brent Olive, University of North Alabama, Florence, Alabama; Don Gamiles, Argos Scientific Inc., Camas, WA*

**1:55 pm – 2:20 pm**

ME46

#### Evaluation of Benzene Detections By OP-FTIR Automated System During Controlled Release Measurements and Simulations Over Operational Fence-Line Measurements Data

*Yael Etzion, Robert Kagann, Gilad Shpitzer, Atmosfir Optics Ltd.*

**2:20 pm – 2:45 pm**

ME07

#### Next Generation Emission Measurements of 1,3-Butadiene Emissions in Louisville, KY— Interim Results

*Eben D. Thoma, Rachele Duvall, Ingrid George, Tai Wu, Don Whitaker, Karen Oliver, Shaibal Mukerjee, EPA ORD NRMRL, RTP, NC; Njeri Carlton-Carew, Jane Spann, Tiereny Bell, Ken Mitchell, EPA Region 4, Atlanta, GA; Parik Deshmukh, Jacob Cansler, Tamira Cousett, Jacobs Technology, RTP, NC; Andrea Cooley, Steven Gravatte, Kyle Zimmerman, Billy Dewitt, Bryan Paris, Louisville Metro APCD, Louisville, KY*

**2:45 pm – 3:10 pm**

ME54

#### Towards Better Understanding of the Temporal Methane Emission Variation from Landfills

*Jacob Mønster, FORCE Technology, Brøndby, Denmark; Charlotte Scheutz, DTU Environment, Technical University of Denmark, Lyngby, Denmark*

**3:10 pm – 3:40 pm**  
Networking Break and Exhibition Viewing

# PRELIMINARY PROGRAM

## TECHNICAL PROGRAM - Wednesday, April 3 con't.

### Session 4D:

#### SOURCE TEST METHODS

[concurrent with Session 5D and 6D]

**Chair:** Jeff Ryan, U.S. EPA

**3:40 pm – 4:05 pm**

ME19

#### Real-Time Monitoring of Formaldehyde from Natural Gas Turbines

*Martin L. Spartz, Kelly R. McPartland, Max Analytical Technologies, East Windsor, CT*

**4:05 pm – 4:30 pm**

ME98

#### High Frequency Gaseous Instrumental Measurements to Characterize Industrial Facility Emissions During Startup, Shutdown, and Transient Operating Conditions

*Thomas A. Dunder, Ph.D., TRC Environmental Corporation, Raleigh, NC*

### Session 5D:

#### AMBIENT AIR APPLICATIONS

[concurrent with Session 4D and 6D]

**Chairs:** Julie Swift, ERG and Doris Chen, U.S. EPA

**3:40 pm – 4:05 pm**

ME42

#### Analysis of Air Pollutants Data from Continuous Ambient Monitoring Stations in Urban Areas – A Case Study

*A.M. Alenezi, M.F. Hamoda, Environmental Group, Department of Civil Engineering, Kuwait University, Kuwait*

**4:05 pm – 4:30 pm**

ME99

#### Ambient Observations of Air Toxics – Data Availability, Data Uses and Data Analysis Tools

*Madeleine Strum, Doris Chen, Josh Drukenbrod EPA/OAQPS, Research Triangle Park, NC; Regi Oommen, Bebhinn Do, Eastern Research Group*

**4:30 pm – 4:55 pm**

ME61

#### Investigation of Temporal and Spatial Correlations Between Citizen Science Odor Reports and Gas Measurements from Open-Path UV-DOAS

*Robert Crampton, Argos Scientific Inc., Camas, WA; Create Lab, Carnegie Mellon University, Pittsburgh, PA; Brent Olive, University of North Alabama, Florence, AL*

### Session 6D:

#### LARGER AREA OIL AND GAS METHODS

[concurrent with Session 4D and 5D]

**Chairs:** Arvind Ravikumar, Harrisburg University and Eben Thoma, U.S. EPA

**3:40 pm – 4:05 pm**

ME79

#### Mobile Optical Measurements of Emissions And Fenceline Concentrations From Oil and Gas Production

*Johan Mellqvist, Chalmers University of Technology, Gothenburg Sweden; Jerker Samuelsson, Brian Offerle, Samuel Brohede, Pontuas Andersson, Oscar Isoz, Marianne Ericsson, FluxSense Inc., San Diego, CA; Olga Pikelnaya, Andrea Polidori, South Coast Air Quality Management District, Diamond Bar, CA*

**4:05 pm – 4:30 pm**

ME40

#### Drone-Based Natural Gas Leak Detection: Minimum Detection Limit Modeling

*Thomas Barchyn, Chris Hugenholtz, Thomas Fox, University of Calgary, Calgary, Alberta, Canada*

**4:30 pm – 4:55 pm**

ME08

#### Optimized Airborne Inspection of Upstream Oil & Gas Methane Emissions

*Andrew E. Pomerantz, Kashif Rashid, Andrew Speck, Timothy P. Osedach, and Dominic V. Perroni Schlumberger-Doll Research, Cambridge, MA*

# TECHNICAL PROGRAM - Thursday, April 4

7:30 am – 10:30 am  
Conference Registration

7:30am - 8:30 am  
Continental Breakfast and Presenters' Meeting

## Session 7A:

### AMBIENT AIR PARTICULATE SPECIATION

[concurrent with Session 8A and 9A]

**Chair:** Xiaoliang Wang, Desert Research Institute

8:30 am – 8:55 am

ME59

#### Characterizing Particulate Matter and Predicting OC-EC on Cookstove Source Emissions Using Fourier Transform Infrared Spectroscopy

Emily Li, Michael Hays, James Jetter, Guofeng Shen, Satoshi Takahama, ORAU/US EPA, Raleigh-Durham, NC

8:55 am – 9:20 am

ME86

#### Estimation of Brown Carbon in PM<sub>2.5</sub> Samples from IMPROVE and CSN Networks

Xiaoliang Wang, Judith C. Chow, Brandon Daub, Steven B. Gronstal, Mark C. Green, John G. Watson, Desert Research Institute, Reno, NV

9:20 am – 9:45 am

ME49

#### The Total Carbon Analyzer—A New Method for the Characterization of Carbonaceous Aerosols

Martin Rigler, Aerosol Co., Ljubljana, Slovenia; Tony Hansen, Magee Scientific, Berkeley, CA

9:45 am – 10:10 am

ME36

#### Long Path Photometry for Direct Measurements of NO<sub>2</sub> and Black Carbon

Andrew A. Turnipseed, Craig Williford, Peter C. Andersen, John W. Birks, 2B Technologies, Boulder, CO

10:10 am – 10:35 am

ME29

#### Monitoring for Particulate, Airborne Metals, and Explosives in a Remote Environment

Jodi Lee, Jacobs Engineering, Portland, OR; Mitch Lindsay, Jacobs Engineering, Salt Lake City, UT

10:35 am – 10:50 am

ME91

#### Lidar Remote Detection of Small Aerosol Size and Number

Hans Hallen, C. Russell Philbrick, Physics Department, North Carolina State University, Raleigh, NC

## Session 8A:

### PHOTOCHEMICAL AIR MONITORING

[concurrent with Session 6B]

**Chairs:** Kevin Cavender, U.S. EPA and D Turner, Battelle

8:30 am – 8:55 am

ME56

#### Visualization and Validation of PAMS AutoGC Data

Carol J. Meyer, Orsat, LLC., Pasadena, TX

8:55 am – 9:20 am

ME101

#### Field Evaluation of an Automated-Gas Chromatograph System for Monitoring Volatile Organic Compounds (VOCs) in Ambient Air

Andrea Cooley, Bryan Paris, Billy DeWitt, Tom Lobb, Louisville Metro Air Pollution Control District, Louisville, KY

9:20 am – 9:45 am

ME62

#### Development Of On-Line and Field Dual Td-Gc-Fid/Ms for Automatic and Continuous Ambient Air Monitoring

Franck Amiet, Louis Vivola, Jean-Philippe Amiet, Damien Bazin, Chromatotec, Saint-Antoine, France

9:45 am – 10:10 am

ME75

#### Next Generation Cost Effective True NO<sub>2</sub> Monitoring Trends

Charles Odame-Ankrah, N. Kelly Pickrell, Christopher Swainson, W. Brian Rosentreter, D. Brodie Biggar, Global Analyzer Systems Ltd, Calgary, AB, Canada

## Session 9A: OIL AND GAS: NEXT GEN METHOD COMPARISONS

[concurrent with Session 7A and 8A]

**Chairs:** Arvind Ravikumar, Harrisburg University, and Eben Thoma, U.S. EPA

8:30 am – 8:55 am

ME13

#### Detection Limits of Optical Gas Imaging for Natural Gas Leak Detection in Realistic Controlled Conditions

Daniel Zimmerle, Timothy Vaughn, Clay Bell, Kristine Bennett, Rebecca Tullber, Colorado State University, Fort Collins, CO; Eben Thoma, Jason DeWees EPA/ORD/NRMRL/AEMD, Durham, NC; Parik Deshmukh, Jacobs Technology, Durham, NC

8:55 am – 9:20 am

ME60

#### Methodology to Determine Equivalence for New Methane Emissions Detection Technologies

Arvind P. Ravikumar, Harrisburg University, Harrisburg, PA; Adam Brandt, Stanford University, Stanford, CA

9:20 am – 9:45 am

ME89

#### An Overview of Screening Technologies for Targeting Fugitive Methane From Oil and Gas

Thomas A. Fox, Thomas E. Barchyn, Chris H. Hugenholtz, University of Calgary, Calgary, Alberta; David Risk, St. Francis Xavier University, Antigonish, Nova Scotia; Arvind P. Ravikumar, Harrisburg University, Harrisburg, PA

9:45 am – 10:10 am

ME52

#### Evaluation of Next Generation Emissions Measurement Technologies

Clay Bell, Dan Zimmerle, Timothy Vaughn, Kristine Bennett, Colorado State University, Fort Collins, CO

CONFERENCE ADJOURNS

11:00 am