

# **Symposium on Air Quality Measurement Methods and Technology 2010**

**Los Angeles, California, USA  
2 – 4 November 2010**

**Volume 1 of 2**

**ISBN: 978-1-61782-197-4**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2010) by the Air and Waste Management Association  
All rights reserved.

Printed by Curran Associates, Inc. (2011)

For permission requests, please contact the Air and Waste Management Association  
at the address below.

Air and Waste Management Association  
One Gateway Center, 3rd Floor  
420 Fort Duzuesne Blvd.  
Pittsburgh, Pennsylvania 15222-1435

Phone: 800 270 3444  
Fax: 412 232 3450

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

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

Xqmo g'3

## KEYNOTE

<b>Meeting Air Quality Challenges with Sound Science and Measurements</b> .....	1
<i>Barry R. Wallerstein</i>	

## SUPER SESSION A

<b>Air Toxics Data Treatment, Characterization and Interpretation</b> .....	34
<i>D. Mikel</i>	
<b>Topic 1: Why Air Toxics Are Important (a Brief History of Ambient Air Toxic Monitoring and How Data Needs and How Data Needs and Uses Are Inter-related Across Different Air Toxics Programs</b> .....	36
<i>Regi Oommen</i>	
<b>The Importance of Data Quality and Method Quality Objectives to Data Use</b> .....	N/A
<i>D. Dayton, ERG</i>	
<b>Data Quality and Method Quality Objectives for EPA National Monitoring Programs</b> .....	N/A
<i>D. Mikel, U.S. EPA</i>	
<b>Topic 2: How Do I Use My Air Toxics Measurements Data to Assess Trends?</b> .....	68
<i>Jaime Hauser</i>	
<b>National Trends in Ambient Air Toxics Concentrations</b> .....	97
<i>Michael McCarthy, Jessica Charrier, Hilary Hafner</i>	
<b>Topic 3 - How Do I Use My Air Toxics Data to Evaluate Health Risk</b> .....	118
<i>Regi Oommen</i>	
<b>Examples of Community Level Risk Weighted Air Toxics Concentrations</b> .....	157
<i>Hilary Hafner, Michael McCarthy</i>	
<b>Topic 4: How Do I Use My Air Toxics Data to Validate Modeling Results?</b> .....	179
<i>Regi Oommen</i>	
<b>Topic 5: How Do I Use My Air Toxics Measurements Data to “Validate my Emissions Inventory”</b> .....	N/A
<i>R. Oommen, J. Hauser, and D. Dayton, ERG</i>	

## SUPER SESSION B

<b>Greenhouse Gases</b> .....	200
<i>R. Bramston-Cook</i>	
<b>Quantifying Methane Fluxes Simply and Accurately: the Tracer Dilution Method</b> .....	205
<i>Chris Rella</i>	
<b>Full Characterization of Long-Lived Greenhouse Gases in Ambient Air at an Industrial Park in Huntington Beach, California</b> .....	N/A
<i>R. Bramston-Cook, Lotus Consulting</i>	
<b>Gas Analyzer Technologies for Measuring Carbon Dioxide, Water Vapor, and Methane in the Open Air</b> .....	N/A
<i>D. McDermitt, LI-COR, Inc.</i>	
<b>Monitoring Options and Costs for CO2 Sequestration Projects</b> .....	N/A
<i>S. Benson, Stanford University</i>	
<b>Mobile Mapping of Methane, Ammonia, and Hydrogen Sulfide for Source Identification</b> .....	224
<i>Matt Sweeney</i>	
<b>TDL and OTM 10 Emission Measurements of Fugitive Emissions</b> .....	N/A
<i>R. Hashmonay, ENVIRON</i>	
<b>Active and Passive FTIR Monitoring of Flare Combustion Efficiency</b> .....	241
<i>PIC</i>	
<b>Measuring Greenhouse Gases Emissions from Animal Operations in Environmental Rooms</b> .....	305
<i>Zifei Liu, Wendy Powers</i>	
<b>Analysis of Nitrous Oxide and Helium in Air: Greenhouse Gas Inventory</b> .....	311
<i>Joseph T. Khoury, Alfred W. Sattler, Bryan S. Linsley, Keith D. Magers, Jean Lee</i>	

<b>Development and Deployment of Mobile Laboratory for Continuous Long-term Unattended Measurements of Greenhouse Gases and Pllutants</b> .....	318
<i>Douglas Baer</i>	
<b>Optimum Parameters for Detection of Long-Lived Green House Gases in Ambient Air</b> .....	369
<i>Randall Bramston-Cook, Edward Bramston-Cook</i>	
<b>Mid-IR Based Platform for Measuring Greenhouse Gases</b> .....	377
<i>H.J. Jost, James J. Scherer, Joshua B. Paul</i>	

### **SUPER SESSION C**

<b>Beta Gauge Monitoring Technology</b> .....	N/A
<i>Chair: D. Gobeli, MetOne</i>	
<b>Practical Considerations for Obtaining and Validating BAM- 1020 Particulate Data</b> .....	381
<i>Dennis Hart</i>	
<b>Accuracy Requirements for Continuous Particle Measurement Methods in US and Europe and How They Are Being Met</b> .....	386
<i>Herbert Schloesser</i>	
<b>#59 Comparison Between Filter-based FRM And Continuous FEM PM2.5 Measurements In Southern California</b> .....	N/A
<i>B. Vlasich, S. Dutz, A. Polidori, P. Fine, S. Teffera, South Coast Air Quality Management District</i>	
<b>Real World Performance of Beta Attenuation Monitors in an Extreme Environment: 2010 Symposium on Air Quality Measurement Methods and Technology</b> .....	387
<i>Gary E Bertolin, Joel C. Torcolini, M. Scott Weaver</i>	
<b>Development of an Aerosol Wind Tunnel for Evaluating Performance of PM10 Inlet</b> .....	394
<i>Sangil Lee, Miae Ryu, Hyun Ho Kim, Jae Yong Lee, Sang Bong Han, Ki Jun Jeon, Jung, Sub Roh</i>	
<b>CARBLOGGER: A Freely Available, Open Source, Digital Diagnostic Data system</b> .....	398
<i>Matthew J. Vona, Matthew P. Quok</i>	
<b>TCP/IP MODBUS Digital Data Collection</b> .....	402
<i>Bryan C. Bibeau</i>	

### **SUPER SESSION D (1)**

<b>Stationary Source Dilution Methods for Fine Particulate Matter</b> .....	409
<i>Glenn England</i>	
<b>Continuous Multi-Metals Measurement – Part 1</b> .....	434
<i>K. Petterson, Cooper Environmental Services</i>	
<b>Continuous Multi-Metals Measurement – Part 2</b> .....	N/A
<i>K. Petterson, Cooper Environmental Services</i>	
<b>Mobile Area Source Emissions Measurement</b> .....	N/A
<i>R. Green, Waste Management, Inc.</i>	
<b>Passive Flare Measurements – Part 1</b> .....	N/A
<i>R. Spellicy, IMACC</i>	
<b>Passive Flare Measurements – Part 2</b> .....	N/A
<i>R. Spellicy, IMACC</i>	

### **SUPER SESSION D (2)**

<b>Stationary Source – Advances in Manual Methods</b> .....	N/A
<i>Chair: R. Merrill, Eastern Research Group; Co-Chair: O. Chang, CARB</i>	
<b>Introduction</b> .....	N/A
<i>R. Merrill, Eastern Research Group</i>	
<b>Dilution Methods for Fine Particulate</b> .....	N/A
<i>G. England, ENVIRON</i>	
<b>Dilution Sampling Applications</b> .....	473
<i>O. Chang, CARB</i>	
<b>Black Carbon Particulate Measurement</b> .....	N/A
<i>R. Shores, U.S. EPA</i>	

## SESSION 1

<b>Combustion Source Emissions</b> .....	N/A
<i>Chair: G. England, ENVIRON</i>	
<b>Nitrogen Stable Isotopic Composition of NOX Emissions from Two Coal-fired Power Plants</b> .....	4: 8
<i>J. David Felix, Emily M. Elliott, Stephanie Shaw</i>	
<b>Estimated PM10 Emission Quantitation Limits Using Traditional and Dilution Methods at a Gas-Fired Combined Cycle Plant</b> .....	494
<i>Glenn England</i>	
<b>Implementation of Direct NH3 Measurement Using Tunable Diode Laser System on Post Combustion NOX Reduction Systems</b> .....	4: 9
<i>Timothy J. Kuiken</i>	
<b>The Use of FTIR to Analyze Motor Vehicle Exhaust: A Case Study on Urea-Injection Selective Catalytic Reduction Vehicles</b> .....	"..725
<i>Yong Yu, Bruce Frodin, Richard Ling, Paul Rieger</i>	
<b>The Effect Of Metal Salts On Quantification Of Elemental And Organic Carbon In Diesel Exhaust and Other Carbonaceous Particles Using Thermal-optical Evolved Gas Analysis</b> .....	72:
<i>Y. Wang, A. Chung, S. E. Paulson</i>	

## **Xqwo g'4**

<b>A Precise Gas Chromatographic Method Using ECD Detection for the Measurement of Nitrous Oxide in Vehicle Exhaust</b> .....	535
<i>Leo Zafonte, Paul L. Rieger, Mark Fuentes, Richard Ling</i>	

## SESSION 2

<b>EPA's NCore Network: Pilot Monitoring Program for PM10-2.5 Speciation Sampling</b> .....	73:
<i>Jeff Nichol, James B. Flanagan, R.K.M. Jayanty</i>	
<b>Development of a Method for Ambient Hexavalent Chromium Measurement</b> .....	545
<i>Lihui Huang, Zhihua (Tina) Fan, Lin Lin, Chang Ho Yu, Brian Buckley, Linda Bonanno</i>	
<b>Inhalable Particulate Matter Associated with Mining and Smelter Activities in Rustenburg, South Africa</b> .....	74:
<i>Nnnesi A. Kgabi, Timothy Mokgwetsi, Malefo M. Molefe</i>	
<b>A Comparison of Laboratory Methods and Procedures for Measuring Inorganic Carbonate Carbon in Particulate Matter Using Thermal-Optical Analysis</b> .....	555
<i>Max R. Peterson, Melville H. Richards</i>	
<b>#122 Chemical Speciation of Coarse and Fine Particles in Xian, China Using a Continuous Mass Spectrometer Dichot</b> .....	N/A
<i>H. Lu, IEECAS Academy of Science; N. Yamanaka, Kimoto Electric Co.; T. Merrifield, Greentech Instruments</i>	

## SESSION 3

<b>General PM Monitoring</b> .....	N/A
<i>Chair: J. Flanagan, Research Triangle Institute; Co-Chair: R. Tropp, Desert Research Institute</i>	
<b>Laboratory Evaluation of Methods for Measuring Inorganic Carbonate Carbon in Coarse Particulate Matter</b> .....	562
<i>Max R. Peterson, Eric Poitras</i>	
<b>Visibility Monitoring and an Update on the Proposed New Secondary Standard</b> .....	"768
<i>Rhys D. Evans</i>	
<b>A Cost -Effective, Simple-to-operate Deployable PM Sampling System</b> .....	572
<i>Saulius Trakumas, Donald L. Smith, Charles Nachreiner</i>	
<b>Fugitive Dust Source Mapping at a Cement Processing Facility Using an Eye-safe U.V. Scanning Lidar</b> .....	"777
<i>S. M. Beck, M. E. Sklar, J. R. Linares</i>	
<b>A Comparison Of Pm10 Survey Monitors</b> .....	584
<i>Christopher Lanane, Daniel Johnson</i>	

<b>PM2.5 Challenge: A Comparison of Federal Equivalent Method PM2.5 Monitors to the Federal Reference Method</b> .....	58;
<i>Kevin Goohs, Jeffrey Ambis</i>	

#### **SESSION 4**

<b>VOC/SVOC Method Development</b> .....	N/A
<i>Chair: S. Parmar, AAC; Co-Chair: J. Swift, Eastern Research Group</i>	
<b>Determination of Levels of Volatile Methyl Silicones in Air Samples from Across Canada</b> .....	599
<i>Mehran Alaei, Helena Steer, Jim Daley, L. Wade Bontempo</i>	
<b>Identification of Hydrocarbons in Ambient Air</b> .....	59;
<i>Randall Bramston-Cook, Edward Bramston-Cook</i>	
<b>The Sampling and Analysis of Acrolein From Ambient Air Using O-Benzylhydroxylamine Coated Cartridges</b> .....	5: 7
<i>Kristia Parker, Eric Grosjean, Marcus Hueppe, Sucha Parmar</i>	
<b>Improving Measurement Accuracy of Acrolein, Naphthalene and other more challenging compounds using EPA Method TO-15</b> .....	5; 5
<i>Dan Cardin</i>	
<b>The Measurement of Acrylonitrile in Ambient Air Using Solid Sorbent Tubes and Thermal Desorption</b> .....	5; :
<i>John R Bricarello</i>	
<b>Critical Factors when Using Diffusive Samplers for 1 to 30 Day Sampling of VOCs</b> .....	".....825
<i>Linda S. Coyne, Cindy Kuhlman, Joseph Chada</i>	
<b>Validating Instrument Performance for Measurement of Hydrocarbons in Ambient Air with a Gas Chromatograph and Dual Flame Ionization Detectors</b> .....	".....82:
<i>Randall Bramston-Cook, Edward Bramston-Cook</i>	
<b>Identification of Organic Compounds in Air by Thermodesorption and Gas Chromatography / Mass Spectrometry</b> .....	"836
<i>Geraldine Leroy, Gaël Muckensturm, Valérie Ingrand</i>	
<b>An Air Toxics Study in El Paso: Measurement Quality and Potential Health Risks</b> .....	"... 63;
<i>Richard J. Tropp, Lung-Wen Chen, Dongzi Zhu, Judith C. Chow, John G. Watson, Barbara Zielinska, Wen-Whai Li</i>	
<b>A Simple, More Reliable Time Integrated Whole Air Sampling Approach to EPA Method TO-15 using Helium Diffusion Sampling</b> .....	"..... 654
<i>Daniel B. Cardin, Thomas X. Robinson, Chris J. Casteel</i>	
<b>High Performance Cryogen-free Automated Analysis of Canister Air Samples Using TD-GC/TOF MS and Automated Compound Identification Software</b> .....	".....859
<i>Kurt Thaxton, Nicola M. Watson</i>	
<b>Novel Approach to Co-Measurement of Volatile Organic Compounds and Sulphur Compounds in the Athabasca Oil Sands Region</b> .....	"..... 665
<i>Bob O'Brien</i>	
<b>Accurate Monitoring of Sulfur Compounds in Fused Silica Lined Canisters Utilizing a New Approach for Water Removal during Field Sampling</b> .....	"..... 66:
<i>Thomas X. Robinson, Daniel B. Cardin</i>	
<b>Ambient Air Monitoring Results of Polychlorinated Dibenzop-dioxins, Polychlorinated Dibenzofurans, Polychlorinated Biphenyls, and Polybrominated Diphenylethers at Urban Areas in California from 2002 to 2006</b> .....	"..... 674
<i>Donald Hammond</i>	
<b>Assessing Air Emissions of VOCs, Ammonia, Fixed Gases, and Siloxanes from Biofilters At Compost Facilities Using the SCAQMD Modified USEPA Surface Flux Chamber Technology</b> .....	"..... 679
<i>Tom Card, CE Schmidt, Lorrie Loder, Ron Miesbauer, Robert Rankin, Steve Hoyt</i>	
<b>Evaluation Of The Urban Air Quality In Brazilian Midwest Region</b> .....	"..... 685
<i>Edmilson de Souza, Josmar Davilson Pagliuso</i>	
<b>Real Refractive Indices of a- and b-pinene and Toluene Secondary Organic Aerosols Generated from Ozonolysis and Photo-oxidation</b> .....	"..... 68:
<i>Hwajin Kim, Brian Barkey, Suzanne E. Paulson</i>	
<b>Continuous Measurement Of Air Toxics In The Field</b> .....	N/A
<i>R. Evans, American Ecotech</i>	

## **SESSION 5**

<b>Near Road Exposure Studies</b> .....	N/A
<i>Chair: P. Roberts, STI</i>	
<b>Effect of Proximity to a Freeway with Heavy-duty Diesel Traffic on the Ambient Concentrations of Criteria and Air Toxic Pollutants</b> .....	695
<i>Andrea Polidori, Philip M. Fine</i>	
<b>Near-Roadway Air Quality: Synthesizing the Findings from Real-World Data</b> .....	N/A
<i>A. Karner, D. Niemeier, University of California, Davis; D. Eisinger, Sonoma Technology, Inc.</i>	
<b>Characterization of Aerosol at Several Near Road Schools in Las Vegas, Nevada</b> .....	69:
<i>Steven G. Brown, Jennifer L. DeWinter, Paul T. Roberts</i>	
<b>Near-Road Factors Explaining Spatial Variability in NO<sub>x</sub> Concentrations within Southern California Communities</b> .....	6: 5
<i>Fred Lurmann</i>	
<b>Analysis of Factors Affecting Concentrations of Ultrafine Particles and Associated Pollutants on Freeways</b> .....	8: :
<i>Yifang Zhu</i>	

## **SESSION 6**

<b>Mobile Monitoring Platforms</b> .....	N/A
<i>Chair: S. Fruin, USC School of Medicine; Co-Chair: D. Westerdahl, California Air Resources Board</i>	
<b>An Instrumentation Package for Measuring Commuter Exposure to Vehicle Exhaust Pollutants in New Delhi, India</b> .....	6; 4
<i>Joshua S. Apte, Thomas W. Kirchstetter, Julian D. Marshall, William W. Nazaroff</i>	
<b>Spatial Resolution of Selected Combustion Sources in Tacoma, WA Using Mobile Monitoring</b> .....	6; :
<i>Timothy V. Larson, Ji-Hyun Park, Cole T. Fitzpatrick, Christopher D. Simpson,</i>	
<b>Long Term Monitoring of Greenhouse Gas Emissions from Fugitive and Area Sources</b> .....	924
<i>Ram Hashmonay</i>	
<b>EPA's Mobile Measurement of Source Emissions and Near-source Impact</b> .....	743
<i>Richard Shores, Gayle Hagler, Eben Thoma, Richard Baldauf, Vlad Isakov</i>	
<b>Community Scale Air Toxics Ambient Monitoring Mobile Station</b> .....	767
<i>Steve Boddeker, Andrea Polidori, Philip M. Fine</i>	
<b>Mobile Air Monitoring: Sometimes Simple is Best</b> .....	76;
<i>Dane Westerdahl, Khe Max Zhang, Scott Fruin</i>	
<b>Standardization of Open Source Test Methods: Mobile Monitoring as a Case Study</b> .....	7: 2
<i>Chatten Cowherd</i>	
<b>Approaches and Methodologies for Measurement of Diesel Exhaust Self-Pollution in School Buses</b> .....	7: 7
<i>Eric Winegar, Scott Fruin, Jay Turner</i>	

## **SESSION 7**

<b>Panel – Monitoring Data: The Beginning or the End?</b> .....	N/A
<i>Chair: E. Winegar, Applied Measurement Science; Co-Chair: H. Hafner, Sonoma Technology Inc.; Panelists: R. Henry, University Southern California; P. Fine, South Coast Air Quality Management District; D. Westerdahl, California Air Resources Board; R. Evans, American Ecotech; R. Tropp, Desert Research Institute</i>	

## **SESSION 8**

<b>Ozone Measurements and Studies</b> .....	N/A
<i>Chair: K. Durkee, South Coast Air Quality Management District; Co-Chair: D. Fitz, University of California</i>	
<b>A Comparison of Ambient Ozone Levels in Wyoming's Upper Green River Basin with Utah's Uintah Basin during Winter 2010</b> .....	7; 4
<i>William J. Hauze, Brian Olsen, Dan Risch, George Wilkerson</i>	
<b>Measurement and Analysis of Boundary Air Quality and Meteorological Data for Ozone Attainment Modeling of California's South Coast Air Basin</b> .....	7; 9
<i>Robert A. Baxter, Kevin R. Durkee, Sang-Mi Lee</i>	
<b>Development of a Sensitive Analyzer for Fast and Direct Measurements of NO<sub>2</sub> in Ambient Air</b> .....	: 24
<i>Sabine Crunaire, Jean-Luc Mineau, Frédéric Antoine, Thierry Gonthiez, Guillaume Méjean, Daniele Romanini</i>	

<b>Measurement of NOy, NO2, PAN, and k1 in Support of Ozone Characterization Studies</b> .....	809
<i>Dennis Fitz, Kurt Bumiller</i>	
<b>Speciation of VOCs from Complex Sources: Validation of Reactivity-Weighted Emissions</b> .....	832
<i>Peter G. Green, Anuj Kumar, Isabel Faria, Michael J. Kleeman</i>	
<b>Assessing Ozone Reactivity Emissions from a Biofilter at a Compost Facility Using the SCAQMD Modified USEPA Flux Chamber Technology and the UC Davis Mobile Ozone Chamber Assay Technology</b> .....	837
<i>Peter Green, Isabel Faria, Mike Kleeman, Zackary Kay, Randy French, Tom Card, CE Schmidt</i>	

## **SESSION 9**

<b>Vapor Intrusion</b> .....	N/A
<i>Chair: C. Schmidt, Environmental Consultant</i>	
<b>Optimizing Analytical Parameters for Soil Vapor Samples Using Automated Thermal Desorption/Gas Chromatography/Mass Spectrometry (ATD/GC/MS)</b> .....	842
<i>Lee Marotta, Miles Snow, Stephen Varisco, Tom Kwoka</i>	
<b>Measurement of Toxic Chemicals in Vapor Intrusion Samples Over a Very Wide Concentration Range with Flame Ionization Prescreen and Automatic Selection of an Appropriate Analysis Method</b> .....	847
<i>Edward H. Bramston-Cook, Stefan J. D'Angona, Mark Scesny, Randall Bramston-Cook</i>	
<b>Comparison of Measured Flux Versus Modeled Flux of VOCs from a Groundwater Source- Case Study with Sideby- Side Flux and Soil Gas Measurements</b> .....	852
<i>Ranjit Sahu, Mark Jones, Ken Kiefer, CE Schmidt</i>	
<b>A Turn-Key Solution for Indoor and Sub-Slab Vapor Intrusion Monitoring using Canisters that Provides Faster Sample Collection, Higher Molecular Weight Recovery, and More Advanced Leak Avoidance</b> .....	862
<i>Dan Cardin</i>	

## **SESSION 10**

<b>Quality Assurance and Data Interpretation</b> .....	N/A
<i>Chair: R. Tropp, Desert Research Institute</i>	
<b>Artifact Adjustments to Organic Carbon Particulate Matter Concentrations in the IMPROVE Network</b> .....	67
<i>Ann M. Dillner, Charles E. McDade, Warren H. White</i>	
<b>New Data Analysis Methods For Air Quality Measurements With Averaging Times Of Minutes</b> .....	872
<i>Ronald Henry</i>	
<b>Wood Smoke Markers to Characterize Winter Season Contribution of Residential Wood Combustion to PM2.5</b> .....	877
<i>Keith Jones</i>	
<b>Chemical Mass Closure and Spatial and Seasonal Characteristics of Coarse Particulate Matter in the Los Angeles Area</b> .....	883
<i>Z. Ning, K. Cheung, W. Kam, N. Daher, C. Sioutas</i>	
<b>Statistical Comparison of Low Concentration Measurement Accuracy of Compliance and Trace Level Nitrogen Oxide Monitors</b> .....	888
<i>Miloslav Nosal, Allan H. Legge, Martin Hansen</i>	
<b>PM2.5 Emissions: Do The New Test Methods Improve The Results?</b> .....	896
<i>Kevin Crosby</i>	
<b>Meteorological Quality Assurance Under the New EPA Volume IV Guidelines -Implementation of a Common Sense Approach to Real World Audits</b> .....	8: 7
<i>David H. Bush, David L. Yoho, Robert A. Baxter</i>	
<b>Advanced Ambient Air Network Operations</b> .....	8: 2
<i>Will Breckenridge</i>	
<b>Quality Assurance Protocol: Optical Remote Sensing</b> .....	8: 9
<i>Dennis K. Mikel</i>	

## **SESSION 11**

<b>Fine and Ultrafine Particles</b> .....	N/A
<i>Chair: T. Hansen, Magee Scientific Corp.</i>	



<b>Ozone Formation in Salt Lake and Utah Valley: Summer 2009</b> .....	24
<i>Delbert J. Eatough, Jaron C. Hansen, R. Neal Olson</i>	
<b>The “Micro” Aethalometer® – an Enabling Technology for New Applications in the Measurement of Aerosol Black Carbon</b> .....	2:
<i>Anthony D. A. Hansen, Griša Mocnik</i>	
<b>Measuring Trace Metal Concentrations in Diesel and Biodiesel Particulate Exhaust</b> .....	35
<i>Jing Guo, Edward F. Peltier, Gwen L. Macpherson</i>	
<b>PAX: a New Instrument to Measure Black Carbon Mass and Optical Properties of Aerosols</b> .....	3:
<i>G. Kok, J. Walker, P. Arnott, I. Arnold, P. Keady, C. Hare</i>	
<b>Design and Performance of New Instrument to Measure Fine and Ultra-fine Particles (UFP) in Ambient Air</b> .....	59
<i>Kathleen A. Erickson, Fredrick R. Quant, Sean Morell, Robert Caldwell, Brian L. Osmondson</i>	
<b>A Baseline Assessment and Comparison of Particulate Matter and Black Carbon Emissions from Gasoline Direct Injection Vehicles</b> .....	64
<i>Michael A. Kamboures, Shishan Hu, Yong Yu, Sherry Zhang, Richard Ling, Julia Sandoval, Inna Dzhema, Darey Huo, Paul Rieger</i>	
<b>Residential Indoor Ultrafine Particle Measurements During Cooking Activities Using Gas and Electric Appliances</b> .....	69
<i>A. L. Wilson, Olexandr Karpukhin, Lance DeLaura</i>	
<b>Inter-Community Variability In Total Particle Number Concentrations In Receptor Areas Of Los Angeles Air Basin</b> .....	88
<b>Techniques for Determining Partial Size Distribution of Particulate Matter in Egg Production Environment: Laser Diffraction versus Electrical Sensing Zone</b> .....	94
<i>Lingjuan Wang, Zihan Cao</i>	
<b>The Influence of Local-Scale Meteorology on PM2.5 Concentrations in a Coastal Environment</b> .....	2
<i>Joel C. Torcolini, Gary E. Bertolin, M. Scott Weaver, Lisa Wunder, Christopher Patton</i>	

**ADDITIONAL PRESENTATIONS**

<b>Air Exchange Rates of a Large, Representative Sample of California Vehicles and Predictive Models Useful for Epidemiological Studies</b> .....	::
<i>Scott Fruin, Neelakshi Hudda, Costas Sioutas, Ralph Delfino</i>	
<b>Application of a Tracer Dilution Method Using Cavity Ring Down Spectroscopy to Quantify Landfill Methane Emission</b> .....	3236
<i>Roger Green, Gary Hater, Nathan Swan, Eben Thoma, Jason DeWees, Chris Rella, Doug Goldsmith</i>	
<b>Author Index</b>	