

# **110th Air and Waste Management Association Annual Conference and Exhibition (ACE 2017)**

Bridging Environment, Energy & Health

Pittsburgh, Pennsylvania, USA  
5 - 8 June 2017

Volume 1 of 4

ISBN: 978-1-5108-5184-9

**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.**

The information and opinions expressed in these papers/presentations are solely of the authors and should not be considered as having the endorsement or support of the Association.

Compilation Copyright © (2017) by Air & Waste Management Association.  
Copyright of the individual papers are retained by the authors.

Additional copies of these and other A&WMA conference proceedings will be available through the A&WMA Online Store. To place an order, please visit the Online Store at [www.awma.org](http://www.awma.org) or contact the A&WMA Publications Order Department at [onlinestore@awma.org](mailto:onlinestore@awma.org), +1-412-232-3444 (phone) or +1-412-232-3450 (fax).

Printed by Curran Associates, Inc. (2018)

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

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

Phone: +1-800-270-3444  
+1-412-232-3444  
Fax: +1-412-232-3450

[info@awma.org](mailto:info@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: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## VOLUME 1

|   |     |
|---|-----|
| <b>Ammonia Inhibition and Recovery Potential in Anaerobic Digesters: A Review</b> .....   | 1   |
| <i>C. Khalil, S. Ghanimeh, Y. Medwar</i>  |     |
| <b>The Impact of Lime Dosage on Odor Reduction of Biosolids</b> .....   | 13  |
| <i>A. Abri, M. Sattler</i>  |     |
| <b>Review of Mercury Monitor Accuracy Audit Results at Coal-Fired Power and Cement-Producing Plants</b> .....   | 18  |
| <i>A. Adam, T. Rodak, V. Schmid</i>   |     |
| <b>Phase Out of Ozone Depleting Substances (ODS) Foam in Egypt</b> .....  | 26  |
| <i>E. Agaiby, M. Labib, A. Sabry</i>  |     |
| <b>Regional Planning for End-of-Life Electric Vehicle Batteries: An Inventory Analysis and Case Study in California</b> .....                             | 41  |
| <i>N. Ai, J. Zheng</i>  |     |
| <b>Advanced SCR Systems for Clean Energy from Natural Gas Power Plants in Pennsylvania</b> .....  | 52  |
| <i>R. Aiello, B. Tatum, M. Rost, P. Andersen, C. Wissel-Tyson</i>   |     |
| <b>Combined Theoretical and Experimental Approach to Build a New Monitoring Method for Undetectable CO<sub>2</sub> Leaks from the Storage Sites</b> ..... | 63  |
| <i>M. Alam</i>  |     |
| <b>Regulatory Timeline Adaptation through Automation</b> .....  | 71  |
| <i>B. Allred, F. Castaneda</i>  |     |
| <b>A Scalable, Automated System for Photochemical Modeling on the Cloud</b> .....   | 80  |
| <i>M. Alvarado, E. Fanny, E. Fahy, C. Lonsdale, E. Bettencourt</i>  |     |
| <b>Modeling the Dispersion of Pollutants in Vicinity of Depressed Roadways</b> .....  | 91  |
| <i>S. Amini, A. Venkatram, D. Heist, S. Perry</i>   |     |
| <b>Alternative Landfill Closure and Climate Change Mitigation</b> .....   | 105 |
| <i>R. Arcuri, B. Gaffigan</i>   |     |
| <b>Utilizing Advanced Computer Simulation to Improve Occupational Safety and Health</b> .....   | 115 |
| <i>B. Bakowski</i>  |     |
| <b>Biochar-based Biofiltering Medium for Removal of Acetone, Ammonia and Xylene Vapors</b> .....  | 130 |
| <i>E. Baltreinaite, P. Baltrenas</i>  |     |
| <b>Comparison of Methane Production from Household Waste Using Pond Soil and Horse Dung as Microbial Inocula</b> .....                                    | 135 |
| <i>S. Baniya, M. Sattler</i>  |     |
| <b>Addressing Emerging Contaminants Under Conflicting State and Federal Regulatory Programs: A Case Study</b> .....                                       | 140 |
| <i>C. Barnes</i>  |     |
| <b>Concerns with Validity and Integrity of Renewable Fuels Standard (RFS) Verification</b> .....  | 148 |
| <i>W. Barnes</i>  |     |
| <b>MACT Process Heater Inspections Lessons Learned</b> .....  | 153 |
| <i>C. Baukal, J. McGuire, M. Pappé, B. Weimer</i>   |     |
| <b>Challenges and Strategies to Reducing GHG Emissions for Land Use Developments</b> .....  | 166 |
| <i>S. Berlin</i>  |     |
| <b>Evaluation of Inter-precursor Trading (IPT) Modeling for Ozone in Nonattainment Area</b> .....   | 171 |
| <i>A. Bhat</i>  |     |
| <b>Air Permitting Implications of a Biorefinery Producing Raw Bio-oil in Comparison with Producing Gasoline and Diesel Blendstocks</b> .....              | 173 |
| <i>A. Bhatt, Y. Zhang</i>   |     |
| <b>The Paris Agreement: The Latest Turn on an Uncertain Journey</b> .....   | 182 |
| <i>K. Blakemore</i>   |     |
| <b>Environmental Crisis Management Lessons from Freedom and Beyond</b> .....  | 198 |
| <i>D. Bluedorn, R. Butter, J. Centofanti</i>  |     |
| <b>Estimation of Nitrous Oxide by Irrigation in Parks with Treated Wastewater in the City of Chihuahua, Mexico</b> .....                                  | 213 |
| <i>M. Bojorquez, E. Herrera, C. Navarro</i>   |     |
| <b>Fueling Our Future Phase 1: Evaluating Consumer Acceptance of Biofuels in Iowa</b> .....   | 218 |
| <i>S. Hallmark, J. Dong, G. Bou-Saab</i>  |     |
| <b>Computational Time Improvements of Pollutant Release Characterization Using Pre-computed Advection-Diffusion Adjoint Releases</b> .....                | 224 |
| <i>C. Brereton, M. Johnson, L. Campbell</i>   |     |
| <b>Assessing Industrial Facility Vulnerability from Flooding Events in a Changing Climate</b> .....   | 229 |
| <i>N. Briggs, C. Boyce, D. Mayfield, S. Ikeda, M. Mayo</i>  |     |
| <b>Safety Success Learning Model – A Paradigm Shift</b> .....   | 236 |
| <i>P. Brush</i>   |     |
| <b>Design and Performance of an Alternative Final Cover System at a Coal Combustion Residual Surface Impoundment</b> .....                                | 240 |
| <i>R. Buffalini, D. Tolmer, J. Buck</i>   |     |
| <b>State Air Toxics Program Enhancements</b> .....  | 265 |
| <i>D. Caniparoli, J. Frohning, E. Engel</i>   |     |
| <b>Daily Kilometer-Scale MODIS Satellite Maps of PM<sub>2.5</sub> Describe Wintertime Episodes</b> .....  | 269 |
| <i>R. Chatfield, M. Sorek-Hamer, A. Lyapustin, Y. Wang</i>  |     |

|   |     |
|---|-----|
| <b>Aerosol Loading Effects on Particle Size-selective Samplers</b> .....  | 275 |
| <i>T.-J. Chen, C. Lin, S.-H. Huang, C.-C. Chen, Y.-M. Kuo, W.-C. Lee</i>  |     |
| <b>PM<sub>2.5</sub> Source Apportionment Using a Hybrid Environmental Receptor Model</b> .....  | 280 |
| <i>L.-W. Chen, X. Wang, J. Chow, J. Watson, J. Cao</i>  |     |
| <b>Characteristics of Particle Mass and Number Size Distributions inside Metro Trains Traveling on Ground and in Underground Environments in the Taipei Mass Rapid Transit System</b> ..... | 285 |
| <i>H.-X. Ninh, Y.-H. Cheng</i>  |     |
| <b>Trends in Anaerobic Treatment for Industrial Wastewater and Food Waste to Energy Projects</b> .....  | 290 |
| <i>J. Cleary</i>  |     |
| <b>Excluding Offsite Emission Sources Under the EPA Fenceline Benzene Monitoring Rule</b> .....   | 304 |
| <i>B. Cochran</i>   |     |
| <b>Integrating Particulate Matter Emissions into EPA's Avoided Emissions and Generation Tool (AVERT)</b> .....  | 311 |
| <i>D. Cooley, K. Siegel, J. Dorn, A. Belova, D. Mulholland, E. Zinsmeister</i>  |     |
| <b>Landfill Leachate Impacts from Coal Ash and Exploration &amp; Production Wastes</b> .....  | 319 |
| <i>I. Cooper</i>  |     |
| <b>Zero Liquid Discharge at Power Plants - Problems, Causes, and Cures</b> .....  | 336 |
| <i>I. Cooper</i>  |     |
| <b>VOC Emission Testing Issues and Potential Solutions</b> .....  | 353 |
| <i>K. Crosby</i>  |     |
| <b>Production of Oh Radicals by Ultraviolet Photolysis of H<sub>2</sub>O in an Air and Surface Purifier</b> .....   | 371 |
| <i>D. Crosley, C. Araps, M. Doyle-Eisele, J. McDonald</i>   |     |
| <b>Preparation of Nitrogen-Doped Iron Impregnated Activated Carbon Composites from Harmful Algal Bloom Biomass</b> .....  | 383 |
| <i>Y. Cui, H. He, J. Atkinson</i>   |     |
| <b>State Incentives for Combined Heat and Power Projects to Reduce GHG Emissions</b> .....  | 388 |
| <i>J. Culp, D. Sandlin</i>  |     |
| <b>Recovering Energy from Landfill Gas: An Environmental Benefit or Burden?</b> .....   | 395 |
| <i>L. Damiano, S. Zemba</i>   |     |
| <b>Case Studies of Efficient Odor Control Management of Combined Sewer Overflow Structures</b> .....  | 408 |
| <i>R. David</i>   |     |
| <b>Detecting Subsurface Fires at Landfills using Gas Data</b> .....   | 413 |
| <i>A. Havilland, R. Lindstrom</i>   |     |
| <b>Assessing the Emission Benefits of Renewable Energy and Energy Efficiency using EPA's Avoided Emissions and generation Tool (AVERT)</b> .....  | 425 |
| <i>J. Fisher, R. DeYoung, N. Santen</i>   |     |
| <b>Estimating the Environmental Effects of Green Roofs: A Case Study in Kansas City, Missouri</b> .....   | 446 |
| <i>R. DeYoung, A. Shatas, V. Ludwig</i>   |     |
| <b>Quantifying Energy Efficiency Savings to Support State and Local Emission Reductions Goals</b> .....   | 467 |
| <i>N. Dietsch</i>   |     |
| <b>Mining the Knowledge of PM<sub>2.5</sub> Pollution and Application in Beijing, China</b> .....   | 479 |
| <i>H. Ding, Z. Yu, Y. Liu</i>   |     |
| <b>Agency Ethics, Overreach, Sue and Settle and the Misuse of Science</b> .....   | 485 |
| <i>S. Dismukes, D. Rockman, K. Graf, J. Pezze</i>   |     |
| <b>Refinery 1-Hour SO<sub>2</sub> NAAQS Non-Attainment SIP Air Quality Modeling Analysis Case Study</b> .....   | 502 |
| <i>D. Dix, J. Roy</i>   |     |
| <b>AWMA ACE Citizen Science Emission Monitoring</b> .....   | 510 |
| <i>S. Dolan</i>   |     |
| <b>Evolution of DOCS II (2006-2016)</b> .....   | 519 |
| <i>N/A</i>  |     |
| <b>OrganEcs - A Cost Estimating Tool for Managing Source-Separated Organics</b> .....   | 531 |
| <i>J. Donahue</i>   |     |
| <b>Impact of Appendix W Revisions on SO<sub>2</sub> Data Requirements Rule AERMOD Analyses</b> .....  | 543 |
| <i>I. Donaldson, S. Miller</i>  |     |
| <b>Solid Waste Air Permitting Obstacles: A Case Study</b> .....   | 551 |
| <i>L. Damiano, J. Doris</i>   |     |
| <b>Best Practices Learned from Greenhouse Gas Reporting</b> .....   | 562 |
| <i>C. Drotman, R. Huff, P. Sullivan</i>   |     |
| <b>Air Emission Measurements to Evaluate Mixed and Alternate Fuels for Compliance with Boiler MACT</b> .....  | 568 |
| <i>T. Dunder, J. Miller, A. Sakellariou</i>   |     |
| <b>Optimization Methods for Environmental Engineers and Scientists</b> .....  | 574 |
| <i>L. Theodore, R. Dupont</i>   |     |

## VOLUME 2

|  |     |
|--|-----|
| <b>The Impact of Industrial Odors on General Well-Being of Residential Communities in Colorado</b> ..... | 589 |
| <i>M. Eltarkawe, S. Miller</i>   |     |
| <b>Using Vegetation to Enhance the Impact of Solid Barriers on Near-road Air Pollution</b> .....         | 594 |
| <i>F. Ahangar, S. Amini, A. Venkatram</i>  |     |

|   |      |
|---|------|
| <b>PM2.5 Emission Factors and Species Profiles for Natural Gas-Fired Engines</b> .....  | 609  |
| <i>G. England, J. Urisk, K. Crosby</i>  |      |
| <b>Crushing the Dust in the Western Mojave Desert using Cost-Effective, Innovative and Creative Methodologies</b> .....   | 622  |
| <i>R. Farber, C. Cowherd, M. Cloud-Hughes, E. Roberts, R. Roberts, R. Countess, P. Nguyen, H. Minshew, A. DeSalvio, B. Banks, V. Rausch, R. Campell, L. Doster, D. Foster, S. Irwin, A. Noga, D. Newton, T. Yamasaki, J. Schuder, J. Grim</i> |      |
| <b>Emergency Demand-Response - Federal Regulatory Evolution and State Difference</b> .....  | 661  |
| <i>A. Farnoud, Z. Good</i>  |      |
| <b>TSCA Reform - Changes to TSCA and the Inventory Reset Rule</b> .....   | 673  |
| <i>L. Fields, A. Sajo</i>   |      |
| <b>Business Sustainability Reporting and Disclosure: Evolution and Best Practices</b> .....   | 697  |
| <i>J. Fillo</i>   |      |
| <b>Case Study – Air Dispersion Modeling for a Surface Coal Mine in Western Colorado</b> .....   | 703  |
| <i>K. Fritchman, L. Blinn</i>   |      |
| <b>Updated Impact of Boundary Conditions on Simulating O<sub>3</sub> Concentration</b> .....  | 709  |
| <i>J. Fu, K. Huang, J. Tan</i>  |      |
| <b>A Study of Gender Difference in Health Benefits of Air Pollution Reduction</b> .....   | 724  |
| <i>F. Yeh, C.-H. Tseng, Y.-A. Wang</i>  |      |
| <b>Performance Analysis of a Surface Treatment Technique Applied Onto Granular Materials Storage Piles</b> .....  | 729  |
| <i>B. Furieri, J. Santos, J.-L. Harion, J. Costa, J. Silva</i>  |      |
| <b>Assessing Key Uncertainties in Projections of Climate Change Impacts on Air Quality</b> .....  | 742  |
| <i>F. Menendez, R. Saari, E. Monier</i>   |      |
| <b>Impacts of the Bakken Oil and Gas Fields on Regional Fine Particle Concentrations</b> .....  | 751  |
| <i>K. Gebhart, D. Day, A. Prenni, B. Schichtel, J. Hand, W. Malm, A. Evanski-Cole</i>   |      |
| <b>Catalytic Oxidation of NO Using Hydrophobic Styrenic Porous Polymers Hyper-Cross-Linked with 1,2-Dichloroethane</b> .....  | 763  |
| <i>M. Ghafari, J. Atkinson</i>  |      |
| <b>Successful Rapid Response Mitigation of High Strength Vapor Plume Underneath a Large, Active Navy Building</b> .....   | 768  |
| <i>L. Goode, B. Hitchens, N. Durant, P. Chang, V. Hosangadi, M. Pound</i>   |      |
| <b>EPA Method 325 and the Search for a Portable, Low-Cost, Real-Time, Accurate, Trace-Level Benzene Fenceline Air Monitor</b> .....   | 781  |
| <i>J. Granstra, B. Cochran, M. Modrak</i>   |      |
| <b>Using Physical Modeling to Evaluate Re-entrainment of Stack Emissions</b> .....  | 791  |
| <i>S. Guerra, R. Peterson</i>   |      |
| <b>Using Physical Modeling to Refine Downwash Inputs to AERMOD</b> .....  | 798  |
| <i>S. Guerra, R. Petersen</i>   |      |
| <b>Utilizing Six Sigma Tools to Maintain Compliance with the Pharmaceutical MACT Standard</b> .....   | 814  |
| <i>D. Guntz</i>   |      |
| <b>“Ghosts” of Air Permits Past</b> .....   | 823  |
| <i>J. Hall</i>  |      |
| <b>Implementation of Final NSPS XXX Rules</b> .....   | 834  |
| <i>J. Hall</i>  |      |
| <b>Planning for a Facility Inspection</b> .....   | 848  |
| <i>J. Hall, M. Contestabile</i>   |      |
| <b>PSD Single-Source Ozone Analysis Modeling and Permitting Concerns</b> .....  | 862  |
| <i>R. Hamel</i>   |      |
| <b>Evaluation of the IMPROVE Equation for Reconstructing Haze from Speciated Aerosol Data</b> .....   | 874  |
| <i>J. Hand, A. Prenni, B. Schichtel, W. Malm, S. Copeland</i>   |      |
| <b>An Innovative Mercury Emissions Control Technology</b> .....   | 883  |
| <i>C. Poling, T. Lesniak, M. Harrison</i>   |      |
| <b>Groundwater Modeling for Closure of the Little Blue Run CCR Disposal Area</b> .....  | 892  |
| <i>B. Hastings, H. Walsh</i>  |      |
| <b>Air Permitting Challenges for Waste-To-Energy Projects</b> .....   | 904  |
| <i>S. Head, G. Wolffe</i>   |      |
| <b>Controlling Active Ventilation to Safeguard the Community from Indoor Releases of Acutely Toxic Chemicals</b> .....  | 915  |
| <i>D. Heinold, L. Warren</i>  |      |
| <b>What Changes to EPA's Risk Management Program will Mean to Affected Industry and Surrounding Communities</b> .....   | 930  |
| <i>D. Heinold</i>   |      |
| <b>Potential use of NSPS and GHGRP Data to Calculate GHG Reductions</b> .....   | 936  |
| <i>J. Henkelman, P. Sullivan, R. Huff, C. Drotman</i>   |      |
| <b>Lessons Learned: How to Manage and Coordinate Environmental Sampling in the Wake of a Natural Disaster</b> .....   | 942  |
| <i>S. Henningsen</i>  |      |
| <b>Evaluation Of The Transport Of Norm Contaminants In The Air And Saturated Underground Zone Of The City of Aldama, Mexico</b> .....   | 956  |
| <i>E. Herrera, M. Bojorquez, E. Ramirez, A. Campos, J. Carrillo, J. Arroyo, A. Medina, M. Montelongo, C. Navarro</i>  |      |
| <b>Air Quality Measurements—From Rubber Bands to Tapping the Rainbow</b> .....  | 971  |
| <i>M. Kleinman, J. Watson</i>   |      |
| <b>Air Quality Measurements: Role in Policy and Permitting</b> .....  | 1005 |
| <i>S. Head</i>  |      |

|  |      |
|--|------|
| <b>Measurements, Emissions and Modeling</b> .....  | 1009 |
| <i>R. Morris, R. Environ</i>   |      |
| <b>The Future of Air Monitoring</b> .....  | 1018 |
| <i>E. Stevenson</i>  |      |
| <b>Reviews of Landfill Higher Operating Value Demonstrations in Ohio</b> .....   | 1025 |
| <i>M. Hopkins, R. Lindstrom</i>  |      |
| <b>Determination of the Impact of Fuel Composition on the Fate and of Transport Gaseous Emissions from Vehicles: a Computational Fluid Dynamics Investigation</b> .....          | 1034 |
| <i>S. Hoque</i>  |      |
| <b>Contaminated Groundwater Flow Control Across an Inverted Groundwater Divide with Three Groundwater Control Systems</b> .....  | 1039 |
| <i>C. Hortert</i>  |      |
| <b>Smell Pittsburgh: a Mobile Crowdsourced Application for Reporting and Visualizing Pollution Odors</b> .....   | 1052 |
| <i>Y.-C. Hsu, P. Dille, M. Tasota, B. Dias, R. Sargent, I. Nourbakhsh</i>  |      |
| <b>Comparison of Real World Light-Duty Gasoline Vehicle Emissions for High Altitude Mountainous Versus Low Altitude Piedmont Study Areas</b> .....                               | 1062 |
| <i>J. Hu, H. Frey</i>  |      |
| <b>Evaluation of the Effect of Biodiesel on Exhaust Emissions of Locomotive Head End Power Engines</b> .....   | 1085 |
| <i>J. Hu, H. Frey</i>  |      |
| <b>The Establishment of a Real-time Air Quality Map and Warning Mechanism Based on Health Impact - A Case Study in Taipei City</b> .....   | 1103 |
| <i>K.-I. Huang, C.-C. Chang, C.-H. Tseng</i>   |      |
| <b>Facing the Challenge of International Environmental Auditing</b> .....  | 1108 |
| <i>M. Hult, M. Acker</i>   |      |
| <b>Climate Change and NEPA</b> .....   | 1122 |
| <i>D. Huxley</i>   |      |
| <b>Emission Limits in Air Permits</b> .....  | 1131 |
| <i>R. Iyer</i>   |      |
| <b>Producing and Implementing Effective Sound Monitoring Studies</b> .....   | 1138 |
| <i>J. Jackson, J. Weber</i>  |      |
| <b>Atmospheric Contingencies by Ozone Air Quality at Mexico City</b> .....   | 1149 |
| <i>M. Jaimes, A. Retama, H. Bravo, R. Sosa, P. Sanchez, G. Vazquez, V. Magana</i>  |      |
| <b>Reduction of Fugitive HAPs and VOCs Emissions by a Vapor Recovery System (VRS) in a Gas Station</b> .....   | 1156 |
| <i>T.-H. Jang, B.-B. Jin, H.-S. Kim, J.-G. Choi, W.-R. Kim</i>   |      |
| <b>Exploring the Effectiveness of Standardized “Worst Case” Release Conditions</b> .....   | 1161 |
| <i>M. Jones</i>  |      |
| <b>Environmental Decision Support System for Floating Treatment Wetlands</b> .....   | 1175 |
| <i>J. Kaminski, B. Steen, B. Cordova</i>   |      |
| <b>Generating Sustainability Metrics for Developing Economies</b> .....  | 1190 |
| <i>R. Kanniganti</i>   |      |
| <b>Quantifying Municipal Solid Waste Management in the U.S. Using a Facility-based Methodology</b> .....   | 1205 |
| <i>D. Kantner, B. Staley</i>   |      |
| <b>On-the-road Testing of the Effects of Driver's Experience, Gender, Speed, and Road Grade on Car Emissions</b> .....   | 1210 |
| <i>A. Khader, R. Martin</i>  |      |
| <b>Air Dispersion Modeling of Multiple Natural Gas Well Pads, in Different Terrain Types and Determination of Exponential Value in Inverse Distance Weighting Function</b> ..... | 1223 |
| <i>F. Khalaj, M. Sattler</i>   |      |

### VOLUME 3

|   |      |
|---|------|
| <b>Key Factors Affecting Inter-County Variability in MOVES County-Level Energy Inventory</b> .....                    | 1229 |
| <i>T. Khan, H. Frey</i>   |      |
| <b>Emissions Profiles of Volatile Organic Compounds from Marijuana (Cannabis sativa) Cultivation Facilities</b> ..... | 1249 |
| <i>M. McDaniel, M. Wolf, V. Samburova, A. Khlystov</i>  |      |
| <b>Evaluation of the MOVES Model Using Real World Vehicle Emission Data Collected in the Ft. McHenry Tunnel</b> ..... | 1259 |
| <i>A. Khlystov, D. Campbell, M. McDaniel</i>  |      |
| <b>EPA's Recent Regulation of Oil and Gas Activities</b> .....  | 1268 |
| <i>J. King</i>  |      |
| <b>Aerosol Cleaning Energy-Saving Technology (ACEST) For Flue Gases &amp; Waste Waters</b> .....                      | 1281 |
| <i>S. Komkov-Epshtein</i>   |      |
| <b>Characterizations of Air Quality Weekend Effect in Houston, Texas</b> .....  | 1285 |
| <i>X. Shen, N. Gallegos, R. Mullins, M. Standard, H. Du, R. Kommalapati</i>   |      |
| <b>Effects of Biomass Co-firing with Coal on Air Quality in the Greater Houston Area</b> .....                        | 1295 |
| <i>I. Hossain, H. Du, V. Botlaguduru, R. Kommalapati</i>  |      |
| <b>Life Cycle Greenhouse Gases and Pollutants Emissions of Electric Vehicles in the US</b> .....                      | 1306 |
| <i>H. Du, E. Armah, R. Kommalapati</i>  |      |
| <b>A Walk Through NSPS OOOOa: Applicability Determination and Implementation Methods</b> .....                        | 1315 |
| <i>M. Kraus</i>   |      |

|   |      |
|---|------|
| <b>Innovative Approach to Vapor Mitigation</b> .....  | 1327 |
| <i>S. Kretschman</i>  |      |
| <b>Internal Combustion Engines: Strategies and Helpful Tips for Permitting and Compliance</b> .....   | 1338 |
| <i>J. Kriger</i>  |      |
| <b>Installation of Conductive Geomembrane and Leak Location Methods for Impoundments</b> .....  | 1347 |
| <i>D. Landue, M. Foltz</i>  |      |
| <b>Indoor Air Quality with Respect to Clean Energy Deprivation and Health Impact in Rural Areas of Lucknow</b> .....  | 1348 |
| <i>A. Lawrence</i>  |      |
| <b>Monitoring of Atmospheric Mercury at a Clean Area in Northern Taiwan</b> .....   | 1353 |
| <i>M.-C. Lee, J.-C. Wang, C.-P. Chou, C.-H. Tseng, H.-C. Hsi</i>  |      |
| <b>Controlling Emissions of Natural Gas Engines</b> .....   | 1359 |
| <i>K. Lehtoranta, T. Murtonen, H. Vesala, P. Koponen, J. Alanen, N. Kuittinen, P. Simonen, T. Ronkko, S. Saarikoski, H. Timonen, T. Maunula, K. Kallinen, S. Korhonen</i> |      |
| <b>Effect of Citric Acid on Arsenic Removal with Phosphorene and Adsorption in Solution</b> .....   | 1364 |
| <i>Y.-J. Lin, W.-Z. Cao, T.-O. Yang, C.-T. Chang</i>  |      |
| <b>Conducting the Review of Demonstrations for Higher Operating Value for Landfill Wells</b> .....  | 1371 |
| <i>R. Lindstrom, A. Havilland</i>   |      |
| <b>Black and Yellow Brownfields: Redeveloping Special Industrial Areas in the City of Pittsburgh</b> .....  | 1408 |
| <i>K. Linnell, A. Statkiewicz, J. Hanna</i>   |      |
| <b>How Easy is it to Reform Regulations, Anyway?</b> .....  | 1420 |
| <i>G. Lipka</i>   |      |
| <b>Alternative Emission Limits for Startup Shutdown Periods for Municipal Waste Combustor, a Case Study</b> .....   | 1428 |
| <i>W. Liu, C. Hibbard</i>   |      |
| <b>Comparative Assessment of Variability in Light Duty Vehicle Exhaust Emission Rates Based on Vehicle Types, Age, Driving Cycles, and Ambient Conditions</b> .....       | 1434 |
| <i>B. Liu, H. Frey</i>  |      |
| <b>Projecting Potential Impacts of Electrical Vehicles on Local Air Quality in Urban Centers</b> .....  | 1458 |
| <i>H. Liu, J. Liu, S. Capstick, C. Taylor, R. Wyles</i>   |      |
| <b>When AERCOARE Needs to Be Applied?</b> .....   | 1463 |
| <i>H. Liu, S. Capstick, R. Wyles, C. Taylor, J. Liu</i>   |      |
| <b>An Intercomparison of On-Site vs National Weather Service Meteorologic Data in Rough Terrain</b> .....   | 1468 |
| <i>D. Long</i>  |      |
| <b>Human Health Risk Assessment (HHRA) for Proposed Power Plant Projects: Methodology and Case Study</b> .....  | 1484 |
| <i>C. Long, P. Valberg</i>  |      |
| <b>Nanotechnology – Use in Contamination Remediation</b> .....  | 1489 |
| <i>B. Looney, D. Chiang, M. Darrington</i>  |      |
| <b>Effect of Biochemical Factors from Mixed Animal Wastes Feedstock in Biogas Production</b> .....  | 1499 |
| <i>N. Lovanh, G. Ruiz-Aguilar, J. Loughrin</i>  |      |
| <b>A Low Cost Technology for PCBs (Poly-Chlorinated Biphenyls) Dechlorination</b> .....   | 1507 |
| <i>M. Lu, F. Ren, J. Zhang, A. Khopade, S. Dong</i>   |      |
| <b>The Management of Fats, Oils and Grease (FOG) in Waste Water Treatment Plants (WWTPs) Across the US</b> .....  | 1512 |
| <i>M. Lu, J. Zhang, N. Holliday, A. Helmstetter</i>   |      |
| <b>Regional Biosolids Recycling with Negative Carbon Power Oxidation</b> .....  | 1517 |
| <i>K. Best, L. Lundberg</i>   |      |
| <b>Comparing Industrial Hygiene and Environmental Approaches to Statistically Evaluating Indoor Air Data: Vapor Intrusion Applications</b> .....                          | 1531 |
| <i>J. Lowe, C. Lutes, L. Lund</i>   |      |
| <b>Opportunities and Challenges for Unmanned Aerial Vehicle Monitoring of Oil and Gas Operations for Methane</b> .....  | 1536 |
| <i>K. Macoskey, R. Celender</i>   |      |
| <b>Geographic Information Systems (GIS) and Database Tools for Environmental Compliance - Making Sense of "Big Data"</b> .....  | 1543 |
| <i>M. Maguire</i>   |      |
| <b>Key Considerations in Designing and Reviewing Air Quality Studies of Unconventional Natural Gas Development</b> .....  | 1544 |
| <i>C. Ng, M. Maier, R. Machado, R. Environ</i>  |      |
| <b>Differences in Reporting Between the National Emissions Inventory and the Toxics Release Inventory</b> .....   | 1553 |
| <i>A. Maldonado</i>   |      |
| <b>Stormwater Regulatory Impacts for PA and MD Industry</b> .....   | 1557 |
| <i>J. Marteny</i>   |      |
| <b>Boiler NESHAP Changes &amp; Compliance Tools</b> .....   | 1563 |
| <i>J. McClain, D. Wood</i>  |      |
| <b>Potential Inhalation Exposure to Pesticide Residue in Medical Cannabis</b> .....   | 1569 |
| <i>D. McCready</i>  |      |
| <b>The Dose Makes the Poison! Potential Inhalation Exposure to Tap Water Contaminated with MCHM</b> .....   | 1581 |
| <i>D. McCready</i>  |      |
| <b>Emission Reduction Credits: Navigating the Northeast and Mid-Atlantic Markets</b> .....  | 1593 |
| <i>J. McDougal</i>  |      |
| <b>Air Quality Regulations in the Oil and Natural Gas Industry: Challenges, Lessons, and Opportunities</b> .....  | 1600 |
| <i>J. McGreevy</i>  |      |
| <b>Review and Validation of Hourly VOC Data Collected by PAMS Aut oG C Systems</b> .....  | 1604 |
| <i>C. Meyer</i>   |      |

|   |      |
|---|------|
| <b>The Removal of Volatile Trihalomethanes Mixtures Under Different Environmental Conditions by using Two Independent Biotrickling Filters</b> .....                | 1621 |
| <i>B. Mezgebe, G. Sorial, D. Wendell, E. Sahle-Demessie</i>   |      |
| <b>New Jersey's Legacy Landfill Law A Look at its Requirements</b> .....  | 1626 |
| <i>S. Miller</i>  |      |
| <b>Differences in Air Emissions at Compressor Stations from Wet Gas and Dry Gas in the Marcellus Shale Formation</b> .....  | 1643 |
| <i>L. Miner, S. Friel</i>   |      |
| <b>Energy from Waste: Many Types, Many Challenges, Future Strategies</b> .....  | 1655 |
| <i>D. Minott, S. Zemba</i>  |      |
| <b>Evolution of CASTNET's Enhanced Nitrogen Monitoring Using Chemiluminescence</b> .....  | 1659 |
| <i>K. Mishoe, C. Rogers, A. Ward, G. Beachley, M. Puchalski, M. Stewart, K. Howell</i>  |      |
| <b>Ultraviolet Differential Optical Absorption Spectroscopy (UV-DOAS) and Auto-Gas Chromatography: Alternative Monitoring Technologies to EPA Method 325?</b> ..... | 1666 |
| <i>M. Modrak, B. Cochran, J. Granstra</i>   |      |
| <b>How Thermal Oxidizer Operation and Maintenance Really Impacts Environmental Compliance</b> .....   | 1676 |
| <i>J. Moore</i>   |      |
| <b>Western Digital's Eight Year Journey from Conserving Electricity to a Fully Integrated Resource Management Program</b> .....                                     | 1686 |
| <i>J. Morrell, H. Ishizuka</i>  |      |
| <b>Allegheny County PM<sub>2.5</sub> and SO<sub>2</sub> Sip Modeling</b> .....  | 1697 |
| <i>R. Morris, A. Sadar</i>  |      |
| <b>Odour Impact On Surrounding Environment Of An Oil Refinery Plant</b> .....   | 1706 |
| <i>A. Damuchali, H. Guo</i>   |      |
| <b>Mobile Toxics Human Health Risk Assessment Framework</b> .....   | 1720 |
| <i>M. Munshed, J. The, R. Fraser</i>  |      |
| <b>Quantifying Primary and Secondary Ultrafine Particle Sources in the United States</b> .....  | 1731 |
| <i>B. Murphy, F. Binkowski</i>  |      |
| <b>Aerosol-mediated Analysis of Nanoparticulate Matter in Snow</b> .....  | 1746 |
| <i>Y. Nazarenko, R. Rangel-Alvarado, P. Ariya</i>   |      |
| <b>Nanomaterials: Occupational Safety and Health, Analysis and Regulation</b> .....   | 1751 |
| <i>W. Looney, R. Shaffer, Y. Nazarenko</i>  |      |
| <b>Calculating Emissions from Oil and Gas Production Facilities - Problems with Some Answers</b> .....  | 1755 |
| <i>L. Nelms</i>   |      |
| <b>Innovative True NO<sub>2</sub> Converter - Enabling a Chemiluminescent NO<sub>x</sub> Analyzer to Measure 'True' NO<sub>2</sub></b> .....                        | 1761 |
| <i>C. Odame-Ankrah</i>  |      |
| <b>Ambient Air Quality Near a Marcellus Shale Well Pad in Southwestern Pennsylvania</b> .....   | 1770 |
| <i>N. Orak, N. Pekney, M. Reeder</i>  |      |
| <b>Using BUOYLINE in the AERMOD Model – Advantages and Pitfalls</b> .....   | 1783 |
| <i>B. Otten, G. Schewe</i>  |      |
| <b>Mid-2017 Progress Report: Implementation of the 1-hour SO<sub>2</sub> NAAQS</b> .....  | 1796 |
| <i>R. Paine, J. Connors</i>   |      |
| <b>Adsorption of Mercury onto the Activated Carbons Prepared from Various Raw Materials</b> .....   | 1809 |
| <i>J. Park, S.-S. Lee</i>   |      |
| <b>TDR Sensor for Detecting Groundwater Contamination</b> .....   | 1813 |
| <i>M. Pashnun, S. Sargand</i>   |      |
| <b>Life Cycle Analysis of Self Healing Nanoparticles</b> .....  | 1824 |
| <i>S. Pathan</i>  |      |
| <b>Radical Innovation – Summertime Gas, Exemptions, &amp; OIAI</b> .....  | 1832 |
| <i>T. Pendola</i>   |      |
| <b>Laboratory and Field-test of a Novel Fiber Optic Methane Leak Detection System</b> .....   | 1849 |
| <i>L. Pereira, C. Florida, J. Rosolem, F. Bassan, J. Fracarolli, R. Penze</i>   |      |
| <b>PRIME2, The Next Generation Building Downwash Model</b> .....  | 1855 |
| <i>R. Petersen, S. Guerra</i>   |      |

#### VOLUME 4

|   |      |
|---|------|
| <b>A Review of SCR Technology for NO<sub>x</sub> Control in Refinery Applications</b> .....   | 1875 |
| <i>M. Pham</i>  |      |
| <b>Control Technologies for Refinery Fluid Catalytic Cracking Units – Approaching a One-Digit Level of Emissions</b> .....                                    | 1887 |
| <i>M. Pham, R. Kunz</i>   |      |
| <b>Assessment of Hydrogen Cyanide Emissions from a Tailing Storage Facility of a Gold Mine on Public Health: Findings from a Case Study in Thailand</b> ..... | 1898 |
| <i>T. Phenrat, Q. Ba, W. Trivitanurak</i>   |      |
| <b>Infrared Camera - An Advanced Monitoring Tool for the Detection of VOC's</b> .....   | 1906 |
| <i>D. Picklesimer</i>   |      |
| <b>Intra-Urban Spatial and Temporal Variations in Fine Particle Composition, Number, and Sources</b> .....  | 1916 |
| <i>A. Presto, N. Zimmerman, P. Gu, H. Li, R. Subramanian, A. Robinson, J. Apte</i>  |      |



|  |      |
|--|------|
| <b>Comparing Measured Emissions from Conveyors with Computational Fluid Dynamics Solutions</b> .....   | 1937 |
| <i>J. Silva, J. Costa, B. Silva, R. Queiroz, T. Morimoto</i>   |      |
| <b>Low-cost Air Quality Monitoring in a Sustainable Community: Deployment of the RAMP Sensor Package in Millvale, PA</b> .....   | 1942 |
| <i>R. Subramanian, N. Zimmerman, A. Presto, Z. Hussain, J. Gu</i>  |      |
| <b>Procedure for Evaluation of Retrofitted SCR-Based Emission Control System for a Passenger Railroad Locomotive</b> .....   | 1952 |
| <i>N. Rastogi, H. Frey</i>   |      |
| <b>Wet ESP Technology for Control of PM<sub>2.5</sub> and SO<sub>3</sub></b> .....   | 1974 |
| <i>J. Reynolds, P. Doonan</i>  |      |
| <b>Ambient Air Quality Measurements in Kuwait in 2015</b> .....  | 1983 |
| <i>M. Labib, A. Bojabarah, K. Al-duwaisan, A. Gertler</i>  |      |
| <b>Establishment of a Climate Change Research Center (CCRC) in Egypt</b> .....   | 1996 |
| <i>M. Labib</i>  |      |
| <b>GHG Emissions from the Building Sector in Egypt</b> .....   | 2009 |
| <i>M. Labib</i>  |      |
| <b>The Impacts of Climate Change on Health in Egypt</b> .....  | 2024 |
| <i>M. Labib, A. Gertler</i>  |      |
| <b>Avoided Silo Modifications in a Dry Scrubber System</b> .....   | 2041 |
| <i>D. Ritzenthaler, T. Habib</i>   |      |
| <b>Quantification of Area Fugitive Ghg Emissions at Oil Sands Mines by a Novel Inverse Dispersion Modeling (IDM) Approach</b> .....  | 2059 |
| <i>F. Robe, C. Reuten, M. Seguin, D. Chadder, N. Veriotes, T. Flesch</i>   |      |
| <b>Validation of Fugitive and Diffuse Emission Measurement Techniques</b> .....  | 2075 |
| <i>R. Robinson, F. Innocenti, J. Helmore, T. Gardiner, A. Finlayson, A. Connor, N. Howes</i>   |      |
| <b>Analysis of Different Coating Configurations at Annular Flow Reactor to Increase Volatile Organic Compounds Degradation Rates by Heterogeneous Photocatalysis</b> ..... | 2081 |
| <i>U. Doubek, B. Ribeiro, E. Tomaz</i>   |      |
| <b>Novel Geotextile Mat Tailored to Reduce Odor Emission (H<sub>2</sub>S) from Landfills</b> .....   | 2086 |
| <i>R. Rodriguez, R. Liu, M. Hull, D. Mazzyk, T. Townsend</i>   |      |
| <b>Source Location by Regression of Monitor Air Concentrations by Wind Direction</b> .....   | 2096 |
| <i>P. Ryan</i>   |      |
| <b>Predictors of Indoor Radon Concentrations and Hydraulic Fracturing in Ohio</b> .....  | 2106 |
| <i>M. Sajja, Y. Xu, A. Kumar</i>   |      |
| <b>WASTE TO ENERGY – Markets and Benefits</b> .....  | 2120 |
| <i>M. Sankey</i>   |      |
| <b>NO<sub>2</sub> Options in the New Guideline: An AERMOD Case Study</b> .....   | 2125 |
| <i>T. Schroeder</i>  |      |
| <b>Impact of Weather and Human Activity on the Microbiome Diversity and Indoor Air Quality in Offices and Laboratories of a University Building</b> .....                  | 2134 |
| <i>D. Seong, S. Hoque</i>  |      |
| <b>Innovative Air Permitting Strategies for Biogas-to-Energy Combined Heat and Power (CHP) Projects at Wastewater Treatment Facilities</b> .....                           | 2140 |
| <i>D. Shah, A. Sen, C. Hibbard</i>   |      |
| <b>Estimating Surface PM<sub>2.5</sub> Using Satellite AOD Observations and the NASA MERRA Model Simulations</b> .....   | 2147 |
| <i>X. Shen, H. Zhang, H. Algazwi, R. Mullins, T. Schley, H. Du, R. Kommalapati</i>   |      |
| <b>Critical Issues for Natural Gas Power Plant Siting and Licensing</b> .....  | 2158 |
| <i>D. Shotts, T. Wickstrom</i>   |      |
| <b>Estimating Health Benefits of Energy Efficiency and Renewable Energy Projects</b> .....   | 2170 |
| <i>D. Cooley, K. Siegel, A. Belova, J. Haskell, D. Mulholland, E. Zinsmeister</i>  |      |
| <b>Understanding the Chemistry Behind Secondary Aerosols from Nitrogen and Sulfur Compounds in Agriculture</b> .....   | 2178 |
| <i>P. Silva, D. Cocker, K. Purvis-Roberts</i>  |      |
| <b>Procedure for Measuring and Comparing Fuel Use and Gaseous Emissions for Gas-Direct Injection versus Port Fuel Injection Vehicles</b> .....                             | 2184 |
| <i>S. Singh, H. Frey</i>   |      |
| <b>Overview of the 2011 National Air Toxics Assessment (NATA)</b> .....  | 2200 |
| <i>T. Palma, M. Strum, M. Morris, A. Eyth, J. Thurman, S. Phillips, D. Smith, R. Cook</i>  |      |
| <b>Re-entrainment Evaluations: Not Your Father’s Air Dispersion Modeling</b> .....   | 2210 |
| <i>D. Snare, A. Essner, S. Sadler, A. Bhat</i>   |      |
| <b>Towards Understanding the Dependency of AOD-PM Association on the Aerosol Vertical Distribution</b> .....   | 2218 |
| <i>M. Sorek-Hamer, R. Chatfield, A. Strawa, D. Broday, T. Banerjee, F.-K. Helena, I. Katra, K. Itai</i>  |      |
| <b>Sulfate and Nitrate in Wet Atmospheric Deposition on the Coast of the Gulf of Mexico from 2003 to 2015</b> .....  | 2226 |
| <i>R. Sosa, H. Bravo, A. Alarcon, M. Torres, P. Sanchez, M. Jaimes, E. Granados, D. Gay</i>  |      |
| <b>Air Dispersion Modelling Challenges of Short Stack NO<sub>x</sub> (NO<sub>2</sub>) Emissions, Using Various Models and Methods</b> .....                                | 2241 |
| <i>P. Staniaszek, A. Maric, B. McEwen</i>  |      |
| <b>Challenges in Air Quality Dispersion Modeling of Mines</b> .....  | 2249 |
| <i>P. Staniaszek</i>   |      |
| <b>Design and Implementation of a Passive Treatment System for Acid Mine Drainage at the Teerco 5A Mine Site, Greene County, PA</b> .....                                  | 2258 |
| <i>A. Statkiewicz, K. Linnell, J. Hanna</i>  |      |

|   |      |
|---|------|
| <b>Updated Federal Leak Detection Monitoring Requirement for Hazardous Substance Underground Storage Tanks</b> .....  | 2268 |
| <i>J. Stickler-Morris, H. Casillas, M. Belew, M. Hult</i>   |      |
| <b>Air Dispersion Modelling Assessment on a Local Scale, Selection of Modelling Tools</b> .....   | 2281 |
| <i>B. Sylvestre-Williams</i>  |      |
| <b>DISTANCE-DEBUG and HRBINARY: Modeling Tools for Unpacking the AERMOD BlackBox</b> .....  | 2296 |
| <i>C. Szembek, R. Paine, M. Garrison</i>  |      |
| <b>Using Microwave Pyrolysis and Supported Liquid Membrane Extraction to Recover Precious Metals from Waste Printed Circuit Boards</b> .....  | 2306 |
| <i>S.-L. Chou, M.-W. Pan, Y.-F. Huang, P.-T. Chiueh, S.-L. Lo</i>   |      |
| <b>Fine Particulate PM<sub>2.5</sub> Air Pollution and Respiratory Mortality in Allegheny County, PA</b> .....  | 2311 |
| <i>E. Talbot, J. Rager, R. Bilonick</i>   |      |
| <b>Clean Power Plan (CPP) Litigation Updates and Road Ahead</b> .....   | 2319 |
| <i>R. Thaker</i>  |      |
| <b>Managing Springs Emanating from Coal Combustion Residual Disposal Impoundments</b> .....   | 2323 |
| <i>D. Tolmer, M. Orzechowski</i>  |      |
| <b>Upcoming Changes to OSHA’s Process Safety Management (PSM) Standard and USEPA’s Risk Management Program (RMP) – How Modified Guidance and Revised Regulations May Affect Your Facility</b> ..... | 2334 |
| <i>M. Traister</i>  |      |
| <b>The Promise of Advanced Monitoring</b> .....   | 2345 |
| <i>C. Tunis, D. Hindin</i>  |      |
| <b>Diagnosis and Definition of Strategies for the Air Quality Component in a Cement Plant</b> .....   | 2346 |
| <i>E. Velez, S. Gomez, E. Echeverri, O. Zuluaga</i>   |      |
| <b>Benefits in the Construction Method of Directional Dikes and River Transport of Cargo</b> .....  | 2358 |
| <i>E. Echeverri, E. Velez, S. Gomez, L. Chaverra, D. Escobar, O. Zuluaga</i>  |      |
| <b>Regional Model of a Sogamoso Valley As a Complement to the AERMOD Model for the Operation</b> .....  | 2373 |
| <i>O. Zuluaga, J. Baena, S. Gomez, E. Velez</i>   |      |
| <b>Combustion Turbine Power Plant Electrical Load Following Impacts of Emission Regulations</b> .....   | 2384 |
| <i>C. Wedig</i>   |      |
| <b>Development of Simplified Models of CNG, Diesel, and Hybrid Transit Bus Energy Use</b> .....   | 2402 |
| <i>T. Wei, T. Khan, H. Frey</i>   |      |
| <b>Air Quality Applications of Big Data Pipelines</b> .....   | 2416 |
| <i>J. Williams</i>  |      |
| <b>VOC Emissions from Marijuana Cultivation and Processing</b> .....  | 2425 |
| <i>M. Wolf, M. McDaniel</i>   |      |
| <b>Regulatory Timeline Adaptation through Policy and Guidance</b> .....   | 2426 |
| <i>D. Wood, J. McClain</i>  |      |
| <b>MOVES2014a Project Level Sensitivity Tests</b> .....   | 2432 |
| <i>M. Wu, S. Puppala, H. Ginzburg</i>   |      |
| <b>New Devices for Measuring Indoor and Outdoor Ultra-Fine Particulates – A Case Study</b> .....  | 2443 |
| <i>R. Jaeger, D. Xhillari, S. Choi, D. Carluccio</i>  |      |
| <b>In-flight Inactivation of an Airborne Non-enveloped Virus by a Packed Bed Non-thermal Plasma</b> .....   | 2455 |
| <i>T. Xia, A. Kleinheksel, Z. Qiao, K. Wigginton, H. Clack, E. Lee</i>  |      |
| <b>A 10-year Monitoring of PM<sub>2.5</sub>-Bound Nickel in Xi’an, China: Effects of Source Control on Its Trend and Associated Health Risks</b> .....  | 2461 |
| <i>H. Xu, J. Cao</i>  |      |
| <b>Integrating Engine Start, Soak, Evaporative, and Truck Hoteling Emissions in MOVES-Matrix</b> .....  | 2466 |
| <i>X. Xu, H. Liu, H. Li, M. Rodgers, R. Guensler</i>  |      |
| <b>Estimation of CO<sub>2</sub> Emissions from Grain Transportation in the United States</b> .....  | 2486 |
| <i>T. Yu, J. Calcagno, J. Fu</i>  |      |
| <b>Quantification of Transit Train Activity Data for Energy Consumption Estimation</b> .....  | 2492 |
| <i>W. Yuan, H. Frey, Y. Sun</i>   |      |
| <b>PFAS Contamination of Groundwater by Airborne Transport and Deposition</b> .....   | 2509 |
| <i>S. Zemba, L. Damiano</i>   |      |
| <b>Characterizing Intra-Urban Air Quality Gradients with a Spatially-Distributed Network</b> .....  | 2523 |
| <i>N. Zimmerman, E. Robinson, H. Li, A. Ellis, R. Subramanian, A. Robinson, J. Apte, A. Presto</i>  |      |
| <b>Author Index</b>   |      |