

Guideline on Air Quality Models 2013

The Path Forward

**Raleigh, North Carolina, USA
19-21 March 2013**

Volume 1 of 2

ISBN: 978-1-62748-568-5

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

Compilation Copyright © 2013 by the Air & Waste Management Association.
Copyright of the individual papers are retained by the authors. Published in July 2012

Printed by Curran Associates, Inc. (2013)

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

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
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

OPENING PLENARY SESSION

Pounding Nails With Shoes To Decide Which Shoes To Buy	1
<i>John S. Irwin</i>	
Flag Update	8
<i>John Vimont, John Notar, Tim Allen, Bret Anderson</i>	
CALPUFF Modeling System Status and Availability	19
<i>Gale F. Hoffnagle</i>	
Status of EPA's Guideline on Air Quality Models	24
<i>Tyler Fox</i>	
Status of AERMOD	41
<i>Roger W. Brode</i>	

SESSION 1: AERMOD TOPICS 1 – EVALUATION STUDIES

Ambient Ratio Method Version 2 (ARM2) for use with AERMOD 1-hr NO₂ Modeling	79
<i>Mark Podrez</i>	
Detailed Analysis of AERMOD PVMRM NO₂ Model Performance Using the Empire Abo, NM Database	107
<i>Doug N. Blewitt, Dana M. Wood</i>	
TRANSVAP: A New Technique for Predicting Impacts from Portable or Transitory Sources	138
<i>Thomas A. Damiana, Richard P. Hamel</i>	
Progress Report: Further EMVAP Development, Testing, and Evaluation	168
<i>Robert J. Paine, Richard P. Hamel, Mary Kaplan, David W. Heinold, Eladio M. Knipping, Naresh Kumar</i>	
Illustrative Example of the Application of the Emissions Variability Process (EMVAP) for AERMOD	177
<i>Eladio Knipping, Robert J. Paine, Richard P. Hamel, Mary Kaplan, David W. Heinold, Eladio M. Knipping, Naresh Kumar</i>	
Evaluation of the Urban Option in AERMOD – Modeled Sensitivity for a Scrubbed Coal Fired Power Plant Stack	195
<i>Tom Wickstrom, Anand Yegnan, Mark Garrison, John Sherwell</i>	
AERMOD Low Wind Speed Issues: Review of New Model Release	213
<i>Jeffrey A. Connors, Robert J. Paine, Steve Hanna</i>	
Enhancement of Determination of Surface Roughness for Input to AERMOD	245
<i>Hong Liu, Jennifer Ahluwalia, Ravi Mahabir</i>	
AERMOD Performance Evaluation for Three Coal-Fired Electrical Generating Units in Southwest Indiana	265
<i>Keith A. Baugues</i>	

SESSION 2: AERMOD TOPICS 2 – VALIDATION STUDIES

Use of AERMOD for NO₂ Near-road Monitoring Implementation	282
<i>James A. Thurman, Chad Bailey, Nealson Watkins, Richard Baldauf, Roger Brode</i>	
1-Hour NO₂ NAAQS Dispersion Modeling Case Study	311
<i>Jason A. Gilbert, M. Kirk Dunbar, Edward J. Liebsch</i>	
1-Hour SO₂ NAAQS Dispersion Modeling Case Study	325
<i>Jason A. Gilbert, Edward J. Liebsch, M. Kirk Dunbar</i>	
North Birmingham AERMOD Model Evaluation Study	338
<i>Allen Dittenhoefer, Michael Hirtler, Julia Shannon, Howard Ellis</i>	
Combined Analysis of Modelled and Monitored SO₂ Concentrations at a Complex Smelting Facility	362
<i>Peter J. G. Rehbein, Michael G. Kennedy, David J. Cotsman, Madonna A. Campeau, Monika M. Greenfield, Melissa A. Annett, Mike F. Lepage</i>	
Resolution of 1-hour SO₂ Nonattainment Area in Kingsport, Tennessee: Advanced Meteorological and Monitoring Study	381
<i>Robert J. Paine, Frank R. Tringale, Stephen R. Gossett</i>	

Resolution of 1-hour SO₂ Nonattainment Area in Kingsport, Tennessee: Model Evaluation Analysis Results to Date	398
<i>Carlos D. Szembek, Robert J. Paine, Stephen R. Gossett</i>	

SESSION 3: CALPUFF TOPICS

Evaluation of AERMOD, CALPUFF and CAMx with the Kincaid Tracer Dataset	424
<i>Joseph S. Scire, David G. Strimaitis, Zhong-Xiang Wu</i>	
Short Range CALPUFF Modelling Coupled with WRFNMM Fine Resolution Meso-Scale Generated Meteorology	440
<i>Zivorad Radonjic, Douglas Chambers, Bosko Telenta, Chris Marson, Lisa Janes, Barrie Lawrence</i>	
Near-field Visibility Impacts Predicted by CALPUFF	484
<i>Salahuddin K. Mohammad</i>	
Retrofit Control Options Used to Reduce Regional Haze Impacts- A Case Study	502
<i>Ramachandran V. Iyer, Robert C. McCann, Salahuddin K. Mohammad</i>	
Comparative Statistical Study of Hourly Precipitation Determined by Radar-Based Stage IV and Ground-Based Methods in the North Central United States	521
<i>Pietro A. Catizone, Steven Zell, Christopher Arrington, Steve F. Weber, Rob White</i>	
Implementation and Evaluation of ISORROPIA in CALPUFF	561
<i>Joseph S. Scire, Zhong-Xiang Wu, David G. Strimaitis</i>	
Comparison of Regional Haze Impacts from EPA-approved and ISORROPIA Versions of CALPUFF	576
<i>Darryl Chartrand, John Frohning, Michelle Neumann, Robert Pearson</i>	

SESSION 4: BACKGROUND CONCENTRATION TOPICS

Probability Analyses of Combining Background Concentrations with Model Predicted Concentrations	592
<i>Douglas R. Murray, Michael B. Newman</i>	
Background Concentration and Methods to Establish Background Concentrations in Modeling	618
<i>Bruce R. Nicholson</i>	

VOLUME 2

NO₂ Chemistry, Calculation Problems And Suggested Need For Research	661
<i>Bruce R. Nicholson</i>	
A Method of Developing Background Concentrations from Ambient Monitors with Significant Source Impacts	676
<i>David Long, Pietro Catizone, Michael Anderson, Steve Zell, Michael Newman</i>	

SESSION 5: GENERAL GUIDELINE TOPICS

American Forest & Paper Association and American Wood Council Review of Updated Regulatory Air Quality Modeling Techniques and Guidance	697
<i>Ryan A. Gesser</i>	
Comparison of Flare Dispersion Modeling Methodologies and Current Flare Technologies	710
<i>Whitney L. Boger, Jacquie Hui, Weiping Dai, Qiguo Jing, Kaushik Deb</i>	
General Recommendations on Model Clearinghouse and Procedures	727
<i>Steven R. Hanna</i>	
Validation of Dispersion Models for NAAQS Compliance Demonstrations	739
<i>Roger Brode, James Thurman</i>	

SESSION 6: MODELING OF PM_{2.5} AND OZONE

Methods for Single Source Ozone and PM_{2.5} Analysis	758
<i>Gale F. Hoffnagle</i>	
Screening Approach to Account for Secondary PM_{2.5} in Stationary Source Modeling	772
<i>Jeffrey Connor, David Heinold, Robert Paine, Gary Moore</i>	

Evaluation of SO₂ and NO_x Offset Ratios to Account for Secondary PM_{2.5} Formation	795
<i>Sergio A. Guerra, Shannon R. Olsen, Jared J. Anderson</i>	
Estimating Secondary Pollutant Impacts from Single Sources	810
<i>Kirk R. Baker, James T. Kelly, Tyler Fox</i>	
Fugitive Haul Road Emission Characterizations Case Study for 24-Hour PM_{2.5}	828
<i>Brooke A. Myer, Anthony J. Schroeder</i>	
A Canadian Municipal Regulatory Permitting System for PM_{2.5} Emissions and Health Impacts Utilizing the CALPUFF Dispersion Model	849
<i>Franco Digiovanni, Margaret Matusik, David Pengelly, Claude Davis, Cindy Toth, Jeffrey T. Lee</i>	
Application of an Integrated Plume to Regional Photochemical Model for the Allegheny County Liberty-Clairton PM_{2.5} Attainment Demonstration Modeling	874
<i>Ralph E. Morris, Jaegun Jung, Bonyoung Koo, Jason Maranche</i>	

SESSION 7: METEOROLOGICAL DATA ISSUES

Prognostic Data in AERMET: A Case Study of MMIF versus NWS Data	902
<i>Michael T. Hammer</i>	
An Evaluation of the MMIF Program as Applied With AERMOD	930
<i>Surya Ramaswamy, Mark Garrison, John Sherwell</i>	
Effects Of Sensor Location And The Atmospheric Stability On The Accuracy Of An Inverse-Dispersion Technique For Lagoon Gas Emission Measurements	943
<i>Kyoung S. Ro, Melvin H. Johnson, Kenneth C. Stone, Patrick G. Hunt, Thomas Flesh, Richard W. Todd, Steven Trabue</i>	
Use of the Urban Option in AERMOD for a Large Industrial Facility	948
<i>George J. Schewe, John Colebrook</i>	
Evaluation of Three Approaches for Determining Surface Roughness for Use in an Air Dispersion Modeling Evaluation	973
<i>Meghan E. Barber, Adrian E. Ciacci, Daniel P. Dix</i>	
Suggested Enhancements to AERMOD to Handle Near Source Impact Estimates in Low Wind Speed –Meandering Wind Conditions	996
<i>Bruce P. Nicholson</i>	
Minimum Turbulence Assumption in Dispersion Models during Low-Wind Stable Conditions	1016
<i>Steven R. Hanna, Biswanath Chowdhury</i>	

SESSION 8: OTHER MODELING APPROACHES

Comparing AERMOD and CFD Downwash Predictions for GEP Stacks	1034
<i>Lloyd L. Schulman, Christopher G. Desautels</i>	
Practical Uses of the WindStation Computational Fluid Dynamics (CFD) Model in Air Quality Dispersion Studies	1053
<i>Gary Moore, Robert J. Paine, Antonio Manuel Gameiro Lopes</i>	
Comparison of Near-field CFD and CALPUFF Modelling Results around a Backup Diesel Generating Station	1080
<i>Zivorad Radonjic, Vladimir Agranat, Bosko Telenta, Bohdan Herbenyk, Douglas Chambers, Travis Ritchie</i>	
Using SCICHEM-2012 To Determine Single-Source Secondary Impacts And Comparisons With Other Modeling Approaches	1112
<i>Prakash Karamchandani, Ralph Morris, Bart Brashers, Greg Yarwood, Lynsey Parker, Eladio Knipping, Biswanath Chowdhury, Ian Sykes</i>	
Evaluation of Reactive Puff Model, SCICHEM-2012 using AERMOD Field Study Databases	1126
<i>Biswanath Chowdhury, Ian Sykes, Doug Henn, Eladio Knipping</i>	
Additional Development And Evaluation Of Hywinmod – A Hybrid Wind Tunnel/Numerical Model	1149
<i>Ronald L. Petersen, Anke Beyer-Lout</i>	
Aermod Prediction Challenges For Cylindrical Structures And Other Unusual Buildings In Light Of The 2011 EPA Memorandum	1183
<i>Ronald L. Petersen, Anke Beyer-Lout</i>	
NO_x to NO₂ in Air Quality Modeling	1210
<i>Mark Garrison, Anand Yegnan, John Sherwell</i>	
Overview of Recommended Models for Hot-spot Conformity Analyses	1228
<i>R. Chris Owen, Roger Brode, James Thurman Tyler Fox, George Bridgers, Meg Patulski, Chris Dresser</i>	
Air Quality Modeling Considerations of EPA Clean Air Markets Division Emissions Data	1249
<i>Roger Caiazza</i>	

Sources of Secondary Organic Aerosols in the Pearl River Delta Region in Fall: Contributions from the Aqueous Reactive Uptake of Dicarboxyls.....	1267
<i>Nan Li, Tzung-May Fu, Junji Cao</i>	
Author Index	