

13th Annual Emission Inventory Conference:

Working for Clean Air in Clearwater



Courses: June 7 - 8, 2004

Conference: June 8 - 10, 2004

Hilton Clearwater Beach Resort, Clearwater, Florida



Sponsored by:

**Emission Factors and Inventory Group
Emissions, Monitoring and Analysis Division
Office of Air Quality Planning & Standards**

Emission Inventory Improvement Program

Message from the General Conference Chair

The U.S. Environmental Protection Agency (U. S. EPA) invites you to the thirteenth annual Emission Inventory Conference, “Working for Clean Air in Clearwater” to be held June 7 - 10, 2004 in Clearwater, Florida. The conference is being organized by EPA’s Office of Air Quality Planning and Standards (OAQPS) and is supported by the Emission Inventory Improvement Program, a partnership between EPA and the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Air Pollution Control Officials (ALAPCO).

The conference begins on Monday with training courses on several aspects of emission inventory preparation and use (see Training Schedule). Training continues on Tuesday morning and the conference begins in earnest with a plenary session on Tuesday afternoon. Peter Tsirigotis, Director of OAQPS’ Emission Monitoring and Analysis Division will begin the plenary session with a discussion of current federal initiatives to reduce environmental risks from air pollution. Next is our keynote speaker, Dr. Thomas Atkeson from the Florida Department of Environmental Protection, who will present the results of his work on mercury and nitrogen compound transport and deposition. Dr. Atkeson was named the Florida Wildlife Federation’s 2002 Air Conservationist of the Year and his work underscores the importance of emission inventories in understanding and solving multi-media environmental problems.

Two days of three-concurrent technical sessions will follow on Wednesday and Thursday, covering a variety of topics of interest to the participants. This is a great opportunity to keep abreast of developments in the world of emissions data so I hope you will attend and share your experiences with other emission inventory professionals from international, federal/state/local regulatory agencies, tribal governments, industry and academia.

Clearwater is a short drive from Tampa and is located on the Gulf of Mexico. The city is rich in history with a diverse population and geographical make-up. We will have information on local activities available at the conference or you can visit the Chamber of Commerce Website at <http://www.clearwaterflorida.org/>. You can view information on the hotel at [Hilton Clearwater Beach Resort](#). Plan to spend some extra time and enjoy all that the area has to offer.

As we did last year, to cover some of the basic costs of the conference, we are charging a registration fee of \$65, but this still makes this event one of the best values around. We hope to see you at the Emission Inventory Conference in Clearwater this June!

Philip A. Lorang
Emission Factor and Inventory Group
Office of Air Quality Planning & Standards

Schedule at a Glance

Time	Session	Time	Session
Mon, Jun 7		Wed, Jun 9	
8:00 - 5:00	Courses	3:30 - 5:30	Session 4 - Uncertainty
Tue, Jun 8			Session 5 - Ammonia
8:00 - 11:30	Courses		Session 6 - Air Toxics
11:30 - 1:30	Lunch (On Your Own)	Thur, Jun 10	
1:30 - 5:00	Plenary Session - Keynote	8:00 - 9:30	Session 7 - Data Management
6:00 - 8:00	Poster Session and Exhibitor Reception		Session 8 - Mobile Sources
Wed, Jun 9			Session 9 - EI Preparation for Modeling
8:00 - 9:30	Session 1 - Point/Area Sources	9:30 - 10:00	Break
	Session 2 - Greenhouse Gas	10:00 - 11:30	Session 7 - Data Management
	Session 3 - Quality Assurance		Session 8 - Mobile Sources
9:30 - 10:00	Break		Session 9 - EI Preparation for Modeling
10:00 - 11:30	Session 1 - Point/Area Sources	11:30 - 12:30	Lunch (On Your Own)
	Session 2 - Greenhouse Gas	12:30 - 2:00	Session 10 - Regional Planning Organizations
	Session 3 - Quality Assurance		Session 11 - Mobile Sources
11:30 - 1:00	Lunch (On Your Own)		Session 12a - Tribal Emission Inventories
1:00 - 3:00	Session 4 - Uncertainty	2:00 - 2:30	Break
	Session 5 - Ammonia	2:30 - 4:00	Session 10 - Regional Planning Organizations
	Session 6 - Air Toxics		Session 11 - Mobile Sources
3:00 - 3:30	Break		Session 12b- Uncertainty

Speakers

Peter Tsirigotis

Peter is currently the Director of Emissions, Monitoring, and Analysis Division in EPA's Office of Air Quality, Planning and Standards (OAQPS). Before coming to OAQPS, most of his work at EPA focused on controlling emissions from power plants, including the development of compliance mechanisms such as "cap and trade" designed to achieve the environmental goals while maximizing accountability and flexibility for the regulated sources. He has worked for EPA for over eleven years. Peter received a Master's Degree in Mechanical Engineering from the University of Massachusetts..

Tom Atkeson - Keynote

Dr. Atkeson joined the Epidemiology Program of the Florida Department in Health in 1983, serving 9 years as Chief of the Environmental Epidemiology Program, where he was involved in a wide variety of environmental contaminants issues. He moved to the Department of Environmental Protection in 1992 to focus on the problem of mercury in fish and wildlife, then newly found throughout Florida.

His responsibilities are to coordinate Florida's response to this problem through the activities of a variety of local, state, federal and private agencies. He is responsible for planning and managing a long-term multi-agency program of monitoring, modeling and research into the environmental cycle of mercury, including sources, transport and fate, and ecological effects. The goal of this work is to find the causes of, and potential solutions to, mercury contamination in Florida.

In addition, he now coordinates a related air quality-water quality issue, i.e., the concern over eutrophication of coastal waters. The Bay Regional Atmospheric Chemistry experiment (BRACE) examines the role of air source emission and deposition of active nitrogen compounds as contributor to eutrophication of Tampa Bay.

Dr. Atkeson's background is in zoology and wildlife biology, with degrees from Auburn University and the University of Georgia.

Poster Session and Exhibitors' Reception

6:00 - 8:00 pm

“Methodology for Speciation of Organic Gas Hot Soak Emissions from California Light-Duty Vehicles,”
Y. K. Hsu and M. FitzGibbon, E. H. Pechan and Associates.

“Modeling of Mobile Source Air Toxic Emissions Using EPA’s National Mobile Inventory Model,” R. Cook,
E. Glover, H. Michaels, and D. Brzezinski, US EPA.

“Correlating Ambient Mobile Source Air Toxic Concentrations with Mobile Sources,” K. N. Black, Federal Highway
Administration.

“Data Summaries of the National Emissions Inventory Available on the Web,” M. Salhotra and F. Divita, E. H.
Pechan and Associates, Inc., B. Gilbert, US EPA.

“Presentation of the AES *Online Emission Inventory Application,” B. E. Lane, Ciber, Inc..

“Idaho DEQ - Emission Inventory Graphic User Interface,” C. P. Ramsdell, Idaho Department of Environmental
Quality.

“Locating and Quantifying Previously Unknown PCB Source Emissions in Chicago: Receptor Modeling,” Y-K Hsu,
E. H. Pechan and Associates, Inc., T. M. Holsen and P. K. Hopke, Clarkson University.

“The Community Modeling and Analysis System (CMAS) Center for Supporting Models-3,” A. Hanna, Z. Adelman,
C. Seppanen, S. Arunachalam, U. Shankur, K. Hanisak, Carolina Environmental Program, University of North
Carolina.

“An Evaluation of VOC Emissions from Yeast-Leavened Cracker Production,” W. Juris, Ohio EPA.

“PAH Emission Testing from Solid Fuels Combustion in Residential Furnaces,” S. Kakareka, T. Kukharchyk,
V. Khomich, National Academy of Sciences, BELARUS.

“Emission Reduction Techniques for Agricultural Burning and Wildland Fire - An Annotated Bibliography and
Emission Reductions and Factors Tables,” K. R. Meardon, MACTEC Federal Programs.

“Review of Ammonia Emission Modeling Techniques for Fertilized Soils and Natural Landscapes,” W. Battye and
R. Barrows, EC/R Incorporated; T. Pierce, NOAA.

“Developing Emission Inventory Bounding Estimates for Use in Community-Based Risk Assessments,” G. Setlock,
US EPA.

“Atmospheric Emissions from Commercial On-Farm Dead Animal Cremation Units,” B. J. Van Heyst, University
of Guelph; P. Wu, Ontario Ministry of Agriculture and Food, Canada.

“NARSTO Emission Inventory Assessment,” J. D. Mobley, US EPA; S. Cadle, GM; H. C. Frey, North Carolina
State University; S. Wierman, MARAMA; M. Deslauriers, Environment Canada; L. Rajas-Bracho, Mexican
INE; H. Feldman, API.

- "Comparison Between MOBILE6.2 Model Predictions and Ambient Concentrations of Air Toxics," S. G. Brown, T. M. Tamura, H. L. Arkinson, and H. R. Hafner, Sonoma Technology, Inc.
- "Overview of 1999 NEI for HAPs: Data Quality and Trends," A. Pope and S. Dombrowski, US EPA; D. G. Brown, North Carolina State University; S. Finn and R. Oommen, Eastern Research Group, Inc.
- "CMV Emissions By Fuel Consumption and Power Demand Methods," K. Agyei, Puget Sound Clean Air Agency.
- "State Greenhouse Gas Projection Tool: A Companion to EPA's State Inventory Tool," A. Denny, US EPA; A. Choate and P. Groth, ICF Consulting.
- "Dry Deposition of NH₃ in the Vicinity of a Swine Production Facility," J. Walker, US EPA.
- "Recent Updates to the SMOKE Emissions Modeling System," C. Seppanen, Carolina Environmental Program, University of North Carolina.
- "Evaluating Petroleum Industry VOC Emissions in Delaware, New Jersey and Southeastern Pennsylvania," E. Sabo, MACTEC Federal Programs, Inc.; S. Kayin, MARAMA; R. Papalski, New Jersey DEP; B. Stelzer, Delaware DNREC; B. Trowbridge, Pennsylvania DEP; T. Weir, Philadelphia AMS; S. Wierman, MARAMA.
- "Modeling Ammonia Dispersion from Multiple CAFOs Using GIS," J. Cajka, M. Deerhake, C. Yao, RTI International.
- "Environmental Information Exchange Network - a Partnership with EPA, States and Tribes," C. Freeman, US EPA.
- "Development of a Process Based Model for Agricultural Ammonia," Z. Wang, UC Riverside, M. Janssen, LADCO.
- "A Detailed Emission Inventory for Air Quality Planning at the Local Scale: the Lombardy (Italy) Experience," S. Caserini, A. Fraccaroli, A. Monguzzi, M. Moretti, A. Giudici, E. Angelino, G. Fossati, ARPA Lombardia, Settore ARIA; G. Gurrieri, Regione Lombardia, D. G. Qualità dell 'Ambiente, ITALY.
- "A PM₁₀ Emission Factor for Freestall Dairies," B. Goodrich, California State University at Fresno; C.B. Parnell, S. Mukhtar, R.E. Lacey, and B.W. Shaw, Texas A&M University.
- "The Pune, India Experience - Developing a PM₁₀ Emission Inventory and Database in Seven Days with Forty People," P. Gaffney, M. Benjamin; J. Mooney, and T. MacDonald, US EPA.
- "Emissions of Ammonia, Methane and Hydrogen Sulfide at Dairies," D. Goorahoo and C. Krauter, California State University.

8:00 am "The Evolution of Air Emissions Inventories in Ontario, Canada," J. Georgakopoulos, P. Wong, and N. Ting, Ontario Ministry of the Environment.

Experience Ontario's voyage towards mandatory air emissions reporting that is applicable to a wide array of point sources covering industrial, commercial, institutional, and municipal sectors. We will take you on a journey from voluntary to mandatory point source air emissions reporting, discuss the observations of the air emissions reports submitted by Ontario point sources and address the future direction of air emissions reporting in the province. You will also be shown Ontario's web-based reporting and registration site titled "OnAIR", which allows reporting facilities to report their air emissions under Ontario Regulation 127 (O.Reg.127/01). Come and witness the evolution of air emissions inventories in the province of Ontario.

8:30 am "2002 NEI Point Sources: Integration of HAPs and CAPs," A. Pope, US EPA; S. Finn, Eastern Research Group, Inc.

This paper briefly discusses the compilation of the 2002 NEI and presents the methodology that will be used in integrate hazardous air pollutants (HAPs) and criteria air pollutants (CAPs) point sources.

9:00 am "Improvements in the Point Source Emissions Inventory for Georgia," J. Baek, A. Unal, D. Tian and A. Russell, Georgia Institute of Technology.

In order to improve the accuracy of the emission inventory for the state of Georgia, the point source emission inventory for non-electric generating companies was developed. Our analysis showed that there are significant differences in emissions from companies estimated by our method and EPA's NET99 database. To prepare for further uncertainty analysis, errors in the 2000 point source emission inventory and errors in EPA NET99 database for point sources are estimated.

9:30 am BREAK



- 10:00 am “eGRID Emission Estimation Methods,” S. S. Rothschild, E. H. Pechan & Associates, Inc.; J. Bryson, US EPA.

EPA’s Emissions & Generation Resource Integrated Database (eGRID) is an electric power inventory that is a comprehensive source of data for States implementing emissions policies and for air regulators who need a powerful tool for tracking changes in power plant air emissions as the electricity industry continues to change. eGRID annual NO_x, SO₂, CO₂, and mercury emissions are based on available data from 24 existing Federal data sources, but do not necessarily match the data source(s) values if the unit is a cogenerator (cogen) or combined heat and power (CHP); or if it burns biomass (and especially if it burns renewable methane such as landfill or digester gas). The purpose of this paper is to further describe the methodology for estimating eGRID annual emissions for 2000

- 10:30 am “Developing a Local-Scale Nonpoint Area Sources Emissions Inventory: Cuyahoga County, Ohio,” R. Oommen, G. Brooks, and D. Wilson Eastern Research Group, Inc.

The development of a nonpoint area source emissions inventory is often dictated by the time and resources available. Under a project for the Cleveland Clean Air Century Campaign using a community grant from EPA’s Integrated Air Toxics Strategy Program, ERG, Inc. prepared a 2002 nonpoint area sources inventory of 33 hazardous air pollutants (HAPs) for Cuyahoga County, Ohio. HAP estimates for over fifty nonpoint area source categories were developed for this inventory, with most based on activity data specific to the County. This paper summarizes the bottom-up estimation methodologies used, discusses the resources needed to gather the necessary data, and compares the results to the top-down approaches used for the development of the 1999 National Emissions Inventory (NEI)

- 11:00 am “National Emissions Inventory for Commercial Cooking,” S. M. Roe, M. D. Spivey and H. C. Lindquist, E. H. Pechan & Associates, Inc.; R. Huntley, US EPA.

This paper describes the development of a National Emission Inventory (NEI) for commercial cooking processes. Since the early 1990’s, there have been several investigations and testing programs conducted to characterize emissions from commercial cooking activities. Commercial cooking activities were believed to be capable of producing significant amounts of criteria pollutants (especially fine particulate matter) and HAPS. This paper contains data and methods for quantifying emissions on a national level to determine the impact of commercial cooking activities on national air quality. The approach Pechan used for producing an emissions inventory (EI) of criteria pollutants and HAPS from commercial cooking for the calendar year 2002 is described. The most challenging aspect of the work was to identify appropriate activity data for the existing emission factors. This paper provides information on emission factors developed from recent test programs for commercial cooking followed by a discussion of the activity data that were used to construct the national inventory. Emissions summaries are presented to compare emission estimates for commercial cooking to other sources of fine particulate matter.

8:00 am "Local Climate and Air Emissions Action Planning," J. Yienger, R. Bell and M. Royael, ICLEI.

Local governments around the world are engaged in processes to quantify and reduce emissions of greenhouse gasses and criteria air pollutants. Using the new Clean Air and Climate Protection (CACP) tool, ICLEI has reanalyzed local climate protection plans to illustrate the link between greenhouse gas reduction activities and emissions of criteria air pollutants. This paper presents these findings and makes the case for approaching emission reduction programs in a more harmonized fashion. We also provide an overview of the CACP Software, illustrating its value in assisting local jurisdictions in their planning processes.

8:30 am "Introducing MOVES2004, the Initial Release of EPA's New Generation Mobile Source Emission Model," J. Koupal, M. Cumberworth, M. Beardsley, US EPA.

MOVES2004 is the first release of EPA's new generation mobile source modeling framework, and will enable national inventories and projections at the county-level for on-road energy consumption, CO₂, N₂O, and CH₄. The model will also include an integration with Argonne National Laboratory's GREET model, for the ability to account for life-cycle (i.e., well-to-pump) effects in the estimate of energy consumption and emissions. The paper will provide an overview of model design, the "look and feel" of working with the model, local customization of the model, and how to support "what-if" analysis.

9:00 am "CO₂ Emissions Profile of the U.S. Cement Industry," L. Hanle, US EPA; K. Jayaraman, and J. S. Smith ICF Consulting.

This paper explores, on a more disaggregated level, the geographic location of CO₂ emissions sources from the U.S. cement industry. This paper begins by providing a brief overview of the U.S. cement industry, including national level estimates of energy use and carbon emissions. The focus of the paper is on the development of a cement industry profile for the United States. Based on facility-level capacity statistics, a bottom-up analysis was undertaken to identify sources of CO₂ emissions in the U.S. cement industry in order to gain a better understanding of the geographic scope and concentration of this emissions source.

9:30 am BREAK

10:00 am "Estimating Greenhouse Gas Reductions for a Regional Digester Treating Dairy Manure," D. Bartram, Eastern Research Group, Inc; W. Barbour, Environmental Resources Trust, Inc.

Emissions of greenhouse gases associated with dairy manure management are estimated before and after implementation of a regional anaerobic digester. A monitoring plan is developed to identify the data inputs needed to monitor emission reductions over time to support verified and tradable emission reductions.

10:30 am “Promoting Global Consistency in Estimating Greenhouse Gas Emissions from Oil and Gas Industry Operations,” K. Ritter, American Petroleum Institute; S. Nordrum, Chevron Texaco Energy Technology Company; T. Shires, URS Corporation.

This paper will address the global collaboration among API and other industry organizations in revising the Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry and in developing Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions. The paper also discusses the SANGIA Energy and Emissions Estimating System. ChevronTexaco has made their proprietary software available, free of charge to enable more companies to develop inventories that are consistent with the industry-wide Guidelines and consistently apply the methodologies from the API Compendium.

11:00 am “Estimation of CO₂, Non-CO₂ GHGs and other Gas Pollutant Emissions of Indonesia’s Urea Fertilizer Factories,” E. Munawar, M. Ubaura, N. Goto, and K. Fujie, University of Technology, Japan.

The urea fertilizer industry has grown rapidly in the last century with about 78% of the total world urea produced by developing countries, notably Asian region countries. Urea fertilizer manufacturing is expected to release CO₂ in two ways: direct emissions derived from combustion of fossil fuel and indirect emissions due to over production of CO₂. The CO₂ emissions of urea manufacturing will contribute more to environmental problems in the future without mitigation options. Currently, there is no recommended methodology to estimate CO₂ from urea factories. In this study, CO₂, non-CO₂ and FHF’s and other gas pollutant emissions of Indonesia have been estimated based on natural gas and other fossil fuel consumption and total material balance.



8:00 am “Web-Based Emission Inventory Application: Improving Data Integrity, Quality, and Processing Efficiency,” H. S. Hawkins, North Carolina Department of Environment and Natural Resources.

An overview of North Carolina’s success in developing and applying quality assurance tools for web-based emission inventory reporting.

8:30 am “System Enhancement of Point Source Inventories,” Y-F Lam, W. T. David, T. L. Miller, and J. S. Fu, The University of Tennessee.

Emission inventories are critical components for air quality management. An accurate and up-to-date inventory is an essential element of air quality modeling that is crucial in determining compliance with ambient standards and in making policy decisions. To insure that accurate inventory data are obtained by a State or local agency, a combined Title V permitting process and point source inventory reporting infrastructure is being implemented using Microsoft’s Access database program. This application is to develop the consolidated system for the State of Tennessee point source inventory, the Consolidated Emission Reporting Rule (CERR) request information system and Tennessee Title V permitting system together and manages permitting records and reporting inventory. The Access interface provides a method for major source companies to complete their Title V permit applications electronically and, at the same time, generate their point source inventory required by CERR. For validation purposes, the inventory data obtained from the electronic Title V permit application via the Access interface are checked against the National Emission Inventory Input Format (NIF 3.0) quality assurance algorithm. With this method of collection and verifying data, regulatory agencies can update emission inventories with valid data to meet the requirements of the Consolidated Emissions Reporting Rule with minimal effort and the needs for air quality modeling.

9:00 am “A Quality Assurance Protocol for Emissions Modeling,” Z. Adelman, Carolina Environmental Program, University of North Carolina.

Recent interest in particulate matter (PM) modeling, climate-air quality interactions, and long-range pollutant transport have shifted the application of atmospheric models from episodic to progressively longer time periods. Systematic quality assurance procedures are critical for reviewing the expanding data surrounding these long-term simulations. This presentation defines a framework for performing emissions modeling quality assurance (QA) for large data sets through detailing procedures and the presentation of an organizational infrastructure for checking and documenting emissions modeling. A series of QA classifications cover modeling accuracy and problem identification, software and data accounting, outside review, and documentation. The QA framework begins with the installation of the software and concludes with compiling QA summaries and notes into a final report. This presentation presents details on the types of information required for performing effective QA, specific QA products, and how to archive and document information about the QA process. An electronic docket is associated with this presentation that provides a series of worksheets and checklists for tracking and documenting the QA procedures. Written in the context of SMOKE modeling, the protocol is general enough that it can be extended to any emissions processor.

9:30 am BREAK

- 10:00 am “Truth or Dare: Data Augmentation in the Point Source 2002 NEI,” A. Pope and M. Strum, US EPA; S. Finn, Eastern Research Group.

This paper discusses the methodology EPA employs to identify and augment point source data with missing or out-of-range values. This paper invites you to decide whether you want to play truth or dare and hopes that by understanding the consequences of submitting files with missing or out-of-range parameters, that you can better plan and prioritize your emissions inventory development activities.

- 10:30 am “Reconciliation of the VOC Emission Inventory with Ambient Data in the Houston, Texas Area,” S. Brown, S. Reid, T. Funk, H. Hafner, P. Steifer, D. Sullivan, P. Roberts, Sonoma Technology.

An emission inventory evaluation and reconciliation was performed in the Houston region for the 2000 ozone season. The reconciliation focused on evaluating emissions estimates for point sources in the Houston region and was performed by comparing pollutant ratios from the emissions inventory to surface and aloft ambient air quality data. The results of the analysis identified areas of the emission inventory that can be corrected or adjusted to help improve air quality modeling.

- 11:00 am “Quality Assurance of Emissions Estimated Using NONROAD2002a,” T. Tamura and S. Reid, Sonoma Technology, Inc.

The Draft NONROAD2002a model is currently the U.S. Environmental Protection Agency’s (EPA) best available tool for estimating emissions from most nonroad source types; however, there are several key assumptions in the model that can have a significant effect on the results. For example, available data indicate that diesel fuel usage in construction equipment is being overestimated by at least a factor of two, and that growth rates may also be overstated by a factor of two. This paper (1) provides a means of visualizing and understanding some of the model’s key assumptions and sensitivities, and (2) illustrates that some quality assurance (QA) is possible with available data or limited surveys.



- 1:00 pm "Development of Probabilistic Emission Inventory of Selected Air Toxics for an Urban Area," Y. Zhao, and H. Christopher Frey, North Carolina State University.

Probabilistic emission inventories were developed for 1, 3-butadiene, mercury, arsenic, benzene, formaldehyde and lead for Jacksonville, Florida. The analysis includes an unbiased approach for dealing with data below a detection limit. The uncertainties in the urban air toxics emission inventories range from as small as -25 to +30 percent for mercury to as large as -83 to +243 percent for arsenic. Typically, uncertainty in the inventory of a given pollutant can be attributed primarily to a small number of source categories. Priorities for improving the inventories and for refining the probabilistic analysis are discussed.

- 1:30 pm "Analytical Estimation of Uncertainties in Biogenic Emissions Calculated by BEIS3 Due to Uncertainties in Model Inputs and Parameters," S. Hanna, Hanna Consultants; J. Wilkinson, Georgia Institute of Technology.

BEIS3 was developed by the U.S. EPA to estimate emissions of biogenic substances, which are used for inputs to chemical transport models to calculate concentrations of ozone and other air pollutants. The current study addresses the uncertainties in biogenic emissions and the subsequent uncertainties in CTM predictions due to uncertainties in BEIS3 inputs and parameters. The primary focus of the study was on use of Monte Carlo (MC) probabilistic methods. However, because of the relative simplicity of the emissions equations, it was decided to also apply a standard analytical approach, which was found to agree approximately with the results of the full MC method. For example, the total relative uncertainty in isoprene emissions varied from 0.3 to 0.6, depending on air T. Total OVOC and monoterpene relative uncertainties were similar, ranging from 0.3 to 0.5. Total BNO relative uncertainty ranged from 0.5 to 0.8. It is suggested that the relative uncertainties in emissions depend on the air T, in the sense that one model input would contribute most of the variance at air T of 10 degrees C and another input would contribute most at 30 degrees C.

- 2:00 pm "Variable Industrial VOC Emissions and Their Impact on Ozone Formation in the Houston-Galveston Area," D. Allen, C. Murphy, Y. Kimura and W. Vizuete, University of Texas at Austin; H. Jeffries, B. Kim, M. Webster, M. Symons, University of North Carolina Chapel Hill.

This paper characterizes the nature of the variability in VOC emissions from industrial point sources in the Houston-Galveston area using stochastic models and other tools, with a particular emphasis on the emissions of ethylene, propylene, butenes and 1,3-butadiene (highly reactive VOCs, HRVOCs). The data indicate that hourly emissions from a single facility can vary from annual average emissions by a factor of 10-1000. This emission variability can have a significant impact on ozone formation.

- 2:30 pm "Uncertainty of NONROAD Emissions in Georgia," T. R. Chi, A. Unal, D. Tian, and A. Russell, Georgia Institute of Technology.

An uncertainty analysis of nonroad emissions for the State of Georgia as estimated by the EPA NONROAD model, employing bootstrap sampling, expert elicitation, and Monte Carlo techniques."

- 3:00 pm Break

- 3:30 pm “Uncertainties in Benzene and 1,3-Butadiene Emissions in Houston and Their Effects on Uncertainties in Concentrations Calculated by AERMOD and ISC,” S. Hanna, Hanna Consultants; R. Paine, D. Heinold, and E. Kintigh, ENSR; H. C. Frey, North Carolina State University; D. Baker, Shell Global Solutions; R. Karp, American Petroleum Institute.

Because of the interest in air quality studies of toxics in urban areas, a Monte Carlo (MC) probabilistic uncertainty study is being conducted for a 15 km by 15 km domain centered on the Houston Ship Channel. The focus of the current study is on uncertainties in ISC3ST and AERMOD predictions of annual averaged concentrations of benzene and 1,3-butadiene, due to uncertainties in emissions and meteorological inputs. The uncertainties in emissions components are estimated to be about +/- a factor of three (i.e., covering the 95 % range) for 21 benzene emissions categories and 13 1,3-butadiene emissions categories). ISC3ST and AERMOD are being run 100 times in MC mode, in order to estimate 1) the total uncertainty of the annual averaged concentrations, and 2) the inputs with uncertainties that are most strongly correlated with uncertainties in predicted concentrations. The current paper focuses on the emissions aspects and the results of the MC runs with ISC3ST and AERMOD will be discussed in a later paper.

- 4:00 pm “Needs for Conformity Between Test Methods for Health, Ambient and Emission Assessments (Factors); Some Shortfalls and Uncertainties,” J. H. Southerland, North Carolina Department of Environmental and Natural Resources.

The paper continues the examination of errors, inaccuracies and other incongruent elements that are inherent in the air quality management practices, especially those related to emission factors and emission inventories. The main focus of these uncertainties is caused by differences in test methods for health effects studies, ambient monitoring and stack sampling as relate to attempting to define the 'same pollutant' consistently throughout air quality management processes. The conclusions of the paper offer a straw man starter list of recommendations for things to include in emission source test plans and reports to make them more functional for development of emission factors and validation of their legitimacy in other applications.

- 4:30 pm “Uncertainties in Emissions Processing: Effects of Using Different Emissions Processing Tools and Surrogate Data Inputs,” D. W. Byun and S. Kim, University of Houston.

The Houston-Galveston Area (HGA) is classified as one of the nation's non-attainment areas due to high ground-level ozone and particulate matter concentrations. Several air quality modeling studies are actively being carried out to find cost-effective measures for improving air quality in the region. One essential part of the modeling input data, the emissions inventory (EI), should be processed through emissions modeling systems like SMOKE (Sparse Matrix Operator Kernel for Emissions) and EPS2 (Emissions Preprocessing System version 2) for use in air quality models (AQMs) such as CMAQ (Community Multiscale Air Quality) and CAMx. These emission processing systems may present different AQM-ready emission inputs depending on the use of different cross-reference files, profiles for spatial distribution, temporal allocation methods, and chemical speciations as well as the EIs that are used. Therefore, it is worthwhile to compare one emission modeling system to another by processing the same EI.

- 5:00 pm “Emission Uncertainties Evaluation in Air Pollutants Emission Inventory Computer System,” C. Trozzi, Techne srl, ITALY.

In the paper, a methodology and software tool for evaluating emissions uncertainties in emission inventory at regional level are presented. The paper resumes the methodology and the software used in a first experiment to evaluate overall uncertainties for a regional emission inventory in Italy. For the experiment, the general methodology for uncertainties evaluation proposed by EPA EIIP and referred as DARS has been personalized to the goals of a local inventory. Examples of application are finally reported.

- 1:00 pm “Ammonia Emissions Related to Fertilizers on Field Crops Using Precision Application Practices in the Central Valley of California,” M. Beene, C. Krauter and D. Goorahoo, California State University; B. Roberts, University of California Cooperative Extension Service.

Ammonia was monitored during a precision agriculture trial. Anhydrous ammonia was applied at different rates including a variable rate and monitoring was done before, during, and after the application. Ammonia emissions were compared according to the different application rates.

- 1:30 pm “Evaluation of Alternative Approaches for Developing Growth-Stage-Specific Ammonia Emission Factors for Swine Feeding Operations,” J. B. Coburn, and M. Deerhake, RTI International.

In efforts to improve ammonia emission inventories in North Carolina, a mass-balanced emission inventory was developed based on growth-stage-specific nitrogen excretion rates. This paper addresses the ammonia data available from monitoring studies of CAFOs and methods of selecting growth-stage-specific emission factors from the data set. Three approaches for developing emission inventories for North Carolina swine CAFOs are then presented. The results of the different emission inventories are compared and evaluated, and the advantages and limitations of the different emission factor approaches are discussed.

- 2:00 pm “Ammonia Flux Profiles and ROG Sampling at California Dairies,” C. Krauter, B. Goodrich, D. Goorahoo and M. Beene, California State University.

Three dairies in the Central Valley of California were selected to be sampled for ammonia flux profiles and Reactive Organic Gasses (ROG) from the fall of 2002 through the spring of 2004. Some indication of NH₃ absorption by active vegetation was found under circumstances similar to those reported by other researchers. The ROG sample data was used to evaluate a dispersion model to calculate emission fluxes from the dairies. Preliminary results from the first samples analyzed with the model are slightly less than current emissions estimates used in California. The work will continue through 2004 and final results will be available in about a year.

- 2:30 pm Development of Process-Based National Ammonia Emission Inventory Model,” W. Schrock, US EPA; B. Vanatta, Eastern Research Group, Inc.

Summary of the approach used by EPA to estimate ammonia emissions for the years 2002, 2010, 2015, 2020, and 2030 from U.S. animal husbandry operations using a process-based national inventory model that applies mass balance principles. The procedure for estimating emissions took into account the amount of nitrogen contained in the excreted manure and the way that the manure is managed. This approach addresses regional differences in ammonia emissions caused by variations in manure management practices while ensuring that ammonia emissions are constrained by the amount of available nitrogen in excreted manure.

- 3:00 pm BREAK

- 3:30 pm “Research and Development of Ammonia Emission Inventories for the Central States Regional Air Planning Association,” S. B. Reid, D. C. Sullivan and L. R. Chinkin, Sonoma Technology, Inc.

This paper describes the development of a 2002 ammonia emission inventory for a nine-state region in the central United States. The inventory was developed by applying the Carnegie Mellon University ammonia emissions model, and by supplementing the model with updated activity data, emission factors, temporal profiles, and inventories of additional source categories. The most important emission sources were estimated to be livestock and poultry, fertilizers, and biogenics.

- 4:00 pm “An Improved Ammonia Inventory for the WRAP Domain,” G. E. Mansell, ENVIRON International Corporation; M. Chitjian, University of California.

Recent advances in the understanding of the health impacts of particulate pollution and the important role ammonia (NH₃) emissions play in the formation of secondary particulate matter (PM) has spawned a great deal of new research into ammonia emissions. Major sources of NH₃ emissions include livestock operations, fertilizer use, waste management, mobile sources, industrial point sources, and various biological sources including human respiration, wild animals, and soil microbial processes. For each of these source categories there remain large uncertainties in the magnitude of emissions, the diurnal and seasonal variation, and the spatial distribution. Uncertainty in NH₃ emissions is a key source of uncertainty in the formation of sulfate and nitrate aerosols. Thus, development of improved NH₃ emissions inventories is essential for modeling the formation of fine PM, regional haze, and for developing effective plans to mitigate visibility impairment at National Parks, Forests and Wilderness Areas.

- 4:30 pm “Emission Inventory Guidance for Anthropogenic Ammonia Sources,” S. M. Roe, H. C. Lindquist, K. B. Thesing, M. D. Spivey, R. P. Strait.

New Emissions Inventory Improvement Program guidance on the development of emission inventories for anthropogenic non-agricultural sources of ammonia has been developed. The purpose of this new emissions guidance for “anthropogenic sources” is to update the materials presented in a 1994 U.S. Environmental Protection Agency report on estimating ammonia emissions. Updated guidance is available for estimating ammonia emissions from industrial sources, combustion sources, and miscellaneous sources. For the purposes of this guidance, the term “anthropogenic non-agricultural sources,” excludes emissions from the agricultural sector (e.g., fertilizer application, livestock operations), as well as natural sources (e.g., soils, wild animal populations). As compared to dominant ammonia sources such as livestock operations, the anthropogenic sources covered in this guidance are estimated to contribute small amounts to national and regional annual inventories. However, at smaller spatial and temporal scales, the sources covered in this guidance can make significant contributions to an ammonia emissions inventory (e.g. urban scale inventories).

5:00 pm “Contribution of Industrial Atmospheric Ammonia Emissions to Nitrogen Loading in the Tampa Bay Estuary, Tampa, Florida, USA,” N. Poor, University of South Florida..

Central Florida has one of the world’s richest reserves of phosphate ore, which is mined and processed locally into ammonium phosphate fertilizers. Associated activities that release ammonia to the atmosphere include the off-load of ammonia from ship to shore, transport of ammonia via pipeline from port to plant, and the manufacture, storage and transport of ammonium phosphate products. Preliminary estimates suggest that 50% of the annual nitrogen flux to Tampa Bay is from atmospheric deposition, either directly to the 104,000-ha bay or indirectly by deposition to the 570,000-ha watershed and subsequent water transport to the bay, and about 50% of this fraction is from atmospheric ammonia/ium.^{1,2,3} The CALMET/CALPUFF modeling system was used to simulate the emission, dispersion, transport and deposition of ammonia released from fertilizer manufacturing industries in central Florida, based on SIC codes and annual emission rates reported in the 2001 USEPA toxic release inventory. The simulation was limited to May 2002, a period during which hourly-averaged ammonia/ium concentrations at one site and 12-hour averaged ammonia/ium concentrations at four sites were available to compare with modeled values.



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- 1:00 pm “Emissions Inventory for Large-Scale Risk Assessment,” J. L. Thé, M. Johnson, S. Koo, Cris Thé, M. Hilverda, Lakes Environmental Software, Inc.

Lakes Environmental has executed a number of high profile human health risk assessments. The quality of these studies is completely dependent on the quality of the Emissions Inventory (EI) available. This paper presents the gaps between existing statewide air EI and the human health and ecological risk assessment emissions data requirements. Suggestions for fast and affordable solutions for filling the missing data elements are presented.

- 1:30 pm “The US Mercury Emission Inventory for the Arctic Council Action Plan,” K. Rackley, A. Pope and D. Mobley, S. Durkee and M. Engle, US EPA.

The Arctic Council, having agreed to act to reduce exposures to a number of priority pollutants in the Arctic region, has initiated a mercury project via the Arctic Council Action Plan (ACAP). The project is being led by the Danish EPA with a Steering Group from all eight Arctic countries -Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and United States. The overall project objective is to contribute to a decrease of mercury releases from Arctic countries. This will be accomplished partly by contributing to the development of a common regional framework for an action plan or strategy for the decrease of mercury emissions, and partly by evaluating and selecting one or a few specific point sources for implementation of control measures. It is felt that the decrease of mercury releases from key sources should serve as a demonstration of existing possibilities, giving inspiration to other control measures in the region.

- 2:00 pm “Mercury Emissions from Motor Vehicles,” M. Hoyer, R. W. Baldauf, and C. Scarbro, US EPA; J. Barres and G. J. Keeler, University of Michigan.

The results of a pilot study investigating the emissions of mercury from on-road mobile sources will be presented. Mercury concentrations measured in fuel, lubricating oil and coolant as well as brakes will also be discussed.

- 2:30 pm “Developing a Local HAP Inventory and Reduction Strategy in New Haven, Connecticut,” M. Weil, New Haven City Plan Department.

This paper addresses New Haven's experience in developing a local HAP emissions inventory and provides guidance intended to facilitate future community inventory initiatives. The project has demonstrated the potential for refining inventories through targeted data collection at the local level and methodological innovation. The paper addresses some of the challenges and advantages of local inventory projects and provides insight concerning the resources and partnerships needed to achieve desired results. Finally, this paper reflects on the value of a local inventory to the effort of developing and implementing a comprehensive risk reduction strategy.

- 3:00 pm BREAK

- 3:30 pm “The Ten Pollutant Study in Jacksonville, Florida,” L. Tilley, City of Jacksonville, Florida.

The City of Jacksonville, Florida began air toxic monitoring in 1997. The monitoring data indicates ten hazardous air pollutants (HAPs) are continually present at the majority of air toxic monitoring sites and have consistently high average concentrations in comparison with other monitored pollutants. HAP inventory data from 2000 was used to further evaluate these pollutants and determine which source categories contribute these emissions.

- 4:00 pm “Delaware Statewide Toxics and Criteria Air Pollutant Emissions Inventories for 2002 and Projected Toxics Air Pollutant Emission Inventory for 2003,” S. M. Roe, R. P. Strait, D. W. Holloman, M. A. Mullen, K. B. Thesing, A. D. Bollman, Y. K. Hsu, H. C. Lindquist, P. M. Hemmer, M. D. Spivey and C. Mackay, E. H. Pechan & Associates, Inc; D. F. Fees and J. L. Outten, Delaware Department of Natural Resources and Environmental Development Program.

The Delaware Air Quality Management Section (AQMS) embarked on the Delaware Air Toxics Assessment Study (DATAS) project in 2002 to gain a better understanding of ambient concentrations of toxic air pollutants (TAPs) throughout Delaware, exposure to those TAPs, and the health risks associated with that exposure based on nationally-accepted health benchmarks. The DATAS project involves monitoring of TAPs at 5 locations throughout the state during 2003, and the use of air dispersion models to predict ambient air concentrations based on a comprehensive emission inventory. This paper provides an overview of the emissions inventory, and then focuses on efforts to obtain activity data needed to refine emissions estimates, spatial allocation (e.g., spatial surrogates, geo-coded source locations) and temporal allocation in support of exposure modeling within 5 DE communities.

- 4:30 pm “Trends in Emissions of Air Toxics from Highway Mobile Sources, 1990 to 2002,” R. Cook, and L. Driver, US EPA; M. Mullen, E. H. Pechan & Associates, Inc.

EPA recently released a new version of its motor vehicle emission factor model, MOBILE6.2. MOBILE6.2 is the first version of MOBILE to integrate the calculation of hazardous air pollutant emission factors into the MOBILE6 modeling framework. The model has been used to develop county-level nationwide emission inventories of motor vehicle air toxics for 1990, 1996, 1999, and 2002. Inventories were developed for 13 gaseous hydrocarbon compounds, 16 polycyclic aromatic hydrocarbons, and 4 metal compounds.

- 5:00 pm “Reassessment of Lead Emission Over the Territory of the North East Eurasia,” S. Kakareka and T. Kukharchyk, Institute for Problems of Natural Resources Use & Ecology, BELARUS.

In the paper specific procedures developed and applied for re-evaluation of lead emission over the territory of the former Soviet Union are discussed. Data on heavy metals for these countries are incomplete and need to be improved for regional modeling applications.

8:00 am "Emission Inventory Graphic User Interface for Point Sources," C. P. Ramsdell, Idaho Department of Environmental Quality.

Creation of a Web-based application used by the Idaho Department of Environmental Quality to gather point source data for annual and periodic emissions inventories to the exact requirements of the Consolidated Emissions Reporting Rule (CERR) is discussed.

8:30 am "Constructing the NIF XML Schema," S. R. Boone, and D. Mc Kenzie, E. H. Pechan & Associates, Inc.

State and local agencies provide their point and non-point source category emissions inventory data to the NEI (National Emissions Inventory) to the EPA. The NEI Input Format (NIF) is the current means of transmitting NEI data - however, the NEI data transmittal format can be provided in three separate file types: ASCII flat files, Microsoft Access or eXtensible Markup Language (XML). The NEI input formats have been recently updated to implement relevant final data standards required by the Agency and which are administered by the Office of Environmental Information (OEI). The XML schema has been designed to comply with these new data standards.

9:00 am "Data Management Challenges in Developing a Network of Distributed North American Emissions Databases," S. Falke, Washington University in St. Louis; G. Stella, Alpine Geophysics; T. Keating and B. Hemming, US EPA.

This paper presents results of a North American Commission for Environmental Cooperation sponsored study that examined techniques and methodologies for data gathering and analysis, data management, and web dissemination of publicly available electricity generation utility emissions data from each of the three participating countries. Challenges faced in developing a network of distributed emissions databases and solutions for addressing these challenges are discussed. A prototype web browser interface for accessing, exploring, and visualizing heterogeneous emissions data sources using web services is presented.

9:30 am BREAK



- 10:00 am “System Design of a Georeferenced-Based Emission Inventory Modeling System (G-Beams) for Japanese Emission Inventory Management,” K. Nansai, N. Suzuki, K. Tanabe, S. Kobayashi, and Y. Moriguchi, National Institute for Environmental Studies, JAPAN.

We are developing a 'Virtual World', which is an integrated information system on a Geographic Information System (GIS) platform, for environmental risk assessment and management. One salient characteristic of this Virtual World is the calculation of environmental risks through data exchange between respective models: emission inventory, environmental fate, and exposure. This study is intended to develop an emission inventory model, the Georeference-Based Emission Activity Modeling System (G-BEAMS), which can function with this Virtual World. The primary function of G-BEAMS is to execute an estimation of temporal and spatial emission distribution of chemicals and air pollutants in Japan. It uses functions for estimating the amount of emission; a distribution of the emission on a map and its temporal fluctuation; and databases of emission factors, activity data, spatial allocation factors, and temporal allocation factors. The systematic characteristic of G-BEAMS is the standardization of emission-source classification and geographic position. Unfortunately, there is no Japanese standard source classification for an emission inventory like the SCC of the US or the SNAP code of the EU. Therefore, we did original coding of the classification considering a combination of industries, production processes, and production technologies. Geographic positions were defined with polygonal geometry on a GIS layer, each polygon with a unique index. Basic layers treated in G-BEAMS were chosen with regard to availability of public statistical data including geographic position information. These standardizations enable G-BEAMS to systematize procedures for compiling an emission inventory by both top-down and bottom-up approaches and by spatially and temporally allocating the estimated emission.

- 10:30 am “Establishment of the Intergovernmental Panel on Climate Change (IPCC) Emission Factor Database,” J. Mangino, US EPA; K. Tanabe, IPCC NGGIP-TSU, Japan; T. Pulles, TNO, Netherlands; K. Mareckova, UNDP-GEF, Hungary.

The IPCC National Greenhouse Gas Inventories Programme (IPCC-NGGIP) has developed a web-based emission factor database (EFDB) where users can retrieve and submit emission factors and other parameters with background documentation that can be used for estimating GHG emissions in national inventories.

- 11:00 am “The Development of a CROMERR-Compliant Electronic Document Receiving System,” P.T. Baker, MACTEC Engineering and Consulting; N. V. Raman, Delaware NREC.

In 2003 and 2004, MACTEC worked with a consortium of five state agencies (Arizona, Delaware, Indiana, Kansas, and South Carolina) to develop an online reporting system for facilities to submit the annual air emissions inventory data. The system was developed to be compliant with the U. S. Environmental Protection Agency's (EPA) proposed Cross-Media Electronic Reporting Rule (CROMERR). A web-based version of Satellite i-STEPS was developed to facilitate online air emissions inventory reporting by facilities. Business processes and web applications were incorporated to ensure compliance with the CROMERR requirements. Issues, such as timeliness of data generation, copy of record, integrity of the electronic document, submission knowingly, validity of the electronic signature, binding the signature to the document, opportunity to review, understanding the act of signing and the electronic signature agreement were addressed.

- 8:00 am “EPA’s National Mobile Inventory Model (NMIM), A Consolidated Emissions Modeling System for MOBILE6 and NONROAD,” H. Michaels, D. Brzezinski, R. Cook, C. Harvey, and M. Cumberworth, US EPA.

NMIM was developed to execute MOBILE6 and NONROAD to produce national county-level inventories of criteria and hazardous air pollutants for the National Emissions Inventory (NEI) and for EPA rule making. A key component of NMIM is its county database, which contains the detailed information necessary to run MOBILE6 and NONROAD and to generate inventories. NMIM can run on a single desktop machine or can use multiple computers on a network. A post processing module can do a variety of aggregations and produce NIF3 output.

- 8:30 am “The Kansas City Light-Duty Vehicle Emission Study,” R. Baldauf, C. Fulper, P.Gabele, G. Tierney, J. Somers, J. Warila, US EPA.

This paper provides an overview of the Kansas City Light Duty Vehicle Emissions Study. The primary objective of this study is to improve PM emission factors for light-duty, gasoline powered motor vehicles. The project will also provide emission factors for criteria gases and air toxics, as well as improved source profiles for source apportionment assessments.

- 9:00 am “MOBILE6.2 Air Toxic Emission Factor Modeling: A Trend and Sensitivity Analysis,” T. Tang, M. Claggett, J. Byun, M. Roberts, J. Granell, Federal Highway Administration.

This paper presented the result of a comprehensive sensitivity analysis of the MOBILE6.2 air toxic function. Input parameters including roadway (speed, and facility types, vmt distribution), environmental conditions (humidity and temperature), fuel composition (aromatic, benzene, sulfur content, et al), and oxygenated fuel components were analyzed. A time-series analysis was also performed. Depending on the types of tested parameters, changes of air toxic emission factors range from none to over 100 percent.

- 9:30 am BREAK



- 10:00 am “Evaluating the Contribution of PM_{2.5} Precursor Gases and Re-Entrained Road Emissions to Mobile Source PM_{2.5} Particulate Matter,” W. M. Hodan, W. R. Barnard, MACTEC Federal Programs.

This paper presents a review of current literature pertaining to PM_{2.5} emissions from mobile sources. Both primary and secondary formation of PM_{2.5} are examined. The paper provides a foundation for comparison and contrast of the chemical and physical mechanisms involved in emission and formation of PM_{2.5}

- 10:30 am “Making Use of MOBILE6's Capabilities for Modeling Start Emissions,” J. Houk, Federal Highway Administration.

The MOBILE6 emissions factor model includes several new, but often unutilized, capabilities for capturing emissions from engine starts in an urban area. Starts account for a significant portion of vehicle exhaust emissions in MOBILE modeling, and correctly accounting for these emissions can be critical to successful attainment demonstrations and conformity analyses. This paper highlights several simple methods to customize MOBILE model inputs and outputs in order to better characterize start emissions behavior.

- 11:00 am “Analysis of MOBILE6.2's PM Emission Factor Estimating Function,” J. Granell, C. Ho, T. Tang, and M. Roberts, Federal Highway Administration.

Prior to M6.2, particulate matter emission factors from gasoline and diesel vehicles were calculated using PART5. M6.2 is now the approved model for estimating PM_{2.5} emissions for SIP and transportation conformity purposes. As many areas are currently using PART5 for their emissions analyses, they will be interested in examining what the impacts on emissions estimates are by switching from PART5 to M6.2. This paper begins with a comparison between both models. It summarizes the basic differences between M6.2 and PART5 capabilities in terms of pollutants reported, and the differences in output results. The comparison of the two models is followed by a sensitivity analysis that will allow the users to understand the relative impact of selected parameters on the resulting emission factors.

Thursday June 10, 2004

**Session 9 Emission Inventory Preparation
For Modeling**

**Chairs: Madeleine Strum, US EPA
Michael Jay, US EPA**

8:00 am “Modeling the Effects of E10 Fuels in Canada,” R. Vitale, J. W. Boulton, M. Lepage, M. Gauthier, and X. Qiu, RWDI West, Inc.

This paper presents an overview of the overall methodology and work completed to date for an ongoing project to quantify the effects of splash and tailor blend E10 fuels (10% Ethanol-blended gasoline) on the formation of smog and toxic air pollutants in Canada. Modeling is being performed over two model domains (eastern North America and the Pacific Northwest) covering two meteorological episodes for different base year emission inventories (2000 and 2010). Emissions are being prepared using the recently 'Canadianized' version of MOBILE (ver. 6.2C) and a modified version of SMOKE capable of handling toxic species explicitly. Air quality will be simulated using a modified version of CMAQ with an updated Toxics-SAPRC99 chemical mechanism.

8:30 am “Development of an “Open” Emissions Model,” C. Loomis, Alpine Geophysics; M. Janssen, LADCO.

This paper will outline the project to develop an “Open” emissions model for chemical transport modeling. This model which will be based on LINUX SQL is under development by a consortium of environmental contractors and regional planning organizations. This paper will review and summarize the documents and outline some of the interesting extensions this model will have over its predecessors. In the paper we will discuss enhanced QA processing, improved mobile source modeling, transparent biogenics emissions estimates, use of the GIS GRASS as an alternate GIS, on the fly off-road emissions calculations, and development of an enhanced growth and control module.

9:00 am “An Approach to an Unified Emission Process-Based Regional Flux Modeling Platform,” W. G. Benjey, US EPA.

The trend towards episodic (usually hourly) modeling of environmentally-dependent emission fluxes is increasing. The emissions are estimated using numerical modeling from physical principles, resulting in more realistic values than the historical approach using annual air quality inventories with temporal and spatial disaggregation factors. These developments will result in a series of similar pollutant or source-type specific emission modeling tools with overlapping input data requirements. To maintain a unified one-atmosphere approach to air quality modeling, and to ensure a consistent scientific basis and computational efficiency, a bi-directional surface boundary layer emission flux modeling platform is proposed.

9:30 am BREAK

Thursday June 10, 2004

**Session 9 Emission Inventory Preparation
For Modeling**

**Chairs: Madeleine Strum, US EPA
Michael Jay, US EPA**

- 10:00 am “Spatially Allocating Airport-Related Emissions for Air Quality Modeling: New Approach and New Data,” M. Strum and L. Driver, US EPA; R. Mason, NOAA; J. D. Smith, US EPA; R. Billings, Eastern Research Group, Inc.

A new approach has been developed for allocating aircraft and other airport-related emissions inventoried at the county level that utilizes information on airport location and activity data that is generally consistent with the 1999 National Emission Inventory. This approach has been incorporated in the Emission Modeling System for Hazardous Air Pollutants (EMS-HAP) Version 3.0 and Sparse Matrix Operator Kernel Emissions (SMOKE) 2.0 emission processors.

- 10:30 am “Development of a Chemical Database and Software for Processing Emissions of VOC Emissions for Air Quality Models,” W. P. L. Carter, University of California, Riverside.

A chemical speciation database was developed that consists of assignments of actual chemical compounds to the speciation categories now used for organic compound speciation profiles. Consistent assignments of model species were made for various chemical mechanisms. Programs were written to implement these into SMOKE and other emissions processing systems, and to simplify emissions processing for detailed or modified chemical mechanisms.

- 11:00 am “Recent Updates to the SMOKE Emissions Modeling System,” C. A. Seppanen, Carolina Environmental Program, University of North Carolina.

The Sparse Matrix Operator Kernel Emissions (SMOKE) Modeling System processes area, mobile, point, and biogenic source emissions for input into a variety of air quality models. We continually update and expand SMOKE's capabilities to better meet the needs of emissions modelers. Recent updates include improved MOBILE6 integration; SMOKE is now able to use hourly humidity data from gridded meteorology files as input to MOBILE6. We have also improved the temporal allocation of VMT when applying MOBILE6 emission factors to better model real-world conditions. Current work includes updates to handle variable grid resolutions and processing of aircraft emissions. We are also enhancing the SMOKE distribution system with the addition of an anonymously accessible Concurrent Versions System (CVS) archive. This will allow CVS-savvy users to access the latest stable and experimental code between releases.

- 12:30 pm “Development of Managed Burning and Wildland Fire Emission Estimates for VISTAS,” W. R. Barnard, MACTEC Engineering and Consulting, Inc; P. Brewer, VISTAS.

This paper provides an overview of the development of emission estimates for prescribed, wildland, agricultural and land clearing fires in the Southeastern U.S. as part of the Visibility Improvement State and Tribal Association of the Southeast (VISTAS) base year emission inventory development effort. Information on data collection, methods used to develop fuel loading and other input data necessary for calculating emissions and an overview of the emission levels for these fire types is provided.

- 1:00 pm “Research and Development of Emission Inventories for Planned Burning Activities for the Central States Regional Air Planning Association,” S. B. Reid, T. H. Funk, D. C. Sullivan, P. S. Stiefer, and H. L. Arkinson, Sonoma Technology, Inc.

In support of the Central States Regional Air Planning Association (CENRAP) research on visibility-related issues for Class I sites in the region including Texas, Oklahoma, Louisiana, Arkansas, Kansas, Missouri, Nebraska, Iowa, and Minnesota, Sonoma Technology, Inc. developed emission inventories of episodic combustion events (such as agricultural burning, prescribed burning, open burning of wastes, structural fires, and wildfires). Activity data were gathered by conducting and analyzing the results of telephone surveys of county agricultural extension agents and by gathering information from state, tribal, private, and federal land managers. Emissions were calculated by using the First-Order Fire Effects Model (FOFEM) and by applying Geographic Information Systems (GIS) databases of land use, land cover, and vegetation.

- 1:30 pm “Survey of Residential Wood Combustion Activity and Development of Emissions Inventory,” M. Schuster, and S. S. G. Wierman, MARAMA; S. M. Roe and H. C. Lindquist, E. H. Pechan & Associates, Inc; M. Sullivan, L. Derin, and K. Ewald, Population Research Systems.

The Emissions Inventory Improvement Program (EIIP) suggests using a survey method for collecting activity data on residential wood combustion (RWC). This paper describes the development of a sample frame and survey methodology for gathering RWC activity data, survey implementation, methods for developing an emissions inventory from survey data, and the resulting emission estimates. This paper will discuss the statistical model developed to estimate emissions from residential wood combustion activity. It will also compare the resulting MANE-VU RWC emissions inventory to the National Emissions Inventory (NEI).

- 2:00 pm BREAK

- 2:30 pm “Visualization and Comparison of 1999 NEI v2, v3, and 2001 NEI v1 as Prelude to 2002 MANE-VU Regional Haze Modeling Inventory,” S. Kayin, C. Devi, M. Schuster and S. Wierman, MARAMA.

Specifically, this paper will: (i) Summarize 1999 NEI v2, v3, and 2002 NEI v1 point, area, highway, and non-road PM₁₀, PM_{2.5}, SO₂, NO_x, VOC, and NH₃ emissions for MANE-VU Region, (ii) Compare the emission levels between them, (iii) Include county level emission density maps for those four major source groups and a number of source categories that are important for the region, and (iv) identify source categories to which special attention should be given when preparing 2002 modeling inventory to eliminate gaps, abnormalities, and other potential problems.

- 3:00 pm “Future Year Emission Inventory Development to Support Fine Particulate Mass and Visibility Modeling in the VISTAS Region,” G. Stella, Alpine Geophysics; P. Brewer, VISTAS.

The purpose of this paper is to describe the production of a set of comprehensive future year annual emission inventories for the VISTAS States to support the modeling and assessment of speciated particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers (PM-2.5). We will include discussion of the VISTAS 2002 inventory with a focus on assumptions for its projection to 2018, how similar or dissimilar our results are from EPA's recent projection assumptions, and our procedures for collecting and manipulating inventories for other regions.

- 3:30 pm “Improvements to NONROAD Model Inputs for MidWestern States,” K. B. Thesing and A. D. Bollman, E. H. Pechan & Associates, Inc.; M. Janssen, Lake Michigan Air Directors Consortium.

This paper describes a study to develop representative NONROAD model inputs for construction and agricultural categories for the MidWest RPO region. In EPA's NONROAD emissions model, state-level populations and activity for construction and agricultural categories are derived from national sources of data, and county-level activity is estimated using surrogate indicators that may not always correlate well with local equipment use. Information was collected via survey methods, and from publicly available sources of data, to develop area-specific model inputs for equipment populations and activity. These revised model inputs will be used to support regional emissions modeling efforts. Data resulting from these studies are presented and compared to the existing NONROAD model default inputs.

- 12:30 pm “Correlating Particulate Matter Mobile Source Emissions to Ambient Air Quality,” K. N. Black, Federal Highway Administration; F. Divita, E. H. Pechan & Associates; R. A. Margiotta, Cambridge Systematics, Inc, R. Guensler, Trans/AQ, Inc.

This paper describes the results of research sponsored by the Federal Highway Administration (FHWA) and initiated to study the relationship between traffic activity and ambient PM_{2.5} concentrations. The study, entitled “Estimating the Transportation Contribution to Particulate Matter Pollution,” had the objective of studying correlations between ambient PM concentrations and traffic volumes. Particulate matter and traffic monitoring data were collected in several geographically different metropolitan areas to investigate spatial variability. Temporal variability was evaluated to discern patterns over the day, week, and season. Meteorological influences were also investigated given their significant impact on air quality. This effort is a cooperative initiative between the FHWA, the Environmental Protection Agency (EPA), state Departments of Transportation (DOTs), and, in some cases, local transportation agencies.

- 1:00 pm “Enhancements to the Gulf of Mexico Emission Inventory for Non-Platform Sources,” R. Billings, R. Chang, and H. Perez, Eastern Research Group.

The Department of Interior's Mineral Management Services is responsible for offshore oil platforms in the Gulf of Mexico. MMS continues to develop emission inventories in the central and western area of the Gulf to quantify emission sources and provide data to state and local agencies that can be used to evaluate state air quality impacts associated with activities in the Gulf. These emission inventories include platform and non-platform sources. Non-platform sources can be divided into two groups of mobile sources, emission sources directly related to the construction and operation of offshore oil platforms, and mobile sources that are not directly related to oil platforms in the Gulf. The oil platform related sources include drilling rigs, pipe laying operations, platform construction and removal, support helicopters, support vessels, and survey vessels. Non-oil platform related mobile sources include commercial fishing vessels and commercial vessels.

- 1:30 pm “Development of County and Airshed Specific Input Data for the NONROAD Model for Clark County, Nevada,” W. R. Barnard, MACTEC Engineering and Consulting, Inc., J. Koswan, and D. Ransel, Clark County Department of Air Quality Management.

This paper discusses the development of local activity, population and seasonal usage information for nonroad equipment in the Las Vegas, NV area. Information on these parameters was developed using a survey mechanism. The data were then used to develop revised estimates for use in the EPA NONROAD model. Information on the survey results, data used to migrate survey results to total population and other activity data levels as well as problems associated with using the data with the “subcounty” option of the NONROAD model are discussed.

2:00 pm BREAK

- 2:30 pm “Mobile Source Air Toxic Emission Results from a Diverse Nonroad Engine and Equipment Population,” J. Volkens, R. Baldauf, J. R. Cook, K. Helmer, US EPA.

EPA tested several production and in-use nonroad (NR) diesel engines over both steady-state and transient emission test cycles. The three test fuels used were chosen for sulfur level. A range of regulated and unregulated pollutants were quantified for each test engine, including EPA-designated mobile source air toxic emissions (MSATs). Emission results were summarized in both grams/hour and grams/brake-horsepower per hour.

- 3:00 pm “Use of Urban Travel Demand Models to Develop Regional Emissions Inventories,” M. Janssen, LADCO

This paper will describe the methods used to collect and incorporate Travel Demand Model (TDM) output into inventories ready for integration with Regional Emission Inventories. Subjects specifically addressed will include methods for interpreting TDM output, validating and quality assuring output. Practical data needs, development of spatial and temporal surrogates, tools for conversion from popular travel demand models, and use of future year projections will be discussed.

- 3:30 pm “Applying Humidity and Temperature Corrections to On and Off-Road Mobile Emissions,” C. Lindhjem, ENVIRON International Corporation.

The effect of humidity on internal combustion (gasoline, LPG, CNG, and diesel) engines has been known for many years: higher humidity results in lower NO_x emissions. Likewise, higher temperatures have historically been associated with higher emissions except during the cold start of light-duty vehicles when emission control devices and other engine controls may not function properly. Once the engine has warmed up though, higher temperatures result in higher NO_x emissions. The effect of humidity and temperature has been included in light-duty on-road vehicle emissions estimates in MOBILE6, which includes the effect of air conditioning loads on the engine and the exhaust emission effects described. However, the effect of temperature and humidity has not been included in the MOBILE6 for heavy-duty vehicles and NONROAD emission models even though the emission data used in the development of emission factors has been adjusted for temperature and humidity. This work presents a review of humidity and temperature corrections and applies them to the Houston-Galveston area (HGA) emission inventory demonstrating the effect of humidity and temperature on emissions. Overall the effect of applying the humidity and temperature adjustments on emissions inventory was relatively small for the HGA ranging from a less than 1% to 9% NO_x reduction by episode day, however the effect varied temporally and spatially. The emissions rates decreased most significantly in the evening and early morning where humidity levels were high and temperature was low. The emission rates also vary spatially where counties closer to the coast had higher humidity levels and lower temperatures and so had lower NO_x emission rates.

- 12:30 pm “Penobscot Nation Air Emissions Inventory Development,” C. I. Hester, and J. E. Cavalier, MACTEC Engineering and Consulting; V. Bataille-Ferry, US EPA.

This paper describes an air emissions inventory that was preformed for the Penobscot Nation’s territories located in Maine. Descriptions of the various emission sources and the methodology used to prepare the inventory are presented. Summary tables presenting a breakdown of criteria and HAP emissions are included. The inventory was prepared by MACTEC, Inc. under a work assignment issued by EPA Region 1.

- 1:00 pm “Native American Tribal Emission Inventories, A 2004 Update and Results of Tribal Review of the 1999 National Emission Inventory,” S. Kelly and A. Luedeker, Institute for Tribal Environmental Professionals.

In the years between 1990 and 2000, tribes completing emission inventories used them in their own communities and tribal air programs. The main reasons for conducting an EI were to identify sources of air pollution that were affecting the health of community members and to determine the need for a continuing air quality program and/or air quality monitoring. In 2001, the US EPA’s Office of Air Quality Planning and Standards (OAQPS) recognized the need to provide tribes with assistance in submitting their data to the National Emission Inventory (NEI) database. Through a project funded by both OAQPS and the Tribal Data Development Working Group (TDDWG) of the Western Regional Air Partnership (WRAP), the Institute for Tribal Environmental Professionals (ITEP) raised the number of tribes represented in the 1999 NEI from 1 to 12. This project is continuing with efforts to increase the number of tribes represented in the 2002 NEI. ITEP anticipates 20 tribes will be represented in the first draft of the 2002 NEI in June 2004. Tribally developed source data collected to date will be summarized.

- 1:30 pm “Spatial Integration of Tribal Inventories into Regional Photochemical Models,” M. Janssen, LADCO.

The purpose of this paper is to outline the development of the Midwest RPO’s Tribal Emissions Inventory and the integration of that inventory with the regional emissions inventory. This paper will outline the decisions on coding schemes for Tribal IDs and the development of national spatial surrogates where tribal areas are delineated from other jurisdictions. The paper will provide the mathematical framework for spatially allocating tribal inventories in areas with a variety of other emissions inventory sources to avoid double counting emissions. The purpose of these methods is to provide a seamless framework for the future integration of tribal inventories with regional chemical transport emissions inventories.

- 2:00 pm BREAK

Additional Meetings

(These meetings are **by invitation only**)

Date	Time	Meeting
Jun 7	5:00 - 6:30 pm	EPA Regional Office Meeting
Jun 10	4:00 - 5:30 pm	Organizational Meeting on EPA and State/Local Coordination
Jun 11	8:00 - 1:00 pm	NARSTO Emission Inventory Assessment Steering Committee
Jun 11	8:00 - 1:00 pm	RPO Emission Discussion Group

Exhibitors

Eastern Research Group, Inc

E. H. Pechan & Associates, Inc.

Lakes Environmental Software

MACTEC

RTI International

U.S. Environmental Protection Agency - Emissions, Monitoring and Analysis Division

U. S. Environmental Protection Agency - Environmental Technology Verification (ETV) Program

