



Preliminary
AGENDA

March 11, 2014

24th CRC REAL WORLD EMISSIONS WORKSHOP

Co-Sponsors

California Air Resources Board
National Renewable Energy Laboratory
South Coast Air Quality Management District
US Environmental Protection Agency OTAQ

Workshop Organizers

Dominic DiCicco, Chairman, Phillips 66 Company
Garry Gunter, Chairman, Ford Motor Company
Brent Bailey, Coordinating Research Council
Kevin Black, Federal Highway Administration
Philip Heirigs, Chevron Global Downstream
Jorn Dinh Herner, California Air Resources Board
Henry Hogo, South Coast Air Quality Management District
Tao Huai, California Air Resources Board
Tom Long, US Environmental Protection Agency NRMRL
Ed Nam, US Environmental Protection Agency OTAQ
Shirish Shimpi, Cummins, Inc.
Chris Tennant, Coordinating Research Council
Matthew Thornton, National Renewable Energy Laboratory

Hyatt Regency Mission Bay, San Diego, California
March 30 - April 2, 2014

Welcome Sunday, March 30, 2014

4:30-6:00 pm **Registration** in Bayview Ballroom Foyer and **Poster Setup** in the Pavilion

6:00-7:00 pm **Welcome Reception** in the Cabanas

DAY ONE Monday, March 31, 2014

All sessions take place in Bayview Ballroom unless otherwise noted.

7:30 AM **Registration** in Bayview Ballroom Foyer
Continental Breakfast in the Pavilion

■ 8:30 AM Welcome from the Chairs: Dominic DiCicco, Ford Motor Company, & Garry Gunter, Phillips 66 Company

■ 8:40 AM **KEYNOTE SPEAKER: Margo Oge, Visiting Scholar at the International Council on Clean Transportation**

SESSION 1: Vehicle Emissions Measurements: Remote Sensing

9:30 AM *Introduction by Session Leader Henry Hogo, South Coast Air Quality Management District*

■ 9:35 AM The "Great" Recession and Its Impact on Light-Duty Vehicle Emissions Gary Bishop University of Denver

■ 9:50 AM Where are the High-Emitters Gone? Jens Borken-Kleefeld International Institute for Applied Systems Analysis (IIASA)

■ 10:05 AM Heavy-Duty Truck Emissions Collected Using the Streamlined Heavy-Duty Emissions Detector (SHED) Rachel Hottor-Raguindin University of Denver

■ 10:20 AM Comparison of Historical RSD Data - USA and EU Fleets 2009 / 2012 Marta Lopez Technet, sostenibilidad en transporte, s.l.

■ 10:35 AM General Discussion of Session 1

10:50 AM Introduction to the posters and demonstrations

11:00 AM **BREAK: Posters and Demonstrations in the Pavilion** (see Pages 6-8 for Listings)

SESSION 2: Vehicle Emissions Measurements: Laboratory

11:30 AM *Introduction by Session Leader Matt Thornton, National Renewable Energy Laboratory*

■ 11:35 AM Emissions from Heavy-Duty Trucks Following In-Use Driving Cycles Associated with Goods Movement Poornima Dixit University of California, Riverside CE-CERT

■ 11:50 AM Long Term Deterioration of Tier 2 Vehicles Carl Fulper U.S. Environmental Protection Agency

12:05 AM **Lunch in Mission Ballroom**

■ 1:30 PM A Study on Modern Passenger Vehicles Energy Efficiency and Emissions in Nordic Driving Conditions Jukka Nuottimäki VTT Technical Research Centre of Finland

■ 1:45 PM Evaporative Emissions Running Loss Testing with Implanted Leaks Constance Hart U.S. Environmental Protection Agency

■ 2:00 PM General Discussion of Session 2

SESSION 3:**Vehicle Emissions Measurements: Portable Systems**

2:15 PM

Introduction by Session Leader Jorn Herner, California Air Resources Board

- | | | | | |
|---|---------|---|---------------|---------------------------------|
| ■ | 2:20 PM | In-Use Measurement of the Activity, Fuel Use, and Emissions of Diesel Refuse Trucks | Gurdas Sandhu | North Carolina State University |
| ■ | 2:35 PM | A Closer Look at Cold Start and Low Load NOx Emissions from SCR Equipped Heavy-Duty Diesel Trucks | Jorn Herner | California Air Resources Board |
| ■ | 2:50 PM | Off-Cycle Light-Duty Diesel Vehicle Emissions Under Real-World Driving Conditions | Marc Besch | West Virginia University |

3:05 PM

BREAK: Posters and Demonstrations in the Pavilion (see Pages 6-8 for Listings)

- | | | | | |
|---|---------|--|-----------------------------------|---|
| ■ | 3:35 PM | Experience of PM Measurement in Hong Kong | Carol Wong | Environmental Protection Dept., Hong Kong SAR Government |
| ■ | 3:50 PM | In-Use Fuel Economy from Over 100 Late Model Year Light-Duty Vehicles | Tanfeng (Sam) Cao and Nick Molden | University of California, Riverside CE-CERT |
| ■ | 4:05 PM | New Methods for PEMS Micro-Trip Analysis | Karl Ropkins | University of Leeds |
| ■ | 4:20 PM | Evaluation of PEMS-PN Equipment for the Type Approval of Light-Duty Vehicles in Europe | Francesco Riccobono | European Commission - Directorate General Joint Research Centre |
| ■ | 4:35 PM | General Discussion of Session 3 | | |

5:00 PM

END OF DAY

6:00 PM

Evening in Old Town San Diego - meet in front of hotel lobby to board coaches. LAST BUS LEAVES AT 6:10 PM

DAY TWO**Tuesday, April 1, 2014**

7:30 AM

Registration in Bayview Ballroom Foyer

- | | | | | |
|---|---------|--|--------------|------------------------------------|
| ■ | 8:00 AM | State of the CRC Atmospheric Impacts Committee | Susan Collet | Toyota Motor Engineering & Mfg. NA |
|---|---------|--|--------------|------------------------------------|

SESSION 4:**Measurement Method Development**

8:15 AM

Introduced by Session Leader Kevin Black, U.S. Federal Highway Administration

- | | | | | |
|---|---------|---|-----------------|------------------------------|
| ■ | 8:20 AM | CRC Project E-103: Evaluation of N2O Measurement Instruments with Light-Duty Vehicles | Eugene Jimenez | Southwest Research Institute |
| ■ | 8:35 AM | Evaluation of Fourier Transform Infra-Red (FTIR) Method as an In-Use Emissions Measurement Tool - Comparison with Constant Volume Sampler (CVS) System and Portable Emissions Measurement System (PEMS) | Saroj Pradhan | West Virginia University |
| ■ | 8:50 AM | The Design and Development of a Novel Exhaust Mass Flow Meter | Rob Graze | Sierra-CP Engineering |
| ■ | 9:05 AM | The Effect of Analytical Errors on NMHC Analysis from CNG-Based Fuel Emissions | Barbara Marshik | MKS Instruments |
| ■ | 9:20 AM | General Discussion of Session 4 | | |

SESSION 5:**Off-Road**

9:35 AM *Introduction by Session Leader Tao Huai, California Air Resources Board*

■	9:40 AM	Hybrid Off-Road Equipment Evaluation: Part 2 - Emission Benefit Evaluation	Tanfeng (Sam) Cao	University of California, Riverside CE-CERT
■	9:55 AM	Isolated Zone Evaluation of Advanced Engine and Exhaust Aftertreatment Technologies and Biodiesel Fuels	Aleksandar Bugarski	NIOSH Office of Mine Safety and Health Research
■	10:10 AM	In-Use Emissions Measurements of Passenger Locomotive Engines Operating on Diesel and Biodiesel Fuels	Brandon Graver	North Carolina State University
■	10:25 AM	Impact of Renewable and Biofuels on In-Use Gaseous Emissions and Ultrafine Particles from Marine Vessels	Nicholas Gysel	University of California, Riverside CE-CERT
■	10:40 AM	General Discussion of Session 5		

10:55 AM **BREAK: Posters and Demonstrations in the Pavilion** (see Pages 6-8 for Listings)

SESSION 6:**Particulate Matter Measurement**

11:25 AM *Introduction by Session Leader Shirish Shimpi, Cummins, Inc.*

■	11:30 AM	Evaluation of the Gravimetric Method to Measure Light-Duty Vehicle Particulate Matter Emissions at Levels Below One mg/mile	Suiyun (Sherry) Zhang	California Air Resources Board
■	11:45 AM	Denuder for Particulate Matter Artifacts Removal During Filter Collection	Imad Khalek	Southwest Research Institute
■	12:00 PM	Black Carbon versus Soot? An Examination of PM from Flames, Cast Soot Generator and Engine	Matti Maricq	Ford Motor Company

12:15 PM **Lunch in Mission Ballroom**

■	1:45 PM	Low PM Mass Assessment and Analysis E-99	Kent Johnson	University of California, Riverside CE-CERT
■	2:00 PM	A High Temperature CPC Insensitive to Volatile Particles	Kingsley Reavell	University of Cambridge, Dept. Engineering
■	2:15 PM	Characterization of Repeatability and Reproducibility of BSPN Measurements from AVL Particle Counters	Yusuf Khan	Cummins, Inc.
■	2:30 PM	General Discussion of Session 6		

SESSION 7:**Emissions Modeling**

2:45 PM *Introduction by Session Leader Ed Nam, U.S. Environmental Protection Agency*

■	2:50 PM	New Version of MOVES Planned for Early 2014	Edward Nam	U.S. Environmental Protection Agency
■	3:05 PM	Improving Emission Inventories with Real World Vehicle Activity & Fleet Data: NCHRP 25-38 Overview and Preliminary Results	John Koupal	Eastern Research Group
■	3:20 PM	A New Approach to Modeling Evaporative Emissions in MOVES	David Hawkins	U.S. Environmental Protection Agency

3:35 PM **BREAK: Posters and Demonstrations in the Pavilion** (see Pages 6-8 for Listings)

4:05 PM	Use of MOVES for the Development of On-Road Vehicle Emissions Inventories in the Metropolitan Area of Monterrey, Mexico	Mauro Alvarado-Castillo	LT Consulting Group
4:20 PM	EMFAC2013: An Update to California On-Road Mobile Source Emission Inventory	Vernon Hughes for Sam Pournazeri	California Air Resources Board
4:35 PM	Assessment of In-Use Exhaust After Treatment Activity as a Heavy-Duty Vehicle Emissions Model Parameter	Daniel Carder	West Virginia University
4:50 PM	A Transit Fleet Emissions Model for the Integrated Bus Information System	Jun Tu	International Council on Clean Transportation
5:05 PM	Evaluation of Light-Duty Vehicle Mobile Source Regulations on Ozone Concentration Trends in 2018 and 2030 in the Western and Eastern U.S.	Susan Collet	Toyota Motor Engineering and Mfg.
5:20 PM	General Discussion of Session 7		

5:35 PM **END OF DAY**

POSTERS

Reception for Posters and Demonstrations

6:15 PM Authors will be available to discuss their presentations and answer questions. Drinks and hors d'oeuvres will be served.

DAY THREE

Wednesday, April 2, 2014

7:30 AM **Registration in Bayview Ballroom Foyer**

SESSION 8:

Fuel Effects: Heavy-Duty

8:00 AM *Introduction by Session Leader Chris Tennant, Coordinating Research Council*

8:05 AM	Emissions Comparison of Medium-Duty Conventional and Diesel-Electric Hybrid Vehicles	Adam Ragatz	National Renewable Energy Laboratory
8:20 AM	Comparison of Regulated and Unregulated Emissions from Modern Natural Gas and Diesel Heavy-Duty Vehicles	Arvind Thiruvengadam	West Virginia University
8:35 AM	On-Road Evaluation of Energy Flows and Emissions from New Technology Conventional and Hybrid Transit Buses	David Kittelson	University of Minnesota
8:50 AM	Study of the Emissions Impacts of B5-B10 Blends for California	Georgios Karavalakis	University of California, Riverside CE-CERT
9:05 AM	General Discussion of Session 8		

9:20 AM **BREAK: Posters and Demonstrations in the Pavilion (see Pages 6-8 for Listings)**

SESSION 9:

Fuel Effects: Light-Duty

9:50 AM *Introduction by Session Leader Rich Baldauf, U.S. Environmental Protection Agency*

9:55 AM	Evaluation and Investigation of Gaseous and Particulate Emissions on SIDI In-Use Vehicles with Higher Ethanol Blend Fuels	Peter Morgan	Southwest Research Institute
10:10 AM	Air Toxic, Particle, and PAH Emissions From Spray Guided and Wall-Guided SIDI Passenger Cars Fuelled with Different Alcohol Formulations	Daniel Short	University of California, Riverside CE-CERT
10:30 AM	Impact of Ethanol-Gasoline Blends on Organic Air Toxic Emissions for Motorcycles	Jiun-Horng Tsai	National Cheng Kung University
10:45 AM	Investigation of Mobile Source Air Toxic (MSAT) Emissions from Spark Ignition Direct Injection Light-Duty Vehicles Fueled with Gasoline and Liquefied Petroleum Gas (LGP)	Simsoo Park	Korea University
11:00 AM	CRC Project E-98: Exhaust Emissions of Average Fuel Composition	Eugene Jimenez	Southwest Research Institute
11:15 AM	Influence of PM Index and Ethanol on PM Emissions from Light-Duty Tier 2 Gasoline Vehicles	Aron Butler	U.S. Environmental Protection Agency

■ 11:30 AM General Discussion of Session 9

SESSION 10:

Emissions Control Measures, I/M, and OBDII

11:45 AM *Introduction by Session Leader Phil Heirigs, Chevron Global Downstream*

■ 11:50 AM	Effect of Engine Efficiency Improvements on Aftertreatment Performance and Greenhouse Gas Emissions	Pragalath Thiruvengadam	West Virginia University
■ 12:05 PM	Results of Analysis of On-Board Diagnostic System Trouble Codes	Carl Fulper	U.S. Environmental Protection Agency
■ 12:20 PM	I/M vs. Non-I/M MIL Behavior in Oregon	Gene Tierney	Opus Inspections

12:35 PM **Lunch in the Mission Ballroom**

■ 1:50 PM	Functional Monitoring of Fuel Vapor Recovery Canisters	Michael St. Denis	Revecorp, Inc.
■ 2:05 PM	Developing an On-Road Test Procedure for the Type Approval of Light-Duty Vehicles in Europe	Martin Weiss	European Commission - Directorate General Joint Research Centre
■ 2:20 PM	Alternative Method for Measuring Real-Time Heavy-Duty Diesel Emissions	Josias Zietsman	Texas A&M Transportation Institute
■ 2:35 PM	Development of an Improved and Sensitive Approach to Assess "Smoky" Heavy-Duty Diesel Vehicles in Real Time and within the Carriageways of the M5 East Automotive Tunnel	Brendan Halliburton	Commonwealth Scientific & Industrial Research Organisation (CSIRO)
■ 2:50 PM	The ARB Perspective on Heavy-Duty Diesel In-Use Emissions	Todd Sax	California Air Resources Board
■ 3:10 PM	General Discussion of Session 10		

3:25 PM **Open discussion - Dominic DiCicco and Garry Gunter, Chairs**

4:00 PM **END OF Workshop**

Poster Exhibits

Vehicle Emissions Measurements: Remote Sensing

- | | | |
|---|----------------|---------------------------------|
| ■ On-Road Emissions of High-Mileage Airport Shuttle Vehicles and Taxi Fleet at Seattle-Tacoma International Airport | Oscar Atkinson | Universit of Puget Sound |
| ■ Real-Driving Emissions from Cars and Light Trucks - Results from 13 Years Remote Sensing at Zurich, Switzerland | Yuche Chen | University of California, Davis |

Vehicle Emissions Measurements: Laboratory

- | | | |
|---|------------------|--|
| ■ Bus Emission Inventory and Its Use as a Tool for Procurement of Public Transport Services | Jukka Nuottimäki | VTT Technical Research Centre of Finland |
| ■ Fuel Economy, Particle Number and Regulated Emissions from Comparable GDI/PFI Vehicles Operated at Standard and Cold Temperatures | Jill Hendren | Environment Canada |

Vehicle Emissions Measurements: Portable Systems

- | | | |
|--|---------------------------------|---------------------------------|
| ■ Comparison of Real-World Light-Duty Gasoline Vehicle Emissions: High Altitude Mountainous Terrain Versus Low Altitude Piedmont Terrain | Gurdas Sandhu for Jiangchuan Hu | North Carolina State University |
| ■ Evaluation of the Mobile Environmental and Vehicle Information Systems (MEVIS) | Arvind Thiruvengadam | West Virginia University |

Measurement Method Development

- | | | |
|---|----------------|------------------------------|
| ■ Light-Duty In-Use GHG/Fuel Economy Data Collection and Evaluation | Sandeep Kishan | Eastern Research Group |
| ■ Dilute Measurement of SVOC from Heavy-Duty Diesel Engines | Robert Fanick | Southwest Research Institute |

Off-Road

- | | | |
|--|-----------------|---|
| ■ Black Carbon from Anthropogenic Combustion Sources | Carlos Espinoza | University of California, Riverside CE-CERT |
|--|-----------------|---|

Particulate Matter Measurement

- | | | |
|---|----------------|---|
| ■ Design, Performance and Measurements Taken in a Heavy-Duty Diesel Ambient Dilution Wind Tunnel Applied to Parked Active Regenerations of Diesel Particulate Filters | Harry Dwyer | California Air Resources Board |
| ■ Evaluation of Partial Flow Dilution for Light-Duty Vehicle PM Measurement | Matti Maricq | Ford Motor Company |
| ■ Determination of Suspended Exhaust PM Mass for Light-Duty Vehicles Using IPSP Method | Heejung Jung | University of California, Riverside CE-CERT |
| ■ Engine Exhaust Particle Sizer (EEPS) Improvement for Engine Emission Measurement | Xiaoliang Wang | Desert Research Institute |

Emissions Modeling

■ Development of Long-Term Emission Inventories in the United States from 1990 to 2010	Jia Xing	U.S. Environmental Protection Agency
■ Using MOVES for Estimating Emissions of Automotive Vehicles in the State of San Luis Potosi, Mexico	Mauro Alvarado-Castillo	LT Consulting Group

Fuel Effects: Heavy Duty

■ Status of Natural Gas as a Transportation Fuel	Nigel Clark	West Virginia University
■ RNG and Fungible Fuels Infrastructure Compatibility Study	Thomas Durbin	University of California, Riverside CE-CERT

Fuel Effects: Light Duty

■ Emission Characterization of Gasoline Direct Injection and Port Fuel Injection Vehicles Fueled with Isobutanol at Standard and Cold Temperatures	Jill Hendren	Environment Canada
--	--------------	--------------------

Emission Control Measures, I/M, and OBDII

■ Transit Agency Fleet Planning for GHG Management: An Atlanta GA Application	Randall Guensler	Georgia Institute of Technology
---	------------------	---------------------------------

Demonstrations

■ A Demonstration of the Public Transit Greenhouse Gas Emissions Management Calculator	Yanzhi Xu	Georgia Institute of Technology
■ TSI Product Demonstration	Tim Johnson	TSI, Inc.
■ Real World Emissions Measurement Based on FTIR Technology	Ron Tandy	A&D Technology
■ Achieving Sub- μg $\text{PM}_{2.5}$ Filter Weighing Uncertainties	David A. Dikken	Measurement Technology Laboratories (MTL)
■ BG-3 and Exhaust Mass Flow Meter Review	Del Pier	Sierra CP Technology
■ Demonstration of Dekati and Pegasor Instruments for PM Sampling, Conditioning and Analysis	Tyler Beck	Particle Instruments
■ Sensors Inc. Demonstration	Rob Wilson	Sensors, Inc.
■ The AVL 499 Particle Generator as a Solution for On-Site Quality Checks of Advanced Particle Measurement Device	Siegfried Roeck	AVL
■ High Sensitivity Laser Induced Incandescence Instrument for nvPM Emissions Measurements	William Bachalo	Artium Technologies
■ EDAR- Remote Sensing	John Hager	H.E.A.T.