



7th Diesel Engine Emissions Reduction Workshop August 5 – 9, 2001

**Renaissance Hotel and Waterfront Conference
Center
Portsmouth, Virginia**

PRELIMINARY AGENDA

Sunday, August 5, 2001

- 3:00 – 6:30 p.m. Registration
- 6:00 – 7:30 p.m. Hosted reception (heavy appetizers) and cash bar

SESSION 1 – DIESEL ENGINE EMISSIONS REDUCTION “A VIEW FROM THE BRIDGE”

**Session Chairs: Tom Gross and John Fairbanks
U.S. Department of Energy**

- 5:30 – 6:00 p.m. *Office of Transportation Technologies 21st Century Directions*
David Garman
Assistant Secretary for Energy Efficiency and Renewable Energy U.S.
Department of Energy
Washington, D.C.
- 7:30 – 8:00 p.m. *The Future of the Diesel Engine in Passenger Cars*
Klaus Schindler
Volkswagen
Wolfsburg, Germany
- 8:00 – 8:20 p.m. *California’s Air Plan as It Relates to Diesel Engine Emissions Reductions*
Eileen Wenger Tutt
California Air Resources Board
Sacramento, California
- 8:20 – 8:40 p.m. *DOE’s R&D Support for Clean Diesel Engines*
John Fairbanks
U.S. Department of Energy
Washington, D.C.
- 8:40 – 9:00 p.m. *U.S. Department of Energy Multi-Laboratory Heavy Vehicle
Emissions Reduction Program*
James Patten
Battelle Columbus Laboratory
Columbus, Ohio
- 9:00 p.m. Adjourn

Monday, August 6, 2001

**SESSION 2 – DIESEL ENGINE POLICY AT THE STATE
AND INTERNATIONAL LEVEL**

**Session Chairs: Ken Howden, U.S. Department of Energy
Terry Levinson, Argonne National Laboratory**

- 8:00 - 8:10 a.m. *Administrative Remarks*
John Fairbanks
U.S. Department of Energy
Washington, D.C.
- 8:10 - 8:40 a.m. *Swedish Experience from Low-Emissions City Buses: Impact on Health and Environment*
Peter Ahlvik
Ecotraffic ERD³ AB
Stockholm, Sweden
- 8:40 - 9:00 a.m. *Carl Moyer Advanced Technology Program*
Jerry Wiens
California Energy Commission
Sacramento, California
- 9:00 - 9:20 a.m. *California Trucking Perspective on Fuel, Retrofit, and NAFTA*
Stephanie Williams
California Trucking Association
Sacramento, California
- 9:20 - 9:40 a.m. *California's Diesel Engine Retrofit Program*
Scott Rowland, California Air Resources Board
Sacramento, California
- 9:40 – 10:00 a.m. *Break*

Monday, August 6, 2001 (continued)

SESSION 3 – DIESEL ENGINE EXHAUST AFTERTREATMENT, Part I

**Session Chairs: Connie Lorenz, U.S. Department of Energy
George Sverdrup, National Renewable Energy Laboratory**

- 10:00 – 10:20 a.m. *The CLEERS Program -- Aftertreatment Modeling*
Richard Blint
General Motors
Detroit, Michigan
- 10:20 – 10:40 a.m. *An Integrated Virtual Laboratory Approach for Aftertreatment Simulation for U.S. Tier 2 Emissions*
Brian Bolton, et. al.
Detroit Diesel Corporation
Detroit, Michigan
- 10:40 – 11:00 a.m. *Diesel Engine and Aftertreatment at International Truck and Engine*
Pranab Das
International Truck and Engine Corporation
Melrose Park, Illinois
- 11:00 – 11:20 a.m. *State-of-the-Art Compression Ignition Direct Injection Aftertreatment System*
Nabil Hakim, et. al.
Detroit Diesel Corporation
Detroit, Michigan
- 11:20 – 11:40 a.m. *Smart Engines – Conventional vs. Advanced Controls for Optimized Efficiency and Emissions*
Craig Savonen, et. al.
Detroit Diesel Corporation
Detroit, Michigan
- 11:40 – 11:50 a.m. *California Advanced Reciprocating Internal Combustion Engines (ARICE) Collaborative*
Avtar Bining
California Energy Commission
Sacramento, California
- 11:50 – 12:00 noon *Discussion*
- 12:00 noon *Adjourn*

Monday, August 6, 2001 (continued)

**SESSION 4 – ADVANCES IN IN-CYLINDER COMBUSTION ANALYSIS AND EMISSIONS
REDUCTION**

**Session Chairs: Gurpreet Singh, U.S. Department of Energy
Danilo Santini, Argonne National Laboratory**

- 1:00 – 1:20 p.m. *Homogeneous Charge Compression Ignition Combustion Research Using
Liquid-Phase Fuels*
John Dec
Sandia National Laboratories
Livermore, California
- 1:20 – 1:40 p.m. *Homogeneous Charge Compression Ignition Development*
Gerald Coleman and Tom Vachon
Caterpillar, Incorporated
Peoria, Illinois
- 1:40 – 2:00 p.m. *Natural Gas Homogeneous Charge Compression Ignition Combustion R&D*
Salvador Aceves
Lawrence Livermore National Laboratory
Livermore, California
- 2:00 – 2:20 p.m. *Optimization of Internal Combustion Engine Design for Reduced Emissions
Using Automated Engine Experiments and Computational Fluid Dynamics
Modeling*
Rolf Reitz
University of Wisconsin
Madison, Wisconsin
- 2:20 – 2:40 p.m. *Development of Laser-Induced Incandescent Method for the Reliable
Characterization of Diesel Particulate Emissions*
William Bachalo, et. al.
Artium Technologies, Inc.
Sunnyvale, California
- 2:40 – 3:00 p.m. *Effects of Oxygenated Diesel Fuels on In-Cylinder Combustion and Soot
Formation Processes*
Charles Mueller
Sandia National Laboratories
Livermore, California
- 3:00 – 3:15 p.m. *Break*

Monday, August 6, 2001 (continued)

SESSION 5 – NON-THERMAL PLASMA AFTERTREATMENT

**Session Chairs: Christopher Aardahl, Pacific Northwest National Laboratory
John Hoard, Ford Motor Company**

- 3:15 – 3:35 p.m. *Plasma Catalysis During Temperature Transient Testing*
John Hoard
Ford Motor Company
Dearborn, Michigan
- 3:35 – 3:55 p.m. *Delphi Enhanced Non-Thermal Plasma Emission Solution Tested on a Light-Duty Vehicle*
Joachim Kupe
Delphi Corporation
Flint, Michigan
- 3:55 – 4:15 p.m. *Reduction of NO_x by Plasma-Facilitated Catalysis: An Update on the PNNL-Caterpillar CRADA on Heavy-Duty Emissions Reduction*
Christopher Aardahl, et. al. Paul Park, et. al.
Pacific Northwest National Laboratory Caterpillar, Inc.
Richland, Washington Peoria, Illinois
- 4:15 – 4:35 p.m. *Development of Catalytic Materials for Non-Thermal Plasma Aftertreatment Systems*
Paul Park, et. al. Christopher Aardahl, et. al.
Caterpillar, Inc. Pacific Northwest National Laboratory
Peoria, Illinois Richland, Washington
- 4:35 – 4:55 p.m. *80-hp Plasma-Assisted Catalyst System*
Ralph Slone, B. Bhatt, and Victor Puchkarev
NoxTech
Irvine, California
- 4:55 – 5:15 p.m. *Heavy Truck Engine Program Aftertreatment*
Tom Stover
Cummins, Inc.
Columbus, Indiana
- 5:15 – 5:35 p.m. *The Application of Soot Filters to Military Vehicles*
Bruce Bunting Norman Helgeson
Cummins, Inc. U.S. Navy
Columbus, Indiana Port Hueneme, California
- 5:35 – 6:00 p.m. *Discussion*
- 6:00 p.m. *Adjourn*

Tuesday, August 7, 2001

SESSION 6 – DIESEL ENGINE AFTERTREATMENT, Part II

**Session Chairs: George Sverdrup, National Renewable Energy Laboratory
Ronald Graves, Oak Ridge National Laboratory**

- 8:00 - 8:30 a.m. *Diesel Engine Emissions – Keynote Address*
Timothy Johnson
Corning, Inc.
Corning, New York
- 8:30 - 8:50 a.m. *The Chemistry of the Thermal DeNO_x Process: A Review of the Technology's Possible Application to Control of NO_x from Diesel Engines*
Richard Lyon
Exxon Research and Engineering (retired)
Florham Park, New Jersey
- 8:50 - 9:10 a.m. *Extending Exhaust Gas Recirculation Limits in Diesel Engines*
Johney Green, Jr., and Robert Wagner
Oak Ridge National Laboratory
Oak Ridge, Tennessee
- 9:10 - 9:30 a.m. *Performance of Johnson Matthey CRT Particle Filter system for Emission Control of Heavy-Duty Diesel Engines*
S. Chatterjee, et. al.
Johnson Matthey
King of Prussia, Pennsylvania
- 9:30 - 9:50 a.m. *Development of Advanced Aftertreatment Subsystem Technologies for HSDI Diesel Engines to Meet the Future Low-Emission Standards*
Robert Yu and Scott Cole
Cummins, Inc.
Columbus, Indiana
- 9:50 – 10:10 a.m. *Catalyzed Diesel Particulate Trap: Technology Assessment*
Cornelius Opris, et. al.
Caterpillar, Inc.
Peoria, Illinois
- 10:10 – 10:25 a.m. *Break*
- 10:25 – 10:45 a.m. *CERMET Filters for Diesel Engine Emissions Reduction*
Peter Kong
Idaho National Engineering and Environmental Laboratory
Idaho Falls, Idaho
- 10:45 – 11:05 a.m. *Rypos/Bekaert Active Diesel Particulate Filter System*
Klaus Peter, et. al.
Rypos, Inc.
Medway, Massachusetts

- 11:05 – 11:25 a.m. *Low-Temperature Regeneration of a NO_x Adsorber System*
C. Z. Wan R. Mital and I. Dipehand
Englehard Corporation Cummins, Incorporated
Iselin, New Jersey Columbus, Indiana
- 11:25 – 11:45 a.m. *Development of a Microwave-Assisted Particulate Filter*
Sriram Popuri and Matthew Henricksen
Cummins, Inc.
Columbus, Indiana
- 11:45 – 12 noon *Discussion*
- 12:00 noon *Lunch*

Tuesday, August 7, 2001 (continued)

SESSION 7 – DIESEL ENGINE AFTERTREATMENT, Part III

**Session Chairs: Gurpreet Singh, U.S. Department of Energy
Jules Routbort, Argonne National Laboratory**

- 7:00 – 7:20 p.m. *Field Test Work to Support Soot Filter Application in Urban Buses*
Bruce Bunting
Cummins, Inc.
Columbus, Indiana
- 7:20 – 7:40 p.m. *A Throttle Loss Recovery Supercharger for Natural Gas Engine Applications*
S. M. Shahed Ron Driver
Honeywell International Driver Technologies
Torrance, California
- 7:40 – 8:00 p.m. *Protection of Diesel Exhaust Aftertreatment Systems: A Thermodynamic and
Experimental Evaluation*
Joe Roos and Larry Cunningham
Ethyl Corp.
Richmond, Virginia
- 8:00 – 8:20 p.m. *Supercritical Combustion Studies in a Single Cylinder Yanmar Diesel Engine*
Brian Ahern, et. al.
Quantum Energy Technologies
Cambridge, Massachusetts
- 8:20 – 8:30 p.m. *Break*
- 8:30 – 8:50 p.m. *Evaluations of 1997 Fuel Consumption Patterns in Heavy-Duty Trucks*
Danilo Santini
Argonne National Laboratory
Argonne, Illinois
- 8:50 – 9:10 p.m. *Unregulated (and Unwanted) Emissions from Diesel Engine Emission Control
Devices*
John Storey, et. al.
Oak Ridge National Laboratory
Oak Ridge, Tennessee
- 9:10 – 9:30 p.m. *Desulfation of NO_x Adsorbers: Studies with the SpaciMS Technique*
Jim Parks and Aaron Watson
Goal Line Environmental Technologies

Bill Partridge, Sam Lewis, and John Storey
Oak Ridge National Laboratory

Neal Currier and Jason Chen
Cummins, Inc.
- 9:30 p.m. *Adjourn*

Wednesday, August 8, 2001

SESSION 8 – ADVANCED DIESEL ENGINE TECHNOLOGY

**Session Chairs: John Storey, Oak Ridge National Laboratory
Keith Vertin, National Renewable Energy Laboratory**

- 8:00 - 8:30 a.m. *On the Road in 2020*
John Heywood
Massachusetts Institute of Technology
Cambridge, Massachusetts
- 8:30 - 8:50 a.m. *Diesel 2007 – Promise and Problems*
Pat Flynn
Cummins, Inc. (retired)
Columbus, Indiana
- 8:50 - 9:10 a.m. *Electrically Assisted Turbocharging for Light-Truck Diesel Engine Applications*
S. M. Shahed, et. al.
Honeywell International, Incorporated
Torrance, California
- 9:10 - 9:30 a.m. *Diesel Engine Waste Heat Recovery Utilizing Electric Turbocompound Technology*
Frank Gerke
Caterpillar, Incorporated
Peoria, Illinois
- 9:30 – 9:50 a.m. *Fuel Economy Improvements for Off-Road Heavy-Duty Applications with Electric Auxiliaries and Turbocompounding*
Carl Vuk
John Deere, Incorporated
Waterloo, Iowa
- 9:50 – 10:05 a.m. *Break*
- 10:05 – 10:25 a.m. *Thermoelectric Development at Hi-Z Technology*
Aleksandr Kushch, et. al.
Hi-Z Technology
San Diego, California
- 10:25 – 10:45 a.m. *High-Performance Diesel-Fueled Cabin Heater*
Tom Butcher and James Wegryzn
Brookhaven National Laboratory
Upton, New York
- 10:45 – 11:15 a.m. *Breakthrough Diesel Engine Technology to Meet Tier 2 and CO₂ Emissions Reduction*
Nabil Hakim, et. al.
Detroit Diesel Corporation
Detroit, Michigan

- 11:15 – 11:45 a.m. *Cummins/DOE Light Truck Diesel Engine Progress Report for 2001*
John Stang, et. al.
Cummins, Incorporated
Columbus, Indiana
- 11:45 – 12:00 noon *Discussion*
- 12:00 noon *Lunch*

Wednesday, August 8, 2001 (continued)

SESSION 9 – ENVIRONMENTAL SCIENCE AND HEALTH EFFECTS

**Session Chairs: Michael Gurevich, U.S. Department of Energy
Joe Mauderly, Lovelace Respiratory Research Institute**

- 1:00 – 1:25 p.m. *OHVT Weekday/Weekend Ozone Study in the South Coast Air Basin*
Eric Fujita
Desert Research Institute
Reno, Nevada
- 1:25 – 1:40 p.m. *OHVT Gasoline/Diesel PM Split Study*
Douglas Lawson
National Renewable Energy Laboratory
Golden, Colorado
- 1:40 – 2:00 p.m. *Fine Particle (Nanoparticle) Emissions on Minnesota Highways*
David Kittleson
University of Minnesota
Minneapolis, Minnesota
- 2:00 – 2:10 p.m. *OHVT Study of Comparative Toxicity of Engine Emissions – Sources,
Samples, and Participants*
Douglas Lawson
National Renewable Energy Laboratory
Golden, Colorado
- 2:10 – 2:20 p.m. *OHVT Study of Comparative Toxicity of Engine Emissions – Status of Toxicity
Results*
Joe Mauderly
Lovelace Respiratory Research Institute
Albuquerque, New Mexico
- 2:20 – 2:45 p.m. *Responses of Cultured Lung Epithelial Cells to Airborne Diesel Emissions*
JeanClare Seagrave
Lovelace Respiratory Research Institute
Albuquerque, New Mexico
- 2:45 – 3:05 p.m. *Break*
- 3:05 – 3:25 p.m. *Effects of Direct Exposure of Engine Exhaust Nanoparticles on Human Lung
Cell Immune Response*
John Storey
Oak Ridge National Laboratory
Oak Ridge, Tennessee
- 3:25 – 3:50 p.m. *Traffic and Asthma: The 1996 Atlanta Olympics Study*
Michael Friedman
Center for Disease Control and Prevention
Atlanta, Georgia

- 3:50 – 4:30 p.m. *Health Effects of Living Near Busy Roads – and the Role of Diesel Emissions*
Bert Brunekreef
IRAS Utrecht University
Utrecht, The Netherlands
- 4:30 – 5:00 p.m. *Discussion*
- 5:00 p.m. *Adjourn*

Thursday, August 9, 2001

SESSION 10 – FUELS AND LUBRICANTS, Part I

**Session Chairs: Stephen Goguen and Steven Chalk
U.S. Department of Energy**

- 8:00 - 8:30 a.m. *A Review of Refinery Diesel Desulfurization Technologies*
Michael Leister
Marathon Ashland Petroleum LLC
Findlay, Ohio
- 8:30 - 8:50 a.m. *A Review of Current Penn State University Research on Environmentally Friendly Fluids*
Joseph Perez
Pennsylvania State University
State College, Pennsylvania
- 8:50 - 9:10 a.m. *Supplying Urea for the On-road Vehicle Market*
Michael Jackson
Acurex/A. D. Little
Cupertino, California
- 9:10 - 9:40 a.m. *Urea/Diesel Co-Fueling Panel Discussion*
Richard Baker
Ford Motor Company
Dearborn, Michigan
- 9:40 – 10:00 a.m. *Break and Co-Fueling Demonstration*
- 10:00 – 10:20 a.m. *Status of the Advanced Petroleum-Based Fuel-Diesel Emissions Control Program and Selected Results from the Diesel Emissions Control Sulfur Effects Work*
George Sverdrup
National Renewable Energy Laboratory
Golden, Colorado
- 10:20 – 10:40 a.m. *Experimental Determination of Fuel Sulfur Effects on Oxidation and Lean-NO_x Diesel Engine Catalysts*
Nigel Clark, et. al.
West Virginia University
Morgantown, West Virginia
- 10:40 – 11:00 a.m. *Oxygenates for Diesel Emissions Reduction*
Edward Owens
Southwest Research Institute
San Antonio, Texas
- 11:00 – 11:20 a.m. *Development of Truck Engine Technologies for Use with Fischer-Tropsch Fuels*
Michael May Keith Vertin
Ricardo National Renewable Energy Laboratory
Burr Ridge, Illinois Golden, Colorado
- 11:20 – 12:00 noon *Discussion*
- 12:00 noon *Adjourn*

Thursday, August 9, 2001 (continued)

SESSION 11 – FUELS AND LUBRICANTS, Part II

**Session Chairs: Stephen Goguen and Steven Chalk
U.S. Department of Energy**

- 1:00 – 1:20 p.m. *The Effects of Biodiesel Blends and ARCO EC-diesel on Emissions from Light Heavy-Duty Diesel Vehicles*
Thomas Durbin and Joseph Norbeck
University of California – Riverside
Riverside, California
- 1:20 – 1:40 p.m. *EC-Diesel Technology Validation Program: Round 2 Emissions*
Charles LeTavec
BP
La Palma, California
- 1:40 – 2:00 p.m. *Lubricants for Low-Emissions Diesel Engines*
Shawn Whitacre
National Renewable Energy Laboratory
Golden, Colorado
- 2:00 – 2:20 p.m. *Bioderived Low-Emission Engine Lubricants*
Thomas Ulrich, et. al.
Idaho National Engineering and Environmental Laboratory
Idaho Fall, Idaho
- 2:20 p.m. *Break*

Thursday, August 9, 2001

SESSION 12 – ENVIRONMENTALLY CONCERNED PUBLIC SECTOR ORGANIZATION PANEL

**Session Chair: Coralie Cooper, Northeast States for Coordinated
Air Use Management**

- 2:20 – 4:45 p.m. *Panel Discussion*
Coralie Cooper, NESCAUM
Todd Campbell, Coalition for Clean Air
2 TBD, Natural Resources Defense Council
Becky Stanfield, Public Interest Research Group
1 TBD, Sierra Club
Patricia Monahan, Union of Concerned Scientists
- 4:45 – 5:00 p.m. *Workshop Wrap-Up*
John Fairbanks
U.S. Department of Energy
Washington, D.C.