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# ENVIRONMENTAL Science & Technology

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*Extracting Hydrogen  
and Electricity from*  
**RENEWABLE Resources**



**Public Mis-Notification of Coastal Water Quality**

**Emission Rates of Particulate Matter and Elemental and  
Organic Carbon from Diesel Engines**

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## Policy Analysis

■ 2497

### ► Public Mis-Notification of Coastal Water Quality: A Probabilistic Evaluation of Posting Errors at Huntington Beach, California

Joon Ha Kim and Stanley B. Grant

Using probabilistic approaches for predicting current conditions and adopting analog instead of binary warning systems could reduce public misinformation of coastal water quality.

2505

### Establishing Remediation Levels in Response to a Radiological Dispersal Event (or "Dirty Bomb")

Deborah Elcock, Gladys A. Klemic, and Anibal L. Taboas

Existing radiological cleanup laws, regulations, models, and criteria must be updated and coordinated to provide for long-term remediation of radiological dispersal events ("dirty bombs").

## Characterization of Natural and Affected Environments

■ 2513

### Generation and Characterization of Four Dilutions of Diesel Engine Exhaust for a Subchronic Inhalation Study

Jacob D. McDonald, Edward B. Barr, Richard K. White, Judith C. Chow, James J. Schauer, Barbara Zielinska, and Eric Grosjean

Detailed characterization of diesel exhaust in rodent inhalation exposure chambers reveals that composition does not always scale precisely with dilution rate in complex mixture environments.

2523

### Further Studies on the Latitudinal and Temporal Trends of Persistent Organic Pollutants in Norwegian and U.K. Background Air

Foday M. Jaward, Sandra N. Meijer, Eiliv Steinnes, Gareth O. Thomas, and Kevin C. Jones

Data are presented for PDBEs, PCBs, and selected organochlorine compounds measured at background locations by passive air samplers during 2000–2002.

2531

### Emission of Di-2-ethylhexyl Phthalate from PVC Flooring into Air and Uptake in Dust: Emission and Sorption Experiments in FLEC and CLIMPAQ

Per Axel Clausen, Vivi Hansen, Lars Gunnarsen, Alireza Afshari, and Peder Wolkoff

The emission rate of DEHP is limited by gas-phase mass transport; a dust layer on PVC surfaces increases emission rates by increasing concentration gradients.

2538

### ► How Do Climate Fluctuations Affect Persistent Organic Pollutant Distribution in North America? Evidence from a Decade of Air Monitoring

Jianmin Ma, Hayley Hung, and Pierrette Blanchard

The relationships between POPs concentrations and the fluctuations of different climate parameters are examined.

■ 2544

### ► Emission Rates of Particulate Matter and Elemental and Organic Carbon from In-Use Diesel Engines

Sandip D. Shah, David R. Cocker III, J. Wayne Miller, and Joseph M. Norbeck

PM, EC, and OC emission rates measured on-road at different operating conditions for heavy-duty diesel vehicles are reported and compared to other stationary diesel engines.

2551

### Effect of Engine Load on Diesel Soot Particles

Annele K. K. Virtanen, Jyrki M. Ristimäki, Kati M. Vaaraslahti, and Jorma Keskinen

This paper discusses nonvolatile diesel soot particles, particularly the effects of engine load on particle size distribution and particle morphology.

2557

### Phase and Size Distribution of Polycyclic Aromatic Hydrocarbons in Diesel and Gasoline Vehicle Emissions

B. Zielinska, J. Sagebiel, W. P. Arnott, C. F. Rogers, K. E. Kelly, D. A. Wagner, J. S. Lighty, A. F. Sarofim, and G. Palmer

Mass and elemental carbon contribution increase under higher load and shift toward smaller particle sizes with low load.

■ 2568

### Atmospheric Concentrations and Deposition of Polychlorinated Biphenyls to the Hudson River Estuary

Lisa A. Totten, Cari L. Gigliotti, Daryl A. VanRy, John H. Offenber, Eric D. Nelson, Jordi Dachs, John R. Reinfelder, and Steven J. Eisenreich

Atmospheric deposition of polychlorinated biphenyls to the Hudson River Estuary is estimated from measurements of atmospheric concentrations from the New Jersey Atmospheric Deposition Network.

■ 2574

### Sources and Dechlorination of Polychlorinated Biphenyl Congeners in the Sediments of Fox River, Wisconsin

Ipek Imamoglu, Kai Li, Erik R. Christensen, and Julie K. McMullin

PCB congener patterns in Fox River sediments are identified by a factor analysis model, and deviations from the source profiles are explained quantitatively by anaerobic dechlorination.

2584

### Vehicle Traffic as a Source of Particulate Polycyclic Aromatic Hydrocarbon Exposure in the Mexico City Metropolitan Area

Linsey C. Marr, Lisa A. Grogan, Henry Wöhrenschiemmel, Luisa T. Molina, Mario J. Molina, Thomas J. Smith, and Eric Garshick

Concentrations of particulate polycyclic aromatic hydrocarbons along Mexico City's roadways are among the highest measured in the world.

2593

### Evaluating Differences between Measured Personal Exposures to Volatile Organic Compounds and Concentrations in Outdoor and Indoor Air

Ken Sexton, John L. Adgate, Steven J. Mongin, Gregory C. Pratt, Gurumurthy Ramachandran, Thomas H. Stock, and Maria T. Morandi

Bias and variance for estimators of personal VOC exposure reveal that common exposure estimators are less accurate and precise at the upper end of distribution.

2603

### Occurrence and Bioavailability of Polybrominated Diphenyl Ethers and Hexabromocyclododecane in Sediment and Fish from the Cinca River, a Tributary of the Ebro River (Spain)

Ethel Eljarrat, Agustina de la Cal, Demetrio Raldua, Concha Duran, and Damià Barceló

PBDE and HBCD concentrations in sediment and fish samples from Spain showed that these brominated flame retardants are bioavailable and bioaccumulative.

■ Supporting Information is available free of charge via the Internet at <http://pubs.acs.org>.

► This issue contains a news story about this research.

■ 2609

**Application of Multicriteria Decision Making Methods to Air Quality in the Microenvironments of Residential Houses in Brisbane, Australia**

Godwin A. Ayoko, Lidia Morawska, Serge Kokot, and Dale Gilbert  
PROMETHEE ranks houses based on indoor and outdoor air quality influencing variables, while GAIA plots suggest that indoor air quality depends strongly on house characteristics.

2617

**Evidence for Dynamic Air–Water Coupling and Cycling of Persistent Organic Pollutants over the Open Atlantic Ocean**

Foday M. Jaward, Jonathan L. Barber, Kees Booij, Jordi Dachs, Rainer Lohmann, and Kevin C. Jones

Selected PCBs undergo a diurnal cycle in open ocean air concentrations, which is suggestive of close air–water coupling, although the controlling factors remain unclear.

## Environmental Processes

■ 2626

► **Locating Sources of Surf Zone Pollution: A Mass Budget Analysis of Fecal Indicator Bacteria at Huntington Beach, California**

Joon Ha Kim, Stanley B. Grant, Charles D. McGee, Brett F. Sanders, and John L. Largier

A mass budget analysis reveals the sources of fecal indicator bacteria pollution in the surf zone at Huntington Beach in Orange County.

■ 2637

► **Scaling and Management of Fecal Indicator Bacteria in Runoff from a Coastal Urban Watershed in Southern California**

Ryan L. Reeves, Stanley B. Grant, Robert D. Mirse, Carmen M. Copil Oancea, Brett F. Sanders, and Alexandria B. Boehm

Loading of fecal indicator bacteria in runoff volume from an urban watershed follows a power law, with implications for sources and management strategies.

■ 2649

**Urinary PAH Metabolites as Biomarkers of Exposure in Aquatic Environments**

Gilberto Fillmann, Giles M. Watson, Mike Howsam, Elaine Francioni, Michael H. Depledge, and James W. Readman

Analyses of crab urine by immunoassay and fluorescence (with HPLC validation) is demonstrated as a rapid, nondestructive method to measure environmental exposure of crabs to PAHs.

■ 2657

**Factors Affecting Linear Alkylbenzene Sulfonates Removal in Subsurface Flow Constructed Wetlands**

Yuming Huang, Ana LaTorre, Damià Barceló, Joan García, Paula Aguirre, Rafael Mujeriego, and Josep M. Bayona

Subsurface flow-constructed wetlands can remove linear alkylbenzene sulfonates and sulfophenyl carboxylates from urban wastewaters up to 71 and 11%, respectively.

2664

**Effect of Dissolved Organic Carbon on the Photoproduction of Dissolved Gaseous Mercury in Lakes: Potential Impacts of Forestry**

N. J. O'Driscoll, D. R. S. Lean, L. L. Loseto, R. Carignan, and S. D. Siciliano

In surface water, DOC plays an important role in DGM dynamics; logging may reduce a lake's ability to produce DGM and may diminish mercury evasion.

## Environmental Modeling

■ 2673

**Modeling Expected Solute Concentration in Randomly Heterogeneous Flow Systems with Multicomponent Reactions**

Maria E. Malmström, Georgia Destouni, and Philippe Martinet

We present an approach to couple stochastic modeling of physical solute transport (LaSAR) with the geochemical model PHREEQC for multicomponent reactions.

## Environmental Measurements Methods

2680

**Accurate Quantification of Aromaticity and Nonprotonated Aromatic Carbon Fraction in Natural Organic Matter by <sup>13</sup>C Solid-State Nuclear Magnetic Resonance**

J.-D. Mao and K. Schmidt-Rohr

Accurate quantitation of the aromaticity and the fraction of non-protonated aromatic carbons in natural organic matter is achieved by improved <sup>13</sup>C solid-state nuclear magnetic resonance.

2685

**Standards Development of Global Warming Gas Species: Methane, Nitrous Oxide, Trichlorofluoromethane, and Dichlorodifluoromethane**

George C. Rhoderick and William D. Dorko

Primary gravimetric gas standards containing some of the most important greenhouse and ozone depletion gases were developed at NIST and used to analyze and compare to NOAA standards.

2693

**Experimental and Numerical Test of the Micrometeorological Mass Difference Technique for the Measurement of Trace Gas Emissions from Small Plots**

Vincenzo Magliulo, Giovanni Alterio, and Alessandro Peressotti

Advantages and limitations of the MMD technique, adapted to monitor CO<sub>2</sub> and trace gases exchange at the plot level, are discussed.

■ 2701

**Characterizing Uptake Kinetics of PAHs from the Air Using Polyethylene-Based Passive Air Samplers of Multiple Surface Area-to-Volume Ratios**

Michael E. Bartkow, Darryl W. Hawker, Karen E. Kennedy, and Jochen F. Müller

Passive air samplers consisting of polyethylene sheets deployed with the same cross-sectional surface area but different thickness prove useful in characterizing uptake kinetics for polyaromatic hydrocarbons.

## Remediation and Control Technologies

2707

**Characterization of Diesel Particles: Effects of Fuel Reformulation, Exhaust Aftertreatment, and Engine Operation on Particle Carbon Composition and Volatility**

Timo J. A. Ålander, Ari P. Leskinen, Taisto M. Raunemaa, and Leena Rantanen

The effects of diesel fuel reformulation and engine type and operation parameters on particulate organic and elemental carbon emissions and particle volatility characteristics are investigated.