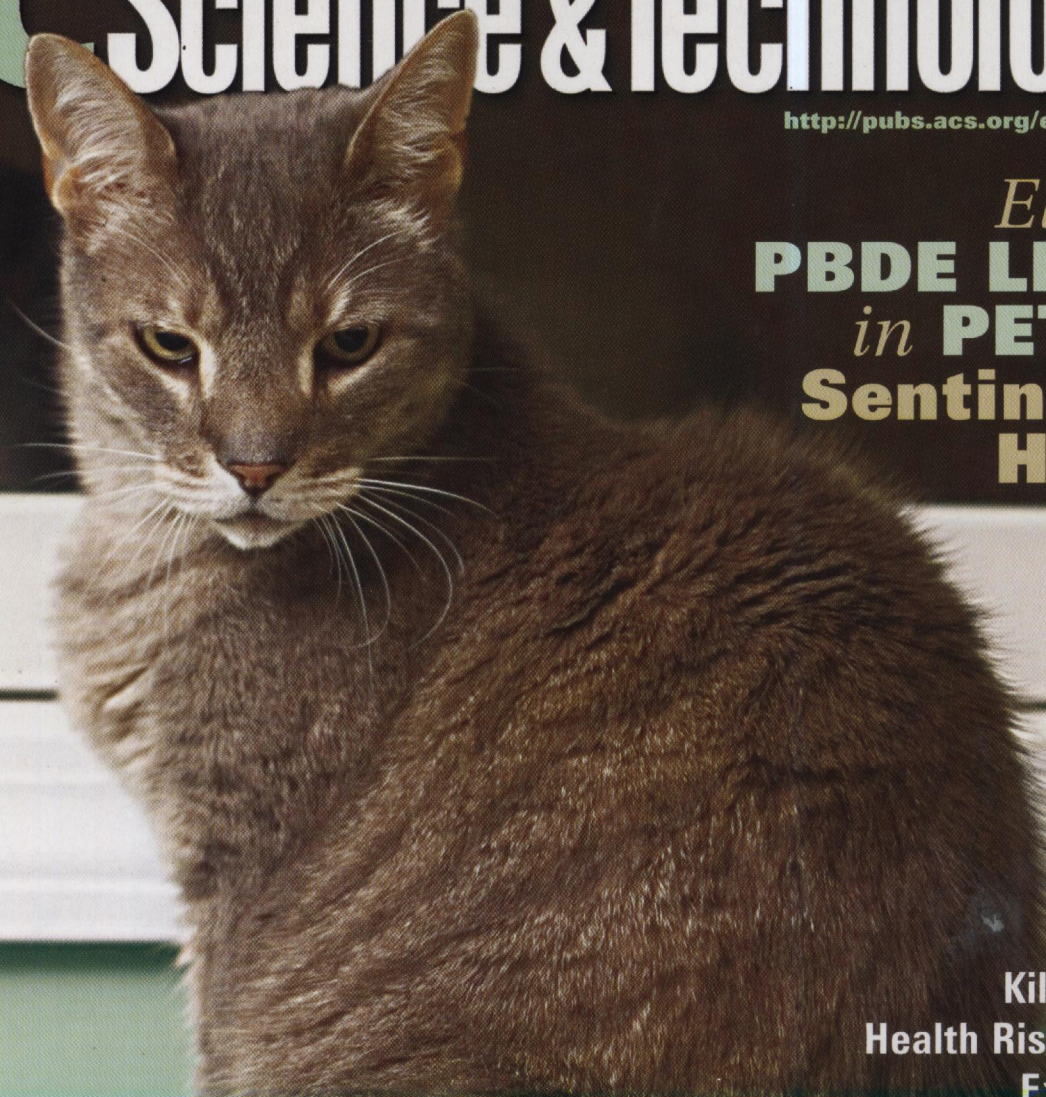


September 15, 2007

# ENVIRONMENTAL Science & Technology

<http://pubs.acs.org/est>



*Elevated*  
**PBDE LEVELS**  
*in PET CATS:*  
**Sentinels for**  
**Humans?**

**Killer Whales Face  
Health Risks from Lifetime  
Exposure to PCBs**

## News and Features

### NEWS

#### 6318 Orcas remain burdened by PCBs

Current guidelines to safeguard marine species aren't likely to protect killer whales.

#### 6319 PBDEs, cats, and children

Chronic exposure to PBDEs may be more endocrine-disrupting than previously believed.

#### 6319-6321 News Briefs

Recycling wastewater nutrients wins prize • End-of-life nano concerns • Communities protect nearby forests • Recycling paper in China saves trees

#### 6320 EPA, industry score low on toxics test

The chemical industry fails to deliver on its promise to identify chemical hazards.

#### 6321 Water-pitcher filters miss lead particles

Testing methods in the U.S. don't account for particles in drinking water.

### PERSPECTIVE

#### 6323 DDT's Resurrection

One year after the World Health Organization recommended the use of DDT in developing countries to prevent the spread of malaria, *ES&T* reporter Naomi Lubick finds that the debate over the persistent pesticide's use continues.

### FEATURE

#### 6326 Critical Loads of Metals and Other Trace Elements to Terrestrial Environments

Stephen Lofts, et al.



Although in small amounts many trace elements are essential for life.

## Research

### CRITICAL REVIEW

#### 6333

#### Environmental Monitoring of Hydrocarbons: A Chemical Sensor Perspective

Bobby Pejic, Peter Eadington, and Andrew Ross

The development of chemical sensors for the detection of hydrocarbons in the biosphere is described.

### CHARACTERIZATION OF NATURAL AND AFFECTED ENVIRONMENTS

#### 6343

#### Electron Microprobe and Synchrotron X-ray Fluorescence Mapping of the Heterogeneous Distribution of Copper in High-Copper Vineyard Soils

Astrid R. Jacobson, Sylvie Dousset, Francis Andreux, and Philippe C. Baveye

$\mu$ -SXRF and electron-microprobe mapping reveal microscale heterogeneity in the distribution of Cu in vineyard soils and that Cu hot spots are associated with particulate organic matter.

#### 6350

#### Elevated PBDE Levels in Pet Cats: Sentinels for Humans?

Janice A. Dye, Marta Venier, Lingyan Zhu, Cynthia R. Ward, Ronald A. Hites, and Linda S. Birnbaum

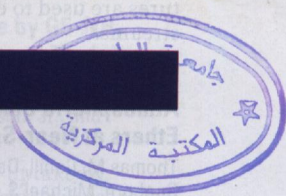
PBDE serum analysis reveals that cats are highly exposed to this endocrine-disrupting environmental contaminant, and diet and indoor dust exposure seemingly contribute to the high levels detected.

#### 6357

#### Comparison of Carbonaceous Aerosols in Tokyo before and after Implementation of Diesel Exhaust Restrictions

Naomichi Yamamoto, Atsushi Muramoto, Jun Yoshinaga, Ken Shibata, Michio Endo, Osamu Endo, Motohiro Hirabayashi, Kiyoshi Tanabe, Sumio Goto, Minoru Yoneda, and Yasuyuki Shibata

Monthly comparisons show no distinct differences in the absolute concentrations of particles before and after regulation, but the ratios of chemical constituents of the particles are



■ 6363

### Isotopic Apportionment of Atmospheric and Sewage Nitrogen Sources in Two Connecticut Rivers

Shimon C. Anisfeld, Rebecca T. Barnes, Mark A. Altabet, and Taixing Wu

Isotopic source signatures are presented for nitrate from sewage, atmospheric deposition, and nitrification; these signatures are used to estimate contributions of these sources to streams.

■ 6370

### Atmospheric Concentrations of Polybrominated Diphenyl Ethers at Near-Source Sites

Thomas M. Cahill, Danka Groskova, M. Judith Charles, James R. Sanborn, Michael S. Denison, and Lynton Baker

Air PBDE concentrations measured at several near-source sites are shown to be elevated, but exposure levels are below those expected to cause adverse health effects.

## ENVIRONMENTAL PROCESSES

■ 6378

### Utilization of Fluoroethene as a Surrogate for Aerobic Vinyl Chloride Transformation

Anne E. Taylor, Mark E. Dolan, Peter J. Bottomley, and Lewis Semprini

The aerobic transformation of fluoroethene and the release of fluoride are correlated with the rates of vinyl chloride transformation.

6384

### Nucleation Mode Particles with a Nonvolatile Core in the Exhaust of a Heavy-Duty Diesel Vehicle

Topi Rönkkö, Annele Virtanen, Jonna Kannosto, Jorma Keskinen, Maija Lappi, and Liisa Pirjola

Size distribution and volatility measurements of the nucleation-mode particles of a Euro IV heavy-duty diesel vehicle indicate that the particles are formed by condensation on a nonvolatile core.

■ 6390

### Reductive Dechlorination of Tetrachloroethylene and Trichloroethylene by Mackinawite (FeS) in the Presence of Metals: Reaction Rates

Hoon Y. Jeong and Kim F. Hayes

Copresent metals [e.g., Fe(II), Co(II), Ni(II), and Hg(II)] have a significant impact on reductive dechlorination rates of tetrachloroethylene and trichloroethylene by mackinawite (FeS).

■ 6397

### Hydrocarbon Condensation in Heavy-Duty Diesel Exhaust

Jyrki Ristimäki, Kati Vaaraslahti, Maija Lappi, and Jorma Keskinen

The semivolatile mass fraction and the density of the semivolatile material of diesel exhaust particles are measured with size-resolved techniques.

An individual-based model of the promising aerobic granular sludge wastewater treatment technology is presented; simulations show how operation conditions select for efficient microbial populations that boost bioconversions.

■ 6418

### Optimization of Nano- and Microiron Transport through Sand Columns Using Polyelectrolyte Mixtures

Bianca W. Hydutsky, Elizabeth J. Mack, Benjamin B. Beckerman, Joanna M. Skluzacek, and Thomas E. Mallouk

The elution of polymer-modified iron nano- and microparticles from water-saturated sand columns is interpreted in the context of current transport theories.

■ 6425

### Formation of Polychlorinated Dibenzo-*p*-Dioxins and Polychlorinated Dibenzofurans (PCDD/F) in Fires of Arsenic-Free Treated Wood: Role of Organic Preservatives

Nigel W. Tame, Bogdan Z. Dlugogorski, and Eric M. Kennedy

When oxidized, biocidal organochlorines such as tebuconazole and permethrin form significant quantities of dioxins, 1000 ng WHO<sub>97</sub>-TEQ/g tebuconazole and 5500 ng WHO<sub>97</sub>-TEQ/g permethrin.

■ 6433

### Methylated Mercury Species in Canadian High Arctic Marine Surface Waters and Snowpacks

Vincent L. St. Louis, Holger Hintelmann, Jennifer A. Graydon, Jane L. Kirk, Joel Barker, Brian Dimock, Martin J. Sharp, and Igor Lehnerr

Monomethyl mercury concentrations in Arctic seawaters are high enough to make seawater itself a direct source for bio-magnification through marine food webs.

■ 6442

### Predicting Bioavailability of Sediment-Associated Organic Contaminants for *Diporeia* spp. and *Oligochaetes*

Peter F. Landrum, Sander D. Robinson, Duane C. Gossiaux, Jing You, Michael J. Lydy, Siddhartha Mitra, and Theodora E. M. ten Hulscher

A single regression was found between oligochaete contaminant bioaccumulation and 6 h Tenax extraction of sediment across species, sediments, field and laboratory exposures, and laboratories.

■ 6448

### The Effect of Water Temperature on the Adsorption Equilibrium of Dissolved Organic Matter and Atrazine on Granular Activated Carbon

Bernd Schreiber, Viktor Schmalz, Thomas Brinkmann, and Eckhard Worch

Contrary to expectations, DOM and atrazine adsorption in surface water tends to increase with increasing water temperature, depending on the type and concentration of DOM present in the water.

■ 6454

### Identification of Volatile/Semivolatile Products Derived from Chemical Remediation of *cis*-1,3-Dichloropropene

■ 6465

**Modeling the Acid-Base Properties of Bacterial Surfaces: A Combined Spectroscopic and Potentiometric Study of the Gram-Positive Bacterium *Bacillus subtilis***

Laura Leone, Diego Ferri, Carla Manfredi, Per Persson, Andrei Shchukarev, Staffan Sjöberg, and John Loring

An acid-base model is developed for the Gram-positive bacterium *B. subtilis* that is based on spectroscopic and potentiometric measurements.

■ 6472

**Nonideal Binding between Dissolved Humic Acids and Polyaromatic Hydrocarbons**

Bo Pan, Saikat Ghosh, and Baoshan Xing

Interactions between dissolved humic acids and PAHs show nonideal behavior, including isotherm nonlinearity, desorption hysteresis, and competitive sorption.

6479

**Nuclei-Mode Particulate Emissions and Their Response to Fuel Sulfur Content and Primary Dilution during Transient Operations of Old and Modern Diesel Engines**

Z. Gerald Liu, Victoria N. Vasys, and David B. Kittelson

An investigation of fuel sulfur content, primary dilution ratio, and engine age shows a correlation with the total nuclei-mode particulate matter number emissions.

6484

**Heterogeneous Uptake of Carbonyl Sulfide on Hematite and Hematite-NaCl Mixtures**

Haihan Chen, Lingdong Kong, Jianmin Chen, Renyi Zhang, and Lin Wang

Heterogeneous uptake of COS on hematite-NaCl mixtures shows another significant sink for COS, implying that the global cycle of sulfur compounds should be reestimated.

■ 6491

**Surface-Potential Heterogeneity of Reacted Calcite and Rhodochrosite**

Chongzheng Na, Treavor A. Kendall, and Scot T. Martin

Structures of <2 nm high, formed with water and oxygen on calcite and rhodochrosite, induce excess surface potential of >100 mV.

■ 6498

**Identification of Fluorescent U(V) and U(VI) Microparticles in a Multispecies Biofilm by Confocal Laser Scanning Microscopy and Fluorescence Spectroscopy**

Kay Großmann, Thuro Arnold, Evelyn Krawczyk-Bärsch, Susann Diessner, Axel Wobus, Gert Bernhard, and Rhena Krawietz

Fluorescent U(V) and U(VI) microparticles are identified in a multispecies biofilm by a combination of confocal laser scanning microscopy and laser fluorescence spectroscopy.

efficient method for the simultaneous collection of gas- and particle-phase carbonyl compounds in air.

## REMEDIATION AND CONTROL TECHNOLOGIES

■ 6521

**Dendritic Anion Hosts: Perchlorate Uptake by G5-NH<sub>2</sub> Poly(propyleneimine) Dendrimer in Water and Model Electrolyte Solutions**

Mamadou S. Diallo, Kwesi Falconer, James H. Johnson, Jr., and William A. Goddard, III

An experimental investigation of perchlorate uptake by dendrimers in aqueous solutions and model electrolytes is described.

6528

**Inhibition of a U(VI)- and Sulfate-Reducing Consortia by U(VI)**

Jennifer L. Nyman, Hsin-I Wu, Margaret E. Gentile, Peter K. Kitanidis, and Craig S. Criddle

U(VI) at elevated concentrations decreases the effective yield of a U(VI)-reducing bacterial consortium and inhibits sulfate-reducing bacteria of the consortium.

■ 6534

**Fate of Cu, Cr, and As during Combustion of Impregnated Wood with and without Peat Additive**

Karin Lundholm, Dan Boström, Anders Nordin, and Andrei Shchukarev

The fate of Cu, Cr, and As during lab-scale combustion of impregnated wood with and without peat additive is studied with SEM-EDS, SRD, XPS, and chemical equilibrium model calculations.

6541

**Electrochemical Oxidation Characteristics of p-Substituted Phenols Using a Boron-Doped Diamond Electrode**

Xiuping Zhu, Shaoyuan Shi, Junjun Wei, Fanxiu Lv, Huazhang Zhao, Jiangtao Kong, Qi He, and Jinren Ni

Electrochemical oxidation of p-substituted phenols using boron-doped diamond electrodes is described, and the relationship between structure of organic compounds and their electrochemical reactivity is discussed.

■ 6547

**Three-Component Adsorption Modeling to Evaluate and Improve Integrated Sorption-Membrane Processes**

Lance C. Schideman, Benito J. Mariñas, Vernon L. Snoeyink, Shaoying Qi, and Carlos Campos

Recently developed competitive adsorption models are applied to highlight antagonisms of current integrated sorption-membrane processes and propose new synergistic alternatives.

Chad Coulliette, Francois Lekien, Jeffrey D. Paduan, George Haller, and Jerrold E. Marsden

Finite-time Lyapunov exponents based on high-frequency radar data collected in Monterey Bay, Calif., reveal a striking flow structure governing the spread of passive contaminants in the bay and suggest the existence of optimal release times.

■ 6573

### Photocatalytic Surface Reactions on Indoor Wall Paint

T. Salthammer and F. Fuhrmann

Wall paint equipped with doped titanium dioxide is investigated for applicability as a photocatalyst to remove organic and inorganic air pollutants under indoor conditions.

6579

### Impact of Sulfur Oxides on Mercury Capture by Activated Carbon

Albert A. Presto and Evan J. Granite

This paper details research investigating the effect of sulfur oxides on mercury capture by activated carbon injection.

■ 6585

### Effects of Redox Potential and pH Changes on Phosphorus Retention by Melter Slag Filters Treating Wastewater

C. Pratt, A. Shilton, S. Pratt, R. G. Haverkamp, and I. Elmetri

This study reveals that Eh and pH significantly affect P retention by melter slag active filters treating all forms of wastewater.

## ECOTOXICOLOGY AND HUMAN ENVIRONMENTAL HEALTH

■ 6591

### Tissue Contaminants and Associated Transcriptional Response in Trout Liver from High Elevation Lakes of Washington

Patrick W. Moran, Neelakanteswar Aluru, Robert W. Black, and Mathilakath M. Vijayan

Fish tissue contaminants in high-elevation lakes of the Washington Cascades are evaluated and compared with basin characteristics and responses using a targeted cDNA microarray.

■ 6598

### A Probabilistic Characterization of the Relationship between Fine Particulate Matter and Mortality: Elicitation of European Experts

Roger M. Cooke, Andrew M. Wilson, Jouni T. Tuomisto, Oswaldo Morales, Marko Tainio, and John S. Evans

Probabilistic characterizations for mortality effects of PM<sub>2.5</sub> exposure on the basis of the formally elicited judgments of six European experts on air pollution epidemiology are provided.

6606

### Human Enteric Viruses in Groundwater from a Confined Bedrock Aquifer

Mark A. Borchardt, Kenneth R. Bradbury, Madeline B. Gotkowitz, John A. Cherry, and Beth L. Parker

Human viruses detected in a deep, confined aquifer suggest that the overlying aquitard may not be as protective against microbial contamination as commonly assumed.

■ 6613

### ► Killer Whales (*Orcinus orca*) Face Protracted Health Risks Associated with Lifetime Exposure to PCBs

Brendan E. Hickie, Peter S. Ross, Robie W. Macdonald, and John K. B. Ford

Bioaccumulation models are used to reconstruct the history of PCB contamination of northeastern Pacific killer whales since 1930 and to evaluate PCB-associated health risks in the future.

■ 6620

### Effects of Monensin on Zooplankton Communities in Aquatic Microcosms

Derek G. Hillis, Linda Lissemore, Paul K. Sibley, and Keith R. Solomon

Zooplankton communities exposed to monensin in microcosms showed indirect effects only at concentrations 40-fold greater than measured environmental concentrations.

■ 6627

### Inactivation of Bacteriophages via Photosensitization of Fullerol Nanoparticles

Appala Raju Badireddy, Ernest M. Hotze, Shankar Chellam, Pedro Alvarez, and Mark R. Wiesner

The photoinactivation of bacteriophages is shown to be directly dependent on the photosensitization chemistry of fullerol nanoparticle suspensions.

■ Supporting information is available free at <http://pubs.acs.org/est>.  
► This issue contains a news story about this research.