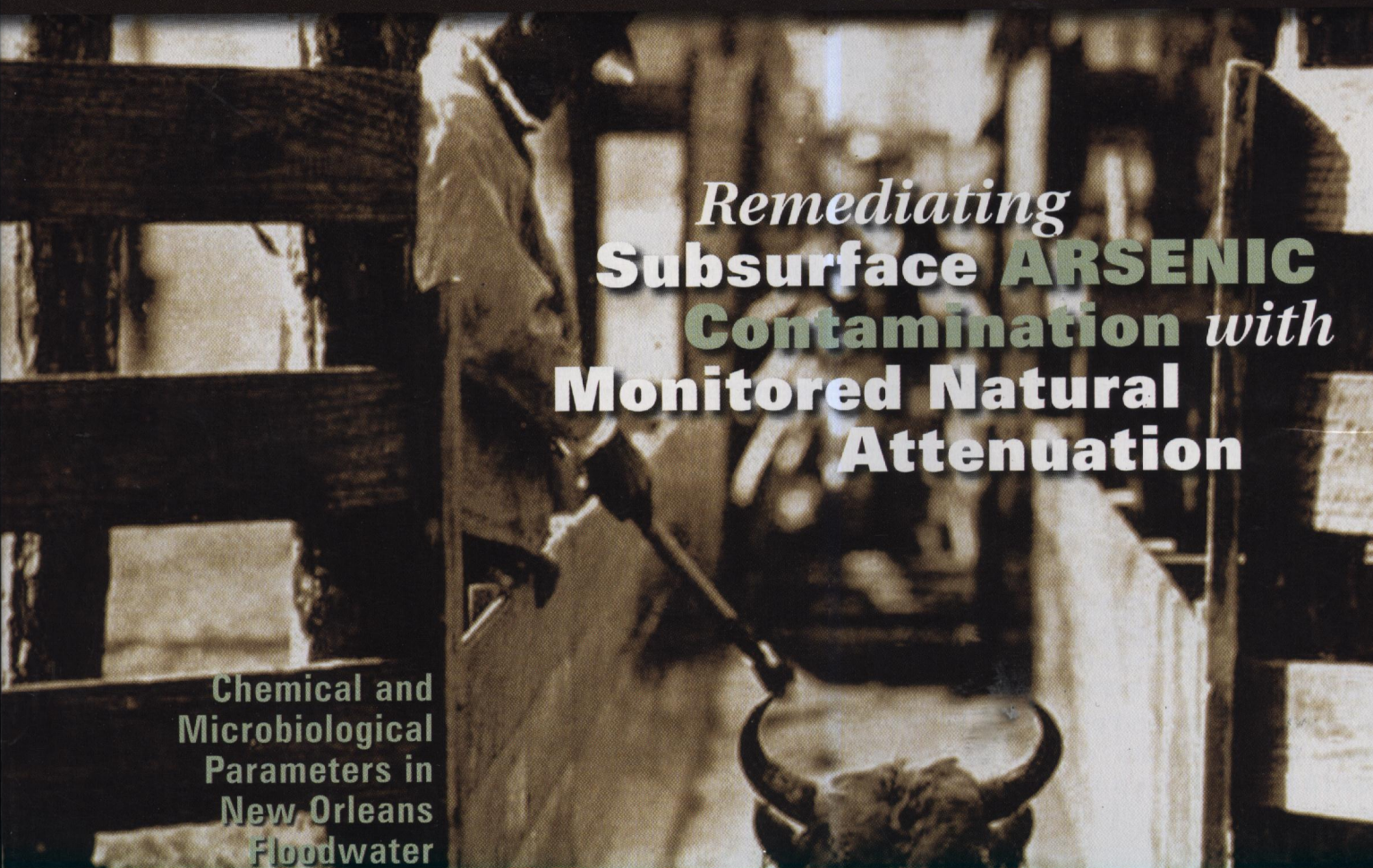


November 15, 2005

ENVIRONMENTAL Science & Technology

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Remediating
Subsurface ARSENIC
Contamination with
Monitored Natural
Attenuation

Chemical and
Microbiological
Parameters in
New Orleans
Floodwater

Critical Reviews

■ 8545

Dynamic Speciation Analysis and Bioavailability of Metals in Aquatic Systems

Herman P. van Leeuwen, Raewyn M. Town, Jacques Buffle, Rob F. M. J. Cleven, William Davison, Jaume Puy, Willem H. van Riemsdijk, and Laura Sigg
A dynamic framework that incorporates fluxes of species at given spatial and time scales provides a rigorous basis for understanding analytical signals of speciation sensors and predicts metal speciation-bioavailability relationships.

8557

Sonochemistry in Environmental Remediation. 2. Heterogeneous Sonophotocatalytic Oxidation Processes for the Treatment of Pollutants in Water

Yusuf G. Adewuyi

An overview of the fundamentals of photocatalysis and sonophotocatalysis is presented, along with a critical review of the remediation of organic pollutants by sonophotocatalytic oxidation processes.

Policy Analysis

■ 8571

Assessing Air Quality Progress Using On-Road Emissions Inventories Updates

Tom Kear and D. A. Niemeier

Changing the assumptions used to develop emissions inventories can confound attempts to show that a region is making progress toward attainment.

8578

Are Renewables Portfolio Standards Cost-Effective Emission Abatement Policy?

Katerina Dobesova, Jay Apt, and Lester B. Lave

Renewables portfolio standards in Texas reduce carbon emissions for \$200 per tonne carbon, including credits for 3P (SO_2 , NO_x , mercury) reduction and costs of transmission and intermittency.

■ 8584

Environmental Effects of Interstate Power Trading on Electricity Consumption Mixes

Joe Marriott and H. Scott Matthews

Electricity consumption mixes for each state and industry sector are created; these can provide a better assessment of the impacts of electricity use in life-cycle analyses.

Characterization of Natural and Affected Environments

8591

Chemical and Microbiological Parameters in New Orleans Floodwater Following Hurricane Katrina

J. H. Pardue, W. M. Moe, D. McInnis, L. J. Thibodeaux, K. T. Valsaraj,

Alison R. Keimowitz, Yan Zheng, Steven N. Chillrud, Brian Mailloux, Hun Bok Jung, Martin Stute, and H. James Simpson

Arsenic mobilities at a neighboring lake and stream are controlled by iron and sulfur, respectively.

8614

Relative Value of Surrogate Indicators for Detecting Pathogens in Lakes and Reservoirs

Justin D. Brookes, Matthew R. Hipsey, Michael D. Burch, Rudi H. Regel, Leon G. Linden, Christobel M. Ferguson, and Jason P. Antenucci

Cryptosporidium and fecal indicator organisms were tracked through a reservoir to determine whether surrogates are appropriate to infer pathogen fate and transport in lakes and reservoirs.

8622

Lipid Composition and Contaminants in Farmed and Wild Salmon

M. Coreen Hamilton, Ronald A. Hites, Steven J. Schwager, Jeffery A. Foran, Barbara A. Knuth, and David O. Carpenter

The contents of n-3 and n-6 fatty acids and lipid-adjusted organochlorine contaminants in farmed, supermarket farmed, and wild salmon are determined.

■ 8630

Multivariate Data Analyses of Chlorinated and Brominated Contaminants and Biological Characteristics in Adult Guillemot (*Uria aalge*) from the Baltic Sea

Katrin Lundstedt-Enkel, Anna-Karin Johansson, Mats Tysklind, Lillemor Asplund, Kerstin Nylund, Mats Olsson, and Jan Örborg

Male versus female relationships, biology versus analyzed contaminants, and organochlorines versus brominated flame retardants are investigated in adult guillemots.

■ 8638

Passive Air Sampling of Polychlorinated Biphenyls, Organochlorine Compounds, and Polybrominated Diphenyl Ethers Across Asia

Foday M. Jaward, Gan Zhang, Jae Jak Nam, Andrew J. Sweetman, Jeffrey P. Obbard, Yuso Kobara, and Kevin C. Jones

Simultaneously deployed passive air samplers throughout Asia provide the first picture of POP source areas and spatial patterns.

■ 8646

Environmental Impact of Uranium Mining and Ore Processing in the Lagoa Real District, Bahia, Brazil

Ilson G. Carvalho, Rosa Cidu, Luca Fanfani, Helmut Pitsch, Catherine Beaucaire, and Pierpaolo Zuddas

Hydrogeochemical studies at Lagoa Real before and one year after uranium mining show good water quality; leaching experiments indicate that ore-processing tailings may generate acidification and salinization.

8653

Measurements of Particle Number and Mass Concentrations and Size Distributions in a Tunnel Environment

Michael D. Geller, Satya Brata Sardar, Harish Phuleria, Philip M. Fine, and Constantinos Sioutas

In comparison with previous roadway tunnel studies conducted seven years ago in California, less particle mass but more particles are emitted by heavy- and light-duty vehicles.

Perihan B. Kurt-Karakus, Terry F. Bidleman, and Kevin C. Jones

Variability in enantiomer depletion patterns of chiral organochlorine pesticides in background soils suggests that degradation takes place after atmospheric deposition.

■ 8678

Ratio of Perfluorochemical Concentrations as a Tracer of Atmospheric Deposition to Surface Waters

Matt F. Simcik and Kelly J. Dorweiler

The ratio of perfluoroheptanoic acid to perfluorooctanoic acid in surface waters is used to indicate the relative importance of atmospheric deposition of perfluorochemicals.

8684

Identification, Quantification, and Synthesis of a Novel Dimethoxylated Polybrominated Biphenyl in Marine Mammals Caught Off the Coast of Japan

Göran Marsh, Maria Athanasiadou, Ioannis Athanassiadis, Åke Bergman, Tetsuya Endo, and Koichi Haraguchi

A novel dimethoxylated PBB that is present in marine mammals is identified.

■ 8691

Brominated Flame Retardants in Waste Electrical and Electronic Equipment: Substance Flows in a Recycling Plant

Leo S. Morf, Josef Tremp, Rolf Gloor, Yvonne Huber, Markus Stengele, and Markus Zennegg

Actual levels of selected BFRs are determined in waste electrical and electronic equipment, and substance flows of BFRs in a state-of-the-art recycling plant are analyzed.

8700

Characterization, Weathering, and Application of Sesquiterpanes to Source Identification of Spilled Lighter Petroleum Products

Zhendi Wang, Chun Yang, Merv Fingas, Bruce Hollebone, Xianzhi Peng, Asger B. Hansen, and Jan H. Christensen

A sesquiterpane analysis method is shown to have potential as a tool for investigation of petroleum spills, particularly for source identification of spilled lighter distillates.

Environmental Processes

■ 8708

Photolysis Study of Perfluoro-2-methyl-3-pentanone under Natural Sunlight Conditions

Barbara D'Anna, Stig R. Sellevåg, Klaus Wirtz, and Claus J. Nielsen

The atmospheric lifetime of the fire protection fluid $\text{CF}_3\text{CF}_2\text{C}(\text{O})\text{CF}(\text{CF}_3)_2$ is determined by a photolysis study in the European outdoor simulation chamber, EUPHORE.

8712

Sorption and Displacement of Pyrene in Soils and Sediments

Xilong Wang, T. Sato, and Baoshan Xing

Polarity of soil/sediment organic matter is an important factor controlling the sorptive behavior of these hydrophobic compounds in soils and sediments.

8736

Adsorption of Super Greenhouse Gases on Microporous Carbons

Erich A. Müller

Molecular simulations of low-molecular-weight perfluorocarbon mixtures suggest that separation selectivities on the order of thousands may be obtained when appropriate nanoporous carbons are used as adsorbents.

8742

Photoassisted Reaction of Sulfur Mustard under UV Light Irradiation

Guo-Min Zuo, Zhen-Xing Cheng, Guo-Wen Li, Lian-Yuan Wang, and Ting Miao

UV irradiation with a germicidal lamp may lead to the destruction of sulfur mustard molecules in both the gas and the condensed phase.

■ 8747

Pyrite Oxidation by Hexavalent Chromium: Investigation of the Chemical Processes by Monitoring of Aqueous Metal Species

Frédéric Demoisson, Martine Mullet, and Bernard Humbert

The processes of pyrite oxidation by chromate in acidic media are investigated by monitoring aqueous metal species versus time.

■ 8753

Mixture Toxicity of Reactive Chemicals by Using Two Bacterial Growth Assays as Indicators of Protein and DNA Damage

Manuela Richter and Beate I. Escher

Mixture effects of electrophilic chemicals with reactive mechanisms, and even those compounds with multiple target sites, can be explained by the mixture toxicity concepts of concentration addition and independent action.

8762

Production Mechanism of Hydroxylated PCBs by Oxidative Degradation of Selected PCBs Using TiO_2 in Water and Estrogenic Activity of Their Intermediates

Kei Nomiya, Teiji Tanizaki, Hiroshi Ishibashi, Koji Arizono, and Ryota Shinohara

The oxidative degradation mechanism of PCBs by TiO_2 is clarified, and the estrogenic activity of the reaction's intermediates is obtained.

■ 8770

Binding of Harvested Bacterial Exopolymers to the Surface of Calcite

Thomas D. Perry, IV, Vanja Klepac-Ceraj, Xiang V. Zhang, Christopher J. McNamara, Martin F. Polz, Scot T. Martin, Neal Berke, and Ralph Mitchell

Isothermal titration calorimetry is used to quantify the thermodynamics of binding to calcite by exopolysaccharides that were harvested from natural, stone-inhabiting microorganisms.

8776

Effect of Slow Desorption on the Kinetics of Biodegradation of Polycyclic Aromatic Hydrocarbons

Cesar Gomez-Lahoz and José-Julio Ortega-Calvo

Microorganisms can promote desorption of the more labile fractions of PAHs sorbed to sediments, but not the slowly desorbing PAHs.

■ 8784

Aluminum Control of Phosphorus Sorption by Lake Sediments

8797**A Possible Mechanism for Furan Formation in the Tropospheric Oxidation of Dienes**

Misaela Francisco-Márquez, J. Raúl Alvarez-Idaboy, Annia Galano, and Annik Vivier-Bunge

Computational quantum chemistry is used to determine the most probable reaction mechanism for furan formation in the reaction of butadiene and isoprene with OH radicals.

8803**Dissolution of Composition B Detonation Residuals**

J. H. Lever, S. Taylor, L. Perovich, K. Bjella, and B. Packer

Test data and model results indicate that slow-dissolving RDX controls the dissolution of Composition B detonation residuals found on the surfaces of military training ranges.

8812**Abiotic Source of Reactive Organic Halogens in the Sub-Arctic Atmosphere?**

Lucy J. Carpenter, James R. Hopkins, Charlotte E. Jones, Alastair C. Lewis, Rajendran Parthipan, David J. Wevill, Laurier Poissant, Martin Pilote, and Philippe Constant

Reactive iodocarbons are shown to be relatively abundant in the sub-Arctic troposphere during spring and to originate from snow-covered sea-ice via a presumably abiotic mechanism.

8817**A Concentration-Dependent Multi-Term Linear Free Energy Relationship for Sorption of Organic Compounds to Soils Based on the Hexadecane Dilute-Solution Reference State**

Dongqiang Zhu and Joseph J. Pignatello

Combining two recent advances in sorption structure-activity analysis, the title LFER provides insight into the nature of direct intermolecular forces between pollutants and soil organic matter.

Environmental Modeling**8829****Modeling the Dynamics of Fermentation and Respiratory Processes in a Groundwater Plume of Phenolic Contaminants Interpreted from Laboratory- to Field-Scale**

Ian A. Watson, Sascha E. Oswald, Steven A. Banwart, Roger S. Crouch, and Steven F. Thornton

Laboratory studies and field-scale transport modeling using powerful computational techniques provide new understanding of biodegradation in the core and at the fringe of a groundwater contaminant plume.

8840**Improved Prediction of Octanol-Water Partition Coefficients from Liquid-Solute Water Solubilities and Molar Volumes**

Cary T. Chiou, David W. Schmedding, and Milton Manes

When the solute activity is related to the volume fraction, instead of the mole fraction, the resulting correlation between partition coefficient and water solubility is greatly improved.

Environmental Measurements Methods**8847****Measurements of OH Reactivity and Photochemical Ozone****8858****Linking Catabolism to Cyclodextrin Extractability: Determination of the Microbial Availability of PAHs in Soil**

Kieron J. Doick, Nadia M. Dew, and Kirk T. Semple

Little difference exists between indigenous and inoculum-derived degradation of phenanthrene, but strong relationships are found between microbial degradative conditions and amounts of phenanthrene extracted by cyclodextrin.

8865**Emissions of Chromium, Copper, Arsenic, and PCDDs/Fs from Open Burning of CCA-Treated Wood**

Shirley J. Wasson, William P. Linak, Brian K. Gullett, Charles J. King, Abderrahmane Touati, Frank E. Huggins, Yuanzhi Chen, Naresh Shah, and Gerald P. Huffman

Measurements from the simulated open burning of CCA-treated wood yield air emission concentrations and preliminary emission factors for particles, arsenic, chromium, copper, and PCDDs/Fs.

8877**Preservation of Inorganic Arsenic Species in Groundwater**

Gautam Samanta and Dennis A. Clifford

A combination of EDTA and acetic acid proves to be the best preservative for maintaining As(III/V) stability in groundwater samples for 30 days or more.

8883**Farfield Tracing of a Point Source Discharge Plume in the Coastal Ocean Using Sulfur Hexafluoride**

Rik Wanninkhof, Kevin F. Sullivan, W. Paul Dammann, John R. Proni, Frederick Bloetscher, Alexander V. Soloviev, and Thomas P. Carsey

The deliberate tracer SF₆ is used to measure the pathways and dilution of an ocean discharge in the coastal ocean for up to 66 km from the outfall.

8891**Aquatic Passive Sampling of Herbicides on Naked Particle Loaded Membranes: Accelerated Measurement and Empirical Estimation of Kinetic Parameters**

B. Scott Stephens, Anita Kapernick, Geoff Eaglesham, and Jochen Mueller

The parameters needed for monitoring trace concentrations of dissolved herbicides with a novel device are elucidated, and rapid methods for estimating these values are presented.

8898**Real-Time, in Situ Monitoring of Bioactive Zone Dynamics in Heterogeneous Systems**

Jonathan G. Dorn, Mark L. Brusseau, and Raina M. Maier

Bioactive zone formation dynamics in heterogeneous systems are driven by a combination of microbial location and concentration as well as local physicochemical conditions.

8906**High-Performance Planar pH Fluorosensor for Two-Dimensional pH Measurements in Marine Sediment and Water**

Qingzhi Zhu, Robert C. Aller, and Yanzhen Fan

Remediation and Control Technologies

■ 8919

How the Natural Organic Matter to Coagulant Ratio Impacts on Floc Structural Properties

Peter Jarvis, Bruce Jefferson, and Simon A. Parsons

This paper describes how the DOC:Fe ratio impacts floc structural characteristics, including floc size, strength, settlement, and fractal dimension.

8925

Experimental Measurements of Fluence Distribution in a UV Reactor Using Fluorescent Microspheres

Zuzana Bohrerova, Gil Bohrer, S. Mohan Mohanraj, Joel Ducoste, and Karl G. Linden

The fluence distribution in a low-pressure UV reactor is experimentally measured through the use of photochemically active fluorescent microspheres.

8931

³¹P MAS NMR: A Useful Tool for the Evaluation of VX Natural Weathering in Various Urban Matrixes

Dana M. Mizrahi and Ishay Columbus

Long-term survival of the chemical warfare agent VX has been evaluated in numerous common urban matrixes by means of solid-state ³¹P NMR technology.

■ 8936

Fe(III)-Enhanced Sonochemical Degradation of Methylene Blue in Aqueous Solution

Claudio Minero, Mirco Lucchiari, Davide Vione, and Valter Maurino

The sonoinduced generation of the Fenton reagent from aqueous Fe(III) enhances sonochemical degradation processes in solution.

■ 8943

Remediation and Recovery of Uranium from Contaminated Subsurface Environments with Electrodes

Kelvin B. Gregory and Derek R. Lovley

Electrodes serve as an electron donor for U(VI) reduction by *Geobacter sulfurreducens* and provide a means of removal and recovery of metals from contaminated subsurfaces.

■ 8948

On the Nonlinear Relationship between k_{obs} and Reductant Mass Loading in Iron Batch Systems

David M. Cwiertny and A. Lynn Roberts

The origin of a nonlinear relationship between alkyl polyhalide reduction rates and reductant mass loading in granular iron batch systems is examined.

8958

Removal of Estrogenic Pollutants from Contaminated Water Using Molecularly Imprinted Polymers

Zihui Meng, Wilfred Chen, and Ashok Mulchandani

The potential for cleaning estrogenic pollutants from wastewater with molecularly imprinted polymers is demonstrated.

8963

Field Evaluation of In Situ Source Reduction of Trichloroethylene in Groundwater Using Bioenhanced In-Well Vapor Stripping

Yunho Lee, Jeyong Yoon, and Urs von Gunten

Fe(VI) can readily oxidize many phenolic endocrine-disrupting chemicals during treatment of natural waters and wastewaters.

Sustainability Engineering and Green Chemistry

■ 8985

Relative Risk Analysis of Several Manufactured Nanomaterials: An Insurance Industry Context

Christine Ogilvie Robichaud, Dickson Tanzil, Ulrich Weilenmann, and Mark R. Wiesner

Relative risk profiles are developed for the manufacturing processes of five nanomaterials to serve as a baseline of risk information for the emerging industry.

Ecotoxicology and Human Environmental Health

8995

Origin of Lead in the United States Diet

William I. Manton, Carol R. Angle, and Kaye L. Stanek Krogstrand

Lead isotopic analyses of duplicate diets and household dust samples indicate that dietary lead comes largely from dust, with a contribution from limestone-based calcium additives.

9001

Development of Estrogen-Responsive Transgenic Medaka for Environmental Monitoring of Endocrine Disrupters

Zhiqiang Zeng, Tao Shan, Yan Tong, Siew Hong Lam, and Zhiyuan Gong

A biomonitoring fish, vitellogenin: *gfp* reporter gene transgenic medaka line was generated; visible GFP expression was observed after exposure to various estrogenic compounds.

■ Supporting information is available free at <http://pubs.acs.org/est>.

RICE UNIVERSITY

The Department of Civil and Environmental Engineering at Rice University invites applications to fill a tenure-track position in the area of Environmental Engineering at the level of Assistant Professor. Candidates with expertise in all sub-disciplines of Environmental Engineering are encouraged to apply. We are particularly interested in theoreticians and computational scientists addressing the environmental implications of energy technologies, complex fluids and materials fabrication, atmospheric dynamics or sustainable urban systems challenged by radical change and/or extreme events. Applications from women and under-represented minorities are strongly encouraged.

Rice University is a non-sectarian, private research university located in Houston Texas, the nation's fourth largest city. Located on Galveston Bay, Houston is a dynamic, cosmopolitan city that is home to the world's energy capital and largest medical complex, NASA's Johnson Space Center, and a growing nanotechnology sector. The Department of Civil and Environmental Engineering currently includes 11 faculty and is undergoing significant growth.