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ENVIRONMENTAL Science & Technology

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Recovering
SUSTAINABLE
Water from
Wastewater

Environmental Implications of Wireless Technologies

Time Ripe for Commission on Water?

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Policy Analysis

2961

Environmental Implications of Wireless Technologies: News Delivery and Business Meetings

Michael W. Toffel and Arpad Horvath

Two common services enabled by wireless information and communication technologies have lower life-cycle environmental impacts than the conventional products and services they replace.

Characterization of Natural and Affected Environments

■ 2971

Levels and Temporal Trends (1988–1999) of Polybrominated Diphenyl Ethers in Beluga Whales (*Delphinapterus leucas*) from the St. Lawrence Estuary, Canada

Michel Lebeuf, Bruno Gouteux, Lena Measures, and Steve Trottier

Concentrations of the most prevalent PBDEs in beluga whales increased exponentially between 1988 and 1999, with a doubling time no longer than three years.

■ 2978

Contaminant Trends in Reservoir Sediment Cores as Records of Influent Stream Quality

Peter C. Van Metre and Barbara J. Mahler

Sediment cores preserve contaminant concentrations and trends in influent suspended sediments to varying degrees, depending on contaminant and site.

2987

Comparative Evaluation of Background Anthropogenic Hydrocarbons in Surficial Sediments from Nine Urban Waterways

Scott A. Stout, Allen D. Uhler, and Stephen D. Emsbo-Mattingly

The chemical character and concentration of hydrocarbons, including PAHs, in urban sediments provide a basis for determining background conditions and thereby recognizing point source contributions.

■ 2995

Fractal-Based Scaling and Scale-Invariant Dispersion of Peak Concentrations of Crop Protection Chemicals in Rivers

David I. Gustafson, Katherine H. Carr, Timothy R. Green, Christophe Gustin, Russell L. Jones, and R. Peter Richards

Methods of fractal geometry are used to model the scale dependence of peak pesticide concentrations in rivers.

3004

Snowmelt Sources of Methylmercury to High Arctic Ecosystems

Lisa L. Loseto, David R. S. Lean, and Steven D. Siciliano

Wetlands and snowmelt water are evaluated as sources of MeHg and THg to High Arctic ecosystems; snowmelt was the most significant source.

■ 3011

Wet Deposition of Polychlorinated Biphenyls in the Eastern Mediterranean

Manolis Mandalakis and Euripides G. Stephanou

Field measurements of PCB wet deposition suggest washout ratios higher than corresponding ratios for gaseous PCBs and a wet deposition flux of 820 ng/m³.

Environmental Processes

3019

Uranium Complexes Formed at Hematite Surfaces Colonized by Sulfate-Reducing Bacteria

Andrew L. Neal, James E. Amonette, Brent M. Peyton, and Gill G. Geesey

Uranylmagnesium acetate dissolved in an aqueous medium flowing through an open bioreactor containing hematite mineral surfaces colonized by sulfate-reducing bacteria forms surface-associated complexes of U(VI).

3028

Determination of Sex Hormones and Nonylphenol Ethoxylates in the Aqueous Matrixes of Two Pilot-Scale Municipal Wastewater Treatment Plants

Mar Esperanza, Makram T. Suidan, Fumitake Nishimura, Zhong-Min Wang, George A. Sorial, Alan Zaffiro, Paul McCauley, Richard Brenner, and Gregory Sayles

Four of seven hormones and nonylphenol polyethoxylate surfactants are removed in excess of 95% from the aqueous phase in two pilot-scale municipal wastewater treatment plants.

3036

Do Earthworms Mobilize Fixed Zinc from Ingested Soil?

Janeck J. Scott-Fordsmand, Daryl Stevens, and Mike McLaughlin

An isotopic dilution technique revealed that *Eisenia andrei* and lettuce took up zinc from the same pools.

■ 3040

Effects of the Biologically Produced Polymer Alginic Acid on Macroscopic and Microscopic Calcite Dissolution Rates

Thomas D. Perry, IV, Owen W. Duckworth, Christopher J. McNamara, Scot T. Martin, and Ralph Mitchell

Atomic force microscopy demonstrates that calcite dissolution is accelerated by alginic acid across a range of pH values with a preferential interaction of the polymer and mineral at the obtuse steps of dissolution pits.

■ 3047

Removal of Estrogens in Municipal Wastewater Treatment under Aerobic and Anaerobic Conditions: Consequences for Plant Optimization

Adriano Joss, Henrik Andersen, Thomas Ternes, Philip R. Richle, and Hansruedi Siegrist

Municipal wastewater treatment plants are compared in terms of estrogen removal, and a model for biological degradation is given.

3056

Hexavalent Uranium Diffusion into Soils from Concentrated Acidic and Alkaline Solutions

Tetsu K. Tokunaga, Jiamin Wan, Jasquelin Pena, Stephen R. Sutton, and Matthew Newville

Diffusion of hexavalent uranium at high concentrations in soils can be fast at non-neutral pH because of relatively weak sorption.

3063

Abiotic Transformation of Toxaphene by Superreduced Vitamin B12 and Dicyanocobinamide

Steffen Ruppe, Anke Neumann, Gabriele Diekert, and Walter Vetter

The chloropesticide toxaphene and its most recalcitrant congener in sediments and soil (B6-923) are rapidly transformed by superreduced corrinoids (dicyanocobinamide and vitamin B12) to products not yet identified.

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

3068

Solving Problems Resulting from Solutions: Evolution of a Dual Nutrient Management Strategy for the Eutrophying Neuse River Estuary, North Carolina

Hans W. Paerl, Lexia M. Valdes, Alan R. Joyner, Michael F. Piehler, and Martin E. Lebo

Managing eutrophication in upstream regions of estuaries through phosphorous reductions enhances downstream eutrophication by increasing the nitrogen-to-phosphorus ratio delivered to the lower estuary.

3074

Binding of 2,4,6-Trinitrotoluene, Aniline, and Nitrobenzene to Dissolved and Particulate Soil Organic Matter

Johan Eriksson, Sofia Frankki, Andrei Shchukarev, and Ulf Skjellberg

Chemical interactions with dissolved and particulate soil organic matter determine the retention and mobility of 2,4,6-trinitrotoluene, aniline, and nitrobenzene in soil.

3081

Hydrophobicity and Octanol-Water Partitioning of Trace Metals in Natural Waters

Andrew Turner and Edward Mawji

A fraction of dissolved trace metals in contaminated natural waters is sufficiently hydrophobic to partition into 1-octanol.

3092

Adaptation of Soil Biological Nitrification to Heavy Metals

James A. Rusk, Rebecca E. Hamon, Daryl P. Stevens, and Mike J. McLaughlin

Tolerance to heavy metals of a key microbial function increases rapidly following pre-exposure to metals, which has potential implications for ecotoxicity testing protocols.

3098

Surface Complexation of Copper(II) on Soil Particles: EPR and XAFS Studies

Karine Flogéac, Emmanuel Guillon, and Michel Aplincourt

According to results of electron paramagnetic resonance and X-ray absorption spectroscopy studies, copper(II) sorption onto soil particles at macroscopic and molecular scales suggests sorption onto organic matter coated to mineral fraction.

3104

Influence of Metal Speciation in Natural Freshwater on Bioaccumulation of Copper and Zinc in Periphyton: A Microcosm Study

Sébastien Meylan, Renata Behra, and Laura Sigg

Metal speciation controls accumulation in algal biofilms in a different way for copper and for zinc because of diffusion limitations of copper.

3112

Influence of the Sea Rush *Juncus maritimus* on Metal Concentration and Speciation in Estuarine Sediment Colonized by the Plant

C. Marisa R. Almeida, Ana P. Mucha, and M. Teresa S. D. Vasconcelos

Juncus maritimus showed capacity for accumulating metals (cadmium, copper, and zinc) and for changing the metal speciation and distribution in sediments, concentrating trace metals around its roots.

3119

Photochemical Decomposition of 15 Polybrominated Diphenyl Ether Congeners in Methanol/Water

Johan Eriksson, Nicholas Green, Göran Marsh, and Åke Bergman

The photochemistry of polybrominated diphenyl ethers, including reaction rates and quantum yields, is studied.

3126

Stable Carbon Isotope Fractionation during Aerobic Biodegradation of Chlorinated Ethenes

Kung-Hui Chu, Shaily Mahendra, Donald L. Song, Mark E. Conrad, and Lisa Alvarez-Cohen

Stable carbon isotope fractionation during aerobic biodegradation of chlorinated ethenes is found to be significantly smaller than during anaerobic reductive dechlorination.

Environmental Modeling

■ 3131

Reactive Transport Modeling of Column Experiments for the Remediation of Acid Mine Drainage

Richard T. Amos, K. Ulrich Mayer, David W. Blowes, and Carol J. Ptacek

Reactive transport modeling is used to investigate geochemical processes within column experiments designed to simulate the treatment of acid mine drainage by permeable reactive barriers.

Environmental Measurements Methods

3139

Response of the Cu(II) Ion Selective Electrode to Cu Titration in Artificial and Natural Shore Seawater and in the Measurement of the Cu Complexation Capacity

Ignacio Rivera-Duarte and Alberto Zirino

Copper complexation capacity values that are consistent with those reported from other coastal environments are measured in San Diego Bay with an ion-selective electrode.

Remediation and Control Technologies

3148

Cadmium Removal from Contaminated Soil by Tunable Biopolymers

Giridhar Prabhukumar, Mark Matsumoto, Ashok Mulchandani, and Wilfred Chen

The use of elastin-based biopolymers for cadmium removal from contaminated soil is demonstrated in batch washing experiments.

3153

Enhanced Contaminant Desorption Induced by Phosphate Mineral Additions to Sediment

Daniel I. Kaplan and Anna S. Knox

Adding apatite, a calcium phosphate mineral, to contaminated sediments may effectively immobilize some contaminants while enhancing the mobility of others.

3161

Free Radical Destruction of *N*-Nitrosodimethylamine in Water

Stephen P. Mezyk, William J. Cooper, Keith P. Madden, and David M. Bartels

Absolute rate constants and initial degradation mechanisms for NDMA destruction in waters using advanced oxidation technology-based free radicals are determined.

3168

Swelling and Morphology of the Skin Layer of Polyamide Composite Membranes: An Atomic Force Microscopy Study

Viatcheslav Freger

A new AFM technique is used to investigate morphological and swelling characteristics of the polyamide layer of composite RO and NF membranes.