

November 15, 2006

# ENVIRONMENTAL Science & Technology

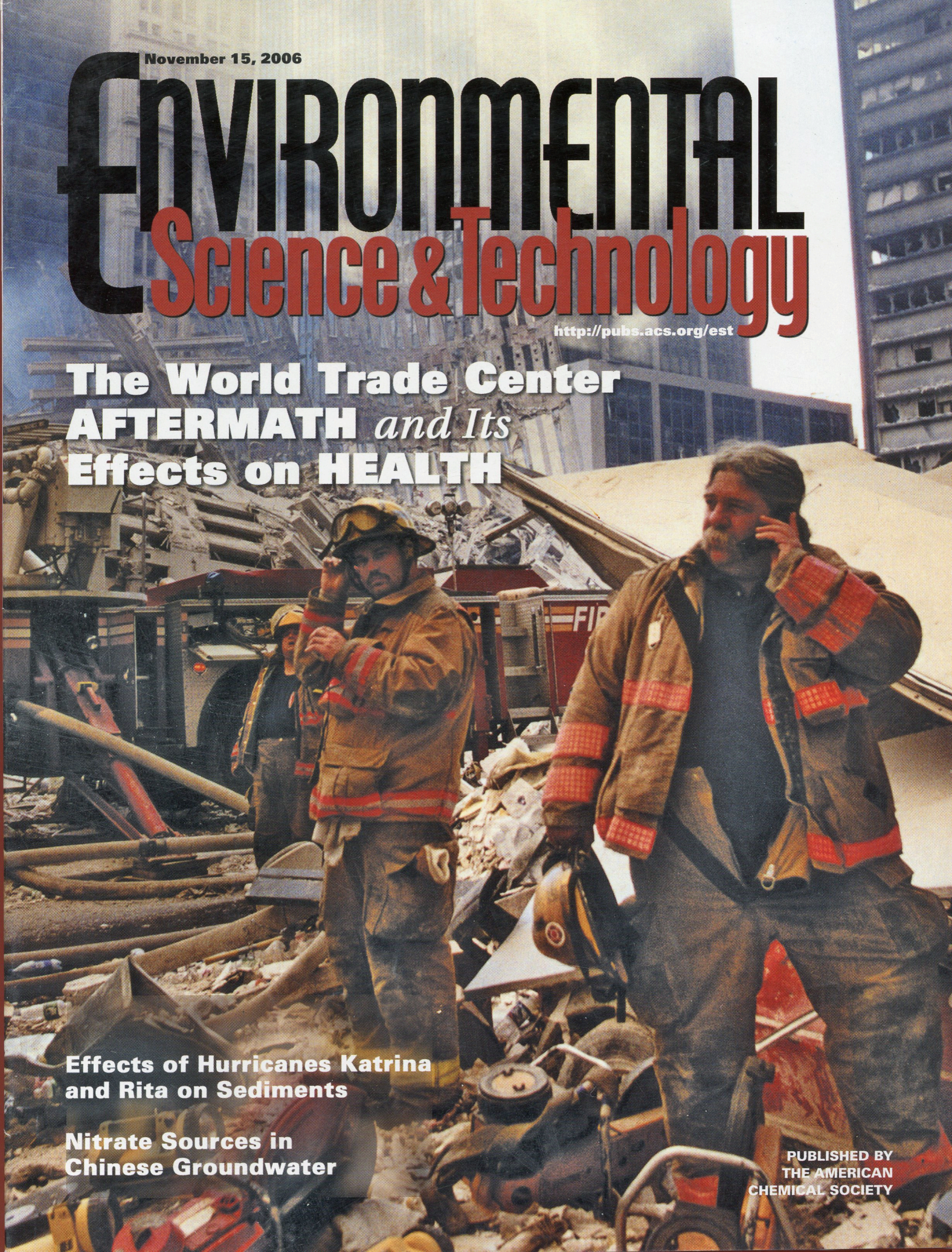
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## The World Trade Center AFTERMATH *and Its* Effects on HEALTH

Effects of Hurricanes Katrina  
and Rita on Sediments

Nitrate Sources in  
Chinese Groundwater

PUBLISHED BY  
THE AMERICAN  
CHEMICAL SOCIETY



## News and Features

## NEWS

**6868 New Orleans soils get clean bill of health—almost**

Recent hurricane activity didn't significantly contribute to sediment pollution in Lake Pontchartrain or soils in and around New Orleans.

**6869 Anthropogenic nitrate in Chinese groundwater**

Nitrogen and oxygen isotopes are used to identify nitrate sources in groundwater in Guiyang, southwest China.

**6869–6871 News Briefs**

Earth as a different planet • U.S. offers a plan for climate technologies • Reporting for nanomaterials in U.K. • Nanotechnology knowledge gaps

**6870 Measuring chemicals in Californians**

California is the first state to pass a human biomonitoring bill that sets rules for measuring people's exposures to pollution.

**6872 Anastas gets Heinz environmental award**

A green-chemistry guru wins \$250,000 for his groundbreaking work.

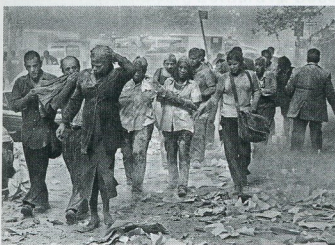
**6873 Perspective: Environmental journals feel pressure to adopt disclosure rules**

After an inquiry by *ES&T*, three leading science societies say they will examine conflict-of-interest policies.

## FEATURE

**6876 The World Trade Center Aftermath and Its Effects on Health: Understanding and Learning through Human-Exposure Science**

Paul J. Lioy, Edo Pellizzari, and David Prezant



Although a relatively young field, human-exposure science should be central to the mitigation of exposures during and after catastrophic events such as the WTC terrorist attacks. Lioy and colleagues discuss the issues associated with application of conventional environmental measurements to the WTC aftermath as surrogates for exposure, how the divergent exposure periods cascaded into unusual adverse health observations, and the degree of follow-through on the lessons learned from the WTC collapse.

environmental measurements to the WTC aftermath as surrogates for exposure, how the divergent exposure periods cascaded into unusual adverse health observations, and the degree of follow-through on the lessons learned from the WTC collapse.

**Cover:** The cover photo of firefighters responding to the 9/11 WTC collapse was provided by Corbis.

**Online news:** Read news first at <http://pubs.acs.org/estnews>.

## Research

## POLICY ANALYSIS

## ■ 6887

**The Costs, Air Quality, and Human Health Effects of Meeting Peak Electricity Demand with Installed Backup Generators**

Elisabeth A. Gilmore, Lester B. Lave, and Peter J. Adams

Diesel backup generators with emission controls for fine particulate matter (PM<sub>2.5</sub>) have competitive private and social costs compared with other options.

## CHARACTERIZATION OF NATURAL AND AFFECTED ENVIRONMENTS

## ■ 6894

**Effects of Hurricanes Katrina and Rita on the Chemistry of Bottom Sediments in Lake Pontchartrain, Louisiana, USA**

Peter C. Van Metre, Arthur J. Horowitz, Barbara J. Mahler, William T. Foreman, Christopher C. Fuller, Mark R. Burkhardt, Kent A. Elrick, Edward T. Furlong, Stanley C. Skrobialowski, James J. Smith, Jennifer T. Wilson, and Stephen D. Zaugg

High levels of urban-waste-indicator compounds and common urban contaminants are of limited extent and are probably transient.

## ■ 6903

**Measured Concentrations of VOCs in Several Non-Residential Microenvironments in the United States**

Miranda M. Loh, E. Andres Houseman, George M. Gray, Jonathan I. Levy, John D. Spengler, and Deborah H. Bennett

A composite sampling methodology is used to measure concentrations of VOCs over a range of store types and other non-residential microenvironments.

## 6912

**Change-Point Detection of Gaseous and Particulate Traffic-Related Pollutants at a Roadside Location**

David C. Carslaw, Karl Ropkins, and Margaret C. Bell

Cumulative-sum methods are used to detect important change-points in the concentration of air pollutants at a central urban roadside location.

## ■ 6919

**Dioxins and Related Compounds in Albatrosses from the Torishima Island, Japan: Accumulation Features by Growth Stage and Toxicological Implications**

Tatsuya Kunisue, Shigeyuki Nakanishi, Nariko Oka, Fumio Sato, Miyako Tsurumi, and Shinsuke Tanabe

Albatrosses from Torishima Island may be specifically exposed to PCDFs and Co-PCBs, and biochemical alternations by these contaminants have potentially occurred in their embryos.

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

6928

### ► Using $\delta^{15}\text{N}$ - and $\delta^{18}\text{O}$ -Values To Identify Nitrate Sources in Karst Ground Water, Guiyang, Southwest China

Cong-Qiang Liu, Si-Liang Li, Yun-Chao Lang, and Hua-Yun Xiao

Both oxygen and nitrogen isotopes of nitrate in the karstic groundwater of Guiyang, southwest China, are measured to identify the nitrate source and its conversion.

6934

### Seasonal Variation of 2-Methyltetrols in Ambient Air Samples

Xiaoyan Xia and Philip K. Hopke

The 2-methyltetrols (2-methylthreitol and 2-methylerythritol) measured in  $\text{PM}_{2.5}$  in northern New York contribute 2% to the organic compounds during summer and almost nothing after the first frost.

6938

### Remote Sensing of In-Use Heavy-Duty Diesel Trucks

Daniel A. Burgard, Gary A. Bishop, Donald H. Stedman, Viktoria H. Gessner, and Christian Daeschlein

On-road, fuel-based, mass emissions of carbon monoxide, hydrocarbons, nitric oxide, nitrogen dioxide, sulfur dioxide, and ammonia from >1600 heavy-duty diesel vehicles are reported.

## ENVIRONMENTAL PROCESSES

6943

### Experimentally Determined Uranium Isotope Fractionation During Reduction of Hexavalent U by Bacteria and Zero Valent Iron

Laura K. Rademacher, Craig C. Lundstrom, Thomas M. Johnson, Robert A. Sanford, Juanzho Zhao, and Zhaofeng Zhang

This study presents observations of mass-dependent  $^{238}\text{U}/^{235}\text{U}$  fractionations induced during  $\text{Fe}^0$  and bacterial laboratory experiments of hexavalent uranium reduction.

6949

### Linear Adsorption of Nonionic Organic Compounds from Water onto Hydrophilic Minerals: Silica and Alumina

Yu-Hong Su, Yong-Guan Zhu, Guangyao Sheng, and Cary T. Chiou

The proposed mineral-water-solute configuration accounts for the linear and noncompetitive adsorption of nonionic organic compounds from water onto hydrophilic oxide minerals.

■ 6955

### Oligomerization of Humic Phenolic Monomers by Oxidative Coupling under Biomimetic Catalysis

Daniela Šmejkalová, Alessandro Piccolo, and Michael Spiteller

Oligomerization of humic phenolic monomers under biomimetic catalysis in aqueous media is studied.

■ 6963

### Simulating Herbicide Volatilization from Bare Soil Affected by Atmospheric Conditions and Limited Solubility in Water

S. R. Yates

Accurate prediction of herbicide volatilization is possible with a model that considers the effects of temperature and solubility in water and that couples volatilization to atmospheric processes.

■ 6969

### Modeling Global-Scale Fate and Transport of Perfluorooctanoate Emitted from Direct Sources

James Armitage, Ian T. Cousins, Robert C. Buck, Konstantinos Prevedouras, Mark H. Russell, Matthew MacLeod, and Stephen H. Korzeniewski

A global modeling study demonstrates that perfluorooctanoate manufacturing emissions can account for observed levels in the oceans, and it quantifies perfluorooctanoate ocean water transport to the Arctic.

6976

### Intestinal versus External Growth Conditions Change the Surficial Properties in a Collection of Environmental *Escherichia coli* Isolates

Hsiao-Hui Yang, Jayne B. Morrow, Domenico Grasso, Robert T. Vinopal, and Barth F. Smets

*E. coli* isolates are more hydrophobic and have a higher tendency to develop biofilms when grown under conditions that simulate the external versus intestinal environment.

■ 6983

### Responses of Ammonium Sulfate Particles Coated with Glutaric Acid to Cyclic Changes in Relative Humidity: Hygroscopicity and Raman Characterization

Man Nin Chan, Alex K. Y. Lee, and Chak K. Chan

The effects of a glutaric acid coating on the hygroscopicity of ammonium sulfate particles in repeated humidification and dehumidification cycles are investigated.

6990

### Effect of Electrode Potential on Electrode-Reducing Microbiota

David A. Finkelstein, Leonard M. Tender, and J. Gregory Zeikus

When a microbial fuel cell uses mineral-reducing microbes as anode catalysts, it sacrifices efficiency for durability.

## ENVIRONMENTAL MODELING

■ 6996

### Simulation of Metals Transport and Toxicity at a Mine-Impacted Watershed: California Gulch, Colorado

Mark L. Velleux, Pierre Y. Julien, Rosalia Rojas-Sanchez, William H. Clements, and John F. England, Jr.

A spatially distributed watershed model is used to evaluate metals transport from mine wastes scattered across the land surface and to identify major metals sources.

■ 7005

### Prediction of the Sorption of Organic Compounds into Soil Organic Matter from Molecular Structure

Gerrit Schüürmann, Ralf-Uwe Ebert, and Ralph Kühne

A new model allows the prediction of  $\log K_{oc}$  of organic compounds from simple parameters and molecular fragments; it covers many chemical functionalities and outperforms existing methods.

## ENVIRONMENTAL MEASUREMENTS METHODS

■ 7012

### Predicting Uncertainty in the Ecotoxicological Assessment of Solid Waste Leachates

Benoit J. D. Ferrari, Jean-François Masfarau, Armand Maul, and Jean-François Féraud

The influence of several nested factors on the overall variability of toxicity results in a procedure assessing the ecotoxicological hazard of solid waste leachates is illustrated.

7018

### Remote Sensing of Ammonia and Sulfur Dioxide from On-Road Light Duty Vehicles

Daniel A. Burgard, Gary A. Bishop, and Donald H. Stedman

More than 20,000 fuel-based on-road mass emissions of ammonia and sulfur dioxide are measured; ammonia emissions increase and then decrease with increasing fleet age.

## REMEDIATION AND CONTROL TECHNOLOGIES

### 7023

#### Thermodynamic Factors in Partitioning and Rejection of Organic Compounds by Polyamide Composite Membranes

Adi Ben-David, Yoram Oren, and Viatcheslav Freger

Reverse osmosis and nanofiltration membranes are considered promising technologies for upgrading water quality, waste treatment, and other environmental applications.

### 7029

#### Photocatalytic Degradation of Gaseous Organic Species on Photonic Band-Gap Titania

Maoming Ren, R. Ravikrishna, and Kalliat T. Valsaraj

The application of photonic band-gap titania for the photocatalytic degradation of gaseous organic vapors is demonstrated.

### 7034

#### Photocatalytic Oxidation of Arsenite on TiO<sub>2</sub>: Understanding the Controversial Oxidation Mechanism Involving Superoxides and the Effect of Alternative Electron Acceptors

Jungho Ryu and Wonyong Choi

As(III) adsorbed on TiO<sub>2</sub> serves as an external charge-recombination center in the UV/TiO<sub>2</sub> process; this explains why the main photooxidants of As(III) are superoxides, not OH radicals (or holes).

### 7040

#### Experimental Study on the Effect of SO<sub>2</sub> on PCDD/F Emissions: Determination of the Importance of Gas-Phase versus Solid-Phase Reactions in PCDD/F Formation

Shawn P. Ryan, Xiao-dong Li, Brian K. Gullett, C. W. Lee, Matt Clayton, and Abderrahmane Touati

Flue gas SO<sub>2</sub> resulted in significant reductions in PCDD/F emissions because of heterogeneous reactions with metal chloride species in fly ash in the postcombustion zone.

### 7048

#### Uranium and Technetium Bio-Immobilization in Intermediate-Scale Physical Models of an In Situ Bio-Barrier

Mandy M. Michalsen, Bernard A. Goodman, Shelly D. Kelly, Kenneth M. Kemner, James P. McKinley, Joseph W. Stucki, and Jonathan D. Istok

Ethanol additions stimulate reducing conditions in sediments and promote long-term U and Tc removal from groundwater in above-ground, intermediate-scale physical models of an in situ bio-barrier.

### 7054

#### Cadmium and Lead Ion Capture with Three Dimensionally Ordered Macroporous Hydroxyapatite

Madhavi Srinivasan, Cristiano Ferraris, and Tim White

Three dimensionally ordered macroporous hydroxyapatite rapidly incorporates cadmium crystallochemically, whereas coexisting amorphous phosphates fix lead by precipitation as pyromorphite.

## SUSTAINABILITY ENGINEERING AND GREEN CHEMISTRY

### 7060

#### The Contemporary Anthropogenic Chromium Cycle

Jeremiah Johnson, Laura Schewel, and T. E. Graedel

The tools of material-flow analysis are used to quantify anthropogenic chromium flows for 54 countries, 9 world regions, and the planet as a whole.

### 7070

#### Empirical Comparison of Process and Economic Input-Output Life Cycle Assessment in Service Industries

Seppo I. Junnila

Results of process-based and EIO-based LCA methods are compared empirically in a service-sector organization, and the environmentally significant processes of the organization are determined.

## ECOTOXICOLOGY AND HUMAN ENVIRONMENTAL HEALTH

### 7077

#### Effects of Temperature on Host-Pathogen-Drug Interactions in Red Abalone, *Haliotis rufescens*, Determined by <sup>1</sup>H NMR Metabolomics

Eric S. Rosenblum, Ronald S. Tjeerdema, and Mark R. Viant

Metabolomics is used to document the progressive metabolic decay of a shellfish inflicted with withering syndrome and to identify partial metabolic recovery in animals receiving antibiotic treatment.

### 7085

#### A Terrestrial Biotic Ligand Model. 1. Development and Application to Cu and Ni Toxicities to Barley Root Elongation in Soils

Sagar Thakali, Herbert E. Allen, Dominic M. Di Toro, Alexander A. Ponizovsky, Corinne P. Rooney, Fang-Jie Zhao, and Stephen P. McGrath

The Terrestrial Biotic Ligand Model for predicting Cu and Ni toxicities in noncalcareous soils is presented; the effects of soil and soil solution properties are considered.

### 7094

#### Terrestrial Biotic Ligand Model. 2. Application to Ni and Cu Toxicities to Plants, Invertebrates, and Microbes in Soil

Sagar Thakali, Herbert E. Allen, Dominic M. Di Toro, Alexander A. Ponizovsky, Corinne P. Rooney, Fang-Jie Zhao, Stephen P. McGrath, Peggy Criel, Hilde Van Eeckhout, Colin R. Janssen, Koen Oorts, and Erik Smolders

The Terrestrial Biotic Ligand Model is shown to be applicable to toxicities of Cu and Ni to plants, invertebrates, and microbes for noncalcareous soils.

## CORRESPONDENCE AND REBUTTAL

### 7101

#### Comment on "Widespread Presence of Naturally Occurring Perchlorate in High Plains of Texas and New Mexico"

Steven Amter and Benjamin Ross

### 7102

#### Response to Comment on "Widespread Presence of Naturally Occurring Perchlorate in High Plains of Texas and New Mexico"

Srinath Rajagopalan, Todd A. Anderson, Ken A. Rainwater, Moira Ridley, W. Andrew Jackson, and Lynne Fahlquist

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