

# OSM NATIONAL LIBRARY

June 10, 2011

## **Current Journal Contents**

**U.S. Office of Surface Mining/DOI  
1999 Broadway, Suite 3320  
Denver, CO 80202-3050**

This is the current compilation of the table-of-contents pages for journals received during the month of May in the Library. Individuals may have copies of specific articles by notifying the librarian either by phone, e-mail, or regular mail service. **(If you have more than one or two articles you want, please send a written or e-mail request.)**

Deborah K. McGinnis, Librarian  
[dmcginnis@osmre.gov](mailto:dmcginnis@osmre.gov)

**Tel: (303) 293-5073  
FAX (303) 293-5017**

[Search the OSM Library Catalog HERE](#)

### **NOTICE OF WARNING CONCERNING COPYRIGHT RESTRICTIONS**

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted material.

Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specific conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

This institution reserves the right to refuse to accept a copying order if, in its judgment, fulfillment of the order would involve violation of copyright law.

## Table of Contents

## Review &amp; Interpretation

## Time and the Productivity of Agronomic Crops and Cropping Systems

Dennis B. Egli . . . . . 743

## Agronomic Application of Genetic Resources

Genotypic and Environmental Effects on Agronomic and Nutritional Value of *Brassica rapa*

Marta Francisco, Pablo Velasco, Margarita Lema, and María Elena Carrea . . . . . 735

## Biofuels

## A Comparison of Perennial Polycultures and Monocultures for Producing Biomass for Biorefinery Feedstock

Andrew P. Griffith, Francis M. Eppin, Samuel D. Fuhlendorf, and Robert Gillen . . . . . 617

## Composition of Native Warm-Season Grasses for Bioenergy Production in Response to Nitrogen Fertilization Rate and Harvest Date

Naroon Waramit, Kenneth J. Moore, and Andrew H. Heggenstaller . . . . . 655

## Narrow-Width Harvester for Switchgrass and Other Bioenergy Crops in Experimental Plots

D.S. Long, P.A. Scharf, and F.J. Pierce . . . . . 780

## Lemongrass Productivity, Oil Content, and Composition as a Function of Nitrogen, Sulfur, and Harvest Time

Valcho D. Zheljazkov, Charles L. Cantrell, Tess Astarkie, and Jeffrey B. Cannon . . . . . 805

## Corn Harvest Strategies for Combined Starch and Cellulosic Bioprocessing to Ethanol

Juan Gao, Leilei Qian, Kurt D. Thelen, Xinmei Hao, Leonardo da Costa Sousa, Ming Woei Lau, Vankatesh Balan, and Bruce E. Dale . . . . . 844

## Biometry, Modeling &amp; Statistics

## Statistical Modeling of Yield and Variance Instability in Conventional and Organic Cropping Systems

Abdullah A. Jaradat and Sharon L. Weyers . . . . . 673

## CSM-IXIM: A New Maize Simulation Model for DSSAT Version 4.5

J.I. Lizaso, K.J. Boote, J.W. Jones, C.H. Porter, L. Echarte, M.E. Westgate, and G. Sonohat . . . . . 766

## Crop Ecology &amp; Physiology

## Determining Biophysical Parameters for Olive Trees Using CASI-Airborne and Quickbird-Satellite Imagery

J.A. Gómez, P.J. Zarco-Tejada, J. García-Morillo, J. Gama, and M.A. Soriano . . . . . 644

## Rainfall Impacts Winter Wheat Seedling Emergence from Deep Planting Depths

William F. Schillinger . . . . . 730

## In-Season Prediction of Corn Yield Using Plant Height under Major Production Systems

Xinhua Yin, M. Angela McClure, Ngowari Jaja, Donald D. Tyler, and Robert M. Hayes . . . . . 923

## Crop Economics, Production &amp; Management

## Agronomic Responses of Corn to Stand Reduction at Vegetative Growth Stages

Jeffrey A. Coulter, Emerson D. Nafziger, Lori J. Abendroth, Peter R. Thomason, Roger W. Elmore, and Mark E. Zarnstorff . . . . . 577

## Lower Limits of Cotton Seeding Rates in Alternative Row Widths and Patterns

C. Owen Gwathmey, Lawrence E. Steckel, James A. Larson, and Daniel F. Mooney . . . . . 584

## Forage Rice Yield and Quality Response to Harvest Timing and Nitrogen Management

H. Nakano, I. Hattori, K. Sato, and S. Morita . . . . . 593

Autotoxic Compounds from Rhizosphere Soil of *Humulus lupulus* L. Extracts: Identification and Biological Activity

Xin-Hui Zhang, En-Hc Zhang, and Duo-Yong Lang . . . . . 695

## Comparisons of Single-Row and Twin-Row Soybean Production in the Mid-South

H. Arnold Bruns . . . . . 702

## Seeding Rate, Nitrogen Rate, and Cultivar Effects on Malting Barley Production

J.T. O'Donovan, T.K. Turkington, M.J. Edney, G.W. Clayton, R.H. McKenzie, P.E. Juskiw, G.P. Lafond, C.A. Grant, S. Brandt, K.N. Harker, E.N. Johnson, and W.E. May . . . . . 709

## Relationships among Traits of Tropical Early Maize Cultivars in Contrasting Environments

B. Badu-Apraku, R.O. Akinwale, S.O. Ajala, A. Menkir, M.A.B. Fakorede, and M. Oyekunle . . . . . 717

## Harvest Aid Application Timing Affects Wheat and Relay Intercropped Soybean Yield

Kelly A. Nelson, Raymond E. Massey, and Bruce A. Burdick . . . . . 851

## Optimum Timing and Rate of Trinexapac-Ethyl to Reduce Lodging in Spring Wheat

J.J. Wiersma, J. Dai, and B. R. Durgan . . . . . 864

## Organic Agriculture &amp; Agroecology

## Blade Roller–Green Manure Interactions on Nitrogen Dynamics, Weeds, and Organic Wheat

Iris Vaisman, Martin H. Entz, Don N. Everitt, and Robert H. Gulden . . . . . 879

(cont.)

Cover: Rainfall on olive (*Olea europaea* L.) orchards in southern Spain. See "Determining Biophysical Parameters for Olive Trees Using CASI-Airborne and Quickbird-Satellite Imagery," by J.A. Gómez et al. (p. 644-654). Photo credit: Dr. José A. Gómez, CSIC, Córdoba, Spain.

RECEIVED  
011 MAY 24 AM 8:51  
CSM-103-3  
EMERSON COULTER COVER

## Pest Interactions in Agronomic Systems

- Integrated Management of *Sitona lineatus* with Nitrogen Fertilizer, *Rhizobium*, and Thiamethoxam Insecticide  
Meghan A. Vankosky, Héctor A. Cárcamo, Ross H. McKenzie, and Lloyd M. Dosdall . . . . . 565
- Crop Management Effects on Root and Crown Rot of Wheat in West-Central Saskatchewan, Canada  
M. R. Fernandez, D. Ulrich, S. A. Brandt, R. P. Zentner, H. Wang, A. G. Thomas, and O. Olfert . . . . . 756
- Response of Root-Knot Nematodes and Palmer Amaranth to Tillage and Rye Green Manure  
P. Timper, R. F. Davis, T. M. Webster, T. B. Brenneman, S. L. F. Meyer, L. A. Zasada, G. Cai, and C. P. Rice . . . . . 813
- Response of Green Peach Aphids and Other Arthropods to Garlic Intercropped with Tobacco  
Rongquan Lai, Minsheng You, L.A.P. (Bert) Lotz, and Liette Vasseur . . . . . 856

## Soils, Agronomy & Environmental Quality

- Soil Organic Matter Accumulation in Creeping Bentgrass Greens: A Chronosequence with Implications for Management and Carbon Sequestration  
Danasha Seth Carley, David Goodman, Shannon Sermons, Wei Shi, Dan Bowman, Grady Miller, and Thomas Ruffy . . . . . 604
- A Phosphorus Budget for Bahiagrass Pastures Growing on a Typical Florida Spodosol  
A.K. Obour, M.L. Silveira, J.M.B. Vendramini, J. Jawitz, G.A. O'Connor, and L.E. Sollenberger . . . . . 611
- Dry Bean Response to Salinity in Southern Manitoba  
Robert J. Brogan, Jane C. Froese, and Martin H. Entz . . . . . 663
- Nitrogen Fertilization Influences Shear Strength and Quality of Kentucky Bluegrass Sod Grown on Clay  
Deying Li, Wenjuan Fang, and Liebao Han . . . . . 751
- Macronutrients in Hawaii's Coastal Wetland Pastures and Potential Phosphorus Release to Water  
B. W. Mathews, J. R. Carpenter, L. E. Sollenberger, and W. M. Steiner . . . . . 830
- Nitrogen Fertilizer Effects on Irrigated Conventional Tillage Corn Yields and Soil Carbon and Nitrogen Pools  
Claudia Pozzi Jantalia and Ardell D. Halvorson . . . . . 871
- A Time-Efficient Scooping Method to Prepare Cover Crop Seed for Cone Planters  
Eric B. Brennan . . . . . 906

## Soil Fertility & Crop Nutrition

- Dairy Manure Nitrogen Availability in Eroded and Noneroded Soil for Sugarbeet followed by Small Grains  
Rodrick D. Lentz, Gary A. Lehrs, Bradford Brown, Jodi Johnson-Maynard, and April B. Leytem . . . . . 628
- Corn Responses to In-Furrow Phosphorus and Potassium Starter Fertilizer Applications  
Antonio P. Mallarino, Nicolas Bergmann, and Daniel E. Kaiser . . . . . 685

- Yield, Protein, and Remobilization of Water Soluble Carbohydrate and Nitrogen of Three Spring Wheat Cultivars as Influenced by Nitrogen Input  
Chengei Chen, Guoqiang Han, Huaqing He, and Malvern Westcott . . . . . 786

- Categorical Analysis of Spatial Variability in Economic Yield Response of Corn to Nitrogen Fertilization  
P.M. Kyveryga, T.M. Blackmer, and P.C. Caragea . . . . . 796

- Potassium Fertilization on Maize under Different Production Practices in the North China Plain  
Junfang Niu, Weifeng Zhang, Xinping Chen, Chunjian Li, Fusuo Zhang, Libua Jiang, Zhaohui Liu, Kai Xiao, Menachem Assaraf, and Patricia Imas . . . . . 822

- A Corn Nitrogen Status Indicator Less Affected by Soil Water Content  
Juanjuan Zhu, Nicolas Tremblay, and Yinli Liang . . . . . 890

- Incorporation of Municipal Biosolids Affects Organic Nitrogen Mineralization and Elephantgrass Biomass Production  
Miguel S. Castillo, Lynn E. Sollenberger, João M.B. Vendramini, Kenneth R. Woodard, George A. O'Connor, Maria L. Silveira, and Jerry B. Sartain . . . . . 899

## Soil Tillage, Conservation & Management

- Tillage and Cattle Grazing Effects on Soil Properties and Grain Yields in a Dryland Wheat-Sorghum-Fallow Rotation  
R. L. Baumhardt, R. C. Schwartz, J. C. MacDonald, and J. A. Tolck . . . . . 914

## Notes & Unique Phenomena

- Soybean Response to Rhizobia on Previously Flooded Sites in Southern Wisconsin  
Branden J. Furseth, Shawn P. Conley, and Jean-Michel Ané . . . . . 573

## Other Items

- ASA Statement of Ethics . . . . . iv
- 2010 Annual Meeting Reports  
ASA Yearly Reports . . . . . 930  
Presidents of the American Society of Agronomy . . . . . 930  
Reports of ASA Divisions, Branches, and Committees . . . . . 931  
Awards Presented in Agronomy . . . . . 943  
Fellows of the American Society of Agronomy . . . . . 946  
ASA Fellows and Award Recipients . . . . . 949  
Thanks to Our Reviewers . . . . . 956  
2011 Corporate Members . . . . . 960

P. 2 of 2

# Coal Age

## FEATURE ARTICLES

- 26 Dredging the Lower Mississippi
- 30 Mechel-Bluestone Launches the K2 Prep Plant  
*Enhanced flotation enables more fine coal recovery*
- 36 Haulage & Loading 2011 Preview  
*Technical program offers insight into future technology as well as hands-on ideas to improve safety and efficiency at surface mines*
- 46 Clean Machines: Cut Operating Costs with Contamination Control  
*Investing in a clean-fluids strategy can pay dividends in machine availability*
- 56 Can We Rely on Roof Bolters to Identify a Defective Roof?
- 62 Coal Prep 2011 Expected to Draw Record Numbers of Processing Professionals  
*Trade show organizers add a few new twists to highly successful program*
- 78 West Virginia Designs New Rescue Vehicle

## COAL IN THE NEWS

- 6 Industry remembers UBB miners
- 6 MSHA places two mines on POV status
- 7 CONSOL Energy reaches CWA with U.S. EPA and West Virginia DEP
- 8 MSHA announces results of February impact inspections
- 10 West Virginia governor speaks to *Coal Age*
- 14 Arch Coal to settle Clean Water Act violations
- 14 Hallador pursuing new underground mine in Illinois
- 16 Rhino Resource Partners double net income in 2010
- 20 Quinn vetoes Illinois coal gasification
- 4 Kentucky governor signs CO<sub>2</sub> pipeline bill into law

## WORLD NEWS

- 7 BHP expands Hunter Valley Energy Coal  
Coal loading capacity at Newcastle could reach 30 million mt  
L&L acquires DaPing in China
- 8 Russia's Mechel launches coking battery no. 6  
Indians & Chinese circle for Premier Coal sale

RECEIVED  
2011 MAY -9 AM 9:14

NEWS/65M-WRO  
DENVER, COLORADO



PREP PLANT PROFILE/30



HAULAGE & LOADING PREVIEW/36



MAINTENANCE/46



# THIS ISSUE

*This month, Coal Age profiles the new K2 prep plant constructed by Mechel-Bluestone. It produces a high grade met product. (Photo courtesy of Lee Buchsbaum)*

## DEPARTMENTS

- 4 Editorial
- 6 Coal in the News
- 7 World News
- 16 People
- 18 Dateline Washington
- 20 Calendar
- 22 Awards
- 78 Operating Ideas
- 80 Suppliers News
- 82 Product News
- 85 Classified
- 88 Legally Speaking

RECEIVED  
2011 MAY -3 PM 4:21  
CON-WRCS  
DENVER, COLORADO

## FEATURES

- Speed and Safety: Raiseboring Provides the Solution**  
*A look at current trends in a technology that has changed development methods for ever* ..... 32
- Haulage & Loading 2011 Preview**  
*Technical program offers insight into future technology as well as hands-on ideas to improve safety and efficiency at surface mines* ..... 38
- Drive Time**  
*New stationary and mobile drive systems introduced at CONEXPO 2011 offer higher performance with improved economy of operation* ..... 46
- Endurance Contest: Suppliers Steadily Improve Wear-resistant Materials Lineup**  
*OEMs and end users can pick up from an expanding range of products, selection tools and installation techniques* ..... 48
- Extreme Weather Events and the Mining Industry** ..... 58

## LEADING DEVELOPMENTS

- BHP Billiton Adds to Australian Iron Ore and Met Coal Spending ..... 6
- Goldcorp Approves Two Major Canadian Projects ..... 7
- Xstrata Zinc Investigating Major Production Increase ..... 8

## AROUND THE WORLD

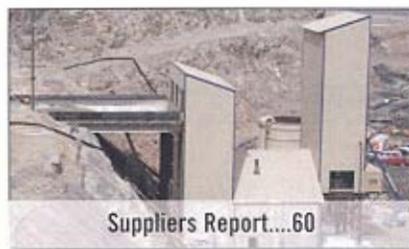
- U.S. & Canada:**  
*Northern Dynasty Receives Pebble Project Preliminary Assessment* ..... 10
- Latin America:**  
*Japan-Korea Partnership Investing \$1.95 Billion in Brazil's CBMM* ..... 16
- Australia/Oceania:**  
*Expansion Studies for Karara Iron Ore Project* ..... 18
- Africa:**  
*African Eagle Advances Its Dutwa Nickel Project* ..... 20
- Asia:**  
*Centerra to Spend \$405M to Extend Kumtor Pit Production* ..... 22
- Exploration Roundup:**  
*New Copper-Moly-Gold Discovery at Oyu Tolgoi* ..... 24



This month, in the Haulage & Loading Preview, E&MJ offers a preliminary glimpse of what delegates attending the leading conference dedicated to open-pit mining can expect. (Photo courtesy of P&H Mining Equipment Co.)

## DEPARTMENTS

- Calendar ..... 28
- Classified Advertisements ..... 70
- Equipment Gallery ..... 66
- From the Editor ..... 2
- Markets ..... 72
- Operating Strategies ..... 58
- People ..... 14
- Processing Solutions ..... 64
- Suppliers Report ..... 60
- This Month in Coal ..... 26



RECEIVED

MAY 31 PM 3:23

DENVER, CO 80202

## FEATURES

- New System Manages Main Compressor on Rotary Drills**  
*Several advancements allow dramatic savings in fuel and extend the service intervals for the engine and compressor.....* 30
- Potash: The New "Hot" Commodity**  
*Having seen their markets shrink dramatically during 2009, potash producers are once again predicting strong sales as the world's farmers catch up on their fertilizer application .....* 36
- Exploration Bounces Back**  
*Nonferrous metals exploration spending rebounded rapidly in 2010 after a disastrous 2009. Industry suppliers also responded with a wave of new products for higher drilling productivity and improved data handling and analysis. ....* 46
- Screening Technology Expands to Meet Expectations**  
*Leading vibratory screen suppliers stay on top by listening to the customer's needs—and providing efficient solutions that satisfy those requirements .....* 52
- Bodies at Work**  
*Mine mechanics' trucks need more payload capacity, more storage space and more muscle to handle bigger jobs. The newest models meet all requirements. ....* 58
- Utility Equipment Provides Support**  
*Advancements in machine design are not limited to production equipment.....* 62

## LEADING DEVELOPMENTS

- Gold Fields Increases Tarkwa, Damang and Cerro Corona Stakes ..... 4
- Barrick Tops Minmetals Bid for Equinox..... 4
- Vale Elects New CEO. Bids \$1.125B for Metorex ..... 5
- MolyCorp Acquires Processing Facilities..... 5
- Iamgold, China National Gold Join Forces ..... 6
- Teck Celebrates Startup of Production from New Chilean Copper Concentrator ..... 6

## AROUND THE WORLD

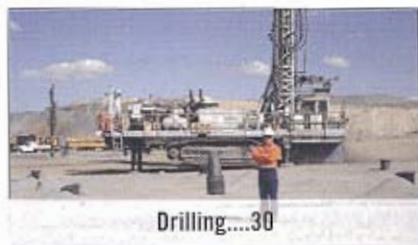
- U.S. & Canada:** Preliminary Assessment Supports Adriana's Pelletizing Project ..... 8
- Latin America:** Anglo American Pours First Metal at Barro Alto Nickel ..... 14
- Australia/Oceania:** Olympic Dam Expansion Advances to Feasibility Stage ..... 16
- Africa:** Rio Tinto Signs Agreement with Guinea for Simandou Iron Mining Title ..... 18
- Asia:** Sulphides Expected to Add to Çöpler Gold Production ..... 20
- Exploration Roundup:** Quadra FNX Sees Promising Future for Victoria Project ..... 22



Industry observers predict strong market fundamentals for potash over the next five years, and both producers and juniors are looking for new prospects. (Photo courtesy of Western Potash Corp.)

## DEPARTMENTS

- Calendar ..... 26
- Classified Advertisements ..... 78
- Equipment Gallery ..... 72
- From the Editor ..... 2
- Markets ..... 80
- Operating Strategies ..... 66
- People ..... 12
- Processing Solutions ..... 70
- Suppliers Report ..... 68
- This Month in Coal ..... 24



## FEATURE

### DON'T FORGET ABOUT THE CHRISTCHURCH EARTHQUAKE: Lessons learned from this disaster



24

The earthquake that struck Christchurch, New Zealand, in February is a stark reminder that even technologically advanced cities can be devastated by earthquakes.

Michael W. Hamburger and Walter D. Mooney

### JAPAN'S MEGAQUAKE AND KILLER TSUNAMI:

How did this happen?

The March temblor and tsunami off the coast of Honshu, Japan, caught people by surprise — and it has complicated the picture of foreshocks and aftershocks.

Rasoul Sorkhabi



27

## FEATURE

### MYSTERIOUS DISEASE SOUNDS THE DEATH KNELL FOR BATS

White Nose Syndrome has killed at least 2 million hibernating bats and is threatening to wipe out one species entirely. Will scientists figure out this disease in time to save the flying mammals?



Mary Caperton Morton

30

## FEATURE

### D-DAY'S LEGACY SANDS

Researchers found a surprise when they examined modern samples of sand from Omaha Beach in Normandy, France: shrapnel and iron and glass beads left over from the D-Day invasions in 1944.

Earle F. McBride and M. Dane Picard



38

## FEATURE

### TRAVELS IN GEOLOGY: Stonehammer Geopark, Canada

New Brunswick's Stonehammer Geopark is a perfect example of how a geopark connects people with the landscape, highlighting the intersection of geology and society.



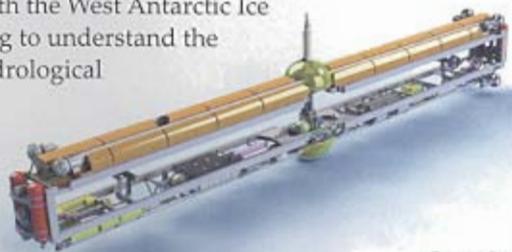
Randall Miller

44

## TRENDS AND INNOVATIONS

### SIR UNDER ICE

Researchers are turning to the new Sub-Ice ROVER to probe beneath the West Antarctic Ice Sheet, hoping to understand the complex hydrological forces deep below the frozen continent.



Carolyn Gramling

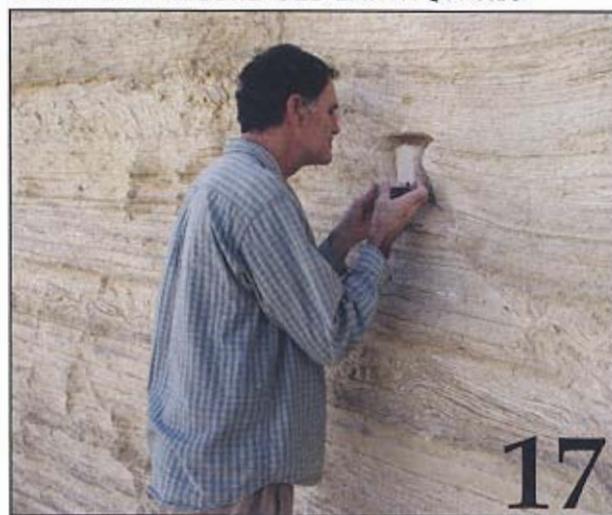
20

NEWS

- 8 YOUR GAS IS GRASS
- 9 SAUROPODS: VACUUM CLEANERS OF THE MESOZOIC
- 9 FAULT-RIDDLED LANDSCAPES ATTRACTED EARLY HUMANS
- 10 EXPLORING AFAR'S PRESENT TO UNDERSTAND THE PAST



- 11 ANCIENT VEGETARIAN HAD A BIG BITE
- 12 STUDY FINDS NO LINK BETWEEN DISTANT, BIG EARTHQUAKES
- 13 IT'S IN THE SHEAR: FASTER PLATES, MORE DEFORMATION, MORE VOLCANOES
- 14 FOAMY GASES MAKE VOLCANOES SING?
- 15 SOOT ON SNOW INTENSIFIES ASIAN MONSOONS
- 16 OIL SPILL OFFERS ATMOSPHERIC SCIENTISTS CLUES TO AEROSOLS
- 17 TITAN STORM BRINGS APRIL SHOWERS
- 17 SEDIMENTS RECORD OLD EARTHQUAKES



- 18 NEW OLD IMPACT FOUND IN AUSTRALIA
- 19 MINERAL RESOURCE OF THE MONTH: TITANIUM

VIEWS

RECEIVED COMMENT

NUCLEAR PLANTS AND NATURAL DISASTERS: FUKUSHIMA'S FALLOUT

Nuclear power has been one of the go-to energy options in the last few years, especially as oil prices increase. But how palatable will nuclear energy be worldwide following the disaster in Japan?

Rasoul Sorkhabi

72 GEOLOGIC COLUMN

GOOD NEWS FROM NASA'S MESSENGER OF THE GODS

In March, the MESSENGER spacecraft tucked into orbit around Mercury. It will orbit the planet 700 times over the next year, taking photos and collecting data.

Lisa A. Rossbacher

P. 20f2

RECEIVED  
2011 MAY 17 PM 12:4  
USM-WRC  
DENVER, CO, USA

DEPARTMENTS

- 4 FROM THE MANAGING EDITOR
- 6 LETTERS: PERSPECTIVES FROM READERS
- 53 GEOMEDIA  
On the Web: Lend Climate Scientists Your Computer at Weatherathome.net  
Books: Demystifying "The Power of the Sea"  
Books: On the Shelf: "Born in Africa"
- 56 CROSS-SECTION: A PUZZLE
- 57 WHERE ON EARTH?
- 58 BENCHMARKS  
June 22, 1969: The Cuyahoga Burns



- 60 DOWN TO EARTH WITH STRATIGRAPHER, SOCCER REFEREE AND ITHACA-HUNTER JOHN UNDERHILL
- 62 EARTH PRODUCT SPOTLIGHT
- 64 GEOMARKETPLACE
- 66 CLASSIFIEDS: CAREER OPPORTUNITIES

RECEIVED

MAY -3 PM 4:10

## SPECIAL REPORT

## The Top 500 Design Firms

**59** With the private-sector market seemingly on the verge of recovery, many large design firms worry that the market might be faltering.

Cover illustration by Peter Bollinger; rendering courtesy of SmithGroup



#69

**SMITHGROUP**, like many Top 500 Firms, is finding green pastures abroad, working on projects like this 428,000-square-meter R&D plant in China.



Dry casks v. wet pools. Page 12

## NEWS

## Environment

- 12 Nuclear:** Dry-cask storage for spent fuel
- 26 Flood Protection:** CBY lands big contract

## Buildings

- 14 Collapse Prevention:** Engineers seek ways to warn of impending failures

## UPCOMING ISSUES

- May 2 Web News and Updates
- May 9 Buildings Report
- May 16 The Top 400 Contractors
- May 23 Technology

## Engineering News-Record

The McGraw-Hill Companies  
Serving the industry since 1874

offices: Two Penn Plaza, New York, N.Y. 10121-2298. Phone (212) 512-2000. Postmaster: Please send address changes to ENR/Engineering News-Record, Attention: Fulfillment Manager, P.O. Box 5730, Harlan, IA 51593. Periodicals postage paid at New York, N.Y., and at additional mailing offices. Canada Post Publication Mail Agreement No. 40012501. Registered for GST as The McGraw-Hill Companies. GST #R123075673. RETURN UNDELIVERABLE CANADIAN ADDRESSES TO: DHL Global Mail, 355 Admiral Blvd Unit 4, Mississauga, ON L5T 2N1. Email: enrcustserv@cdsfulfillment.com. Copyright, printing and reprinting: Titles Engineering News-Record (ENR) and CONSTRUCTION WEEK reg. ® in U.S. Patent Office. Copyright © 2011 by The McGraw-Hill Companies. All rights reserved. Officers of The McGraw-Hill Companies, Inc.: Harold W. McGraw III, Chairman, President, and Chief Executive Officer; Jack F. Callahan Jr., Executive Vice President and Chief Financial Officer; Kenneth M. Vittor, Executive Vice President and

General Counsel. McGraw-Hill Construction; Keith Fox, President; John Murphy, Director, Finance. Where necessary, permission is granted by copyright owner for those registered with Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, Mass. 01923, www.copyright.com, to photocopy any article herein for personal or internal reference use only for the flat fee of \$1.20 per copy for each article. Send payment to CCC, ISSN 0891-9526/92. Copying for other than personal or internal reference use without express permission of The McGraw-Hill Companies is prohibited. Write the editor to request such permission. Printed in the USA. Subscription rates for individuals in the field of the publication: U.S. and possessions, \$82 per year (single copies \$9.95 in U.S.); Canada and Mexico, \$89 per year; outside North America, \$195 per year. Please allow four to six weeks for shipment. Subscriber service and single copies: (877) 876-8208 or (515) 237-3681. Send all correspondence, notices and subscription orders to Fulfillment Manager, ENR, P.O. Box 5730, Harlan, IA 51593. If possible, attach address label from a recent issue. Please contact customer service to change your name or address. If the postal authorities alert us that your magazine is undeliverable, we have no further obligation unless we receive a corrected address within two years. Please allow a month for change of address to take effect. Classified advertising: Send ads to ENR, Classified Advertising, Two Penn Plaza, 9th Floor, New York, NY 10121. Phone (212) 904-2815.

## Business &amp; Economics

- 16 Legal:** Nation's high court hears global-warming arguments
- 16 Research:** Survey shows optimization opportunity for prefabrication
- 18 Companies:** Design-firm CFOs relate post-recession strategies

## Power &amp; Industrial

- 18 Transmission:** Power line faces a rocky route
- 20 Disasters:** U.S. engineering firms assist TEPCO with cleanup program
- 22 Nuclear Cleanup:** Robot loaders and massive pumps head to Japan plant



U.S. equipment aids in Japan relief. Page 22

## DEPARTMENTS

- 4** Online
- 9** Construction Week
- 11** Washington Observer
- 29** Technology
- 51** Construction Economics
- 54** Products
- 99** Pulse
- 108** Official Proposals (cont. on p. 109)
- 112** Editorials



## For subscriber services call:

(877) 876-8208 or (515) 237-3681

GO TO MY.ENR.COM FOR PASSWORD-PROTECTED ONLINE ACCESS.

Not getting ENR Insider and News Alerts? Please call (877) 876-8208

**enr.com**

ADDITIONAL CONTENT ONLINE

RECEIVED

## COVER STORY

## Gang's Forms

**26** Architect Jeanne Gang inspects the custom formwork system for the undulating slab edges of her first high-rise, the 859-ft-tall Aqua Tower. Gang, considered a talented designer, is known for her commitment to sustainable architecture, her innovative use of materials and her engagement in construction methods.



Cover photo by Steve Hall/Hedrich Blessing; photo above courtesy of Studio Gang Architects

## NEWS

## Environment

**12** Japan's Tsunami: Rescuing perishable data

**16** Waste Cleanup: Los Alamos settles runoff lawsuit

## Water and Power

**14** Disasters: Utilities scramble to restore power to zone hit by storms

**14** Flood Control: Corps blasts levee near Cairo, Ill.

**15** Flood Protection: Circular-cell cofferdam saves time, cost and concrete



ASCE teams in Japan's disaster zone. Page 12

## Business &amp; Economics

**16** Legal: NYC Fire trial judge orders lawyers to speed up case

**17** Workforce: First national conference for women in the trades

**22** Companies: Spain's ACS moves to fix hold on German builder Hochtief

## Transportation

**18** Emergency Response: St. Louis Airport makeover weathers April 22 tornado

**18** Rail: USDOT: N.J. must repay tunnel aid

## DEPARTMENTS

- 4 Calendar
- 9 Construction Week
- 11 Washington Observer
- 24 Technology
- 25 People
- 32 Construction Economics
- 34 Products
- 42 Pulse
- 45 Official Proposals (cont. on pp. 46-47)
- 48 Editorial



## For subscriber services call:

(877) 876-8208 or (515) 237-3681

GO TO MY.ENR.COM FOR PASSWORD-PROTECTED ONLINE ACCESS.

Not getting ENR Insider and News Alerts? Please call (877) 876-8208

**enr.com**

ADDITIONAL CONTENT ONLINE

## UPCOMING ISSUES

May 16 The Top 400 Contractors

May 23 U.S. Tsunami Risks

May 30 Web News and Updates

June 8 Top 100 Project Delivery Firms

## Engineering News-Record

The McGraw-Hill Companies

SERVING THE INDUSTRY SINCE 1827

offices: Two Penn Plaza, New York, N.Y. 10121-2298. Phone (212) 512-2000. Postmaster: Please send address changes to ENR/Engineering News-Record, Attention: Fulfillment Manager, P.O. Box 5730, Harian, IA 51593. Periodicals postage paid at New York, N.Y., and at additional mailing offices. Canada Post Publication Mail Agreement No. 40012501. Registered for GST as The McGraw-Hill Companies. GST #R123075673. RETURN UNDELIVERABLE CANADIAN ADDRESSES TO: DHL Global Mail, 355 Admiral Blvd-Unit 4, Mississauga, ON L5T 2N1. Email: enrsubs@mcgraw-hill.com. Copyright, printing and reprinting: Titles Engineering News-Record (ENR) and CONSTRUCTION WEEK reg. ® in U.S. Patent Office. Copyright © 2011 by The McGraw-Hill Companies. All rights reserved. Officers of The McGraw-Hill Companies, Inc.: Harold W. McGraw III, Chairman, President, and Chief Executive Officer; Jack F. Callahan Jr., Executive Vice President and Chief Financial Officer; Kenneth M. Vittor, Executive Vice President and

ENR (Engineering News-Record), (ISSN 0891-9526). Published weekly 3 issues a month; 36 weeks a year by The McGraw-Hill Companies, 1221 Ave. of the Americas, New York, N.Y. 10020. Founder: James H. McGraw (1860-1948). Executive, editorial, circulation, advertising

General Counsel, McGraw-Hill Construction: Keith Fox, President; John Murphy, Director, Finance. Where necessary, permission is granted by copyright owner for those registered with Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, Mass. 01923, www.copyright.com, to photocopy any article herein for personal or internal reference use only for the flat fee of \$1.20 per copy for each article. Send payment to CCC. ISSN 0891-9526/92. Copying for other than personal or internal reference use without express permission of The McGraw-Hill Companies is prohibited. Write the editor to request such permission. Printed in the USA. Subscription rates for individuals in the field of the publication: U.S. and possessions, \$82 per year (single copies \$9.95 in U.S.); Canada and Mexico, \$89 per year, outside North America, \$195 per year. Please allow four to six weeks for shipment. Subscriber service and single copies: (877) 876-8208 or (515) 237-3681. Send all correspondence, notices and subscription orders to Fulfillment Manager, ENR, P.O. Box 5730, Harian, IA 51593. If possible, attach address label from a recent issue. Please contact customer service to change your name or address. If the postal authorities alert us that your magazine is undeliverable, we have no further obligation unless we receive a corrected address within two years. Please allow a month for change of address to take effect. Classified advertising: Send ads to ENR, Classified Advertising, Two Penn Plaza, 9th Floor, New York, NY 10121. Phone (212) 904-2815.

"ENR"

May 16, 2011

Contents

Volume 266 • Number 14

RECEIVED

SPECIAL REPORT

THE TOP 400 CONTRACTORS

65 Contractors are holding on despite a recessionary market by focusing on diversification, smart bidding and helping to find project financing. But some contractors fear that, without a market recovery, this could be the year when firms begin to fail.

KBR acquired in 2010 the 50% of M.W. Kellogg Ltd. it did not already own, which should help with jobs such as the SEGAS LNG in Egypt, where Kellogg and KBR worked together.



Cover illustration by Peter Bollinger; photo right courtesy of KBR Inc.

NEWS

Business and Economics

- 14 Safety and Health: Enforcing the new OSHA crane rules
23 Labor Relations: Will painters union set trend in 2011 New York bargaining?
24 Corruption: Interiors firms charged again

Water & Power

- 16 Flood Control: Corps tries to tame raging river by opening spillways
28 Alternative Energy: New England partners push big solar brownfields project
33 Power: Work starts on record-scale carbon-capture powerplant

Transportation

- 18 Litigation: U.S. court again halts road in Alaska wild, citing its EIS

UPCOMING ISSUES

- May 23 U.S. Tsunami Risks
May 30 Web News and Updates
June 8 Top 100 Project Delivery Firms
June 13 Top 100 Professional Service Firms



Orange droplets help ironworkers. Page 104

- 19 Federal Funding: NE corridor scores big share of rail aid Florida rejected

Environment

- 21 Water Supply: Report blasts plan to protect California Bay-Delta's wildlife
30 Urban Development: Israel tries innovative solution at decades-old waste dump

Buildings

- 27 Structural Guidelines: Defensive-design aid coming

enr.com

ADDITIONAL CONTENT ONLINE

DEPARTMENTS

- 6 Online
8 Dialogue
11 Construction Week
13 Washington Observer
57 People
60 Equipment Tracks & Trends
61 Construction Economics
102 Technology
104 Products in Practice
106 Pulse
115 Official Proposals (cont. on p. 116)
119 Viewpoint (cont. on p. 120)



For subscriber services call: (877) 876-8208 or (515) 237-3681

GO TO MY.ENR.COM FOR PASSWORD-PROTECTED ONLINE ACCESS.

Not getting ENR Insider and News Alerts? Please call (877) 876-8208

Engineering News-Record

The McGraw-Hill Companies

ENR (Engineering News-Record), (ISSN 0891-9526). Published weekly 3 issues a month; 36 weeks a year by The McGraw-Hill Companies, 1221 Ave. of the Americas, New York, N.Y. 10020. Founder: James H. McGraw (1860-1948). Executive, editorial, circulation, advertising offices: Two Penn Plaza, New York, N.Y. 10121-2298. Phone (212) 512-2000. Postmaster: Please send address changes to ENR/Engineering News-Record, Attention: Fulfillment Manager, P.O. Box 5730, Harlan, IA 51593. Periodicals postage paid at New York, N.Y., and at additional mailing offices. Canada Post Publication Mail Agreement No. 40012501. Registered for GST as The McGraw-Hill Companies. GST #R123075673. RETURN UNDELIVERABLE CANADIAN ADDRESSES TO: DHL Global Mail, 355 Admiral Blvd-Unit 4, Mississauga, ON L5T 2W1. Email: enrsubs@mcgraw-hill.com. Copyright, printing and reprinting: Titles Engineering News-Record (ENR) and CONSTRUCTION WEEK reg. ® in U.S. Patent Office. Copyright © 2011 by The McGraw-Hill Companies. All rights reserved. Officers of The McGraw-Hill Companies, Inc.: Harold W. McGraw III, Chairman, President, and Chief Executive Officer; Jack F. Callahan Jr., Executive Vice President and Chief Financial Officer; Kenneth M. Vittor, Executive Vice President and

General Counsel McGraw-Hill Construction; Keith Fox, President; John Murphy, Director, Finance. Where necessary, permission is granted by copyright owner for those registered with Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, Mass. 01923, www.copyright.com, to photocopy any article herein for personal or internal reference use only for the flat fee of \$1.20 per copy for each article. Send payment to CCC. ISSN 0891-9526/92. Copying for other than personal or internal reference use without express permission of The McGraw-Hill Companies is prohibited. Write the editor to request such permission. Printed in the USA. Subscription rates for individuals in the field of the publication: U.S. and possessions, \$82 per year (single copies \$9.95 in U.S.); Canada and Mexico, \$89 per year; outside North America, \$195 per year. Please allow four to six weeks for shipment. Subscriber service and single copies: (877) 876-8208 or (515) 237-3681. Send all correspondence, notices and subscription orders to Fulfillment Manager, ENR, P.O. Box 5730, Harlan, IA 51593. If possible, attach address label from a recent issue. Please contact customer service to change your name or address. If the postal authorities alert us that your magazine is undeliverable, we have no further obligation unless we receive a corrected address within two years. Please allow a month for change of address to take effect. Classified advertising: Send ads to ENR, Classified Advertising, Two Penn Plaza, 9th Floor, New York, NY 10121. Phone (212) 904-2815.

PHOTOS COURTESY OF APPLIED BUILDING

"ENR"

May 23, 2011

Contents

Volume 266 • Number 15

RECEIVED

2011 MAY 25 PM 4:47

COVER STORY

Searching for Clues

20 A 630-mile-long undersea geologic feature in the Pacific Northwest has engineers and emergency planners concerned that a deadly quake and tsunami could strike at any moment. What are they doing to prepare?

Photo right by Tom Sawyer/ENR



FEATURE

Combating Sewer Overflows

18 In London, construction is set to begin on the \$7-billion Thames Tideway project, which includes 39 kilometers of deep tunnels to intercept about 16 million tonnes of effluent annually.



A major plumbing job in London. Page 18

NEWS

Buildings

10 Virtual Design: Lawsuit reveals that BIM without communication can be costly

Environment

- 12 Flood Control: Corps pulls out all the stops to cope with rising river
- 13 Military Construction: Sudden delay in Japan-funded work on Guam worries bidders
- 14 Nuclear Waste: Huge waste plant progresses at Hanford, with new twists

Business & Economics

- 13 Storm Defenses: Contractors install gates to close New Orleans barrier
- 14 Immigration Reform: Georgia expands e-Verify rules

Water & Power

- 15 Hydropower: Alaska lawmakers approve dam and 600-MW powerplant
- 17 Alternative Energy: Wind tax-credit extension promising, says AWEA staffer

Transportation

- 17 Infrastructure: Florida contractors seek road fund

DEPARTMENTS

- 4 Update
- 6 Letters
- 7 Construction Week
- 9 Washington Observer
- 16 Technology
- 26 Construction Economics
- 28 People
- 29 Products
- 30 Pulse
- 57 Official Proposals (cont. on pp. 58-59)
- 60 Viewpoint



For subscriber services call: (877) 876-8208 or (515) 237-3681

GO TO MY.ENR.COM FOR PASSWORD-PROTECTED ONLINE ACCESS.

Not getting ENR Insider and News Alerts? Please call (877) 876-8208

enr.com ADDITIONAL CONTENT ONLINE

**UPCOMING ISSUES**  
 May 30 Web News and Updates  
 June 8 Top 100 Project Delivery Firms  
 June 13 Top 100 Professional Service Firms  
 June 25 Second Quarterly Cost Report

Engineering News-Record

The McGraw-Hill Companies

offices: Two Penn Plaza, New York, N.Y. 10121-2298. Phone (212) 512-2298. Published weekly 3 issues a month; 36 weeks a year by The McGraw-Hill Companies, 1221 Ave. of the Americas, New York, N.Y. 10020. Founder: James H. McGraw (1860-1948). Executive, editorial, circulation, advertising Postmaster: Please send address changes to ENR/Engineering News-Record, Attention: Fulfillment Manager, P.O. Box 5730, Harlan, IA 51593. Periodicals postage paid at New York, N.Y., and at additional mailing offices. Canada Post Publication Mail Agreement No. 40012501. Registered for GST as The McGraw-Hill Companies. GST #R123075673. RETURN UNDELIVERABLE CANADIAN ADDRESSES TO: DHL Global Mail, 355 Admiral Blvd-Unit 4, Mississauga, ON L5T 2N1. Email: enrsubs@cdsfulfillment.com. Copyright, printing and reprinting: Titles Engineering News-Record (ENR) and CONSTRUCTION WEEK reg. ® in U.S. Patent Office. Copyright © 2011 by The McGraw-Hill Companies. All rights reserved. Officers of The McGraw-Hill Companies, Inc.: Harold W. McGraw III, Chairman, President, and Chief Executive Officer; Jack F. Callahan Jr., Executive Vice President and Chief Financial Officer; Kenneth M. Vittor, Executive Vice President and

General Counsel. McGraw-Hill Construction: Keith Fox, President; John Murphy, Director, Finance. Where necessary, permission is granted by copyright owner for those registered with Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, Mass. 01923, www.copyright.com, to photocopy any article herein for personal or internal reference use only for the flat fee of \$1.20 per copy for each article. Send payment to CCC, ISSN 0891-9526/92. Copying for other than personal or internal reference use without express permission of The McGraw-Hill Companies is prohibited. Write the editor to request such permission. Printed in the USA. Subscription rates for individuals in the field of the publication: U.S. and possessions, \$82 per year (single copies \$9.95 in U.S.); Canada and Mexico, \$89 per year; outside North America, \$195 per year. Please allow four to six weeks for shipment. Subscriber service and single copies: (877) 876-8208 or (515) 237-3681. Send all correspondence, notices and subscription orders to Fulfillment Manager, ENR, P.O. Box 5730, Harlan, IA 51593. If possible, attach address label from a recent issue. Please contact customer service to change your name or address. If the postal authorities alert us that your magazine is undeliverable, we have no further obligation unless we receive a corrected address within two years. Please allow a month for change of address to take effect. Classified advertising: Send ads to ENR, Classified Advertising, Two Penn Plaza, 9th Floor, New York, NY 10121. Phone (212) 904-2815.

General Counsel. McGraw-Hill Construction: Keith Fox, President; John Murphy, Director, Finance. Where necessary, permission is granted by copyright owner for those registered with Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, Mass. 01923, www.copyright.com, to photocopy any article herein for personal or internal reference use only for the flat fee of \$1.20 per copy for each article. Send payment to CCC, ISSN 0891-9526/92. Copying for other than personal or internal reference use without express permission of The McGraw-Hill Companies is prohibited. Write the editor to request such permission. Printed in the USA. Subscription rates for individuals in the field of the publication: U.S. and possessions, \$82 per year (single copies \$9.95 in U.S.); Canada and Mexico, \$89 per year; outside North America, \$195 per year. Please allow four to six weeks for shipment. Subscriber service and single copies: (877) 876-8208 or (515) 237-3681. Send all correspondence, notices and subscription orders to Fulfillment Manager, ENR, P.O. Box 5730, Harlan, IA 51593. If possible, attach address label from a recent issue. Please contact customer service to change your name or address. If the postal authorities alert us that your magazine is undeliverable, we have no further obligation unless we receive a corrected address within two years. Please allow a month for change of address to take effect. Classified advertising: Send ads to ENR, Classified Advertising, Two Penn Plaza, 9th Floor, New York, NY 10121. Phone (212) 904-2815.

PHOTO COURTESY THAMES WATER

RECEIVED

MAY 10 AM 10:5

# 05.2011

OSM-WRE  
DENVER, COLORADO

*p. 1 of 2*



## FEATURES

**26 HOW BAD IS IT?**  
State and local leaders have taken to saying, 'We're broke.' The true story is a lot more complicated.  
*By Ryan Holeywell*

**32 HELP FOR THE HELPERS**  
Nonprofits deliver the lion's share of health and human services. Right now, they need all the support states can give them.  
*By Jonathan Walters*

**36 THINKING SMALL**  
Cities are struggling to increase residential density without destroying their established single-family neighborhoods. In Seattle, that means the return of the backyard cottage.  
*By Zach Patton*

**42 CODE CURE**  
To move ahead on a low-energy future, states and localities are turning to their building codes.  
*By Linda Baker*

**48 MAKING PRISON WORK**  
States are increasingly utilizing prison labor to plug budget holes, but public employee unions aren't happy.  
*By Russell Nichols*

Inmates haul hay at a prison in Cañon City, Colo.

*(cont.)*

- 5 In This Issue
- 6 Letters
- 8 Dispatch  
Can free-market thinking fix the food stamp program?

## POLITICS + POLICY

- 11 Observer  
A difficult first year doesn't mean new governors won't win re-election.
- 14 At Issue  
Spring training is over, but the stadium debate isn't.
- 16 Potomac Chronicle  
When it comes to bankruptcy, we can't rely on fiction.
- 17 FedWatch  
Federal land-use policies anger public officials in the West.
- 18 Health  
Does a new county program aimed at reducing smoking cross the privacy line?
- 20 Green Government  
The consolidation trend is reaching state natural resource agencies.
- 22 Economic Engines  
Are temporary jobs the future of economic development?
- 23 Urban Notebook  
The lack of access to fresh food in cities is growing worse.



23



22

## PROBLEM SOLVER

- 54 Data-Driven Policing  
Geomapping helps law enforcement fight crime while lowering traffic incidents.
- 56 Smart Management  
When is a shortfall a budget gap and not a budget deficit?
- 58 Idea Center  
Five localities are on a mission to eliminate junk-mail waste.
- 60 Tech Talk  
A new standard solves an Internet address shortage while opening the door to innovation.
- 62 Public Money  
Have states and localities borrowed too much?
- 64 Player  
The nuclear crisis in Japan has put one public utility commissioner in the spotlight.

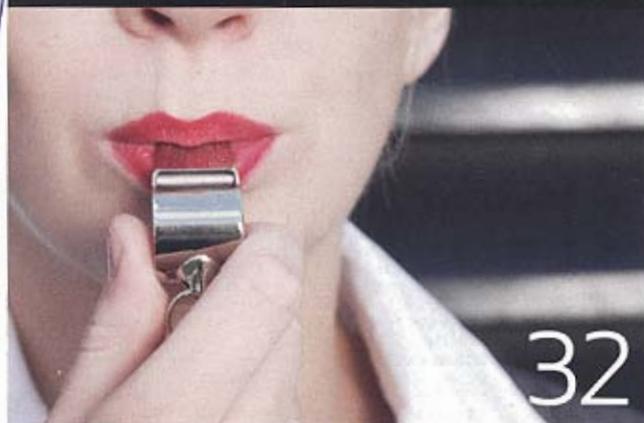
18



# Contents

MAY 2011 VOL. 43 NO. 5

Government Executive  
CLOCKWISE FROM TOP: LISA STIRLING/GETTY IMAGES; GETTY IMAGES; ILLUSTRATION BY STEPHEN WEBSTER



## FEATURES

### Smarter Hiring 24

Agencies are slashing the time it takes to bring on new employees, but it will take more than that to keep top talent from slipping through the cracks. *By Emily Long*

### Whistling in the Dark 32

Congress expands protections for exposing corporate fraud, but government whistleblowers still wait. *By Robert Brodsky*

## TRENDS

### Oil and Water 11

A new regulator is caught between industry and safety. *By William Matthews*

### Labor Fight Renewed 16

Republican lawmakers balk at deals that require union pay for contract workers. *By Robert Brodsky*

### Into the Budget Morass 18

A delayed project to improve immigration processing is pulling resources and morale off course. *By Aliya Sternstein*

## ANALYSIS

### Soft Landings 41

Managing Technology Agencies concerned about sensitive data take incremental steps into the cloud. *By Adam Stone*

### IT Modernization 46

Management Matters Managers get the why, now they must figure out how. *By Elizabeth Newell*

### The Price of Candor 48

Intelligence File When it comes to the toughest calls, lawmakers can't always handle the truth. *By Shane Harris*

### Beyond the Budget 50

Viewpoint Senior executives can inspire innovation, even under fiscal constraints. *By Jennifer Buck and Henry Fischer*

### Breaking Language Barriers 52

Viewpoint The National Security Education Program is filling a critical need for international skills. *By Richard Comfort*



## IN EVERY ISSUE

### Editor's Notebook 4

Near-shutdown experience was no cause for celebration. *By Tom Shoop*

### The Briefing 7

Global warning for the Navy and Coast Guard, leading with the mind, do-it-yourself deficit cuts, and in war's wake.

### Perspectives 54

The duplication refrain is crucial in the rhetoric of cutting back government. *By Timothy B. Clark*

RECEIVED  
MAY 9 2011  
AM 9:15  
U.S. DEPARTMENT OF COMMERCE  
WASHINGTON, D.C. 20540

Cover illustration by Stephen Webster

# Contents

JUNE 2011 VOL. 43 NO. 6



26

## FEATURES

### To the Brink 18

How did the federal government come within an hour of shutting down?  
*By Robert Brodsky*

### One Giant Leap 26

NASA must look beyond the earthly demands of deficit cutting and politics to chart its course.  
*By Rebecca Carroll*



11

## TRENDS

### Masters of Disaster 11

As casualties mount, so do the number of agencies involved in the cleanup.  
*By Kellie Lunney*

### Just Rewards 16

Eliminating second chances for contractor incentives could save millions, auditors say.  
*By Aliya Sternstein*



38



35

## ANALYSIS

### Down to a Science 35

**Managing Technology** From nanotech to biotech, R&D funding reaches beyond agency missions.  
*By Adam Stone*

### The Myth of Multitasking 38

**Management Matters** Trying to tackle that pile of work all at once could be slowing you down.  
*By Elizabeth Newell*

### Back to the Basics 40

**Viewpoint** A simple strategy for a complex cyber threat.  
*By Jerry Cochran*

## IN EVERY ISSUE

### Editor's Notebook 4

The consequences of budget brinkmanship.  
*By Tom Shaop*

### The Briefing 7

The cream of the civil service crop, being virtually there with vGov, federal fuel use and more.

### Perspectives 42

Adm. Mullen says military institutions must be built around the needs of their people.  
*By Timothy B. Clark*

RECEIVED  
2011 MAY 31 PM 3:23  
DENVER, COLORADO

Cover photograph by Peter Cade/Getty Images

CLOCKWISE FROM TOP: GETTY IMAGES; COURTESY FEMA; DAN PAGE; ANSCUTTER

# Information Security Journal: A Global Perspective

Volume 20 ■ Issue 2 ■ 2011

---

## EDITORIAL

65

*Nicolas Sklavos*

---

## REGULAR ARTICLES

67

Secure Dynamic Identity-Based Authentication Scheme Using Smart Cards  
*Sandeep K. Sood*

78

MBNS Steganogram Detection and Payload Capacity Estimation Exploiting the Statistical Moments of Entropy Measure  
*S. Geetha and N. Kamaraj*

91

Tokenization and Other Methods of Security for Cardholder Data  
*Jeff Stapleton and Ralph Spencer Poore*

100

Cookie-Based Virtual Password Authentication Protocol  
*Sandeep K. Sood*

112

Web Authentication Protocol Using Zero Knowledge Proof  
*U. Thiruvazhi and R. Divya*

RECEIVED

2011 MAY 24 AM 8:10

CSM-WRC  
DENVER, COLORADO

p. 1 of 3

**SPECIAL SUBMISSIONS: ADVANCED IN SITU  
SPECTROSCOPIC TECHNIQUES AND THEIR APPLICATIONS  
IN ENVIRONMENTAL BIOGEOCHEMISTRY**

*This special collection of papers focuses on the advances in the use of in situ spectroscopic techniques in environmental biogeochemistry. Special thanks are extended to guest editors Ganga M. Hettiarachchi and Kirk G. Scheckel.*

- 659 **Advanced in situ Spectroscopic Techniques and Their Applications in Environmental Biogeochemistry: Introduction to the Special Section**  
*Enzo Lombi, Ganga M. Hettiarachchi, and Kirk G. Scheckel*
- 667 **X-ray Microspectroscopy and Chemical Reactions in Soil Microsites**  
*Dean Hesterberg, Martine C. Duff, Joe B. Dixon, and Michael J. Vepraskas*
- 679 **Cobalt Distribution and Speciation: Effect of Aging, Intermittent Submergence, In Situ Rice Roots**  
*Douglas G. Beak, Jason K. Kirby, Ganga M. Hettiarachchi, Laura A. Wendling, Michael J. McLaughlin, and Raju Khatiwada*
- 696 **Enhanced Transformation of Lead Speciation in Rhizosphere Soils Using Phosphorus Amendments and Phytostabilization: An X-ray Absorption Fine Structure Spectroscopy Investigation**  
*Yohey Hashimoto, Masaki Takaoka, and Kenji Shiota*
- 704 **Speciation and Long- and Short-term Molecular-level Dynamics of Soil Organic Sulfur Studied by X-ray Absorption Near-Edge Structure Spectroscopy**  
*Dawit Solomon, Johannes Lehmann, Katrin Knott de Zarruk, Julia Dathie, James Kinyangi, Biqing Liang, and Stephen Machado*
- 719 **Infrared Monitoring of Dinitrotoluenes in Sunflower and Maize Roots**  
*K. M. Dakken and L. C. Davis*
- 731 **Applications of Time-Resolved Laser Fluorescence Spectroscopy to the Environmental Biogeochemistry of Actinides**  
*Richard N. Collins, Takumi Saito, Noboru Aoyagi, Timothy E. Payne, Takumi Kimura, and T. David Waite*

- 742 **Differential Individual Particle Analysis (DIPA): Applications in Particulate Matter Characterization**  
*Andrew Huns and David I. Johnson*
- 751 **Spectroscopic Approaches for Phosphorus Speciation in Soils and Other Environmental Systems**  
*Fiona Kizewski, Yu-Ting Liu, Amanda Morris, and Dean Hesterberg\**
- 767 **Combined Application of QEM-SEM and Hard X-ray Microscopy to Determine Mineralogical Associations and Chemical Speciation of Trace Metals**  
*Markus Gräfe, Matthew Landers, Ryan Tippero, Peter Austrin, Bee Gan, Alton Grabsch, and Craig Klauber*

**SPECIAL SUBMISSIONS: AGROFORESTRY SYSTEMS  
AND ENVIRONMENTAL QUALITY**

*This special collection originates from papers presented at the second World Congress of Agroforestry, Nairobi, Kenya, in August 2009. Special thanks are extended to guest editors Scott Chang, Vimala Nair, John Kort, and Damase Khasa.*

- 784 **Agroforestry Systems and Environmental Quality: Introduction**  
*P. K. Ramachandran Nair*
- 791 **Reducing Herbicides and Veterinary Antibiotics Losses from Agroecosystems Using Vegetative Buffers**  
*Chung-Ho Lin, Robert N. Lerch, Keith W. Coyne, and Harold E. Garrett*
- 800 **Agroforestry Buffers for Nonpoint Source Pollution Reductions from Agricultural Watersheds**  
*Ranjith P. Udawatta, Harold E. Garrett, and Robert Kallenbach*
- 807 **Sediment Measurement and Transport Modeling: Impact of Riparian and Filter Strip Buffers**  
*Daniel N. Moriasi, Jean L. Steiner, and Jeffrey G. Arnold*
- 815 **Environmental Impacts of the Shelter Forests in Horqin Sandy Land, Northeast China**  
*Q. I. Yan, J. J. Zhu, Z. B. Hu, and O. J. Sun*
- 825 **Soil Carbon Storage in Silvopastoral Systems and a Treeless Pasture in Northwestern Spain**  
*David S. Howlett, M. Rosa Mosquera-Losada,*

(cont.)

*This issue's cover: Silvopasture: Beef cattle grazing on *Brachiaria brizantha* (grass) grown under *Eucalyptus* hybrid trees on a farm (Fazenda Riacho) in Paracatu, Minas Gerais, Brazil. See P.K.R. Nair, "Agroforestry Systems and Environmental Quality: Introduction," p. 784. Photo by P.K.R. Nair.*

p. 2 of 3

RECEIVED  
2011 MAY 13  
0931-11  
DENVER, CO

P.K. Ramachandran Nair, Vimala D. Nair,  
and Antonio Rigueiro-Rodriguez

Bryan A. Stevenson, Louis A. Schipper, Alexandra McGill,  
and D. J. Clark

- 833 Soil Carbon Storage in Silvopasture and Related Land-Use Systems in the Brazilian Cerrado  
*Rafael G. Tonucci, P. K. Ramachandran Nair, Vimala D. Nair, Rasmio Garcia, and Fernando S. Bernardino*
- 842 A Spatial Model Approach for Assessing Windbreak Growth and Carbon Stocks  
*Qingjiang Hou, Linda J. Young, James R. Brandle, and Michele M. Schoeneberger*
- 853 Trees' Role in Nitrogen Leaching after Organic, Mineral Fertilization: A Greenhouse Experiment  
*M. L. López-Díaz, V. Rolo, and G. Moreno*
- 860 Diagnosis of Nutrient Imbalances with Vector Analysis in Agroforestry Systems  
*Marney E. Isaac and Anthony A. Kimaro*

A Spatial Analysis of Phosphorus in the Mississippi River Basin  
*William M. Jacobson, Mark B. David, and Laurie E. Drinkwater*

Organic Compounds in the Environment

- 942 Interactions of Carbamazepine in Soil: Effects of Dissolved Organic Matter  
*Rotem Navon, Selene Hernandez-Ruiz, Jon Chorover, and Benny Chefetz*

Surface Water Quality

- 949 Phosphorus and Nitrogen in Runoff after Phosphorus- or Nitrogen-based Manure Applications  
*Jim J. Miller, David S. Chanasyk, Tony W. Curtis, and Barry M. Olson*
- 959 Microbial and Chemical Markers: Runoff Transfer in Animal Manure-Amended Soils  
*Anne Jaffrezic, Emilie Jardé, Anne-Marie Pourcher, Michèle Gourmelon, Marie-Paule Caprais, Djilali Heddady, Patrice Cottinet, Muhammad Bilal, Morgane Derrien, Romain Marti, and Sophie Mieszkin*
- 969 Runoff Water Quality during Drought in a Zero-Order Georgia Piedmont Pasture: Nitrogen and Total Organic Carbon  
*Dinku M. Endale, Dwight S. Fisher, Lloyd B. Owens, Michael B. Jenkins, Harry H. Schomberg, Caroline L. Tebes-Stevens, and James V. Bonta*
- 980 *Escherichia coli* Load Reduction from Runoff by Vegetative Filter Strips: A Laboratory-Scale Study  
*Gary A. Fox, Emily M. Matlock, Jorge A. Guzman, Debabrata Sahoo, and Kevin B. Stunkel*
- 989 Controlling Runoff from Subtropical Pastures Has Differential Effects on Nitrogen and Phosphorus Loads  
*Patrick J. Bohlen and Odi R. Villapando*

REVIEWS & ANALYSES

- 867 Water Resources and Land Use and Cover in a Humid Region: The Southeastern United States  
*R. Chelsea Nagy, B. Graeme Lockaby, Brian Helms, Latif Kalin, and Denise Stoeckel*
- 879 Do Lab-Derived Distribution Coefficient Values of Pesticides Match Distribution Coefficient Values Determined from Column and Field-Scale Experiments? A Critical Analysis of Relevant Literature  
*H. Vereecken, J. Vanderborght, R. Kasteel, M. Spitzler, A. Schaffer, and M. Close*

TECHNICAL REPORTS

Atmospheric Pollutants and Trace Gases

- 899 Greenhouse Gas and Alcohol Emissions from Feedlot Steers and Calves  
*Kimberly R. Stackhouse, Yuee Pan, Yongjing Zhao, and Frank M. Mitloehner*
- 907 Tannin Extracts Abate Ammonia Emissions from Simulated Dairy Barn Floors  
*J. M. Powell, M. J. Aguerre, and M. A. Wattiaux*

Bioremediation and Biodegradation

- 915 Anaerobic Degradation of Vinyl Chloride in Aquifer Microcosms  
*Theo H. M. Smits, Antoine Assal, Daniel Hunkeler, and Christof Holliger*

Landscape and Watershed Processes

- 923 Denitrification and Availability of Carbon and Nitrogen in a Well-drained Pasture Soil Amended with Particulate Organic Carbon

Vadose Zone Processes and Chemical Transport

- 999 Effect of Tomato Packinghouse Wastewater Properties on Phosphorus and Cation Leaching in a Spodosol  
*Maninder K. Chahal, Gurbal S. Toor, Peter Nkedi-Kizza, and Bielinski M. Santos*

Waste Management

- 1010 Seasonal Greenhouse Gas Emissions (Methane, Carbon Dioxide, Nitrous Oxide) from Engineered Landfills: Daily, Intermediate, and Final California Cover Soils  
*Jean F. Bognier, Kurt A. Spokas, and Jeffrey P. Chanton*

(cont)

p. 30/3

**SHORT COMMUNICATIONS**

- 1021 A Method to Quantitatively Trap Volatilized Organoselenides for Stable Selenium Isotope Analysis

*Kathrin Schilling and Wolfgang Wilcke*

- 1030 Ecological Restoration: A Global Challenge, edited by Francisco A. Comín  
*Marty D. Matlock*

**BOOK REVIEWS**

- 1028 Wetland Ecosystems, by William J. Mitsch, James G. Gosselink, Christopher J. Anderson, and Li Zhang

*Martin S. A. Blackwell*

- 1029 What Americans Build and Why, by Ann Sloan Devlin

*Gary W. Feyereisen*

**ALSO IN THIS ISSUE**

- 1032 ACS324.1 *Journal of Environmental Quality* Editorial Board  
1039 Thanks to Our Reviewers  
1049 Erratum

The Journal of Explosives Engineering  
Published by International Society  
of Explosives Engineers  
30325 Bainbridge Road  
Cleveland, Ohio 44139  
www.isee.org

**Publisher**  
International Society of Explosives Engineers

**Editor**  
Dede Manross  
explo@comcast.net

**Contributing Writers**  
Paul Downing  
R.B. Hopler  
Bill Reisz

**Board of Directors**  
*President*  
Ron J. Elliott

*Vice President Administration*  
John E. Capers

*Vice President, Technical*  
Michael J. Koehler

*Treasurer*  
Jack W. Eloranta

*Secretary*  
Phyllis E. Hasser

*Past President*  
Jerry R. Wallace

*Directors*  
Nancy C. Allen  
James P. Daley  
Fred Grabner  
Algernon R. Hackett  
David Harrison  
Richard M. Hosley, Jr.  
Thomas S. Jenkins  
P. D. (Takis) Katsabanis  
José A. Sanchidrian  
Alastair C. Torrance  
Dean A. Wiegand  
John E. Wiegand

*Executive Director & General Counsel*  
Jeffrey L. Dean, IOM, CAE

*Deputy Executive Director*  
Christopher Howell, IOM, CAE

*Director of Communication*  
Dede Manross

*Meetings & Conference Manager*  
Lynn Mangol, CMP

*Office Manager*  
Mary Spina-Bosch

*Membership Coordinator*  
Ruth Schaefer

*Publications Coordinator*  
Meghan Hanrahan

*Meetings Assistant*  
Lauren Creneti

*SEE Education Foundation Program Director*  
Arlene Chafe

All correspondence should be directed to:  
International Society of Explosives Engineers,  
30325 Bainbridge Road, Cleveland, Ohio 44139  
Telephone: (440) 349-4400. Fax: (440) 349-3788.  
E-mail: isee@isee.org Website: www.isee.org

RECEIVED  
MAY 17 2011  
OSM-DENVER, CO

The Journal of **EXPLOSIVES ENGINEERING** www.isee.org

Volume 28 Number 3 May/June 2011

## FEATURES

- 6 **Seismic Blasting Between the North Poles**  
The ARTA 2008 Project (Alpha Ridge Test of Appurtenance) was a Canadian Government sponsored deep water seismic survey carried out on the high arctic permanent polar ice cap. This article will enlighten the reader to the complicated logistics, extreme working conditions, inherent dangers and the sights of operating a seismic camp and program near the North Pole, from a blasters point of view.
- 16 **SEE Education Foundation News**  
Reports on the annual clay shoot, auction and President's club awards.
- 28 **18th Annual Photo Contest Winners**
- 30 **Mitigating Loaded Blast Patterns Buried Beneath a High Wall Failure**  
During December 2007, Lake Cowal Gold Mine located in New South Wales, Australia experienced a significant pit wall failure. This wall failure ultimately buried two loaded blast patterns. This article discusses the successful completion of the recovery process and techniques employed to safely recover the buried blasting patterns.

## DEPARTMENTS

- 4 **From the President**
- 18 **Industry News**
- 20 **Calendar of Events**  
A list of upcoming events in the explosives industry
- 22 **Explosives, 100 Years Ago, More or Less**  
A primer on explosives for coal mines.



**On the Cover: Seismic Blasting Between the North Poles.** Blaster, Kirby Kleiter getting ready to drop the 175 kilos on a 100 meter rope. See story, page 6.

Copyright ©2011 Society of Explosives Engineers, Inc., dba International Society of Explosives Engineers

The Journal of Explosives Engineering, published six times per year, is the official publication of the International Society of Explosives Engineers. The Society is not responsible for opinions expressed and statements made by authors in articles or advertisements published in the Journal. ISEE assumes no responsibility for the completeness, accuracy or conclusions reached in any of the articles or items published in this Journal.

Since the information is unique and because each job site is different, information presented in this Journal may not apply to your specific field situation. Readers are cautioned to carefully consider ideas presented and decide for themselves if the procedures described are safe and appropriate for the intended use. The International Society of Explosives Engineers cannot be responsible for the specific application of the information presented. Also, remember to always consult the manufacturer of the product(s) you are using for recommended practices.

Mention in this publication of a commercial or proprietary product does not constitute an endorsement or recommendation for its use. Registered names, trademarks, logos, artwork, photographs, etc., used in this publication, even without specific indication thereof, are to be considered protected by law.

Yearly subscription rates: \$95 U.S.A., \$115 all others (International Air Mail). All members of the Society receive a complimentary subscription.



TABLE OF CONTENTS

FEATURED COLLECTION: ISSUES IN WATER QUALITY TRADING  
MATT HEBERLING - COLLECTION EDITOR

p. 1 of 2

FEATURED COLLECTION PAPERS

Issues in Water Quality Trading: Introduction to Featured Collection  
- *Matthew T. Heberling*..... 1

Point-Nonpoint Trading - Can It Work?  
- *Marc O. Ribardo and Jessica Gottlieb*..... 5

Rhetoric and Reality of Water Quality Trading and the Potential for Market-like Reform  
- *Kurt Stephenson and Leonard Shabman*..... 15

A Watershed Approach to Improve Water Quality: Case Study of Clean Water Services' Tualatin  
River Program  
- *Bobby Cochran and Charles Logue* ..... 29

Sociopolitical Conditions for Successful Water Quality Trading in the South Nation River  
Watershed, Ontario, Canada  
- *Dennis O'Grady* ..... 39

Optimal Pollution Trading Without Pollution Reductions: A Note  
- *Jorge H. Garcia, Matthew T. Heberling, and Hale W. Thurston* ..... 52

Economic and Ecological Rules for Water Quality Trading  
- *Richard D. Horan and James S. Shortle*..... 59

ADDITIONAL TECHNICAL PAPERS

Water Dispatch Model for Middle Route of a South-to-North Water Transfer Project in China  
- *Jian-xia Chang, Yi-min Wang, and Qiang Huang*..... 70

Methodology for Developing Flood Rule Curves Conditioned on El Niño-Southern Oscillation  
Classification  
- *Se-Yeun Lee, Alan F. Hamlet, Carolyn J. Fitzgerald, and Stephen J. Burges*..... 81

Wind-Powered Desalination: An Estimate of Saline Groundwater in the United States  
- *James Androwski, Abraham Springer, Thomas Acker, and Mark Manone* ..... 93

Transboundary Groundwater Policy: Developing Approaches in the Western and Southwestern  
United States  
- *Deborah L. Hathaway* ..... 103

Using A GIS Model to Identify Internally Drained Areas and Runoff Contribution in a Glaciated  
Watershed  
- *Jacob A. Macholl, Katherine A. Clancy, and Paul M. McGinley*..... 114

Simulated Impacts of Three Decadal Climate Variability Phenomena on Water Yields in the  
Missouri River Basin  
- *Vikram M. Mehta, Norman J. Rosenberg, and Katherin Mendoza*..... 126

Seasonal Flushing of Pollutant Concentrations and Loads in Urban Stormwater  
- *Kenneth C. Schiff and Liesl L. Tiefenthaler* ..... 136

Alaska's Freshwater Resources: Issues Affecting Local and International Interests  
- *Lilian Alessa, Mark Altaweel, Andrew Kliskey, Christopher Bone, William Schnabel,  
and Kalb Stevenson*..... 143

RECEIVED  
2011 MAY 24 AM 8:51  
JENNER. COLLEGE

(cont.)

Extent and Channel Morphology of Unmapped Headwater Stream Segments of the Quabbin Watershed, Massachusetts  
- Robert T. Brooks and Elizabeth A. Colburn .....158

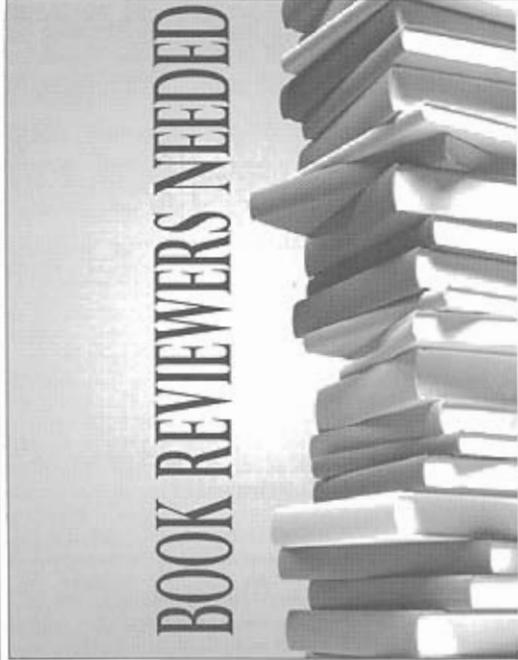
Stage-Discharge Relationships for U-, A-, and W-Weirs in Un-Submerged Flow Conditions  
- Christopher I. Thornton, Anthony M. Meneghetti, Kent Collins, Steven R. Abt, and S. Michael Scurlock..169

Assessing the Impact of Areal Precipitation Input on Streamflow Simulations Using the SWAT Model  
- Ilyas Masih, Shreedhar Maskey, Stefan Uhlenbrook, Steven R. Abt, and Vladimir Smakhtin .....179

TECHNICAL NOTE

Incorporating Social Context Variables into Paired Watershed Designs to Test Nonpoint Source Program Effectiveness  
- Linda Stalker Prokopy, Z. Asligül Göçmen, Jing Gao, Shorna Broussard Allred, Joseph E. Bonnell, Kenneth Genskow, Alicia Molloy, and Rebecar Power .....196

Book Reviews.....203



The Book Review Section of the *Journal of the American Water Association* is made possible by the willingness of water resources professionals to review books. JAWRA has an ongoing need for people interested in providing an occasional book review.

**Reviewers for books in all water resources specialties are needed.**

If you would be willing to review a book for publication in the Book Review Section of JAWRA, please contact:

**Book Review Editor  
Dr. Richard H. McCuen  
[rhmccuen@eng.umd.edu](mailto:rhmccuen@eng.umd.edu)**

Please Submit All Manuscripts Through <http://www.awra.org/jawra/instructionsforauthors.html>.  
All inquiries should be made to: Phone (540) 687-8390, Fax (540) 687-8395, or Email [jawra@awra.org](mailto:jawra@awra.org)  
For AWRA membership information . . . [info@awra.org](mailto:info@awra.org)

Cover photo: Gazebo in Winter Photo by Ken Lanfear.

TABLE OF CONTENTS

RECEIVED  
 2011 MAY 24 AM 8:51  
 OSU - WYOMING  
 DENVER, CO 80202

TECHNICAL PAPERS

Herbicide Transport in Goodwater Creek Experimental Watershed: I. Long-Term Research on Atrazine  
 – *R.N. Lerch, E.J. Sadler, K.A. Sudduth, C. Baffaut, and N.R. Kitchen* .....209

Herbicide Transport in Goodwater Creek Experimental Watershed: II. Long-Term Research on Acetochlor, Alachlor, Metolachlor, and Metribuzin  
 – *R.N. Lerch, E.J. Sadler, C. Baffaut, N.R. Kitchen, and K.A. Sudduth* .....224

Surrogate Measures for Providing High Frequency Estimates of Total Suspended Solids and Total Phosphorus Concentrations  
 – *Amber Spackman Jones, David K. Stevens, Jeffery S. Horsburgh, and Nancy O. Mesner* .....239

Comparison of Two Parametric Methods to Estimate Pesticide Mass Loads in California's Central Valley  
 – *Dina K. Saleh, David L. Lorenz, and Joseph L. Domagalski*.....254

Trends in Pesticide Concentrations in Streams of the Western United States, 1993-2005  
 – *Henry M. Johnson, Joseph L. Domagalski, and Dina K. Saleh* .....265

Estimating Water Budgets and Vertical Leakages For Karst Lakes in North-Central Florida (United States) Via Hydrological Modeling  
 – *Zhulu Lin* .....287

Effectiveness of Multi-Site Weather Generator for Hydrological Modeling  
 – *Malika Khalili, François Brissette, and Robert Leconte* .....303

Understanding the Factors That Influence Headwater Stream Flows in Response to Storm Events  
 – *Les W. Stanfield and Don A. Jackson* .....315

The Role of Headwater Wetlands in Altering Streamflow and Chemistry in a Maine, USA Catchment  
 – *Terry R. Morley, Andrew S. Reeve, and Aram J.K. Calhoun* .....337

Modeling of *Escherichia coli* Fluxes on a Catchment and the Impact on Coastal Water and Shellfish Quality  
 – *Morgane Bougeard, Jean-Claude Le Saux, Nicolas Pérenne, Claire Baffaut, Marc Robin, and Monique Pommepuy* .....350

Hydrologic and Phosphorus Export Behavior of Small Streams in Commercial Poultry-Pasture Watersheds  
 – *J. Joshua Romeis, C. Rhett Jackson, L. Mark Risse, Andrew N. Sharpley, and David E. Radcliffe* .....367

Biophysical-Regulatory Classification and Profiling of Streams Across Management Units and Ecoregions  
 – *Brian S. Caruso and Joshua Haynes*.....386

Evolving Expectations of Dam Removal Outcomes: Downstream Geomorphic Effects Following Removal of a Small, Gravel-Filled Dam  
 – *Kelly Kibler, Desiree Tullos, and Mathias Kondolf*.....408

Comparison of Aquifer Sustainability Under Groundwater Administrations in Oklahoma and Texas  
 – *Aaron R. Mittelstet, Michael D. Smolen, Garey A. Fox, and Damian C. Adams* .....424



## Feature Articles

RECEIVED  
2011 MAY 24 AM 8:55  
UNIVERSITY OF UTAH  
MAY 2011  
VOL. 63 NO. 5

p. 1 of 2

### 20 Canadian Mining Oversize reduction project at the Iron Ore Company of Canada

R. Pinksen and R.P. Proulx

### 45 2010 Annual Review Annual Review 2010: Mining

Staff, U.S. Geological Survey,  
National Minerals Information Center

### 58 Annual Review 2010: Exploration

D.R. Wilburn, R.L. Vasil and A. Nolting,  
U.S. Geological Survey

### 76 Annual Review 2010: Coal

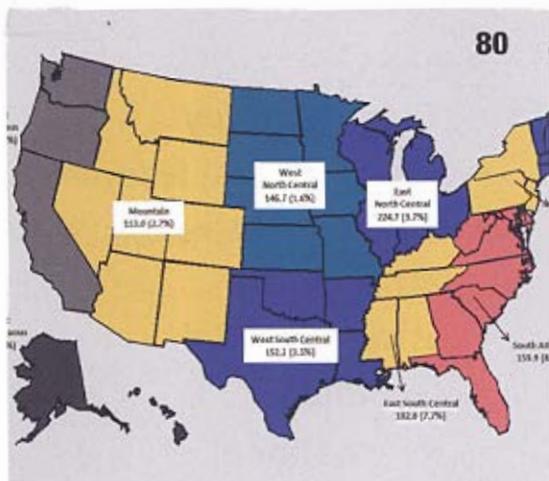
William Watson, Nicholas Paduano,  
Tejasvi Raghuvver and Sundar Thapa,  
U.S. Energy Information Administration

### 89 Marine mining: An area of critical national need

Michael Cruickshank

### 107 Mine closure: plan for the end from the beginning

Hugh Jones



## SME/CMA 2011 Annual Meeting

### 94 Regulations, public awareness still constrain minerals development

Steve Kral

### 96 Exhibit success: A record 683 booths sold at 2011 meeting

William Gleason, Georgene Renner and  
Emily Wortman-Wunder

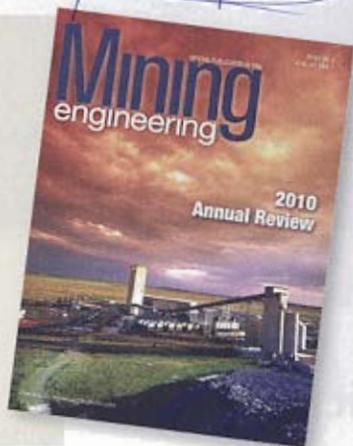
Copyright 2011 by the Society for Mining, Metallurgy and Exploration, Inc. All rights reserved. MINING ENGINEERING (ISSN 0026-5187) is published monthly by the Society for Mining, Metallurgy, and Exploration, Inc., at 12999 E. Adam Aircraft Circle, Englewood, CO, 80112. Phone 1-800-763-3132 or 303-973-9550. Fax: 303-973-3845 or e-mail: sme@smenet.org. Website: www.smenet.org. Periodicals postage paid at Littleton, CO and additional mailing offices. Canadian post: publications mail agreement number 0689688. POSTMASTER: Send changes of address to MINING ENGINEERING, 12999 E. Adam Aircraft Circle, Englewood, CO, 80112. Article copies and back issues available on microfilm or microfiche from Linda Hall Library in Kansas City, Mo. Printed by Cummings Printing Co.



*P. 2 of 2*

## SME News

- 13 SME Nominations
- 114 Young Leaders Committee
- 114 Membership
- 115 Student Design Competition
- 116 Coal & Energy Division Views
- 116 Personal News
- 117 Local Section Hero
- 120 Obituaries
- 121 Student Chapters



## Departments

- 6 President's Page
- 8 Politics of Mining
- 10 Industry Newswatch
- 129 Coming Events
- 130 Web Directory
- 131 Classifieds
- 136 Professional Services
- 143 Index of Advertisers
- 144 Drift of Things

### Cover Story

Mineral commodity prices have steadily increased this past year. Companies throughout the world are spending more on exploration, expansions and are ramping up new mines. ME's annual review of mining begins on page 45. SME welcomes the International Marine Minerals Society as a new division and Mike Cruickshank discusses the importance of marine mining to the United States, page 89. The 2011 SME Annual Meeting attracted a record number of attendees and exhibitors, page 94.



## Editorial Staff

### Editor

Steve Kral  
kral@smenet.org

### Senior Editor

William M. Gleason  
gleason@smenet.org

### Senior Editor

Georgene Renner  
renner@smenet.org

### Technical Editor

Emily Wortman-Wunder  
wunder@smenet.org

### Production Designer

Nate Hurianek  
hurianek@smenet.org

### Business Staff

Media Manager/Advertising  
Johanna McGinnis  
mcginnis@smenet.org

Phone: 1-800-763-3132

Fax: 303-973-3845

E-mail: publications@smenet.org

Internet: www.smenet.org

## Society for Mining, Metallurgy, and Exploration, Inc. Officers

### President

John N. Murphy

### President-Elect

Drew A. Meyer

### Past President

Nikhil C. Trivedi

### Executive Director

David L. Kanagy

### Mining Engineering Committee

Jamal Rostami (Chair), Joseph C. Zelanko (Vice Chair), Jurgen F. Brune, Robert W. Reisinger, William H. Langer, Marc Le Vier and Christopher J. Bise

### Peer Review Editorial Board

Christopher J. Bise, Kirk McDaniel, Kelvin Wu, Vladislav Kecojevic, Keith Heasley, Jurgen F. Brune, Nikhil Trivedi, Rajive Ganguli, Catherine Dreesbach, Hugh Miller, G.T. Lineberry, Henry McCarl, Biswajit Samanta, Gerrit Goodman, Rossen A. Halatchev and Bharath Belle

**Reproduction:** More than one photocopy of an item from SME may be made for internal use, provided fees are paid directly to the Copyright Clearance Center, 27 Congress St., Salem, MA, 01970, USA. Phone 978-750-8400, fax 978-750-4470. Any other form of reproduction requires special permission from, and may be subject to fees by SME.

SME is not responsible for any statements made or opinions expressed in its publications. Member subscription rate included in dues. Nonmember subscription rate, \$245; in Europe, \$275. Single copies \$25, July directory issue, \$150.

## REFEREED RESEARCH

A growth stage and heat-unit model for *Hedysarum boreale*

Michael D Peel, Blair L Waldron, Ivan W Mott, and Scott Walker

4

## REFEREED RESEARCH

Improved germination of two *Sphaeralcea* A. St.-Hil. (Malvaceae) species with scarification plus stratification treatments

Bruce Dunn

13

Scalping improves early growth of longleaf pine seedlings

David B South

18

Making a smoker to produce cellulose-based smoke for treating forest tree seeds

Ken Roeder, James West, and Bobby Smith

27

## REFEREED RESEARCH

Tolerance of native wildflower species to postemergence herbicides

Jessica L Wiese, Elai N Keren, and Fabian D Menalled

31

Propagating shrub yellowroot (*Xanthorhiza simplicissima* Marsh.)

Kate Pawling

37

Perigynium removal improves seed germination in awl-fruit sedge (*Carex stipata*)

Nate Hough-Snee and Derrick D Cooper

41

## REFEREED RESEARCH

Patterns of adaptation in three native grasses in northern California

Jay H Kitzmiller and Linnea Hanson

45

## REFEREED RESEARCH

Prospects for conservation of an endemic woody species native to Florida, *Chionanthus pygmaeus* (pygmy fringetree), through seed and vegetative propagation

Amanda L Bayer and J Ryan Stewart

62

## GERMPLASM RELEASE

Notice of release of Bonita Germplasm plains lovegrass: selected class of certified seed

Mary E Hershdorfer, Heather Dial, and Manuel Rosales

70

## BOOK REVIEWS

*Baboquivari Mountain Plants: Identification, Ecology, and Ethnobotany*

74

*Nursery Manual for Native Plants: A Guide for Tribal Nurseries, Volume One, Nursery Management*

75



RECEIVED

2011 MAY -3 PM 4:20

OSM-WRC,  
DENVER, COLORADO

# NATURAL RESOURCES & ENVIRONMENT

ABA SECTION OF ENVIRONMENT, ENERGY, AND RESOURCES

VOLUME 25, NUMBER 4, SPRING 2011

## FEATURES

- 3 **Electric Transmission Infrastructure:  
A Key Piece of the Energy Puzzle**  
*The Honorable John R. Norris and Jeffery S. Dennis*
- 7 **Energy Efficiency and Conservation:  
New Legal Tools and Opportunities**  
*John C. Dernbach, Robert B. McKinstry, Jr.,  
and Darin Loxeder*
- 12 **Green Energy Tax Policies: State and  
Federal Tax Incentives for Renewable  
Energy and Energy Efficiency**  
*Jerome L. Garciano*
- 15 **State Renewable Portfolio Standards  
and the Commerce Clause**  
*Stephen C. Braverman*
- 19 **Commercial-Scale Renewable Energy  
Projects on Tribal Lands**  
*Donald M. Clary*
- 24 **Offshore Wind Energy in the United States:  
A Legal and Policy Patchwork**  
*Katherine A. Roek*
- 29 **Emulating Europe: Setting a Course for  
Offshore Renewable Energy**  
*Benjamin Nussdorf*
- 33 **The New Federal Renewable Fuel Standard  
Program Rules and Potential Obstacles for  
Implementation**  
*Angela R. Morrison*
- 38 **Water Requirements for Utility-Scale  
Concentrating Solar Power Facilities:  
Are We Robbing Peter to Pay Paul?**  
*L. William Staudenmaier*
- 42 **The U.S. Electrical Grid: Surviving  
Cyber-Terrorism and Solar Flares**  
*Robert J. Lambrechts*

## DEPARTMENTS

- VANTAGE POINT Inside Front Cover
- INTERVIEW: CATHY ZOI 46
- INSIGHTS
- Lender Liability for Clean Water  
Compliance 50  
*Patrick J. Paul and Christopher P. Colyer*
- Park Service Free Speech 51  
*Craig T. Donovan*
- Sources of European Environmental Law 53  
*Isabelle Laborde*
- Firms Using Sustainability for Long-Term  
Success 55  
*William R. Blackburn*
- Resource Property Rights 57  
*Laurie Ristino*
- The Sage Grouse Rebellion 59  
*Elizabeth A. Schulte*
- LITERARY RESOURCES 61
- THE BACK PAGE 64

### Issue Editor:

Dean B. Suagee

### Assistant Issue Editors:

Scott Grover, David Hodas, Hong Huynh, and Jim Murphy

### Cover design:

Sonya Taylor

### Department art:

Mike Callaway



Printed on recycled paper

The views expressed in *Natural Resources & Environment* are those of the authors and do not necessarily represent the policies of the American Bar Association, the Section of Environment, Energy, and Resources, or the employers of the authors. For more information about NR&E, visit online at [www.ababooks.org](http://www.ababooks.org).

RECEIVED  
2011 MAY 17 PH12:43  
DENVER, CO JURADO

# PAY DIRT

MAGAZINE

RECEIVED  
2011 MAY 17 PM 12:44

A Voice For Western Mining Since 1938

February 2011

**Cover Story:** Newmont to acquire Fronteer Gold 3

**Mining in the West** 11

MolyCorp expands plans for its Mountain Pass operations • Atna boosts output, cuts costs at Briggs • Expanded New Jersey mill also will serve nearby Crescent silver mine • Mineral Park has record December moly output • Drilling extends Formation's cobalt deposit • Formation brings on JDS for EOCM work • General Moly to restart Liberty evaluation, development • Nevada Copper hits 180 feet of 1.59% copper at Pumpkin Hollow • IC Potash to move ahead on Ochoa project in New Mexico • Athena is drilling its Langtry silver project in California

**Energy** 12

Energy Fuels gets approval for licensing Piñon Ridge mill • Uranium's comeback in Wyoming is noted by state newspaper • State of Wyoming approves Uranerz' Nichols Ranch ISR uranium project • URI gets more Texas acreage to explore • Arch Coal acquires a share of coal-export terminal in Washington

**Governments and Mining** 14

National Mining Association says it's encouraged by ruling on Spruce No. 1 • EPA move threatens all similar permits, NMA says

**Mining Environment** 15

Colorado state board backs U.S. Energy's right to explore its Mt. Emmons molybdenum project • Raglan treatment plant completes its 6th season of water treatment • OSM rule on coal mining would cost thousands of jobs, NMA says

**The Business of Mining** 16

104 miles of copper cable connects and protects solar farm • Quadra FNX completes sale of Gold Wheaton • Iamgold spending big on brownfield expansions of its mines • Trevali, Kria merger to create new zinc producer • PolyMet closes first tranche of financing from Glencore

Commentary, 2; Canada, 6; Ad Index, 6; Latin America, 7; World, 8; Western Briefs, 11; Miners in the News, 19; Supplying the Mines, 20; Directory, 22; Safety, Health & Labor, 23; Low Grade, 24

## On the Cover

Fronteer Gold has three major discoveries in Nevada: Long Canyon, Sandman and Northumberland. Long Canyon is the one in which Newmont has the most interest, anticipating that its Carlin-type geology will lead to another major source of gold in northern Nevada for the company in years to come. Nevada has no shortage of gold-bearing trends, although none of the others come close to the Carlin and Battle Mountain areas in terms of total gold.

## PAY DIRT Magazine

William C. Epler  
Publisher and Editor  
1968-1995

Frank Barco  
Publisher

Gary Dillard  
Editor

Dan Eyde • Ted Eyde  
George Leaming  
Clarence Ellis  
Chug-A-Lug  
Correspondents

Frank Barco  
Production Manager

Lupe A. Silva  
Bill Riffle  
Production Staff

Caryl L. Larkins  
Advertising Sales/Circulation

Mary Farrington  
Office Staff

**PAY DIRT** (USPS 424-000)  
P.O. Drawer 48, Copper Queen Plaza  
Bisbee, AZ 85603  
(520) 432-2244; FAX (520) 432-2247  
E-mail: [paydirt@cablone.net](mailto:paydirt@cablone.net)

**PAY DIRT** is published monthly by  
Copper Queen Publishing Co. Inc.

### Subscription Rates

Single copy	\$ 3.00
One year	\$30.00
Two years	\$55.00
Three years	\$75.00

Canadian subscriptions add \$15.00 per year.  
foreign subscriptions add \$50.00 per year

### Advertising Rates

For information call (520) 432-2244

Periodical postage paid at Bisbee, AZ 85603  
Postmaster: Please send Form 3579 to:  
**PAY DIRT**, P.O. Drawer 48, Bisbee, AZ 85603

# Rangeland Ecology & Management

A Journal of the Society for Range Management

VOLUME 64

NUMBER 3

MAY 2011

Table of Contents

## Research Papers

- 223 Grazing Management in Tropical Savannas: Utilization and Rest Strategies to Manipulate Rangeland Condition  
*Andrew J. Ash, Jeff P. Corfield, John G. McIvor, and Taoufik S. Ksikisi*
- 240 Automated Animal Control: Can Discontinuous Monitoring and Aversive Stimulation Modify Cattle Grazing Behavior?  
*Jabier Ruiz-Mirazo, Greg J. Bishop-Hurley, and Dave L. Swain*
- 249 Impact of Stocking Rate and Rainfall on Sheep Performance in a Desert Steppe  
*Zhongwu Wang, Shuying Jiao, Guodong Han, Mengli Zhao, Walter D. Willms, Xiying Hao, Jian'an Wang, Haijun Din, and Kris M. Havstad*
- 257 Forage Quality of Plant Species Consumed by Capybaras (*Hydrochoerus hydrochaeris*) in the Paraná River Delta, Argentina  
*María J. Corriale, Santiago M. Arias, and Rubén D. Quintana*
- 264 Effects of Plant Secondary Compounds on Nutritional Carrying Capacity Estimates of a Browsing Ungulate  
*Steve K. Windels and David G. Hewitt*
- 276 Linking Plant Spatial Patterns and Ecological Processes in Grazed Great Basin Plant Communities  
*Andrew P. Rayburn and Thomas A. Monaco*
- 283 Above-Ground Net Primary Production for *Elymus lanceolatus* and *Hesperostipa curtisetata* After a Single Defoliation Event  
*A. Pantel, J. T. Romo, and Y. Bai*
- 291 Allelopathic Cover Crop Prior to Seeding Is More Important Than Subsequent Grazing/Mowing in Grassland Establishment  
*Daniel G. Milchunas, Mark W. Vandever, Leonard O. Ball, and Skip Hyberg*
- 301 Optimized Frequency Measures for Monitoring Trends in Tallgrass Prairie  
*Michael D. DeBacker, John S. Heywood, and Lloyd W. Morrison*
- 309 Comparison of Point Intercept and Image Analysis for Monitoring Rangeland Transects  
*J. Cagney, S. E. Cox, and D. T. Booth*

## Research Notes

- 316 A Mark-Recapture Technique for Monitoring Feral Swine Populations  
*Matthew M. Reidy, Tyler A. Campbell, and David G. Hewitt*
- 319 Foraging Behavior of *Alberes* Cattle in a Mediterranean Forest Ecosystem  
*Jordi Bartolomé, Josefina Plaixats, Jesús Piedrafita, Marta Fina, Eduard Adrobau, Aida Aixàs, Marina Bonet, Jordi Grau, and Lluís Polo*

Front Cover Photograph: Summer in the Northern Mixed Prairie on the Missouri Coteau in south central Saskatchewan. Photo by Jim Romo.

RECEIVED  
2011 MAY 24 AM 8:40  
OSU-LR  
DENVER, COLORADO

# SOIL SCIENCE

An Interdisciplinary Approach to Soils Research

RECEIVED  
2011 MAY 17 PM 2:11  
DUE-MRCS  
DENVER, COLORADO

MAY 2011

CONTENTS

Vol. 176 No. 5

- RELEASE OF NATIVE AND AMENDED BORON FROM ARID ZONE SOILS AFTER VARYING INCUBATION TIMES ..... 213  
*Sabine Goldberg and Donald L. Suarez*
- NITROGEN AND PHOSPHORUS AVAILABILITY IN BIOCHAR-AMENDED SOILS ..... 218  
*Nathan O. Nelson, Sandra C. Agudelo, Wengqiao Yuan, and Jing Gan*
- EFFECTS OF ANNUAL TURKEY LITTER APPLICATION ON SURFACE SOIL QUALITY OF A TEXAS BLACKLAND VERTISOL ..... 227  
*R. Daren Harmel, Rick L. Hancy, and Doug R. Smith*
- SORPTION INDICES TO ESTIMATE RISK OF SOIL PHOSPHORUS LOSS IN THE RATHBUN LAKE WATERSHED, IOWA ..... 237  
*Najphak Hongthana, John L. Kovar, and Michael L. Thompson*
- PHOSPHORUS AND NITROGEN FERTILIZATION EFFECT ON PHOSPHORUS UPTAKE AND PHOSPHATASE ACTIVITY IN RYEGRASS AND TALL FESCUE GROWN IN A CHILLAN ANDISOL ..... 245  
*Cecilia Paredes, Daniel Menezes-Blackburn, Paula Cartes, Laliana Gianfreda, and Maria Luz Mora*
- CONSERVATION STRATEGIES FOR EFFECTIVE MANAGEMENT OF ERODED LANDFORM: SOIL STRUCTURAL QUALITY, NUTRIENT ENRICHMENT RATIO, AND RUNOFF WATER QUALITY ..... 252  
*Kayode S. Aye, Olaolu Babalola, Adebayo O. Oke, Gabriel A. Oluwatosi, Ayodele O. Adelana, Oluwemi A. Ojo, and Olateju D. Adeyolu*

CONTENTS

RECEIVED

2011 MAY 17 PM 12:11

DENVER, COLORADO

**Feature Articles**

Quality of habitat occupied by elk ( <i>Cervus elaphus</i> ) in the southern Sacramento Mountains, New Mexico. Heather Halbritter and Louis C. Bender.	1
Impacts of roads and corridors on abundance and movement of small mammals on the Llano Estacado of Texas. M. Todd Kuykendall and Gregory S. Keller.	9
Habitat model of urban-nesting Cooper's hawks ( <i>Accipiter cooperii</i> ) in southern Arizona. Melody S. Ward and R. William Mannan.	17
Status of red squirrels in Guadalupe Mountains National Park, Texas. Melissa J. Merrick, John L. Koprowski, R. Nathan Gwinn, Geoffrey H. Palmer, and Claire A. Zugmeyer.	24
Temporal and maternal effects on reproductive ecology of the giant gartersnake ( <i>Thamnophis gigas</i> ). Brian J. Halstead, Glenn D. Wylie, Michael L. Casazza, and Peter S. Coates.	29
Identifying nest predators of American avocets ( <i>Recurvirostra americana</i> ) and black-necked stilts ( <i>Himantopus mexicanus</i> ) in San Francisco Bay, California. Garth Herring, Joshua T. Ackerman, John Y. Takekawa, Collin A. Eagles-Smith, and John M. Eadie.	35
Spiders of the Chihuahuan Desert of southern New Mexico and western Texas. David B. Richman, Sandra L. Brantley, David H-C. Hu, and Mary E. A. Whitehouse.	44
Vegetation of forest and savanna communities on glacial sand deposits in northeastern Illinois. Loy R. Phillippe, Mary A. Feist, Daniel T. Busemeyer, Paul B. Marcum, Connie J. Carroll, Greg R. Spyreas, and John E. Ebinger.	54
Annual frequency of clutches of <i>Pseudemys texana</i> and <i>Trachemys scripta</i> at the headwaters of the San Marcos River in Texas. Francis L. Rose.	61
Modeling the distribution of the dwarf palmetto ( <i>Sabal minor</i> ; Arecaceae) in McCurtain County, Oklahoma. Christopher J. Butler, Jennifer L. Curtis, Kimberly McBride, David Arbour, and Berlin Heck.	66
Demography of a semelparous, high-elevation population of <i>Sceloporus bicanthalis</i> (Lacertilia: Phrynosomatidae) from the Nevado de Toluca Volcano, Mexico. Felipe Rodríguez-Romero, Geoffrey R. Smith, Fernando Méndez-Sánchez, Oswaldo Hernández-Gallegos, Petra Sánchez Nava, and Fausto R. Méndez de la Cruz.	71
Diversity of arthropods preyed upon by the carnivorous plant <i>Pinguicula moranensis</i> (Lentibulariaceae) in a temperate forest of central Mexico. Numa P. Pavón, Atilano Contreras-Ramos, and Yadira Islas-Perusquia.	78
Communal nesting in the anoline lizard <i>Norops lionotus</i> (Polychrotidae) in central Panama. Chad E. Montgomery, Edgardo J. Griffith Rodriguez, Heidi L. Ross, and Karen R. Lips.	83
Diet of the Yarrow's spiny lizard <i>Sceloporus jarrovi</i> in the central Chihuahuan Desert. Héctor Gadsden, José L. Estrada-Rodríguez, Diana A. Quezada-Rivera, and Sandra V. Leyva-Pacheco.	89
Shrews of the Ruby Mountains, northeastern Nevada. Eric A. Rickart, Rebecca J. Rowe, Shannen L. Robson, Lois F. Alexander, and Duke S. Rogers.	95

**Notes**

Virtual bats and real insects: effects of echolocation on pheromone-tracking behavior of male corn earworm moths, <i>Helioverpa zea</i> . Erin H. Gillam, John K. Westbrook, Paul G. Schleider, and Gary F. McCracken.	103
Spawning behavior and nest association by <i>Dionda diaboli</i> in the Devils River, Texas. Catherine T. Phillips, J. Randy Gibson, and Joe N. Fries.	108
Extreme periodontal disease in a Brazilian free-tailed bat (Molossidae: <i>Tadarida brasiliensis</i> ) from eastern Texas. Monte L. Thies.	112
Observations of black-tailed jackrabbits ( <i>Lepus californicus</i> ) increase within forests treated with prescribed fire. Andrew J. Amacher, Reginald H. Barrett, and Scott L. Stephens.	115
Aggregation of <i>Sceloporus minor</i> (Sauria: Phrynosomatidae) from Cerro el Potosí, Nuevo León, Mexico. Jorge A. Contreras-Lozano, David Lazcano, and Armando J. Contreras-Balderas.	119
Thermoregulation by a population of <i>Sceloporus palaciosi</i> from Sierra del Ajusco, Distrito Federal, Mexico. Anahí Güizado-Rodríguez, Uri Omar García-Vázquez, and Israel Solano-Zavaleta.	120
Escapes from hoop nets by red-eared sliders ( <i>Trachemys scripta</i> ). Donald J. Brown, Bei DeVoll, and Michael R. J. Forstner.	124
Pattern-class D of parthenogenetic <i>Aspidoscelis tessellata</i> (Sauria: Teiidae) in Las Animas County, Colorado. Jennifer L. Newby, Jacob Boling, John Estes, Laura K. Garey, Andrea M. Grelle, Julie Hasken, Rory McKee, Anthony Wilmes, Chad E. Montgomery, Michael I. Kelrick, and James M. Walker.	128
<i>Eutrombicula alfreddugesi</i> (Acari: Trombiculidae): new host records from four species of lizards in the Sierra de Jimulco, Coahuila, Mexico. Cristina García-De la Peña.	131
Announcements.	134
Cover: Mexican pink tarantula ( <i>Brachypelma klaasi</i> ). Photo by Troy L. Best. Identification by J. Rodrigo Orozco Torres.	

The online article is the official version and may contain additional content not available in this print issue. To access the full article, including multimedia, enhanced figures, auxiliary materials, and other nonprinted content, go to <http://www.agu.org/journals/wrr>.

## Rapid Communication

- W03201** *D. A. DiCarlo, B. Aminzadeh, and H. Dehghanpour*  
 Semicontinuum model of saturation overshoot and gravity-driven fingering in porous media  
 (doi 10.1029/2010WR009879)

## Regular Articles

- W03501** *Aavudai Anandhi, Allan Frei, Donald C. Pierson, Elliot M. Schneiderman, Mark S. Zion, David Lounsbury, and Adao H. Matosse*  
 Examination of change factor methodologies for climate change impact assessment (doi 10.1029/2010WR009104)
- W03502** *Abeeb A. Awotunde and Roland N. Horne*  
 A wavelet approach to adjoint state sensitivity computation for steady state differential equations  
 (doi 10.1029/2010WR009165)
- W03503** *R. Brauchler, R. Hu, P. Dietrich, and M. Sauter*  
 A field assessment of high-resolution aquifer characterization based on hydraulic travel time and hydraulic attenuation tomography (doi 10.1029/2010WR009635)
- W03504** *Margaret Shanafield, Christine Hatch, and Greg Pohl*  
 Uncertainty in thermal time series analysis estimates of streambed water flux (doi 10.1029/2010WR009574)
- W03505** *Lien Loosvelt, Valentijn R. N. Pauwels, Wim M. Cornelis, Gabriëlle J. M. De Lannoy, and Niko E. C. Verhoest*  
 Impact of soil hydraulic parameter uncertainty on soil moisture modeling (doi 10.1029/2010WR009204)
- W03506** *M. Schneider and K.-U. Goss*  
 Temperature dependence of the water retention curve for dry soils (doi 10.1029/2010WR009687)
- W03507** *C. Andrew Ramsburg, John A. Christ, Scott R. Douglas, and Ali Boroumand*  
 Analytical modeling of degradation product partitioning kinetics in source zones containing entrapped DNAPL  
 (doi 10.1029/2010WR009558)
- W03508** *Shuangcai Li and Christopher J. Duffy*  
 Fully coupled approach to modeling shallow water flow, sediment transport, and bed evolution in rivers  
 (doi 10.1029/2010WR009751)
- W03509** *H. Biemans, I. Haddeland, P. Kabat, F. Ludwig, R. W. A. Hutjes, J. Heinke, W. von Bloh, and D. Gerten*  
 Impact of reservoirs on river discharge and irrigation water supply during the 20th century  
 (doi 10.1029/2009WR008929)
- W03510** *Harald Klammeter, Kirk Hatfield, Bussel Nemer, and Simon A. Mathias*  
 A trigonometric interpolation approach to mixed-type boundary problems associated with permeability shape factors  
 (doi 10.1029/2010WR009337)
- W03511** *Alessandra Crosato, Erik Mosselman, Frehiwat Beidmariam Desta, and Wim S. J. Uijtswaal*  
 Experimental and numerical evidence for intrinsic nonmigrating bars in alluvial channels  
 (doi 10.1029/2010WR009714)
- W03512** *Michael Schubert, Lutz Brueggemann, Kay Kneller, and Mario Schirmer*  
 Using radon as an environmental tracer for estimating groundwater flow velocities in single-well tests  
 (doi 10.1029/2010WR009572)
- W03513** *Uri Nachshon, Noam Weisbrod, Maria I. Dragila, and Abraham Grader*  
 Combined evaporation and salt precipitation in homogeneous and heterogeneous porous media  
 (doi 10.1029/2010WR009677)

- W03514** *Patricia Ann Jaramilla-Sanchez, Lei Wang, and Toshio Koike*  
 Modeling the hydrologic responses of the Pampanga River basin, Philippines: A quantitative approach for identifying droughts (doi 10.1029/2010WR009702)
- W03515** *Neil McIntyre, Peter Young, Barbara Orellana, Miles Marshall, Brian Reynolds, and Howard Wheeler*  
 Identification of nonlinearity in rainfall-flow response using data-based mechanistic modeling  
 (doi 10.1029/2010WR009851)
- W03516** *Lijun Zong and Heidi Nepf*  
 Spatial distribution of deposition within a patch of vegetation (doi 10.1029/2010WR009516)
- W03517** *Huan Wu, John S. Kamball, Nate Mantua, and Jack Stanford*  
 Automated upscaling of river networks for macroscale hydrological modeling (doi 10.1029/2009WR008871)
- W03518** *Carl J. Legleiter, Phaedon C. Kyriakidis, Richard R. McDonald, and Jonathan M. Nelson*  
 Effects of uncertain topographic input data on two-dimensional flow modeling in a gravel-bed river  
 (doi 10.1029/2010WR009618)
- W03519** *B. Groppelli, D. Bocchiola, and R. Rosso*  
 Spatial downscaling of precipitation from GCMs for climate change projections using random cascades: A case study in Italy (doi 10.1029/2010WR009457)
- W03520** *Gerardo Severino*  
 Stochastic analysis of well-type flows in randomly heterogeneous porous formations (doi 10.1029/2010WR009840)
- W03521** *Jingfeng Wang and R. L. Bras*  
 A model of evapotranspiration based on the theory of maximum entropy production (doi 10.1029/2010WR009392)
- W03522** *M. Deniz Kasim, Ying Fan, and Matthew Rodell*  
 Possible link between irrigation in the U.S. High Plains and increased summer streamflow in the Midwest  
 (doi 10.1029/2010WR010046)
- W03523** *L. Mari, F. Bertuzzo, R. Casagrandi, M. Gatto, S. A. Levin, I. Rodriguez-Iturbe, and A. Rinaldo*  
 Hydrologic controls and anthropogenic drivers of the zebra mussel invasion of the Mississippi-Missouri river system  
 (doi 10.1029/2010WR009920)
- W03524** *Katelyn E. Gerecht, M. Bayani Cardenas, Andrew J. Guswa, Audrey H. Sawyer, John D. Nowinski, and Travis E. Swanson*  
 Dynamics of hyporheic flow and heat transport across a bed-to-bank continuum in a large regulated river  
 (doi 10.1029/2010WR009794)
- W03525** *Fritz Stauffer, Sebastian Stoll, Rolf Kipfer, and Wolfgang Kinzelbach*  
 Analytical model for environmental tracer transport in well catchments (doi 10.1029/2010WR009940)
- W03526** *D. W. Yasco*  
 On the propagation of a coupled saturation and pressure front (doi 10.1029/2010WR009740)
- W03527** *Dingbao Wang*  
 On the base flow recession at the Panola Mountain Research Watershed, Georgia, United States  
 (doi 10.1029/2010WR009910)

## Corrections

- W03901** *Bradley J. Eck, Michael E. Burrett, and Randall J. Charbeneau*  
 Correction to "Drainage hydraulics of permeable friction courses" (doi 10.1029/2011WR010404)
- W03902** *Jangsun Oh and Christina W. Tsai*  
 Correction to "A stochastic jump diffusion particle-tracking model (SJD-PTM) for sediment transport in open channel flows" (doi 10.1029/2011WR010428)

## Special Section in Progress

The Author Index is at the end of the issue.

RECEIVED  
 2011 MAY -4 AM 8:00  
 DENVER, CO, USA

The online article is the official version and may contain additional content not available in this print issue. To access the full article, including multimedia, enhanced figures, auxiliary materials, and other nonprinted content, go to <http://www.agu.org/journals/wrr>.

#### Regular Articles

- W04501** *Dai Yamazaki, Shinjiro Kanae, Hyungjun Kim, and Taikan Oki*  
A physically based description of floodplain inundation dynamics in a global river routing model  
(doi 10.1029/2010WR009726)
- W04502** *Jun Yin, Roy Haggerty, Deborah L. Stolker, Douglas B. Kent, Jonathan D. Istok, Janek Greshowiak, and John M. Zachara*  
Transient groundwater chemistry near a river: Effects on U(VI) transport in laboratory column experiments  
(doi 10.1029/2010WR009369)
- W04503** *S. J. Bartlett and M. Lehning*  
A theoretical assessment of heat transfer by ventilation in homogeneous snowpacks (doi 10.1029/2010WR010008)
- W04504** *Hoori Ajami, Peter A. Troch, Thomas Maddock III, Thomas Meixner, and Chris Eastoe*  
Quantifying mountain block recharge by means of catchment-scale storage-discharge relationships  
(doi 10.1029/2010WR009598)
- W04505** *András Bárdossy and Geoffrey Pegram*  
Downscaling precipitation using regional climate models and circulation patterns toward hydrology  
(doi 10.1029/2010WR009689)
- W04506** *Xingxing Kuang, Jiu Jimmy Jiao, Li Wan, Xusheng Wang, and Deqiang Mao*  
Air and water flows in a vertical sand column (doi 10.1029/2009WR009030)
- W04507** *Abdullah Cihan and John S. Tyner*  
2-D radial analytical solutions for solute transport in a dual-porosity medium (doi 10.1029/2009WR008969)
- W04508** *Fiona Johnson and Ashish Sharma*  
Accounting for interannual variability: A comparison of options for water resources climate change impact assessments (doi 10.1029/2010WR009272)
- W04509** *Aaron Regberg, Kamini Singha, Ming Tien, Flynn Picardal, Quanxing Zheng, Jurgen Schieber, Eric Roden, and Susan L. Brantley*  
Electrical conductivity as an indicator of iron reduction rates in abiotic and biotic systems  
(doi 10.1029/2010WR009551)
- W04510** *Thomas Wohling and Jasper A. Vrugt*  
Multiresponse multilayer vadose zone model calibration using Markov chain Monte Carlo simulation and field water retention data (doi 10.1029/2010WR009265)
- W04511** *Shimelis G. Setegn, David Royner, Assefa M. Melesse, Bijan Dargahi, and Raghavan Srinivasan*  
Impact of climate change on the hydroclimatology of Lake Tana Basin, Ethiopia (doi 10.1029/2010WR009248)
- W04512** *Bhavna Arora, Binayak P. Mohanty, and Jennifer T. McGuire*  
Inverse estimation of parameters for multidomain flow models in soil columns with different macropore densities  
(doi 10.1029/2010WR009451)
- W04513** *L. R. Harrison, C. J. Legleiter, M. A. Wydzga, and T. Dunne*  
Channel dynamics and habitat development in a meandering, gravel bed river (doi 10.1029/2009WR008926)
- W04514** *James A. Smith, Mary Lynn Baeck, Alexandros A. Ntelekos, Gabriele Villarini, and Matthias Steiner*  
Extreme rainfall and flooding from orographic thunderstorms in the central Appalachians  
(doi 10.1029/2010WR010190)

**W04515** *Kehua You, Hongbin Zhan, and Jian Li*

Analysis of models for induced gas flow in the unsaturated zone (doi 10.1029/2010WR009985)

**W04516** *J. Sreekanth and Bithin Datta*

Coupled simulation-optimization model for coastal aquifer management using genetic programming-based ensemble surrogate models and multiple-realization optimization (doi 10.1029/2010WR009683)

**W04517** *L. Nicótina, D. G. Tarboton, T. K. Tesfa, and A. Rinaldo*

Hydrologic controls on equilibrium soil depths (doi 10.1029/2010WR009538)

#### Special Section in Progress

The Author Index is at the end of the issue.

RECEIVED  
2011 MAY 27 PM 3:53  
OSM-WRR  
DENVER, COLORADO

**Cover.** Bed elevation differences maps illustrating the development of point bars on the inner banks of a series of meander bends in a simple gravel bed river. In this issue, *Harrison et al.* [W04513] report how point bar development increases the topographic steering effect through curved reaches, promoting bend migration at sediment-transporting flows. Point bar evolution also leads to enhanced flow complexity in meander bends during base flow conditions when salmonids are present in the river. The extent to which sediment supply can stimulate channel change and diversify river morphology is discussed further by the authors in paper 2009WR008926.

p. 1 of 2

# Western RECEIVED North American Naturalist

2011 MAY 17 PM 12

Volume 71 No. 1

April 2011 W.R.C.  
DENVER, CO. USA

ISSN 1527-0904

## CONTENTS

### Articles

Composition of forest stands used by White-headed Woodpeckers for nesting in Washington ..... Jeffrey M. Kozma	1
Conservation status of the threatened, insular San Jose brush rabbit ( <i>Sylvilagus mansuetus</i> ) ..... Consuelo Lorenzo, Sergio Tiel Álvarez-Castañeda, and Jorge Vázquez	10
Survival, reproductive output, and transplant potential of <i>Penstemon tubiflorus</i> (tube penstemon) ..... Cathy Mabry	17
Genetic variation in ecophysiological and survival responses to drought in two native grasses: <i>Koeleria macrantha</i> and <i>Elymus elymoides</i> ..... Huarong Zhang, Laura E. DeWald, Thomas E. Kolb, and Dan F. Koepke	25
Mining patterns of the aspen leaf miner, <i>Phyllocnistis populiella</i> , on its host plant, <i>Populus tremuloides</i> ..... Martin L. Morton and Maria E. Pereyra	33
<i>Minibiotus acadianus</i> (Eutardigrada: Macrobiotidae), a new species of Tardigrada from southern Louisiana, U.S.A. .... Harry A. Meyer and Megan N. Domingue	38
Spatial organization of northern flying squirrels, <i>Glaucomys sabrinus</i> : territoriality in females? ..... Jaya R. Smith, Dirk H. Van Vuren, Douglas A. Kelt, and Michael L. Johnson	44
Black-tailed prairie dog population dynamics at Scotts Bluff National Monument, Nebraska: a 28-year record. .... Lloyd W. Morrison and David G. Peitz	49
Breeding and parental care in the endangered Tehuantepec jackrabbit ( <i>Lepus flavigularis</i> ) ..... Tamara Rioja, Consuelo Lorenzo, Eduardo Naranjo, Laura Scott, and Arturo Carrillo-Reyes	56
The ploidy races of <i>Atriplex confertifolia</i> (Chenopodiaceae) ..... Stewart C. Sanderson	67
Exercise conditioning decreases downstream movement of pond-reared razorback suckers released into a stream environment ..... Luke A. Avery, David L. Ward, and Jane C. Marks	78
Ungulate herbivory on alpine willow in the Sangre de Cristo Mountains of Colorado ..... ..... Linda C. Zeigenfuss, Kathryn A. Schoenecker, and Lisa K. Van Amburg	86
Canyon grassland vegetation changes following fire in northern Idaho ..... ..... Corey L. Gucker and Stephen C. Bunting	97

### Notes

Use of nonalpine anthropogenic habitats by American pikas ( <i>Ochotona princeps</i> ) in western Oregon ..... Tom Manning and Joan C. Hagar	106
Virginia opossum ( <i>Didelphis virginiana virginiana</i> ) from Yavapai county, Arizona ..... ..... R. Nathan Gwinn, Geoffrey H. Palmer, and John L. Koprowski	113

(Continued on page 140)

# Western North American Naturalist

Vol. 71, no. 1

## CONTENTS

(April 2011)

P. 2 of 2

(Continued from back cover)

- Occurrence of Ord's kangaroo rat (*Dipodomys ordii*) along its eastern distributional limit in Nebraska ..... Greg D. Wright and Keith Geluso 115
- Extension of southern range and new specimens of the western gray squirrel, *Sciurus griseus anthonyi* (Mammalia: Sciuridae), in Baja California, México ..... Jonathan Gabriel Escobar-Flores, Gorgonio Ruiz-Campos, Aldo Antonio Guevara-Carrizales, and Roberto Martínez-Gallardo 119
- Hyperkyphosis in longnose gar (*Lepisosteus osseus*) of north central Texas ..... Samuel W. Kelley 121
- Melanism in endangered Mohave tui chub *Siphateles bicolor mohavensis* Snyder 1918 (Cypriniformes: Cyprinidae) .... Sujan M. Henkanaththegedara and Craig A. Stockwell 127
- The relationships among plant cover, density, seed rain, and dispersal of *Bromus tectorum* in high-elevation populations ..... Andrew R. Kanarek and Rebecca Hufft Kao 131
- Book Review**
- Ecological Intelligence: Rediscovering Ourselves in Nature *by Ian McCallton* ..... Howard O. Clark Jr. 137
- Retraction**
- Retraction of "Environmental attributes correlating with density of blackbrush (*Coleogyne ramosissima*) shrubs in the Spring Mountains of southern Nevada" (2003) and "Soil compaction from human trampling, hiking, and off-road motor vehicle activity in a blackbrush (*Coleogyne ramosissima*) shrubland" (2004) ..... 139
- Erratum**
- Erratum: "Biogeographic and taxonomic relationships among the mountain snails (Gastropoda: Oreohelicidae) of the central Great Basin" (2004) ..... 139