

# OSMRE NATIONAL LIBRARY

August 2015

## 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 July 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 OSMRE 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.

# Coal Age

**FEATURE ARTICLES**

- 34 Energy & Water Development Appropriations Bill
- 44 Repowering Success  
*Top tips for repowering diesel engines more cost-efficiently and in compliance with changing regulations*
- 48 Stepping in the Right Direction  
*Consultancy firms outline progress at two North American coal properties*
- 54 The Right Safety Alignment  
*Tire and wheel dangers at mine sites, particularly regarding electricity, is sometimes unseen, making tire safety crucial for all*
- 58 Alpha Coal West Works with Cat to Develop a Better Dipper

**COAL IN THE NEWS**

- 8 North American Coal Anticipates Increased Operating Performance at its Mines
- 8 Peabody Plans to Eliminate 250 Salaried Positions
- 10 Patriot Coal to Sell Operations to Blackhawk Mining
- 12 Hundreds Headed for Layoff at Alpha Mines
- 16 Walter Energy Issues WARN Notices in Alabama
- 18 Wilberg Mine Fire to be Remembered in Documentary
- 22 West Virginia Unveils New Machinery Regulations
- 22 Corsa Coal Lowers Expected Sales for 2015
- 27 Can/Am Alabama Divisions File Chapter 11

**WORLD NEWS**

- 9 Teck to Temporarily Suspend Met Coal Production
- 10 India to Complete Third Round of Coal Block Auctions by December

**NEWS/8**



**DIESEL ENGINES/44**



**MINING TIRES/54**



**OPERATING IDEAS/58**

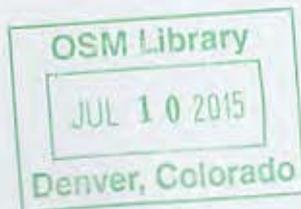


# THIS ISSUE

*This month, Coal Age focuses on surface mining with articles on haulage and loading. On the cover, an improved dipper loads a Cat 797 haul truck in three passes at the Belle Ayr mine in Wyoming.*

**DEPARTMENTS**

- 4 Editorial
- 8 Coal in the News
- 9 World News
- 16 People
- 18 Dateline Washington
- 22 Calendar
- 34 Transport Tips
- 58 Operating Ideas
- 62 Suppliers News
- 64 Product News
- 69 Classified
- 72 Legally Speaking

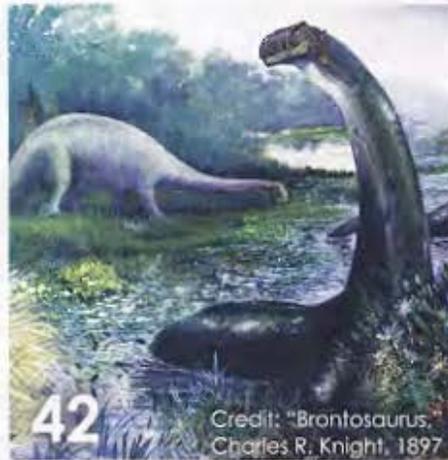


# EARTH

## FEATURES

### 42 | SCIENCE ILLUSTRATORS: Making the Invisible Visible

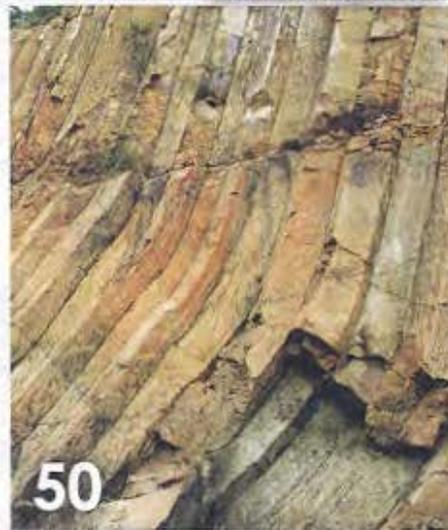
Science illustrators visualize data, revealing what otherwise can't be seen: the deep Earth, distant worlds, quantum particles and extinct life. | [Julia Rosen](#)



Credit: "Brontosaurus," Charles R. Knight, 1897

### 50 | GEOHERITAGE: Preserving Earth's Legacy

When it comes to geology, what is lost cannot be regained. Can geoparks preserve Earth's geologic wonders? | [Terri Cook](#) and [Lon Abbott](#)

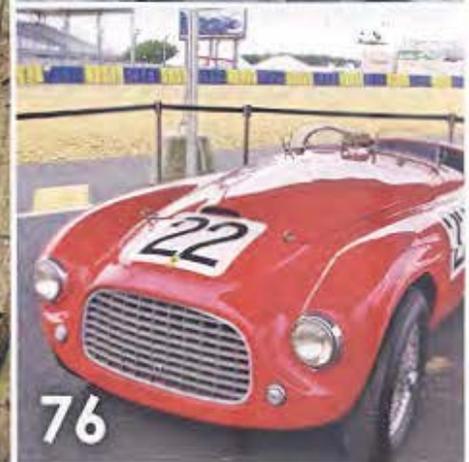


### 58 | TRAVELS IN GEOLOGY Hiking the Catskill Mountain Front

Take a trek through the geologic remnants of the last ice age on display in the Hudson River Valley. | [Robert](#) and [Johanna Titus](#)

### 68 | ENDANGERED ICEBREAKERS: The Future of Arctic Research, Exploration and Rescue at Risk

A shortage of ice-breaking ships limits polar research efforts; complicates search-and-rescue efforts when fishermen, tourists or others are stranded in sea ice; and raises national security concerns. So far, though, the U.S., which has only two government-owned icebreakers, isn't prioritizing funding for these important ships. | [Piper Lewis](#)



### 76 | RACING TO THE FUTURE OF AUTOMOTIVE EFFICIENCY AND PERFORMANCE

High-performance, environmentally friendly race cars used in endurance races are serving as prototypes for the electric and hybrid cars that will soon make their ways to a car lot near you. | [E. Todd Davidson](#) and [Michael E. Webber](#)

### 84 | TRAVELS IN GEOLOGY Touring Texas' Trans-Pecos

In far southwestern Texas, west of the Pecos River and bordering Mexico lies the Trans-Pecos region, a profoundly beautiful area with a rich cultural history and fascinating and diverse geology. | [Terri Cook](#)

OSM Library  
JUL 21 2015  
Denver, Colorado

VOICES

COMMENTS

- 11 **THE ARRIVAL OF THE ENERGY FUTURE**  
In the U.S., both solar and wind energy more than tripled between 2008 and 2013. Renewables are now the fastest growing energy sources. But the first steps on a new path often are tentative and require reinforcement. | [George A. Seielstad](#)
- 12 **WHO SHOULD BE WORRIED ABOUT SPACE WEATHER?**  
If a severe solar storm were headed toward Earth, should you worry? And to whom should you turn for reliable information? | [Rodney Viereck](#)

GEOLOGIC COLUMNS

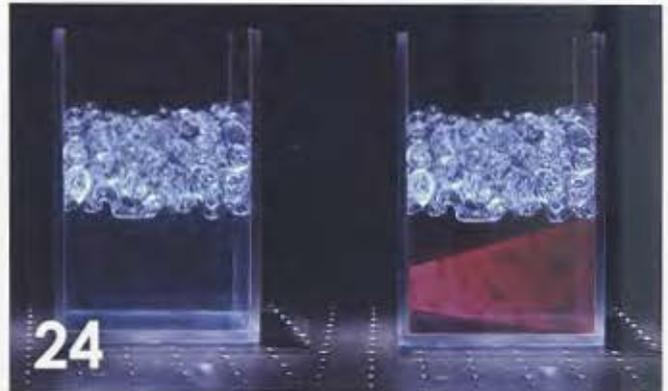
- 118 **JACK AND JILL: THE SEQUEL**  
As the extreme drought in California persists into another year, EARTH's regular commentator returns with some thoughts on the proposed solutions, and the wisdom of going "up the hill" to fetch your water. | [Fred Schwab](#)
- 119 **FIELD SKETCHES**  
An art exhibit prompted the author to reflect on fieldwork, his library of field notebooks and how geologists can integrate digital technology into field geology courses. | [Alan Fryar](#)

NEWS

- 16 **STUDIES RE-EXAMINE HOW MAJOR COPPER DEPOSITS FORM**
- 17 **HYDROGEN CHLORIDE ON THE RISE IN NORTHERN HEMISPHERE SKIES**



- 18 **AMATEUR RADIO USERS HELP SCIENTISTS STUDY SPACE WEATHER**
- 19 **SEDIMENT LOAD SHAPES RIVERS**
- 19 **INTRODUCING EARTH'S INNER INNER CORE**
- 20 **ONE WHALE'S INCREDIBLE JOURNEY DETAILS EAST AFRICA'S UPLIFT**
- 21 **GREAT DRYING LED TO GREAT DYING DOWN UNDER**
- 22 **SOIL MAY SUPPLY SURGING STREAMS AFTER EARTHQUAKES**
- 23 **BIGGER IS BETTER IN THE SEA**



- 24 **LASER EXPERIMENTS ILLUMINATE LANDSLIDE PHYSICS**
- 25 **DID CRUSTAL CHEMISTRY BUOY WESTERN PLAINS?**



- 26 **WIND WHIPS CANYONS INTO SHAPE**
- 26 **DEFORESTATION HANGS CLIMATE OUT TO DRY**
- 27 **RED PLANET ROUNDUP**

**FEATURES**

**Mine Power Options**

*With many mines located in remote places, providing reliable electric power can be a challenge. Here's a look at some of the stand-alone systems available, and at the potential for mines to plug in to renewable energy resources.* ..... 34

**Precise Planning is Paramount for IPCC Success**

*With advantages ranging from low opex and reduced environmental impact to higher overall safety, in-pit crushing and conveying can deliver on its promise—if all the right pieces are carefully put in place* ..... 42

**Repowering Success**

*Important tips for repowering diesel engines more cost efficiently and in compliance with changing regulations* ..... 48

**Making the Most of a Mill**

*Many variables must be taken into account when fine-tuning a grinding line, requiring systematic analysis to achieve outstanding results.* ..... 50

**Top Tips for Juniors Looking for Investors**

*In a struggling market it's more important than ever for juniors to stand out if they want to attract investors. A leading industry consultant group shares its expert advice for making a small project take off.* ..... 56

**AIMEX Links Mining and METS** ..... 58

**Special Report: Peru's Mining Industry**

*Battling commodity cycles and social issues* ..... 63

**LEADING DEVELOPMENTS**

Newmont to Acquire CC&V Mine From AngloGold Ashanti ..... 4

Zijin Extends Reach With Kamao and Porgera Purchases ..... 4

Mining Company Market Capitalizations Fell Again in 2014—Back to 2005 Mark ..... 5

Greenland Minerals Advances \$1.36B Kvanefjeld Project ..... 6

Diamond Miners Form Producers Association ..... 6

**AROUND THE WORLD**

**U.S. & Canada:** Feasibility Study Supports Integrated Pumpkin Hollow Project Development ..... 8

**Latin America:** Las Bambas Signs Transport Agreement for Copper Concentrates ..... 14

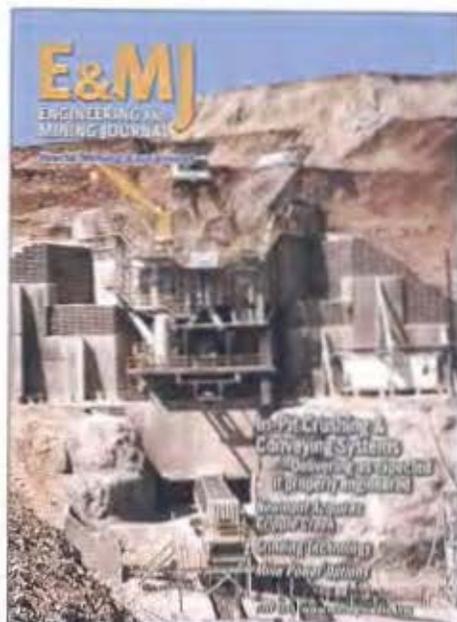
**Australia/Oceania:** Independence Group Acquiring Sirius and its Nova Nickel Project ..... 16

**Africa:** Canadian Company Expands Scope of South Africa's Platinum Resources ..... 18

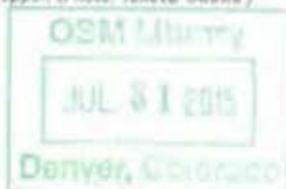
**Asia:** Upgrade Boosts Griffin's Caijiaying Plant Throughput to 1.5M Tons ..... 20

**Europe:** Eldorado Advancing Greek and Romanian Gold Projects ..... 22

**Exploration Roundup:** Oban Mining Leads Consolidation of Five Canadian Junior Companies ..... 24



Careful planning, taking into account everything from pit shell optimization to selection of the right type of crusher, is necessary to extract the maximum benefit from in-pit crushing and conveying operations. Shown here is an in-pit crusher installation at the Buenavista del Cobre copper mine (formerly Mexicana de Cananea) in Sonora, Mexico, operated by Southern Copper. (Photo: Tenova TAKRAF)



**DEPARTMENTS**

Calendar ..... 30

Classified Advertisements ..... 102

Equipment Gallery ..... 96

From the Editor ..... 2

Hall of Fame ..... 26

Markets ..... 104

Operating Strategies ..... 88

People ..... 12

Processing Solutions ..... 94

Suppliers Report ..... 90

This Month in Coal ..... 28

## SPECIAL REPORT

## THE TOP 100 PROFESSIONAL SERVICES FIRMS

**37** CM firms are struggling to convince owners that project and program management services are not an unnecessary expense but a vital service that will pay off during and after the construction process. However, owners are more than willing to hire CM firms to augment their staffs during peak periods.

Cover photo courtesy of Florida Dept. of Transportation; (right) courtesy of Carlsbad Desalination.



**PASS THE SALT** Harris & Associates is PM/CM for Carlsbad, Calif., on the massive Carlsbad Seawater Desalination project.



Florida roadwork uses new rating tool. Page 10

## NEWS

## Infrastructure

- 10 Sustainability:** Envision infrastructure tool digs in
- 14 Infrastructure:** Low & Slow visits boomtowns from Reno to San Francisco
- 15 Transportation:** Parsons Brinckerhoff on board for \$700-million HSR pact
- 16 Nuclear Technology:** Construction delays put focus on Vogtle project's economics
- 18 Transportation:** Final pontoons nearly in place for floating bridge in Seattle

## Business Management

- 15 Project Management:** Apple switching contractor at site of new headquarters
- 17 Infrastructure:** World Bank says Brazil tops project spending
- 21 Safety:** Guardrail manufacturer hit with \$663-million judgment

## Buildings

- 20 Green Buildings:** Sustainable landscape rating program has a new owner

## Equipment

- 20 Equipment:** Caterpillar and Terex rally behind Silk Road

## People

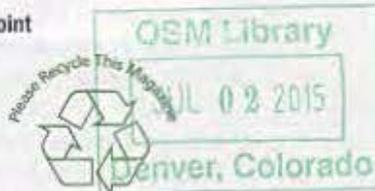
- 21 Policy:** New York City Dept. of Buildings sees new permit high

## UPCOMING ISSUES

- June 29 Top 500 Design Firm Sourcebook
- July 6 Q2 Cost Report
- July 13 Web News and Updates
- July 20 Focus on Risk Management

## DEPARTMENTS

- 4** Calendar
- 6** Washington Observer
- 9** Construction Week
- 42** Equipment Tracks & Trends
- 62** Information Technology
- 63** Construction Economics
- 65** Products
- 66** Pulse
- 72** 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

Engineering News-Record (ENR (Engineering News-Record), (ISSN 0891-9526) Published weekly 3 issues a month; 36 weeks a year by Dodge Data & Analytics, Two Penn Plaza, 10th Floor, New York, N.Y. 10121-2298. Executive, editorial, circulation, advertising offices: Two Penn Plaza, New York, N.Y. 10121-2298. Phone (212) 904-4776. 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 Dodge Data & Analytics. GST #R123075673. Email: enrsubscriptions@mcgraw-hill.com. Copyright, printing and reprinting: Titles Engineering News-Record (ENR) and CONSTRUCTION WEEK reg. ® in U.S. Patent Office. Copyright © 2015 by Dodge Data & Analytics. All rights reserved. Officers of Dodge Data & Analytics: Mike Petrucci, Chief Executive Officer; Desmond Douglas, Chief Financial Officer; Hing Foo Lee, Vice President, Finance Operations. 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 0891-9526/90. Copying for other than personal or internal reference use without express permission of Dodge Data & Analytics 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, \$87 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 90 days. Please allow a month for change of address to take effect. Classified advertising: Send ads to ENR, Classified Advertising, Two Penn Plaza, 10th Floor, New York, NY 10121. Phone (212) 904-2021.

## COVER STORY

## Bus-and-Rail Hub Bulks Up

**40** San Francisco's \$4.5-billion Transbay Transit Center, built to be a safe haven after a major quake, will rely on an exoskeleton with more than 300 seismic nodes.

Cover photo by Jim Wiscombe; photo right courtesy of Transbay Joint Powers Authority



## NEWS

## Business Management

- 10 Safety:** Source alleges cut sling caused crane drop
- 16 Workforce:** "Local hire" rule on Alaska projects to ease joblessness
- 19 Mergers and Acquisitions:** Willbros sells Louisiana and Oklahoma assets

## Infrastructure

- 12 Environment:** Human activity depleting global groundwater sources
- 18 Disaster Preparedness:** Vogtle latest nuclear plant to install FLEX Dome
- 21 Water Quality:** More groundwater coal ash seeps near Duke Energy plant
- 22 Alternative Energy:** Hawaii takes steps to reach 100% renewables by 2045
- 23 Transportation:** Texas road award stirs ire

## Policy

- 12 Oversight:** Lawmakers shut advise board
- 17 Pensions:** Multiemployer plan regulations issued

## Equipment

- 15 Equipment:** EPA floats new fuel-efficiency rules for heavy-duty trucks

## SOURCEBOOK

## General Building

- 48** Acquisitions yield huge gains for design firms

## Transportation

- 50** Tight budgets force firms to be versatile

## Power

- 52** Gas and renewable projects boost sector

## Petroleum

- 54** Sector strong despite volatile oil prices

## Environment

- 56** Drought in western U.S. pushing new projects

## Manufacturing

- 58** A healthy market spurs investment in plants

## Overview

- 61** Industry consolidation shakes up market

## UPCOMING ISSUES

July 6 Q2 Cost Report

July 13 Web News and Updates

July 20 Focus on Risk Management

July 27 Top International Design Firms

## DEPARTMENTS

- 4** Update
- 6** Construction Week
- 9** Washington Observer
- 24** Equipment Tracks & Trends
- 28** People
- 78** Information Technology
- 79** Construction Economics
- 107** Products
- 108** Pulse
- 112** 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

Engineering News-Record

**DODGE**  
DATA & ANALYTICS

ENR (Engineering News-Record), (ISSN 0891-9526). Published weekly 3 issues a month; 36 weeks a year by Dodge Data & Analytics, Two Penn Plaza, 10th Floor, New York, N.Y. 10121-2298. Executive, editorial, circulation, advertising offices: Two Penn Plaza, New York, N.Y. 10121-2298. Phone (212) 904-4778. 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 Dodge Data & Analytics. GST #R123075673. Email: enrsubscriptions@fulfillment.com. Copyright, printing and reprinting: Titles Engineering News-Record (ENR) and CONSTRUCTION WEEK reg. ® in U.S. Patent Office. Copyright © 2015 by Dodge Data & Analytics. All rights reserved. Officers of Dodge Data & Analytics: Mike Petrillo, Chief Executive Officer; Desmond Douglas, Chief Financial Officer; Hong Foo Lee, Vice President, Finance Operations. Where necessary, permission is granted by copyright owner for those registered with Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, Mass. 01923,

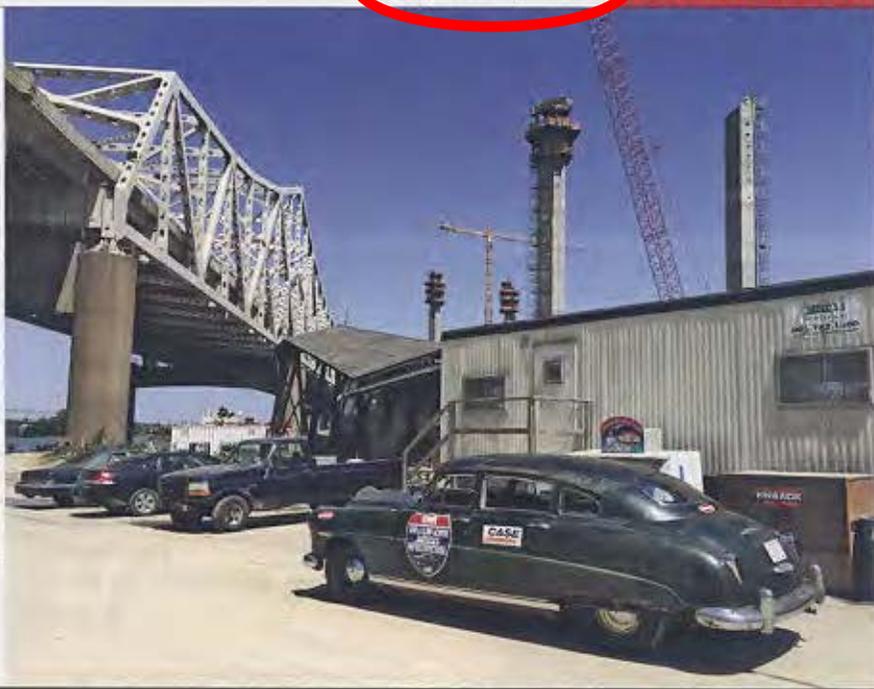
www.copyright.com, to photocopy any article herein for personal or internal reference use only for the flat fee of \$1.20 per copy for each article. Send payment to CCC, ISSN 0891-9526/92. Copying for other than personal or internal reference use without express permission of Dodge Data & Analytics is 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, \$87 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, 10th Floor, New York, NY 10121. Phone (212) 904-2021.

## COVER STORY

## Dynamic Duo

**30** The \$2.6-billion Ohio River Bridges project, the first west-bound stop on ENR's Low & Slow Across America's Infrastructure tour, features vital links built by P3 and design-build.

Cover photo by Tudor Van Hampton/ENR; (right) courtesy of Dan McNichol



## COST REPORT

## Second-Quarter Overview

- 16 Confidence Survey:** Market remains strong, but execs see it begin to soften
- 18 Compensation:** Worker gaps are costing contractors more, survey says.
- 19 Equipment:** Top-down demolition method removes need for scaffolding
- 20 Materials:** A cure for the common crack
- 22 Energy:** Renewables led cost decline
- 23 Economics:** Oil prices and soft world markets keep materials costs in check

## NEWS

## Buildings

- 6 Residential Buildings:** Tower twists prove tough to resist

## UPCOMING ISSUES

July 13	Web News and Updates
July 20	Focus on Risk Management
July 27	Top International Design Firms
Aug. 3	Web News and Updates

## Infrastructure

- 8 Transportation:** More defects found in San Francisco-Oakland Bay Bridge
- 9 Transit:** Maryland Gov. Hogan okays one \$2-billion rail line but nixes another
- 11 Legislation:** Revenue hunt to fund Senate highway bill fully proceeds
- 12 Foundation Design:** LeedCo hopes mono bucket breaks ice on Lake Erie

## Business Management

- 9 Industrial Redevelopment:** New life looms for shuttered steelmaking complex
- 10 Workforce:** Naval Facilities Engineering Command pushes to fill 3,000 slots
- 13 Data Centers:** TVA coal-plant site is picked for \$600-million Google project

## Equipment

- 10 Materials:** As cement producers merge, regulators remain wary
- 14 Equipment:** 3M buys Capital Safety for \$2.5 billion

## DEPARTMENTS

- 2 Letters**
- 4 Washington Observer**
- 5 Construction Week**
- 14 People:** Harvard U. engineering school gets new dean and a \$400-million gift
- 15 Information Technology**
- 25 Construction Economics**
- 27 Products/Manufacturers' Information**
- 28 Pulse**
- 56 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

Engineering News-Record

**DODGE**  
DATA & ANALYTICS

ENR (Engineering News-Record), (ISSN 0891-9526). Published weekly 3 issues a month; 36 weeks a year by Dodge Data & Analytics, Two Penn Plaza, 10th Floor, New York, N.Y. 10121-2298. Executive, editorial, circulation, advertising offices: Two Penn Plaza, New York, N.Y. 10121-2298. Phone (212) 904-4776. 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 Dodge Data & Analytics. GST #R123075673. Email: enrsubs@cdsfulfillment.com. Copyright, printing and reprinting: Titles Engineering News-Record (ENR) and CONSTRUCTION WEEK reg. ® in U.S. Patent Office. Copyright © 2015 by Dodge Data & Analytics. All rights reserved. Officers of Dodge Data & Analytics: Mike Petrillo, Chief Executive Officer; Desmond Douglas, Chief Financial Officer; Hing Foo Lee, Vice President, Finance Operations. 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 Dodge Data & Analytics 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, \$87 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, 10th Floor, New York, NY 10121. Phone (212) 904-2021

## COVER STORY

## Danger Zone: ENR Risk Survey

**18** Better times have brought more risk-shifting, and designers and contractors, responding to an ENR survey, say they avoid unlimited liability in damage clauses.

Cover photo by iStock; photo right by Jay Senter.



States affected by BP disaster expect cash. Page 8

## NEWS

## Infrastructure

- 8 Environment:** BP settlement will speed up projects
- 10 Water Resources:** Key Everglades project to begin this summer
- 12 Transportation Funding:** No new DOT expansion projects expected in Missouri
- 14 Landscape Design:** In London, bridge backed by mayor and movie star draws fire
- 15 Water Projects:** Push back about Pumpback scheme to move water to Denver

## Business Management

- 12 Ethics:** Canada refines 'integrity rules' for federal contractors after backlash
- 13 Associations:** Financial managers see the rewards of giving and getting back
- 16 Companies:** Industry giants Jacobs and Cardno gain outsiders as new CEOs

## Equipment

- 13 Equipment:** Brazil construction machinery sales face steep drop in 2015

## DEPARTMENTS

- 2 Update**
- 4 Construction Week**
- 6 Washington Observer**
- 17 People:** Gilbane elevates McKelvy to DEO
- 34 Equipment Tracks & Trends**
- 36 Construction Economics**
- 38 Information Technology**

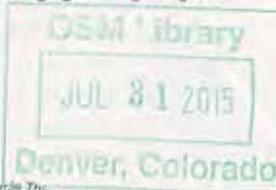
## UPCOMING ISSUES

- July 27** Web News and Updates
- Aug. 3** Top International Design Firms
- Aug. 10** Green Sourcebook
- Aug. 17** Web News and Updates



New mortar helps restore aging buildings. Page 38

- 39 Products**
- 41 Pulse**
- 44 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

Engineering News-Record  
**bnp media**  
ENR ENGINEERING NEWS-RECORD (ISSN: Print 0891-9526) is published weekly, 3 issues a month, 36 weeks a year, by BNP Media II, LLC, 2401 W. Big Beaver Rd., Suite 700, Troy, MI 48064-3333. Telephone: (248) 362-3700, Fax: (248) 362-0317. Annual rate for subscriptions to individuals in the U.S.A.: \$67.00 USD. (Single copy sales \$9.95 in U.S.) Annual rate for subscriptions to individuals in Canada and Mexico, \$89.00 per year (includes GST & postage); outside North America: \$195.00 per year payable in U.S. funds. Printed in the U.S.A. Copyright 2015, by BNP Media. All rights reserved. The contents of this publication may not be reproduced in whole or

in part without the consent of the publisher. The publisher is not responsible for product claims and representations. Periodicals Postage Paid at Troy, MI and at additional mailing offices. **POSTMASTER:** Send address changes to: ENGINEERING NEWS-RECORD, P.O. Box 5729, Harten, IA 51593. **Canada Post:** Publications Mail Agreement #40015472. GST account: 131263923. Send returns (Canada) to ASENDIA, Local Return Address P.O. Box 1051, Fort Erie, ON L2A 6C7. **Change of address:** Send old address label along with new address to ENGINEERING NEWS-RECORD, P.O. Box 5729, Harten, IA 51593. **For single copies or back issues:** contact Ann Kalb at (248) 244-6499 or KalbR@bnpmedia.com.



THE  
GEOLOGICAL  
SOCIETY  
OF AMERICA®

# BULLETIN

VOL. 127 • NO. 7/8 P. 897-1152

JULY/AUGUST 2015

The Geological Society of America Bulletin is a leading international journal for major scholarly research in all branches of the earth sciences. Published continuously since 1890.

## T A B L E O F C O N T E N T S

### T E C T O N I C S

- 899 **Late Oligocene–early Miocene landscape evolution of the Lake Mead region during the transition from Sevier contraction to Basin and Range extension**  
Melissa Lamb, L. Sue Beard, Thomas Hickson, Paul Umhoefer, Nelia Dunbar, Jillian Schleicher, and William McIntosh
- 926 **Detrital zircon geochronology of Neoproterozoic–Lower Cambrian passive-margin strata of the White-Inyo Range, east-central California: Implications for the Mojave–Snow Lake fault hypothesis**  
Alan D. Chapman, W.G. Ernst, Eric Gottlieb, Vladislav Powerman, and Ellen P. Metzger
- 945 **Detrital zircon record of Neogene exhumation of the central Alaska Range: A far-field upper plate response to flat-slab subduction**  
Patrick R.K. Brennan and Kenneth D. Ridgway
- 1052 **Provenance of the Early Permian Nambucca block (eastern Australia) and implications for the role of trench retreat in accretionary orogens**  
Uri Shaanan, Gideon Rosenbaum, and Richard Wormald
- 1108 **Along-strike variation in crustal shortening and kinematic evolution of the base of a retroarc fold-and-thrust belt: Magallanes, Chile 53°S–54°S**  
Paul Betka, Keith Klepeis, and Sharon Mosher

### G E O C H R O N O L O G Y

- 962 **Magnetostratigraphy, biostratigraphy, and chemostratigraphy of the Pignola-Abriola section: New constraints for the Norian–Rhaetian boundary**  
Matteo Maron, Manuel Rigo, Angela Bertinelli, Miriam E. Katz, Linda Godfrey, Mariachiara Zaffani, and Giovanni Muttoni

### P A L E O C L I M A T O L O G Y

- 975 **A new paleoprecipitation proxy based on soil magnetic properties: Implications for expanding paleoclimate reconstructions**  
Ethan G. Hyland, Nathan D. Sheldon, Rob Van der Voo, Catherine Badgley, and Alexandra Abrajewitch

### S E D I M E N T A R Y G E O L O G Y

- 982 **Syndepositional forced folding and related fluid plumbing above a magmatic laccolith: Insights from outcrop (Lower Cretaceous, Basque-Cantabrian Basin, western Pyrenees)**  
Luis M. Agirrezabala

- 1001 **Late Cretaceous evolution of the Coqen Basin (Lhasa terrane) and implications for early topographic growth on the Tibetan Plateau**  
Gaoyuan Sun, Xiumian Hu, Hugh D. Sinclair, Marcelle K. BouDagher-Fadel, and Jiangang Wang

### H Y D R O G E O L O G Y

- 1021 **Characterization and quantification of aquifer heterogeneity using outcrop analogs at the Canadian Forces Base Borden, Ontario, Canada**  
G.S. Weissmann, A. Pickel, K.C. McNamara, J.D. Frechette, I. Kalinovich, R.M. Allen-King, and I. Jankovic

### G E O C H E M I S T R Y

- 1036 **Clumped isotope thermometry in deeply buried sedimentary carbonates: The effects of bond reordering and recrystallization**  
Brock J. Shenton, Ethan L. Grossman, Benjamin H. Passey, Gregory A. Henkes, Thomas P. Becker, Juan Carlos Laya, Alberto Perez-Huerta, Stephen P. Becker, and Michael Lawson

### P L A N E T A R Y G E O L O G Y

- 1064 **Equatorial layered deposits in Arabia Terra, Mars: Facies and process variability**  
Monica Pandrelli, Angelo Pio Rossi, Laetitia Le Deit, Frank Fueten, Stephan van Gessel, Mihaela Glamoclija, Barbara Cavalozzi, Ernst Hauber, Fulvio Fronchi, and Riccardo Pozzobon

### P R E C A M B R I A N G E O L O G Y

- 1090 **Sedimentology and geochemistry of Archean silica granules**  
Elizabeth J.T. Stefurak, Donald R. Lowe, Danielle Zentner, and Woodward W. Fischer

### E C O N O M I C G E O L O G Y

- 1135 **Evaluating rare earth element (REE) mineralization mechanisms in Proterozoic gneiss, Music Valley, California**  
S. Tyson McKinney, John M. Cottle, and Graham W. Lederer



# Information Security Journal: A Global Perspective

Volume 24 ■ Issues 1-3 ■ 2015

## Contents

### Articles

- Digital Document Signing: Vulnerabilities and Solutions 1  
*Gianluca Lax, Francesco Buccafurri, and Gianluca Caminiti*
- A Qualitative Analysis for Evaluating a Cyber Terrorism Framework in Malaysia 15  
*Zahri Yunus, Rabiah Ahmad, and Nor Amalina Mohd Sabri*
- Towards Better AAA in Identity Federations 24  
*Paul Rabinovich*
- Cyber Capabilities and Intent of Terrorist Forces 31  
*Christopher Cox*
- Locking Out the Investigator: The Need to Circumvent Security in Embedded Systems 39  
*Huw Read, Iain Sutherland, Konstantinos Xynos, and Frode Roarson*
- Precemptive Security Through Information Analytics 48  
*Gregory Early and William Stott III*
- Impact Metrics of Security Vulnerabilities: Analysis and Weighing 57  
*Georgios Spanos and Lefteris Angelis*
- Improving Cyber Security Awareness and Training Programs with Data Analytics 73  
*Karina Korpela*



*(Abstracted/Indexed in: Chemical Abstracts; Current Contents Physical, Chemical and Earth Sciences; Geo Abstracts; PASCAL/CNRS; PROMIS; and the Science Citation Index. Also covered in the abstract and citation database Scopus®. Full text available on ScienceDirect®)*

Geology of Barcode type coking coal seams, Mecondezi sub-basin, Moatize Coalfield, Mozambique G. Lakshminarayana	1
Impact of geological modeling processes on spatial coalbed methane resource estimation F. Zhou, G. Yao and S. Tyson	14
Enhanced microbial coalbed methane generation: A review of research, commercial activity, and remaining challenges D. Ritter, D. Vinson, E. Barnhart, D.M. Akob, M.W. Fields, A.B. Cunningham, W. Orem and J.C. McIntosh	28
The representative sample size in shale oil rocks and nano-scale characterization of transport properties S. Saraji and M. Piri	42
Charcoalified logs as evidence of hypautochthonous/autochthonous wildfire events in a peat-forming environment from the Permian of southern Paraná Basin (Brazil) I. Degani-Schmidt, M. Guerra-Sommer, J.d.O. Mendonça, J.G. Mendonça Filho, A. Jasper, M. Cazzulo-Klepzig and R. Iannuzzi	55
A preliminary study on the characterization and controlling factors of porosity and pore structure of the Permian shales in Lower Yangtze region, Eastern China L. Pan, X. Xiao, H. Tian, Q. Zhou, J. Chen, T. Li and Q. Wei	68
A comprehensive model to history match and predict gas/water production from coal seams A.F. Ibrahim and H.A. Nasr-El-Din	79
A metaproteomic approach for identifying proteins in anaerobic bioreactors converting coal to methane J. Zhang, Y. Liang, P.M. Yau, R. Pandey and S. Harpalani	91
Investigations on the methane sorption capacity of marine shales from Sichuan Basin, China F. Yang, Z. Ning, R. Zhang, H. Zhao and B.M. Krooss	104
Organic geochemistry of crude oils and Cretaceous source rocks in the Iranian sector of the Persian Gulf; An oil–oil and oil–source rock correlation study Z.S. Mashhadi and A.R. Rabbani	118
Characterizing microbial communities dedicated for conversion of coal to methane in situ and ex situ J. Zhang, Y. Liang, R. Pandey and S. Harpalani	145
Organic Geochemistry of Ağaçaşu Yayla Peat Deposits, Köprübaşı/Trabzon, NE Turkey F. Hoş-Çebi and S. Korkmaz	155
Intact microbial fossils in the Permian Lucaogou Formation oil shale, Junggar Basin, NW China X. Xie, T. Borjigin, Q. Zhang, Z. Zhang, J. Qin, L. Bian and J.K. Volkman	166
Shear stress in the graphitization of carbonaceous matter during the low-grade metamorphism from the northern Parang Mountains (South Carpathians) — Implications to graphite geothermometry S.C. Barzoi	179
An analytical model for shale gas permeability M. Kazemi and A. Takbiri-Borujeni	188





FEATURES

6

28

36



479 Charges, 13 Decks... 120 Meters Above a Crushing Plant

This case study shows how a unique combination of field measurements and advanced technologies allowed blasters to design, load and fire an incredibly challenging quarry blast.



Determining and Mitigating the Effects of Firing a Linear Shaped Charge Underwater

This study was conducted to better understand the behavior of linear shaped charges underwater. The hypothesis that filling the standoff volume between the linear shaped charge and the target with waterproof foam would negate the detrimental effects of an underwater environment is tested.



Photo Contest

Gator Demolition – Union Pacific Head House Demolition – Kansas City, Missouri.

**On the Cover:** Union Pacific Railroad needed to get rid of a 100-year-old structure at their rail yard in Kansas City, Missouri. Dykon Blasting Corp. completed the job. See felling photos on page 36.



DEPARTMENTS

4

16

20

22

26

From the Executive Director

Chapter News  
News from the Eastern PA Chapter 20th Anniversary Celebration, the Best in the West Drill and Blast Conference, and the Kentucky Blasting Conference.

Calendar of Events  
A list of upcoming events in the explosives industry.

Explosives, 100 Years Ago, More or Less  
Blasting stumps.

Industry News

Copyright ©2015 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

### A SECTION

#### FEATURES

- 77A **Slurry trenches and relief wells installed to strengthen Ohio and Mississippi river levee systems**  
Kenneth R. Olson and Lois Wright Morton
- 82A **A system approach to conservation agriculture**  
Rattan Lal
- 89A **Irrigation with treated municipal wastewater in Indiana, United States**  
Anne Dare

#### VIEWPOINT

- 95A **The need for more uniform terms and measures of nitrogen use efficiency in agricultural production**  
J. Mark Powell

### A SECTION Call for Papers

Are you working on cutting edge research in soil and water conservation? Does your work involve new tools, technologies, or materials that others should be aware of? Have you observed or been a part of conservation practices that are worth sharing with the journal audience?

If you answered "Yes" to any of these questions, you are invited to submit your article ideas for the A Section of the *Journal of Soil and Water Conservation*.

Your work could be published in one of the A Section topic areas: Conservation in Practice, Viewpoint, Ideas & Innovations, Conservation in Action, In the News, Feature, etc.

To submit your article ideas or for more information, contact editor Annie Binder at [annie.binder@swcs.org](mailto:annie.binder@swcs.org)



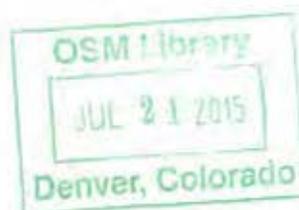
**On the Cover**  
Storm Clouds Saskatchewan  
Canola field yellow color.  
Photo by Pictureguy.



Printed on 100% post-consumer  
waste recycled paper with  
vegetable-based inks.

## RESEARCH SECTION

- 209 **AgBufferBuilder: A geographic information system (GIS) tool for precision design and performance assessment of filter strips**  
M.G. Dosskey, S. Neelakantan, T.G. Mueller, T. Kellerman, M.J. Helmers, and E. Rienzi
- 218 **Determinants of adoption of drought adaptations among vegetable growers in Florida**  
E.A. van Dijk, K.A. Grogan, and T. Borisova
- 232 **Conservation effects on soil quality indicators in the Missouri Salt River Basin**  
K.S. Veum, R.J. Kremer, K.A. Sudduth, N.R. Kitchen, R.N. Lerch, C. Baffaut, D.E. Stott, D.L. Karlen, and E.J. Sadler
- 247 **Using hedgerow biodiversity to enhance the carbon storage of farmland in the Fraser River delta of British Columbia**  
B. Thiel, S.M. Smukler, M. Krzic, S. Gergel, and C. Terpsma
- 257 **Land use and land cover in critical source areas on small dairy farms in the eastern United States**  
N.R. Jordan, K.M. Clower, S.M. Manson, D.B. Bonsal, and J.L. Immich
- 267 **Ammonia and nitrous oxide gas loss with subsurface drainage and polymer-coated urea fertilizer in a poorly drained soil**  
P. Nash, P. Motavalli, K. Nelson, and R. Kremer



**Vol. 70, no. 4 (July/August 2015)**  
**Page 2 of 2**

**JOURNAL OF SOIL AND WATER  
CONSERVATION**  
**o n l i n e**

The *Journal of Soil and Water Conservation* is online.

### AUTHORS

Please submit manuscripts using the online  
manuscript review system.

### MORE INFORMATION

Go to [www.jswconline.org](http://www.jswconline.org)

### TABLE OF CONTENTS

#### EDITOR'S MESSAGE

- 693 Bibliographic Databases: Is *The Journal of Wildlife Management* Being Found?  
*Evelyn Merrill*

#### COMMENTARY

- 695 The Influence of Harvest Timing on Greater Sage-Grouse Survival: A Cautionary Perspective  
*Erik J. Blomberg*

#### MULTIMODEL INFERENCE SPECIAL SECTION

- 704 History of Multimodel Inference via Model Selection in Wildlife Science  
*Mark S. Lindberg, Joshua H. Schmidt, and Johann Walker*
- 708 MMI: Multimodel Inference or Models With Management Implications?  
*John Fleberg and Douglas H. Johnson*
- 719 Iterating on a Single Model is a Viable Alternative to Multimodel Inference  
*Jay M. Ver Hoef and Peter L. Boveng*
- 730 Truth, Models, Model Sets, AIC, and Multimodel Inference: A Bayesian Perspective  
*Richard J. Barker and William A. Link*

#### RESEARCH ARTICLES

##### POPULATION ECOLOGY

- 739 Estimating the Phenology of Elk Brucellosis Transmission with Hierarchical Models of Cause-Specific and Baseline Hazards  
*Paul C. Cross, Eric J. Maichak, Jared D. Rogerson, Kathryn M. Irvine, Jennifer D. Jones, Dennis M. Heisey, William H. Edwards, and Brandon M. Scurlock*
- 749 Some Mechanisms Underlying Variation in Vital Rates of Grizzly Bears on a Multiple Use Landscape  
*Bruce N. McLellan*

##### HABITAT RELATIONS

- 766 Prescribed Fire and Timber Harvest Effects on Terrestrial Salamander Abundance, Detectability, and Microhabitat Use  
*Katherine M. O'Donnell, Frank R. Thompson III, and Raymond D. Semlitsch*
- 776 Estimating the Residual Value of Alternate Bald Eagle Nests: Implications for Nest Protection Standards  
*Bryan D. Watts*
- 785 Nest-Site Selection and Reproductive Success of Greater Sage-Grouse in a Fire-Affected Habitat of Northwestern Nevada  
*Zachary B. Lockyer, Peter S. Coates, Michael L. Casazza, Shawn Espinosa, and Shawn Espinosa*

##### HUMAN DIMENSIONS

- 798 Understanding People's Willingness to Implement Measures to Manage Human-Bear Conflict in Florida  
*Elizabeth F. Pienaar, David Telesco, and Sarah Barrett*

##### MANAGEMENT AND CONSERVATION

- 807 Rapid Growth and Genetic Diversity Retention in an Isolated Reintroduced Black Bear Population in the Central Appalachians  
*Sean M. Murphy, John J. Cox, Joseph D. Clark, Ben C. Augustine, John T. Hast, Dan Gibbs, Michael Strunk, and Steven Doherty*
- 819 A Tale of Two Markers: Population Genetics of Colorado Rocky Mountain Bighorn Sheep Estimated From Microsatellite and Mitochondrial Data  
*Catherine C. Driscoll, James G. Driscoll, Corey Hazekamp, Jeffrey B. Mitton, and John D. Wehausen*
- 832 Supplementary Winter Food for Gamebirds Through Feeders: Which Species Actually Benefit?  
*Carlos Sánchez-García, Francis D. Buner, and Nicholas J. Aebischer*

##### QUANTITATIVE APPROACHES

- 846 Melanistic Leopards Reveal Their Spots: Infrared Camera Traps Provide a Population Density Estimate of Leopards in Malaysia  
*Laurie Heiges, Wai Yee Lam, Ahimsa Campos-Arceiz, D. Mark Rayan, William F. Laurance, Chris J. Latham, Salman Saabari, and Gopalasamy Reuben Clements*

##### NOTE

- 854 General Versus Specific Surveys: Estimating the Suitability of Different Road-Crossing Structures for Small Mammals  
*Marcello D'Amico, Anthony P. Clevenger, Jacinto Román, and Eloy Revilla*

##### BOOK REVIEWS

- 861 Wildlife Trafficking: A Deconstruction of the Crime, the Victims, and the Offenders  
*Aaron Haines*
- 863 Fish and Wildlife Management: A Handbook for Mississippi Landowners  
*Phillip Jones*

##### ERRATA

- 865 Erratum
- 868 Erratum





## Feature Articles

- 23** **Sierra Gorda: Chile's new copper-molybdenum operation**  
T. Comi, C. Garcia, A. Potulska and J.J. Opazo

## 2014 Industrial Minerals review

- |    |                            |     |                       |
|----|----------------------------|-----|-----------------------|
| 31 | Ball Clay                  | 64  | Kaolin                |
| 32 | Barite                     | 66  | Lime                  |
| 35 | Bauxite and Alumina        | 67  | Lithium               |
| 36 | Bentonite                  | 68  | Magnesia              |
| 37 | Bismuth and Antimony       | 69  | Mica                  |
| 38 | Boron                      | 72  | Nitrogen              |
| 39 | Bromine                    | 73  | Peat                  |
| 40 | Cement                     | 74  | Perlite               |
| 42 | Chromium                   | 75  | Perlite               |
| 44 | Common Clay                | 76  | Phosphate Rock        |
| 45 | Diatomite                  | 80  | Potash                |
| 47 | Dimension Stone            | 81  | Pumice and Pumicite   |
| 47 | Fire Clay                  | 82  | Salt                  |
| 48 | Fluorspar                  | 83  | Sillimanite           |
| 50 | Fuller's Earth             | 86  | Soda Ash              |
| 52 | Gemstones                  | 87  | Strontium             |
| 53 | Graphite                   | 88  | Sulfur                |
| 54 | Ground Calcium Carbonate   | 90  | Talc and Pyrophyllite |
| 55 | Gypsum                     | 92  | Titanium              |
| 56 | Industrial Diamond         | 95  | Vermiculite           |
| 58 | Industrial Garnet          | 96  | Wollastonite          |
| 59 | Industrial Sand and Gravel | 99  | Zeolites              |
| 60 | Iodine                     | 102 | Zirconium             |



## Technical Papers (peer-reviewed and approved)

- 105** **Room-and-pillar panel design method to avoid subsidence**  
Y. Luo
- 111** **Effect of ground control mesh on dust sampling and explosion mitigation**  
D.W. Alexander and L.L. Chasko

Copyright 2015 by the Society for Mining, Metallurgy and Exploration, Inc. All rights reserved.  
MINING ENGINEERING (ISSN 0026-8167) is published monthly by the Society for Mining, Metallurgy, and Exploration, Inc., at 12999 E. Adam Aircraft Circle, Englewood, CO, 80112 USA. Phone 1-800-763-3132 or 1-303-946-4200; Fax: 1-303-973-3845 or email: sme@minnet.org; Website: www.smenet.org  
Periodicals postage paid at Englewood, CO USA 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 USA.  
Printed by Cummings Printing Co.